Banking Crises Without Panics*

Matthew Baron, Emil Verner, and Wei Xiong**

March 2020

Abstract

We examine historical banking crises through the lens of bank equity declines, which cover a broad sample of episodes of banking distress both with and without banking panics. To do this, we construct a new dataset on bank equity returns and narrative information on banking panics for 46 countries over the period 1870-2016. We find that even in the absence of panics, large bank equity declines are associated with substantial credit contractions and output gaps. While panics can be an important amplification mechanism, our results indicate that panics are not necessary for banking crises to have severe economic consequences. Furthermore, panics tend to be preceded by large bank equity declines, suggesting that panics are the result, rather than the cause, of earlier bank losses. We also use bank equity returns to uncover a number of forgotten historical banking crises and to create a banking crisis chronology that distinguishes between bank equity losses and panics.

* The authors would like to thank Daniel Dieckelmann, Md Azharul Islam, and Jamil Rahman for their extraordinary research assistance. Isha Agarwal, Isaac Green, William Shao, Sylvia Lu, Felipe Silva, Bryan Tam, Yevhenii Usenko, and the librarians at the Harvard Business School Historical Collections also provided valuable assistance. The authors would also like to thank Jason Donaldson, Sam Hanson, Mikael Juselius, Arvind Krishnamurthy, Randy Kroszner, Solomos Solomou, Moritz Schularick, Andrei Shleifer, Eugene White, and seminar participants at the Bank for International Settlements, Boston Fed, Boston University, Cambridge University, Columbia University, Cornell University, Danmarks Nationalbank, EDHEC, Erasmus University Rotterdam, Federal Reserve Board, Georgetown University, Harvard University, Imperial College London, London Business School, MIT, OCC, Oxford University, Richmond Fed, Rutgers University, University of Bonn, University of British Columbia, University of Maryland, University of Rochester, University of Toronto, Yale University, Chicago Booth financial crises conference, fall 2018 NBER Corporate Finance meeting, Becker-Friedman Institute junior finance/macro conference, 2018 AEA meeting, 2019 AFA meeting, Kentucky Finance Conference, Columbia SIPA / BPI financial regulation conference, and the New York Fed/NYU Conference of Financial Intermediation for their comments and feedback. We thank Mika Vaihekoski and Frans Buelens for sharing data. A previous version of this paper was circulated with the title "Salient Crises, Quiet Crises."

** Contact information: Matthew Baron, Johnson Graduate School of Management, Cornell University, baron@cornell.edu; Emil Verner, MIT Sloan, everner@mit.edu; Wei Xiong, Princeton University and NBER, wxiong@princeton.edu.

The severe economic distress faced by the world economy following the 2008 financial crisis has renewed interest in understanding the causes and consequences of banking crises. Academics and policy makers often emphasize panics among bank creditors as a key driver of banking crises. For example, Friedman and Schwartz (1963) argue that depositor panics played a central role in the severity of the Great Depression, and Bernanke (2018) attributes the unusual severity of the Great Recession primarily to the panics in funding and securitization markets after the collapse of Lehman Brothers. As highlighted by the classic theory of Diamond and Dybvig (1983), using short-term debt to finance long-term illiquid investments exposes even solvent banks to self-fulfilling panics. As a reflection of the influence of the panic-based view of banking crises, some have gone as far as essentially defining banking crises as banking panics (Schwartz 1987, Gorton 2014).

However, there remains a debate about whether panics are so essential to banking crises. Another strand of research on banking crises argues that policy makers should be concerned primarily by bank capital crunches driven by asset losses, rather than panics per se (e.g., Calomiris and Mason 2003, Greenlaw et al. 2008, Admati and Hellwig 2014). This alternative view is motivated by an extensive literature that emphasizes bank equity as a key state variable that determines banks' capacity to intermediate funds from savers to firms and households, e.g., Holmstrom and Tirole (1997) and Gertler and Kiyotaki (2010). As large declines in bank equity tend to impair banks' intermediation capacity, an important question is whether large bank losses even without panics can also translate into severe recessions. If so, large bank equity losses should be viewed as the central feature of banking crises.

We address this debate by asking—are panics necessary for banking crises to have severe economic consequences? Our conceptual definition of a banking crisis is an episode in which the banking sector's ability to intermediate funds is severely impaired. By panics, we mean episodes of severe and sudden withdrawals of funding by bank creditors from a significant part of the banking system. If the answer to this question is no, then a bank capital crunch caused by large loan losses or other impairment of the banking sector can lead to a sharp contraction in credit supply that depresses macroeconomic output, even without a panic.

We use bank equity returns to systemically examine this question, as large bank equity declines capture a sample of episodes in which banks suffer large losses from the viewpoint of

equity investors, and thus likely capture times of *bank distress*. Since equity holders are the first to suffer losses from the occurrence of a banking crisis that damages banks' intermediation capacity, we assume that conceptually a large bank equity decline is necessary for a banking crisis. Large bank equity declines offer several advantages as measures of aggregate banking sector distress relative to existing approaches to identifying historical banking crises (e.g., Reinhart and Rogoff 2009, Laeven and Valencia 2013). First, large declines in bank equity cover a broad sample of episodes of banking distress both with and without panics, as episodes without panics may be otherwise hard to detect due to the "quiet" nature of some such episodes of bank distress. Second, in contrast to the information insensitivity of credit-market instruments prior to panics, bank equity returns tend to be gradual and cumulative and thus may capture early signs of banking crises for real-time policy making. Third, the broad availability of bank equity returns across many countries going far back in time makes bank equity returns particularly appealing for studies of historical crises.

We construct a new historical dataset of bank equity index returns for 46 advanced and emerging economies going back to 1870, built in large part from hand-collected individual bank stock price and dividend data from historical newspapers. We control for broader stock market conditions by also constructing new indexes for nonfinancial stocks over the same sample. Our dataset thus provides nearly 2,500 country-years of information on bank equities, nonfinancial equities, and macroeconomic variables. We also collect new information on the occurrence of events such as banking panics and widespread bank failures, backed by several hundred pages of narrative documentation.

As many other factors beyond banking crises may also cause large fluctuations in bank equity returns, one cannot take for granted the empirical performance of bank equity declines in identifying crises and predicting subsequent economic outcomes. We first confirm that bank equity declines contain useful information about banking sector distress and the economy by testing at the country level whether bank equity index returns have predictive content for future macroeconomic dynamics, beyond the information contained in nonfinancial equities. We find that bank equity declines predict large and persistent declines in future real GDP and bank credit to the private sector. For example, a decline in bank equity of at least 30% predicts 3.4% lower real GDP and 5.7 percentage points lower bank credit-to-GDP after three years. The relation between bank equity returns and future output and credit growth is highly nonlinear: declines in bank equity

predict future output and credit contraction, whereas increases in bank equity do not predict stronger economic performance. In contrast, while nonfinancial equity declines also separately predict lower GDP, they have no relation to subsequent bank credit-to-GDP.

Large bank equity declines thus likely pick up episodes when output contracts in part due to troubles in the banking sector. As further confirmation, we find that bank equity declines tend to capture other characteristics associated with banking crises, such as widespread bank failures, high rates of nonperforming loans, and government intervention into the banking sector. By using bank equity declines as a convenient measure of banking distress, our analysis provides broad evidence of the macroeconomic consequences of banking distress across time and countries, complementing previous studies that use cross-sectional variation in specific episodes to offer sharp identification of the macroeconomic consequences of banking distress (Peek and Rosengren 2000, Khwaja and Mian 2008, Amiti and Weinstein 2011, Puri, Rocholl, and Steffen 2011, Chodorow-Reich 2014, and Huber 2018).

To facilitate our analysis of panic and non-panic episodes, we define a "bank equity crash" as a bank equity decline of over 30% in a year. We then separate these bank equity crashes into panic versus non-panic episodes based on a systematic reading of the narrative evidence for each of these episodes. We define panics as episodes of severe and sudden withdrawals of funding by bank creditors from a significant part of the banking system, which could include withdrawals of funding from either insolvent banks ("fundamental runs") or illiquid but fundamentally solvent banks ("non-fundamental runs"). Our analysis finds that while panic bank equity crashes tend to be followed by greater credit contractions and lower output growth, non-panic bank equity crashes also predict substantial credit contractions and persistent output gaps. For example, even in the absence of any creditor panic, a decline in bank equity of at least 30% predicts that after three years, bank credit-to-GDP declines by 3.4% and real GDP declines by 2.9%. This finding suggests that in a large historical sample, panics are not necessary for severe economic consequences, as non-panic episodes can also lead to substantial credit contractions and output drops.

While some of the non-panic bank equity crashes might be solely driven by equity market noise, we show that many are, in fact, well-documented episodes in which the financial system suffered major losses and was undercapitalized, yet strong regulatory forbearance, implicit government guarantees, or outright government intervention prevented panics from emerging

among bank creditors. To stress their relevance, we highlight several prominent episodes of severe non-panic banking distress, including Canada during the Great Depression, Spain in 1977-1982, the U.S. in 1990-1992, Japan in 1990-1996 and 2001-2003, and several Eurozone countries today – examples which are all associated with prolonged recessions and credit crunches. Our analysis thus motivates policy makers to broaden their policy interventions to cover not just panics on the banking system but also bank capital crunches even in the absence of panics.

One other important advantage of bank equity returns is that they allow for precise analysis of the turning points of historical banking crises and the dynamics of how crises evolve, as understood in real-time by equity investors. We thus zoom in on a sample of crises to examine the timing of large bank equity declines relative to panics. Using monthly data covering over one hundred crises, we find that large bank equity declines tend to precede panics and credit spread spikes. On average, panics, as identified by narrative accounts, occur 7 months *after* the bank equity index has already declined by 30%. Moreover, prior to the month of the panic, bank equity has declined by an average of 36% from its previous peak. These results suggest that substantial bank losses are already present at the early stages of these crisis episodes, rather than these losses being due to the subsequent panics. Furthermore, while credit spreads are relatively insensitive to these early losses, bank equity returns are more sensitive, which, while not surprising from a conceptual perspective, nevertheless highlights bank equity declines as a useful crisis indicator for policy making in real-time.

Taken together, our findings paint a more complete picture of the roles played by bank equity declines and panics during banking crises: large bank equity declines tend to be followed by severe economic consequences even without panics; large bank equity declines precede the occurrence of panics; and panics with large bank equity declines tend to have the most severe credit contractions and output gaps. These findings highlight panics as an amplification mechanism, albeit not a necessary condition for severe banking crises. Furthermore, these findings reinforce the importance of timely recapitalization of bank capital during early phases of banking distress, rather than having policy makers simply backstop liquidity, in order to prevent subsequent panics from erupting and to minimize the adverse macroeconomic consequences.

Finally, as a byproduct of our analysis, we provide a new chronology of banking crises that highlights both crises with banking panics and crises with bank equity losses but without panics.

Prior chronologies of historical banking crises, e.g., Bordo et al. (2001), Caprio and Klingebiel (2003), Demirgüç-Kunt and Detragiache (2005), Reinhart and Rogoff (2009), Schularick and Taylor (2012), and Laeven and Valencia (2013), tend to be subjective in how they designate banking crisis episodes (Romer and Romer, 2017). As a result, these various banking crisis chronologies disagree with one another. We use information from bank equity returns, along with newly collected information on panics and widespread bank failures, to create a more systematic banking crisis chronology. As there is no single correct definition of a banking crisis, our goal is to provide one possible construction of clear-cut crisis episodes based on three systematic criteria: bank equity losses, bank failures, and panics. Importantly, our approach also removes spurious episodes from the previous narrative-based banking crisis chronologies and helps to reconcile disagreements between them. With the help of large bank equity declines as a screening tool, we also uncover a number of "forgotten" historical banking crises that are confirmed by new narrative evidence.

Our paper is organized as follows. Section I discusses conceptual issues. Section II describes our new historical dataset. Section III presents the results on the informativeness of bank equity returns for macroeconomic outcomes. Section IV explores the macroeconomic implications of panics and non-panic bank distress episodes. Section V compares the timing of bank equity declines, panics, and other financial market indicators around banking crises, and Section VI presents our new banking crisis chronology.

I. Conceptual issues

This section outlines theories of banking crises and discusses how these theories connect to our empirical bank equity decline measure.

A. Theories of crises

The classic model of Diamond and Dybvig (1983) has greatly influenced views of policy makers and academics about banking crises. In their model, panics in the form of self-fulfilling multiple equilibria can lead depositors to run on a fundamentally solvent but illiquid bank. This situation arises because banks are funded by demand deposits, a type of short-term debt, which

exposes banks to nonfundamental panic runs. When other households choose to withdraw their deposits, each depositor finds it optimal to withdraw as well, even if the bank's illiquid assets are able to pay off its liabilities in the long run. When panic runs occur, the bank is forced to liquidate its assets at a discount, leading the bank to fail.

While modern financial systems include non-bank financial institutions and non-deposit funding, short-term debt remains the most important form of financing, thus exposing the banking system to panic runs. Despite the instability it creates, short-term debt is widely used due to several important economic considerations. Calomiris and Kahn (1991) argue that short-term debt financing can serve as a mechanism for lenders to discipline borrowers in the presence of moral hazard. Gorton and Pennacchi (1990) emphasize that when a borrower is far from insolvency, its short-term debt is safe and thus insensitive to private information about its fundamentals, which alleviates adverse-selection problems in financial markets and makes short-term debt liquid in secondary markets. Dang, Gorton and Holmstrom (2019) further argue that the rapid growth of securitization of mortgage loans in the shadow banking sector during the 1990s and 2000s was largely driven by the market demand for information-insensitive securities.

Short-term debt financing also exposes banks and non-bank financial institutions to fundamental-driven panics. In the presence of asymmetric information about the health of a bank, Chari and Jagannathan (1988), Allen and Gale (1998), and Calomiris and Kahn (1991) show that panics occur not only after negative fundamental shocks but also when depositors suffer liquidity shocks, because depositors cannot tell apart these situations. Goldstein and Pauzner (2005) and He and Xiong (2012) develop both static and dynamic models to show that negative fundamental shocks may exacerbate the coordination problem among short-term debt holders, leading to panic runs on a fundamentally solvent bank. In these models, panic runs serve to amplify initial negative fundamental shocks.

These panic-based mechanisms, either through self-fulfilling runs or fundamental-driven runs, tend to occur as discontinuous disruptions in credit markets. Bernanke (2018) provides a summary of credit market disruptions during the 2007-2008 U.S. financial crisis, occurring in asset classes such as asset-backed commercial paper (Kacperczyk and Schnabl 2010; Covitz, Liang, and Suarez 2013; Schroth, Suarez and Taylor 2014), structured investment vehicles and other conduits (Gorton 2008), and money market mutual funds (McCabe 2010). Bernanke (2018) highlights that,

as these short-term credit-market instruments are by design information-insensitive during normal periods, it is particularly difficult for policy makers to predict the occurrence of panic runs on these instruments and the economic consequences of such runs.

Instead of focusing on disruptions in bank funding markets, this paper explores bank equity declines as an alternative lens to study banking crises. Our analysis is broadly motivated by the literature that emphasizes bank equity as the key determinant of banks' intermediation capacity, e.g., Holmstrom and Tirole (1997), Gertler and Kiyotaki (2010), He and Krishnamurthy (2013), Brunnermeier and Sannikov (2014), and Rampini and Viswanathan (2019). For example, in Holmstrom and Tirole (1997), banks are incentivized to monitor borrowers by investing a sufficiently large stake of their own capital into firms. This implies that banks face an equity constraint with their lending limited by their capital. According to these models, adverse shocks that impair bank equity may constrain banks' capacity to finance the economy, depressing output through a *bank capital crunch*.[1]

What factors increase the likelihood of bank capital crunches and panics? An extensive literature provides evidence that banking crises are not simply due to random realizations of negative shocks, but rather deeply connected to prior credit booms. Specifically, credit booms predict a higher probability of banking crises (Schularick and Taylor 2012, Baron and Xiong 2017) and coincide with low credit spreads and an increase in debt issuance by riskier borrowers (Greenwood and Hanson 2013, Mian, Sufi, and Verner 2017, López-Salido, Stein, and Zakrajšek 2017, Krishnamurthy and Muir 2018). These findings highlight that elevated sentiment or over-optimism likely plays a central role in credit booms. Following a period of positive shocks, lenders may over-extrapolate recent low defaults and neglect downside risk, leading to the underpricing of risk during the credit boom and subsequent bank asset losses (Bordalo, Gennaioli, and Shleifer 2018, Greenwood, Hanson, and Jin 2019). Overall, credit booms increase the fragility of the banking system and the economy, leaving banks vulnerable to future losses that lead to bank capital crunches or even panics.

[1] He and Krishnamurthy (2013) also highlight a subtler channel beyond the bank lending channel: shocks to bank health may depress asset prices, which in turn lowers the ability of households and firms to access credit due to household and firm balance sheet constraints.

B. Research questions

The contrasting emphasis of the two strands of the literature on panics and bank equity losses motivates our research questions:

Are large bank equity declines associated with adverse macroeconomic consequences? An extensive literature examines the macroeconomic consequences of bank distress by analyzing the effects of sharply identified shocks to the banking sector. Peek and Rosengren (2000) and Amiti and Weinstein (2011) use shocks from Japanese banks, which affected economic activity in the U.S. and Japan; Khwaja and Mian (2008) analyzes a bank credit supply shock created by a political event in Pakistan; Chodorow-Reich (2014) exploits the Lehman bankruptcy during the Great Recession as a credit supply shock to study its effect on U.S. employment; while Huber (2018) studies the effects of domestic lending cuts by Commerzbank, a large bank that suffered significant losses in its international trading book. While these studies offer sharp identification, they are limited to the specific countries and time periods in their respective samples, thus leaving open the question regarding whether severe economic consequences of bank distress exist in a broad sample that spans time and space. By addressing this question, we are also able to establish the empirical performance of bank equity declines as a way of measuring banking distress.

Are panics necessary for banking crises to have severe economic consequences? Bank equity prices allow us to address this question, as large equity declines capture a sample of episodes in which banks suffer large losses from the viewpoint of equity investors. Since a large bank equity decline is necessary for a banking crisis,[2] these episodes include both those that have experienced banking panic and those without, and thus allow us to separately examine macroeconomic consequences of large bank equity declines with and without observations of panics. Banking crises without panics may occur when banks are undercapitalized and their ability to lend is severely impaired, even when panics by bank creditors are prevented, often due to a combination of regulatory forbearance, implicit creditor guarantees, and forceful government interventions.

[2] However, as we will show, measurement error can lead to observations of narrative accounts of bank panics that are not associated with large equity declines for at least two reasons. First, because our bank equity index primarily covers large commercial banks, our bank equity index may not reflect runs on private bank, regional banks, or nonbank financial institutions are not captured by our bank equity index. Second, panics without large bank equity crashes declines can also be episodes of short-lived panics, in which long-run bank solvency is not affected and bank equity thus recovers by the end of the year.

These banking crises without panics may reflect episodes with narrative evidence of bank failures.[3] However, importantly, bank equity declines also allow us to go one step further and identify episodes of banking sector distress with neither panics *nor* narrative evidence of bank failures, which we refer to as *quiet crises*. These quiet crises may reflect bank losses that do not translate into headline events such as panics or bank failures, but where losses nevertheless impair banks' ability to lend. Narrative-based approaches often miss such quiet episodes due to the difficulty of detecting banking losses in the absence of salient characteristics such as depositor runs or bank failures, as acknowledged by early studies that use narrative-based approaches, e.g., Caprio and Klingebiel (1996, 2003).

Do bank equity declines precede panics? The joint dynamics of bank equity returns, panics, and credit-market spreads allow us to systematically examine the relative timing of bank equity declines, panics, and credit-market disruptions around banking crises. If panics are driven by self-fulfilling shocks unrelated to bank fundamentals, they would not be preceded by bank equity declines. Thus, evidence of bank equity declines preceding subsequent panics helps to link panic runs to prior bank losses, rather than non-fundamental runs causing bank losses.

We further compare the timing of bank equity declines with the timing of credit spread spikes, which reflect disruptions in credit markets. The lower sensitivity of credit-market instruments to bank fundamentals leads us to expect that bank equity declines should detect crises earlier than credit-market measures. As bank equity has the lowest payoff priority among all bank stakeholders, bank equity prices should be sensitive to bank losses regardless of whether a bank is close to or far away from insolvency. As a result, bank equity returns would be expected to provide a continuous and cumulative measure of bank distress, in contrast to prices of credit-market instruments, especially short-term debt instruments, which tend to display discontinuities around panics. Nevertheless, their actual power in a large sample remains to be systematically examined.

C. Mapping historical banking crises

In contrast to our approach emphasizing bank equity returns to identify periods of banking distress, the traditional approach in the literature (e.g., Reinhart and Rogoff 2009, Schularick and

[3] Examples of bank failures without panics include situations when banks are orderly wound down or restructured through judicial bankruptcy proceedings, merged by the government with a healthy bank, or nationalized.

Taylor 2012, Laeven and Valencia 2013) identifies banking crises based on narrative accounts of salient features such as bank runs, bank failures, and large-scale government interventions. Romer and Romer (2017) point out that because narrative-based approaches are subjective and retrospective, they may contain look-back biases that lead to an overstatement of average banking crisis severity. Other drawbacks of narrative approaches include the treatment of crises as discrete episodes (when a continuum between "normal recessions" and banking crises might be a more accurate representation) and the lack of quantitative measures of bank impairment to distinguish between minor versus major crises. These various narrative approaches also disagree with each other about which episodes should be regarded as banking crises. Table 1 highlights this disagreement in the case of Germany, while Table A1 shows this problem across all countries.[4] This disagreement is due in part to a lack of a consistent definition of which features constitute a banking crisis.[5] And, importantly, these traditional narrative-based approaches of identifying historical banking crises may miss episodes without panics or other salient characteristics, due to the difficulty of detecting banking losses in the absence of such salient features.

In contrast to historical narrative accounts, bank equity returns provide an objective, real-time, quantitative, and theoretically motivated measure to map out historical periods of bank distress from the viewpoint of equity investors. Bank equity has strong predictive power for macroeconomic consequences, as we show, both in terms of the magnitude and signal-to-noise ratio. Furthermore, bank equity price and dividend data are readily available over much of the sample, covering 46 countries over the period 1870-2016, in contrast to corporate bond and interbank lending spreads, which are relatively limited historically.[6] Finally, using bank equity

[4] Jalil (2015) discusses this disagreement among narrative chronologies in the case of U.S. pre-1929 banking crises.

[5] Moreover, these approaches (with the exception of Laeven and Valencia 2013) have minimal historical documentation for each banking crisis episode, making it difficult for other researchers to reconcile these differences between approaches or even to assess the basic facts of what happened during each crisis. Reinhart and Rogoff (2009) and Caprio and Klingebiel (2003) write only a few sentences about each crisis, while Bordo et al. (2001)'s database mainly presents macroeconomic variables. Schularick and Taylor (2012) do not provide publicly available documentation to support their chronology; in personal correspondence, the authors say their chronology is constructed by surveying country-specific experts in banking history in 17 countries.

[6] Bond markets in many countries have only been developed in recent decades. In the postwar period, corporate bond markets mainly existed in the U.S. and U.K., while in most non-Anglophone advanced economies, corporate bond markets were very limited or non-existent until deregulation in the 1980s (as corporate credit was channeled mainly through the banking system). For example, there was only a *single* corporate bond each trading in Denmark and Japan before the 1980s (that of Det Store Nordiske Telegrafselskab and Nippon Telegraph and Telephone, respectively). Even organized interbank markets are a relative recent phenomenon, with data becoming available for most countries starting in the 1990s. As a result, Krishnamurthy and Muir (2018) analyze a more limited sample, since they do not

returns does not rely on observing salient features, allowing us to capture a larger sample of episodes of bank distress, which is key to our purpose of studying episodes without panics.

II. Data

We now describe how we gather and construct the historical database used in our analysis. We discuss, in turn, the following types of variables: bank and nonfinancial equity real total returns, bank and nonfinancial credit spreads, and macroeconomic variables. All variables are annual (except those noted as monthly variables) and form an unbalanced country panel across 46 countries over the period 1870-2016.[7] The Appendix contains further details on data sources and data construction beyond what is presented here, and Tables B2 through B4 provide a comprehensive summary by country of all data sources used to construct the main variables.

Annual bank and nonfinancial stock returns. We construct a new historical dataset on bank equity prices and dividends for 46 advanced and emerging economies going back to 1870. A practical advantage of bank equity returns to study crises is that bank equity price and dividend data are readily available over much of our sample. This abundance of data is due to the fact that, in the 19th and early 20th centuries, bank stocks were highly prominent, featured in newspapers and traded as much as railroad stocks.[8]

For each country in the sample, we construct annual (as of December 31 of each year) price return and dividend return indexes for both bank and nonfinancial stocks. In this paper, all equity returns (unless otherwise noted) are expressed as *real total* returns of the country-level index. The

have corporate credit spread data for emerging market countries—or even for many advanced economies (Denmark, Italy, France, the Netherlands, and Switzerland) in the modern period.

[7] We exclude country-year observations during major wars because supply-side contractions and large government financing needs can lead to both macroeconomic contractions and banking sector losses, but these are not the typical banking distress episodes we want to consider. In particular, we drop all countries during the world wars (1914-1918 and 1939-1945), Korea during 1950-53, Spain during 1936-1938, France and Germany in 1870, Mexico during 1910-1920, South Africa during 1899-1902, Japan during 1894-1895, Colombia during 1899-1902, Russia during 1917-1922, and Greece during 1946-1949.

[8] In the period 1870-1939, nearly all the major commercial banks in all our countries were publicly-traded joint stock banks, much more so than even today—the main exception being the U.S., where banks were not widely traded until the mid-1920s. (In fact, even most central banks were publicly traded in that period, though we do not include them in our indexes). The private banks of this period were generally either merchant banks or mortgage banks, not commercial banks. We are thus able to gather the stock prices and dividends of nearly all large commercial banks in each country from historical newspapers during this period.

price and dividend indexes in a given country may not necessarily correspond to the exact same underlying banks due to data availability, but they are either market-capitalization-weighted or price-weighted indexes of the broad domestic banking and nonfinancial sectors within each country.[9] Each of these series is pieced together from a variety of sources (documentation and source tables can be found in the Appendix).[10] We start by collecting premade bank equity indexes from Global Financial Data (mainly price indexes), Datastream (price and dividend indexes), and Baron and Xiong (2017, newly constructed bank dividend indexes).

In addition to using premade indexes, we construct bank equity price and dividend indexes from individual bank and nonfinancial companies' stock prices and dividends. Our main source of new data on individual stocks comes from historical newspapers in each country. From these newspapers, we hand collect prices and dividends on an annual basis for the closing price closest to December 31.[11]

Data on individual stock prices and dividends of banks and nonfinancial firms also come from several databases from Yale's International Center for Finance (gathered and made publicly available by William Goetzmann and Geert Rouwenhorst) including *Investor's Monthly Manual* data (1869-1934), New York Stock Exchange data (1800-1871), and St. Petersburg Stock Exchange data (1865-1917). Other data on individual stock and index returns are from a variety of additional sources including individual country studies and statistical yearbooks. Additional dividend data for individual bank and nonfinancial stocks is hand-collected from Moody's Banking

[9] In price-weighted indexes, each stock is normalized to the same par value in the initial year. Its weight in subsequent years is then determined by past returns.

[10] The nonfinancial equity index is constructed to represent a diverse set of important and large companies, mainly covering the following industries: iron and steel, goods manufacturing, electrical equipment, textiles, chemicals, paper and pulp products, food suppliers and breweries, and retail. We exclude transportation stocks (railroads and shipping), commodity-related stocks (including mining), utilities, real estate companies, and foreign and colonial enterprises, due to their high exposure to international factors or to real estate.

[11] Figure A1 in the Appendix provides examples of historical newspapers used to construct our bank equity return data. To give a sense of the sheer number and diversity of historical sources we uncovered, we list the main ones here (the full list is available in Table B2): *Journal de Bruxelles* for Belgium (1868-1935); *Dagens Nyheder* for Denmark (1868-1909); *Le Temps* for France (1873-1939); *Berliner Borsen-Zeitung* and *Berliner Morgenpost* for Germany (1871-1933); *La Stampa* for Italy (1865-1934); *Japan Times* for Japan (1897-1915); *De Telegraaf* and *De Standaard* for the Netherlands (1875-1933); *Diario de Lisboa* for Portugal (1921-1990); the *Straits Times* for Singapore (1965-1980); *ABC* for Spain (1909-1965); and *Gazette de Lausanne*, *Journal de Genève*, *Le Temps*, and *Neue Zürcher Zeitung* for Switzerland (1852-1936). We also collect stock returns data from a variety of additional sources: Argentinian stock returns data (1900-1935) from Nakamura and Zarazaga (2001); Belgian stock returns data from the SCOB database (University of Antwerp, Belgium); Danish stock returns data (1911-1956) from *Denmark Statistical Yearbooks*; Finnish stock returns data (1911-1974) from Nyberg and Vaihekoski (2010); and Swedish stock returns data (1870-1901) from Waldenstrom (2014).

Manuals (1928-2000) and from individual financial statements of banks accessed at the Harvard Business Library's Historical Collections. We add the bank equity price returns and dividend returns to get bank equity total returns and then adjust by the CPI for each country to get bank equity real total returns. Figure A3 plots the distribution of bank and nonfinancial equity returns around banking crises defined by narrative-based approaches.

The bank equity returns data start around 1870 for advanced economies such as Australia, Austria, Belgium, Canada, France, Germany, Ireland, Italy, New Zealand, Sweden, Switzerland, the U.K. and the U.S. and even for economies that are today considered emerging markets such as Argentina, Brazil, Egypt, Greece, Hong Kong, India, Mexico, Russia, and Ottoman Turkey. To assess the coverage of our bank index, Table B1 reports, for each country and decade, the number of underlying banks used to construct the bank equity return index, or, when premade indexes are available, the source of the premade index. The exact range of included banks varies across countries and historical periods, due to historical data limitations. However, as can be seen both from Table B1 and the associated lists of individual constituent banks (linked in the Appendix), the bank equity index generally contains a broad representation of the largest domestically chartered commercial banks mainly located in the country's financial center and covering a substantial share of the country's bank assets and deposits. For many countries, our newly constructed bank equity index is based on underlying returns for at least five banks (and often much more), almost always the largest. It is important to note that the focus on large commercial banks in the country's financial center may lead the bank equity measure to underrepresent banking crises centered on smaller or provincial banks and fail to capture distress of private banks.

Monthly stock returns and credit spreads for banks and nonfinancials. To analyze the dynamics of how crises unfold, we also focus on a newly-constructed set of clearly identified banking crisis episodes. We refer to the sample of clear-cut crisis episodes as the BVX Crisis List (which we described in detail in Section VI). For these clear-cut crisis episodes, we construct *monthly* series in a three-year window around each episode for the following four variables: bank equity index returns, nonfinancial equity index returns, bank credit spreads, and nonfinancial corporate credit spreads. Due to limitations on historical data availability, the monthly data is a smaller subset of the larger annual dataset on bank equity returns and only covers around 100 crisis episodes.

The complete list of sources for monthly equity returns and credit spreads for each country is recorded in Table B3. For monthly bank and nonfinancial equity data for the period 1980-2016, we mainly use country-level indexes from Datastream, which covers nearly all 46 countries. For the period 1870-1979, the monthly equity data is limited to fifteen countries (Argentina, Australia, Belgium, Denmark, France, Germany, Italy, Japan, Netherlands, Norway, Spain, Sweden, Switzerland, U.K., and U.S.) and three-year windows around banking crises, due to the difficulty of hand-collecting monthly data from historical records. In this period, monthly bank and nonfinancial stock prices are transcribed from the historical newspapers listed in the previous section or obtained from other historical sources such as *Investor's Monthly Manual* and Global Financial Data (see Table B3 for details). Credit spreads mainly come from Global Financial Data or from newly transcribed historical statistics (again, see Table B3). Bank credit spreads are typically from overnight interbank lending rates, while corporate credit interest rates are from corporate bond yields. We subtract a short-term Treasury bill yield (typically three-month maturity) to get the bank credit spread and a long-term Treasury bond yield (typically 10-year maturity) to get the corporate credit spread.

Macroeconomic variables. To construct real GDP growth, we obtain annual data for each country on nominal or real GDP and the CPI from the Maddison database, the Jordà-Schularick-Taylor macro-history database, Global Financial Data, and the OECD, IMF, and World Bank datasets. The same CPI used to deflate returns is used to obtain real GDP. Data on bank credit-to-GDP comes mainly from the Jordà-Schularick-Taylor database (which goes back to 1870 but for 17 countries only) and from the BIS long credit series for other countries. We supplement these existing datasets on bank credit-to-GDP with newly transcribed data from: (i) IMF print statistical manuals from the 1940s and 1950s, and (ii) "League of Nations: Money and Banking Statistics" volumes from 1925 to 1939. These new data allow us to form aggregate bank credit-to-GDP series going back at least to 1918 for nearly all the countries in our sample and back to 1870 for a subset of those. The complete list of sources for each variable is recorded in Table B4.

Narrative accounts of crises. To compare the information contained in bank equity declines with the information content from narrative-based approaches, we construct a list of "Narrative Crises," defined as the union of all banking crises from six prominent papers: Bordo et al. (2001), Caprio and Klingebiel (2003), Demirgüç-Kunt and Detragiache (2005), Laeven and Valencia (2013), Reinhart and Rogoff (2009, and online update 2014), and Schularick and Taylor (2012,

online update 2017). Table A1 reports the Narrative Crisis list. We define the "Narrative Crisis year" as the earliest reported starting year of each banking crisis across the six papers.

The BVX crisis list. We systematically combine information on large bank equity declines with a new database of episodes of panics and widespread bank failures to create a chronology of historical banking crises, which we refer to as the BVX Crisis List. Details on constructing the new chronology are discussed further in Section VI. This new database on episodes of panics and widespread bank failures is reported in Table A2, and links to our extensive historical documentation on episodes of panics and widespread bank failures can be found in Appendix Section I.B.

III. Bank equity declines and future macroeconomic dynamics

In this section, we examine the predictive power of large bank equity declines for subsequent economic outcomes such as real GDP and bank credit-to-GDP, without being concerned by whether these declines are accompanied by banking panics. By showing that large bank equity declines tend to precede severe economic outcomes, this analysis serves to establish that bank equity declines are not simply equity market noise and instead carry important information. It thus highlights the potential relevance of bank capital crunches in a long and broad macroeconomic sample and justifies our use of large equity declines to analyze banking crises.

A. Real GDP and credit dynamics around bank equity crashes

As an initial exploration of the data, we start by examining how real GDP and bank credit-to-GDP evolve around bank equity crashes compared to times without crashes. Our definition of a "bank equity crash" is an annual bank equity decline of more than 30%. In our full sample, there are 263 country-years with a 30% bank equity crash and 209 when we restrict the sample to observations with non-missing GDP growth, credit-to-GDP, and nonfinancial equity returns.

Figure 1 presents an event study around these bank equity crashes. We compute the average cumulative change in log real GDP and credit-to-GDP around bank equity crashes relative to five years before the crash. Year $t = 0$ is defined as the year of the bank equity crash. For reference, we also plot the average dynamics around normal times, defined as years without a crash. Panel A

in Figure 1 shows that, in the years leading up to a bank equity crash, GDP growth is similar to growth in normal times. However, in the year after the crash growth slows sharply, opening an output gap of 4%, which persists even five years after the crash.

In contrast to real GDP, credit-to-GDP expands rapidly in the run-up to bank equity crashes. On average, credit-to-GDP expands by 8.3 percentage points in the five years preceding a crash, relative to 5.1 percentage points during other periods. This pattern is consistent with the evidence in Baron and Xiong (2017) that credit expansions predict bank equity crashes and shows that this result holds for a broader and longer sample. After the crash in bank equity, credit-to-GDP stops expanding and starts declining. This event study thus provides preliminary evidence that bank equity crashes are preceded by credit booms and followed by contractions in output and bank credit-to-GDP.

B. Bank equity declines and future GDP growth

We next examine the predictability of large bank equity declines for subsequent GDP growth more formally. To flexibly estimate such predictability and explore potential nonlinearities, we estimate the following Jordà (2005) local projection specification for horizons $h = 1, \dots, 6$:

$$\Delta_{\mathrm{h}} y_{i,t+h} = \alpha_i^h + \sum_j \beta_j^h \, 1[r_{i,t}^B \in B_j] + \sum_j \delta_j^h \, 1[r_{i,t}^N \in B_j] + \Gamma^{\mathrm{h}} X_{i,t} + \varepsilon_{i,t}^h, \qquad (1)$$

where $\Delta_{\mathrm{h}} y_{i,t+h}$ is real GDP growth from year t to $t+h$, α_i^h is a country fixed effect, and $1[r_{i,t}^B \in B_j]$ is an indicator variable for whether the bank equity return in year t is within a range defined by bin B_j. The indicator $1[r_{i,t}^N \in B_j]$ is similarly defined but for nonfinancial equity returns. To examine the predictability across the full distribution of returns, we include eight evenly-spaced bins, B_j, for both bank and nonfinancial returns: less than -45%, -45% to -30%, -30% to -15%, -15% to 0%, 0% to 15%, 15% to 30%, 30% to 45%, and greater than 45%. The omitted bin is the 0% to 15% range, which we think of as returns during "normal" times. Relative to the traditional VAR framework, the advantage of the local projection method is that it is robust to misspecification and allows for the estimation of nonlinearities and state-dependent responses, as argued by Jordà (2005).

Equation 1 controls for contemporaneous ($t-1$ to t) and lagged real GDP growth and the bank credit-to-GDP change, as well as lags of the bank and nonfinancial equity return bins,

captured by $X_{i,t}$. We include three annual lags for all variables, but the results are not sensitive to the lag length. Our baseline specification does not include year fixed effects to exploit time series variation within countries, but year fixed effects are included in robustness tests. We compute Driscoll and Kraay (1998) standard errors with a lag length of six to allow for serial correlation in $\varepsilon_{i,t}^{h}$ that mechanically arises from overlapping observations at horizons $h > 1$ and residual correlation across countries induced by common shocks. When reporting statistical significance based on *p*-values, we employ Kiefer and Vogelsang's (2005) *fixed-b* asymptotic distribution to correct for the tendency of heteroskedacity and autocorrelation consistent (HAC) variance estimators to over-reject in finite samples.

The key parameters of interest are the sequence of local projection impulse responses $\{\beta_j^h\}$ for each bin j, which capture the predictive power of bank equity returns after controlling for nonfinancial returns and current and lagged economic conditions. Note that after controlling for contemporaneous nonfinancial returns, bank equity declines reflect shocks from two sources. First, they may reflect banks' loan losses in the current period. Second, as equity prices are forward-looking, they may also reflect the stock market's anticipation of banks' losses in future periods. Thus, the impulse responses capture not only the impact of banks' current losses on the broad economy, as a result of banks' reduced capacity to lend to firms and households, but also the anticipated interactions between future economic downturns and future bank losses. For the purpose of our analysis, it is not particularly important to isolate these two effects.[12] Bank equity is probably also informative for reasons other than a banking channel: for example, bank equity declines may also reflect the macroeconomic consequences of household balance-sheet distress, as households are on the other side of bank lending.

The left plot in Figure 2 Panel A depicts the cumulative response of real GDP to bank equity return innovations. Relative to "normal times" (0% to 15% returns), declines in bank equity of greater than 45% predict 3.6% lower output after three years. Note that Equation 1

[12] A more nuanced question is why bank equity declines contain information content about the broad economy not captured by contemporaneous nonfinancial equity returns, which are supposed to reflect all information available about nonfinancial sectors. We can think of at least two possible mechanisms. First, banks tend to provide credit to households and small firms, which are not be fully represented by equity returns of nonfinancial firms. Second, stock market participants may not immediately recognize the full consequences of banking sector losses for the broad economy. The finance literature has offered extensive evidence that stock prices may often underreact to public information. For example, Baron and Xiong (2017) show that stock prices do not fully reflect risks brought by banks' credit expansions.

simultaneously estimates the responses to changes of both bank and nonfinancial equities, so that the response plotted on the left side of Panel A is the additional response to bank equity returns over-and-above the response to nonfinancial equity returns (which is plotted on the right side of the panel). This negative effect is highly persistent, translating into a permanent loss in output after 6 years of about 3%. More moderate but still substantial shocks of -30% to -45% are followed by 2.5% lower output after 3 years, with some subsequent recovery. In contrast, smaller negative shocks of -15% to 0% and positive shocks lead to weaker effects on future GDP.

The strong impact of large *negative* bank equity returns but weaker impact of *positive* returns provides evidence that shocks to bank equity have nonlinear predictive content for the real economy. This nonlinear relationship between bank equity distress and output growth is consistent with models of constrained intermediaries such as He and Krishnamurthy (2013), and highlights the advantage of bank equity returns as a continuous measure of banking sector distress. Interestingly, Romer and Romer (2017) find no evidence of nonlinearity between a continuous narrative measure of financial distress and subsequent output, while Adrian et al. (2019) find evidence of asymmetry in the response of GDP growth to financial conditions in U.S. data.

The right plot in Figure 2 Panel A shows the GDP response to nonfinancial equity shocks. Unsurprisingly, larger declines in nonfinancial equity predict lower subsequent output. In contrast with bank equity returns, there is less evidence of nonlinearity in the predictive power of nonfinancial equity returns. The ability of nonfinancial equity returns to predict future GDP growth is consistent with Stock and Watson (2003) and justifies nonfinancial equity returns as a suitable control for shocks to the broad economy.

Table 2 presents the regression version of Figure 2 at the 1- and 3-year ahead horizons. For expositional purposes, we replace the eight return bins with an indicator variable for whether there is a bank equity crash, $1[r_{i,t}^{B} \leq -30\%]$, which is defined by an annual return below -30%:[13]

$$\Delta_{\mathrm{h}} y_{i,t+h} = \alpha_i^h + \gamma_t^h + \beta^h 1[r_{i,t}^{B} \leq -30\%] + \delta^h 1[r_{i,t}^{N} \leq -30\%] + \Gamma^{\mathrm{h}} X_{i,t} + \varepsilon_{i,t}^h \qquad (2)$$

We report results with and without including year fixed effects γ_t^h. In Table 2 Panel A, a bank equity crash of at least 30% is associated with a decline in real GDP of about 2.6% after one year

[13] Appendix Table A3 presents the table version of Figure 2 with all eight return bins for the three-year forecast horizon.

(column 2) and 3.4% after three years (column 5), with the estimated coefficients being statistically significant. A crash of 30% in nonfinancial equity also predicts significant and persistently lower real output, and the magnitude is similar to the impact of a bank equity crash.

C. Bank equity declines and future bank credit growth

Why do bank equity declines predict lower future GDP growth, even controlling for nonfinancial equity returns? In this subsection, we show that the bank lending channel may play a key role.

Figure 2 Panel B presents estimates of Equation 1 with the change in bank credit-to-GDP as the dependent variable. The left plot shows that, after 6 years, a bank equity decline of over 45% predicts a 12-percentage point decline in credit-to-GDP, controlling for nonfinancial equity. Declines of between 30% and 45% also predict sizeable credit contractions, amounting to a credit-to-GDP decline of 8 percentage points after 6 years. Table 2 Panel B presents the regression version of Figure 2 Panel B using the 30% bank equity crash indicator. It shows that the decline in credit-to-GDP following a bank equity crash is statistically significant and robust to including controls.

Figure 2 Panel B also shows that the response of credit-to-GDP to bank equity return shocks is highly nonlinear. Large declines in bank equity are followed by sharp credit contraction, but smaller declines (0% to -15%) and increases in bank equity are followed by muted changes in bank credit. This nonlinearity in credit growth is again consistent with models in which banks are financially constrained. Larger shocks to bank net wealth are more likely to force banks against their capital constraint and therefore to contract the asset side of their balance sheet.

The right plot in Figure 2 Panel B presents the credit-to-GDP response to nonfinancial equity shocks. There is a striking contrast between bank equity and nonfinancial equity shocks. Nonfinancial equity shocks have essentially no predictive content for future credit-to-GDP. Even large declines or increases in nonfinancial equity returns have no impact on the subsequent credit-to-GDP ratio. This sharp contrast provides one potential explanation for why bank equity shocks matter for future growth, even after we control for nonfinancials. Bank equity declines likely capture shocks to bank net wealth, which translate into a credit-supply contraction that may depress household consumption, corporate investment, and production.

D. Robustness, subsamples, and further evidence on the informativeness of bank equity

The strong relation between bank equity crashes and subsequent output and credit contraction is highly robust to alternative specifications. Appendix Figure A4 shows that the results in Figure 2 are quantitatively similar when including year fixed effects to control for global shocks. Figure A5 explores an alternative timing in which bank equity returns impact real GDP and credit-to-GDP in the same year. Since bank equity returns are correlated with contemporaneous GDP growth, this specification implies that bank equity crashes are associated with even larger output and credit contractions. Panel A in Figure A6 shows that a simpler specification with just a single indicator variable for 30% bank equity crashes (as in Table 2) predicts persistent output gaps and credit-to-GDP contraction. Panel B presents another alternative specification showing the responses to *continuous* innovations in bank and nonfinancial equity returns, rather than using indicator variables. This specification assumes a linear relation between innovations to returns and subsequent outcomes. Panel B shows that shocks to both bank equity and nonfinancial equity predict subsequent output growth. The right plot shows that only bank equity returns predict future credit-to-GDP. Table A4 shows that the nonlinear relation between bank equity returns and subsequent output and credit also emerges using a quadratic specification or separating positive and negative returns.

Figure A7 and Table A5 estimate the responses to 30% bank and nonfinancial equity crashes for various subsamples. Figure A7 Panel A excludes the Great Depression and Great Recession years. Specifically, we drop years 1927-1937 and 2005-2015 for all countries and find similar estimates to the full sample. Panel B focuses on the prewar sample and finds more modest effects of bank equity crashes on both real GDP and credit-to-GDP. In contrast, Panel C shows that effects are stronger in the postwar period. The postwar results hold in the Bretton Woods Era (1946-1970, Panel D) and in recent decades (1971-2016, Panel E). The fact that bank equity crashes predict output declines and credit contraction during the Bretton Woods Era, a period without major banking crises according to narrative chronologies, suggests a role of bank equity distress outside of traditionally defined banking crises and even during normal recessions. We explore this point further in Section IV. Figure A8 presents estimates for the United States only

and finds qualitatively similar results, even when excluding the Great Depression and Great Recession.[14]

In addition to having strong predictive power, large bank equity declines line up closely with existing narrative classifications of banking crises in terms of signal-to-noise properties. To explore the signal-to-noise properties of bank equity returns, Figure A2 shows that bank equity returns provide the best real-time signal of banking crises on the list of Narrative Crises identified by existing classifications, relative to a host of other variables including nonfinancial equity returns, credit spreads, and macroeconomic conditions. See the full discussion in Appendix Section II.A. Specifically, bank equity declines best *coincide* with banking crises identified from existing classifications in terms of the signal-to-noise ratio (i.e. a higher "true positive" rate for a given "false positive" rate, relative to other indicators). 57% of crises identified by narrative-based approaches involve a bank equity crash of at least 30% in the year of the crisis or in adjacent years. This further validates large bank equity declines as a reasonable measure of banking distress.

As a final test to illustrate the informative content of bank equity returns, we focus on the predictive content of bank equity declines *conditional* on Narrative Crisis episodes. Table A6 shows that the magnitude of the peak-to-trough bank equity decline of each Narrative Crisis episode is associated with the magnitude of the decline in real GDP and with crisis characteristics such as the severity of deposit withdrawals, nonperforming loans, bank failures, and the likelihood of various forms of government interventions to support the banking sector. These findings are not driven by general declines in equity markets, as they also hold, albeit not as strongly, when using bank returns in excess of nonfinancial equity returns, as reported in Table A7. See the full discussion in Appendix Section IV. These facts confirm that bank equity returns capture the salient features of banking crises and motivate their use in identifying a broad sample of episodes of banking sector distress, as well as in refining banking crisis chronologies.

IV. Banking crises without panics

The global financial crisis and Great Recession rekindled a discussion about the role of panics in banking crises. Bernanke (2018), for example, argues that the unusual depth and severity

[14] The episodes of 30% annual bank equity crashes for the U.S. capture the most serious episodes of banking distress, namely in 1907, 1930, 1931, 1937, 1974, 1990, 2007, and 2008.

of the Great Recession was caused by the panics in funding and securitization markets that occurred in the fall of 2008 after the collapse of Lehman Brothers, which led to a sharp contraction in credit supply. He argues that distressed bank and nonfinancial private sector balance sheets alone would not have precipitated such a sharp decline in output. On the other hand, a bank capital crunch may itself lead to a contraction in credit supply that depresses consumption and investment, even without a panic. In this section, we compare the macroeconomic consequences of banking distress with and without panics.

A. Bank equity declines with and without panics

As in Section III, we estimate the response of real GDP and credit-to-GDP to bank equity crashes. However, this time, we interact bank equity crashes with a "panic" indicator. This specification thus allows us to analyze bank equity crashes without panics, bank equity crashes with panics, and panics without bank equity crashes.

To capture episodes of bank distress with and without panics, we systematically go through all -30% bank equity crashes, classifying each episode as a "panic" or "non-panic." Table A2 provides a summary of our classification. We research each individual episode, drawing both on standard narrative accounts of crises and also new narrative sources (e.g., newspaper articles, research papers, IMF and governmental reports, first-hand accounts). Extensive historical documentation for each episode regarding the presence or absence of panics can be found in Appendix Section I.B.

Following Calomiris and Gorton (1991) and Gorton and Huang (2003), we define a "panic" as an episode containing (within a ±3-year window) any of the following criteria appearing in narrative accounts: 1) severe and sudden depositor or creditor withdrawals at more than one of a country's largest banks or more than ten smaller banks, that lead these banks to be on the verge of collapse;[15] 2) severe and sudden strains in interbank lending markets; or 3) severe and sudden

[15] Our empirical mapping of panics is based on the definition of Gorton and Huang (2003), who, following Calomiris and Gorton (1991), define a banking panic "as an event in which bank debt holders (depositors) at many or even all banks in the banking system suddenly demand that their banks convert their debt claims into cash (at par) to such an extent that banks cannot jointly honor these demands and suspend convertibility. *Note that this definition excludes events in which a single bank faces a run, as a panic is a system-wide phenomenon. Also, cases where depositors seek to withdraw large amounts from the banking system, but banks can honor these withdrawals, are not 'panics,' although the banking system may shrink significantly*" [emphasis added].

foreign-currency capital outflows from the banking sector.[16] In short, we define panic episodes as an episode when banks experienced sudden salient funding pressures.[17] Our goal is to err on the side of being overly inclusive in calling episodes a panic and include all potential types of panics. By being overly inclusive, we ensure that the "non-panic distress" episodes that we are most interested in do not include any of these characteristics.

To examine the consequences of banking sector distress by whether they coincide with a panic, we estimate a macroeconomic predictive regression similar to Equation 2, but now interact the 30% bank equity crash indicator, $1[r_{i,t}^{B} \leq -30\%]$, with an indicator for whether there is narrative evidence of a panic.[18] The specification we estimate is:

$$\Delta_{\mathrm{h}} y_{i,t+h} = \alpha_i^h + \beta_1^h 1[r_{i,t}^{B} \leq -30\%] + \beta_2^h Panic_{i,t} + \beta_3^h 1[r_{i,t}^{B} \leq -30\%] \times Panic_{i,t} + \\ + \Gamma^{\mathrm{h}} X_{i,t} + \varepsilon_{i,t}^h, \qquad (3)$$

As in Equation 2, Equation 3 also includes a 30% nonfinancial equity crash indicator, along with the standard control variables (country fixed effects, three lags in the bank equity crash, nonfinancial equity crash, panic indicator, and the panic indicator interacted with the equity crash measures, as well as contemporaneous and up to three-year lagged real GDP growth and change in credit-to-GDP). We emphasize that the estimation of Equation 3 does not provide causal evidence on the effects of panics. Instead, it provides the predicted path of output following a panic episode, as well as evidence about whether episodes of non-panic distress are also associated with subsequent downturns. Furthermore, as we define a panic based on narrative information, any selection bias in narrative accounts might inflate the subsequent downturns after panics, but goes against finding substantial downturns after non-panic bank equity crashes.

[16] Our broad definition of a panic is motivated by the fact that traditional depositor runs are rare in modern banking crises and we thus want to capture a broad set of definitions of what modern banking panics look like. Furthermore, traditional runs are difficult to observe directly because banks do not generally report their funding status at daily or weekly frequencies, so we need other characteristics, such as sudden strains in interbank lending markets, to help infer the existence of panics among bank creditors.

[17] Empirically it is challenging to disentangle panic runs on solvent but illiquid banks due to strategic uncertainty and runs on insolvent banks. For our purpose, this distinction is not crucial, and we do not attempt it. Artavanis et al. (2019) examine large scale depositor withdrawals in Greece and provide evidence that both fundamental and strategic uncertainty led to sharp increases in depositor withdrawals, with about two-thirds being driven by fundamental uncertainty.

[18] Specifically, the indicator $Panic_{i,t}$ takes the value of 1 just in the year of a crash if there is a panic in any of the surrounding three years. This accounts for the fact that the bank equity crash and the panic may not be exactly contemporaneous. In all other times not near a crash, $Panic_{i,t}$ takes the value of 1 just in the year of the panic.

Impulse responses of real GDP and bank credit-to-GDP are plotted in Figure 3. The responses represent the impact of: (i) non-panic bank equity crash episodes, β_1^h, (109 episodes in the estimation), (ii) panic episodes without a bank equity crash, β_2^h, (67 episodes), and (iii) panic episodes with bank equity crashes, $\beta_1^h + \beta_2^h + \beta_3^h$, (34 episodes).

Figure 3 Panel A shows that both panic and non-panic bank equity crashes predict lower subsequent output and credit contraction, though the magnitudes are stronger for panic episodes. The corresponding coefficient estimates at the *t+3* horizon are reported in Table 3 Panel A. Non-panic bank equity crashes predict 2.8% lower output (column 2) and 3.4% lower credit-to-GDP (column 5) after three years, and the estimates are statistically significant. Episodes of panic bank equity crashes are associated with 4.9% lower output (column 2, sum of rows 1-3) and 9.1% lower credit-to-GDP (column 5, sum of rows 1-3) after three years.[19] While it is not surprising that panic episodes are worse, these estimates suggest that even non-panic bank equity crash episodes are associated with deep recessions and persistently tight credit conditions.

Bank equity crashes allow us to pick up periods of banking sector distress that are not associated with headline events such as a bank panic. However, one concern with Equation 3 is that some of the bank equity crashes may reflect equity market "noise" that is not associated with banking sector losses or other forms of impairment to the banking sector. That is, some of these banking crises without panics may not be banking crises at all, but simply equity market crashes due to sentiment.

To address this concern, we can further refine the set of bank distress episodes into those that also include narrative evidence of *widespread bank failures*. Observing widespread bank failures is likely a sufficient condition for impairment of the banking system. Widespread bank failures is defined as the failure of a top-5 (by assets) bank or more than five total banks failures above the normal rate of bank failures. Widespread bank failures may still occur in the absence of panics due to orderly bank resolutions, e.g., government-directed purchase-and-assumptions, nationalizations, restructurings, or bank closures, all of which we consider bank failures. We again interact bank equity crash episodes conditional on widespread bank failures with the panic

[19] For robustness, Figure A9 plots the full nonlinear specification for bank equity return (similar to Figure 2), but excluding all panic episodes, and Figure A10 estimates a specification with continuous bank equity returns. These results reinforce the finding that bank equity distress outside of panic episodes are also associated with weaker macroeconomic performance.

indicator and re-estimate Equation 3. Figure 3 Panel B presents the results, which are also reported in Table 3 Panel B. Once we condition on episodes of bank failures, non-panic bank equity crash episodes are now as severe as panic episodes. For example, three years after the start of a non-panic bank equity crash, real GDP is 5.1% (column 2) below the previous trend, compared to 5.0% for panic episodes (column 2, sum of rows 1-3). Over the same horizon, non-panic bank equity crashes predict a 7.4 percentage point decline in bank credit-to-GDP (column 5), compared to 8.1 percentages points (column 5, sum of rows 1-3) for panic episodes.[20]

Figure 3 also analyzes the reverse case: panics without bank equity crashes. The impulse response for these episodes is not statistically or economically different from zero. Thus, panics without bank equity crashes are not associated with any adverse macroeconomic consequences.[21] One may wonder how we can observe panics without bank equity declines, given that in models of panics described earlier, panics lead to bank failures and therefore to large losses for equity holders. As we explained earlier in footnote 2, this can happen due to various forms of measurement error.

Our finding on the negligible impact of panics without bank equity crashes is consistent with Calomiris (2010), who writes that most pre-Great-Depression panics in the U.S. were driven by relatively small fundamental shocks, which created "temporary confusion" of depositors in these cases but no long-term damage to the banking system or economy. As a result, minor panics without bank equity declines are likely over-represented in narrative chronologies, due to the salience of panics, even though their macroeconomic consequences are mild. On the other hand, bank equity declines without panics may be under-represented in narrative chronologies, due to the difficulties of detection, even though the consequences can be quite dire. The resulting bias

[20] One possibility, raised by the model of Gertler and Kiyotaki (2015), is that low output in non-panic bank equity crash episodes may partly reflect *anticipated* panics that do not materialize. Anticipated panics that do not occur ex-post can increase bank funding costs, reduce bank net worth, and decrease credit supply in their model. In some settings, explicit government guarantees for distressed banks, including state-owned banks, likely imply that creditors would assign close to zero probability on a panic occurring. In practice, it is difficult to ascertain whether bank creditors assign a positive probability of a panic in our non-panic bank equity crash episodes. Nevertheless, our results show that banking distress can be associated with adverse macroeconomic outcomes without the occurrence of a panic.

[21] Figure A11 addresses the concern that our conservative classification of panics introduces noise that biases down the estimate on the impact of panics without bank equity crashes. Figure A11 performs a similar analysis to Figure 3, but uses a finer classification of potential panic episodes. We distinguish between episodes with isolated creditor runs (which also include borderline episodes with inconclusive evidence as to whether a panic occurred) versus clear-cut panic episodes. Clear-cut panic episodes have the most severe consequences, but generally only if they are associated with bank equity crashes.

towards salient but inconsequential panics may actually lead standard narrative chronologies to underestimate the costs of banking crises driven by severe solvency concerns, which we will see in Section VI.

B. Examples of non-panic bank distress episodes

Non-panic bank distress episodes have been quite common historically. From Table A2, we find that among Narrative Crises, 32.8% of these banking crises do not feature panics. Figure A12 in the Appendix plots the frequency of banking crisis episodes (using our BVX Crisis List introduced in Section VI) which are *not* associated with panics for each decade in our sample since the 1870s. In the 19th century, virtually all banking crises featured banking panics. By the interwar period, some crises did not involve banking panics, though most crises were associated with panics. In the post-war era, especially in the post-Bretton-Woods period, the frequency of crises without panics increased. This increase over time may reflect the expanded role of government in financial regulation, including the gradual adoption of central banks with lender of last resort facilities, deposit insurance, and expanded fiscal capacity for regulatory forbearance. The 20th century also witnessed a gradual increase in banking sector leverage (Jordà, Richter, Schularick, and Taylor 2017), which has increased bank vulnerability to losses.

We highlight several prominent episodes of Narrative Crises that do not feature panics. Our first example of non-panic bank distress is the initial stages of Japan's recent banking crisis (1991-1996). In this phase of Japan's crisis, most of the major banks were thought to be near insolvency following the crash in the Japanese real estate and stock market, but significant regulatory forbearance and perceptions of strong government guarantees to creditors forestalled a creditor panic. In general, strong government guarantees characterize many episodes of "non-panic bank distress". This situation lasted until the fall of 1997, when the collapse of two major securities firms and the Hokkaido Takushoku Bank led interbank markets to seize up, ushering in the panic phase of the crisis (1997-98). The severe declines in bank equity experienced by Japanese banks also translated into contractions in lending and construction activity in U.S. markets with large penetration by subsidiaries of Japanese banks, highlighting that a cutback in credit supply had important real effects in this crisis (Peek and Rosengren 2000).

Other examples of Narrative Crises that did not feature panics include the following well-known historical banking crises: Sweden in 1921-1926, Spain in 1977-1982, Denmark in 1987-1992, and the U.S. in 1990-1992. For example, a number of studies argue that bank losses contributed to the severity of the 1990-91 recession in the U.S., despite the absence of panics, especially in the northeast region (Syron 1991, Bernanke and Lown 1991, Peek and Rosengren 1992, and Mian, Sufi, and Verner 2019).[22]

At the same time, we identify many other episodes of non-panic bank distress that were not previously identified by narrative-based approaches, including:[23]

- Canada during the Great Depression. Despite the lack of a banking panic and only a single bank failure (Weyburn Security Bank), Kryzanowski and Roberts (1993) argue that the large and widespread bank losses in Canada, as reflected by the large fall in bank stock prices, in part explain the extreme macroeconomic severity of the Great Depression in Canada.[24]
- 1973-75: Many countries experienced bank distress during the global downturn of 1973-75, including Australia, Finland, France, Greece, Hong Kong, Ireland, Italy, Singapore, Switzerland, Turkey, and the U.S., all of which saw large drops in bank equity, both in absolute terms and relative to nonfinancial equity.[25,26] The recessions in these countries were relatively deep and prolonged, compared to previous postwar recessions.

[22] For example, writing about the 1990-91 recession, Syron (1991) argues that "[i]n substantial measure, this period of tight credit is the result of a loss of bank capital, rather than a loss of deposits" (p. 4).

[23] Though it is not included on our list of non-panic bank equity crash episodes, because the bank equity decline is less than 30% in magnitude, the U.S. in 1920-21, in which strong monetary contraction induced waves of bank failures and a large aggregate credit contraction, is an important example too.

[24] Kryzanowski and Roberts (1993) note that the large Canadian banks "were insolvent at market values and remained in business only due to the forbearance of regulators coupled with an implicit guarantee of all deposit", both policies being held over from the previous Canadian banking crisis of 1923. They report that the largest Canadian bank at the time, the Bank of Montreal, had estimated nonperforming loans in excess of 40%.

[25] Among these non-panic episodes, the banking problems were perhaps the most severe in Australia, which saw a large real estate bust and numerous failures of building societies and small banks between 1974 and 1979 (Fitz-Gibbon and Gizycki, 2001). In Western Europe, countries faced balance-of-payment crises, which impacted the banking sector especially through large foreign exchange losses at banks and tight Eurodollar funding (Coombs, 1973). In particular, Germany's Herstatt Bank failed in 1974, and Germany's Westdeutsche Landesbank and Switzerland's UBS suffered large losses in foreign exchange markets (Schwartz, 1987). In Singapore, the Chung Khiaw Bank, then part of United Overseas Bank, was rumored to be close to bankruptcy.

[26] In the U.S., in particular, there were large aggregate bank losses, widespread symptoms of financial distress, and several prominent failures of large regional banks. Doyran (2016) writes: "Although bank profits subsided in 1974 because of high interest rates and foreign competition, US banks were particularly hard hit by bad loan portfolios, poor regulatory oversight over foreign exchange transactions, inadequate capital (high loan/capital ratio), deficient

- 2002-03: Several countries, including Germany, Greece, Israel, Italy, Japan, and Portugal, saw large drops in bank equity, both in absolute terms and relative to nonfinancial equity. In Germany, for example, according to the IMF's financial stability report in 2003, three out of the four largest German private commercial banks suffered major losses in 2002, and a number of small and medium-sized institutions had to be merged, closed by the regulator, or assisted, due to serious difficulties. In Israel, banks suffered large credit losses, with the collapse of Trade Bank and large losses at Discount Bank. In Japan, still recovering from the banking crisis of the 1990s, new problem loans were disclosed across the banking sector; in particular, the government injected 2 trillion yen into Resona Bank, one of Japan's largest banks, which was effectively insolvent, and nationalized Ashikaga Bank, a large regional bank.

C. Quiet crises

In this subsection, we ask whether large bank equity declines predict subsequent output and credit contractions, even in the absence of *any* narrative evidence of either banking panics or widespread bank failures. That is, are there "quiet" episodes of bank distress with negative macroeconomic consequences? During such "quiet" crises, several factors may forestall bank creditors from running on a bank, including government intervention that is kept hidden and the absence of other bank failures, which may give the impression to creditors that the health of the banking sector is sound. However, any banks losses experienced by a bank may still lead to tighter credit conditions. We re-estimate Equation 1, but now exclude country-year observations within a ±3-year window around episodes with either a panic or widespread bank failure in Table A2. As before, we control for nonfinancial equity return indicators, along with the standard control variables.

Figure 4 plots impulse responses from local projections for future real GDP and bank credit to GDP. As can be seen in this non-parametric specification, the magnitudes of the real GDP

internal controls and audit procedures, and aggressive expansion through the use of short-term borrowed funds, especially Eurodollar funds, money market CDs and federal funds. In early 1974, a tightened monetary policy surprised banks expecting eased interest rates. This led to short-term borrowing for large real estate projects as many large banks borrowed billions on a daily basis to collateralize short-term loans. When higher interest rates were announced, they suffered enormous losses. The concern over the effects of financial instability increased greatly as regulators reported substantial increases in the number of 'problem banks' under their supervision."

decline are nearly as large excluding episodes with panics or bank failures as they are in the full sample (Figure 2).[27] Thus, the predictive content of bank equity declines is not simply driven by episodes with panics or bank failures and reinforces the result that episodes of non-panic bank distress are associated with adverse macroeconomic consequences. Moreover, it suggests that banking sector distress and credit supply contraction play an important role in business cycles more generally.

V. Relative timing of bank equity declines, panics, and other financial market indicators

The previous section showed that panics are not necessary for bank equity distress to be associated with output and credit contractions. However, panics can substantially amplify the consequences of banking sector distress. In this section, we examine the timing of bank equity declines relative to the start of panics and financial market indicators. To do this, we use monthly data around banking crises on the BVX Crisis List, a list of clear-cut crisis episodes fully described in Section VI, to provide an in-sample analysis of the relative timing of bank equity declines, panics, credit spread spikes, and nonfinancial equity declines. This analysis also illustrates how bank equity returns can be useful in providing information on the timing and proximate causes of banking crises. Monthly data tell us about the turning points of crises and the dynamics of how crises evolve, as understood in real-time by equity and debt investors. This higher-frequency information allows us to show that large bank equity declines usually precede panics and credit spread increases during these clear-cut banking crisis episodes.

The U.S. 2007-8 banking crisis provides a vivid illustration of the key results, so we start with this case study before showing the results for a broad sample of crises. Figure 5 shows that, for the 2007-8 U.S. crisis, bank equity declined substantially before the panic phase of the crisis, which we date as starting in September 2008. Bank equity also detected the impending crisis before credit spreads and nonfinancial equity. Bank equity peaked in January 2007, ten months before the nonfinancial index peak in October 2007; similarly, bank equity cumulatively fell 30% by February 2008, while nonfinancial equity did not do the same until September 2008. Meanwhile,

[27] Similarly, Table A8 show no difference between the predictive content of bank equity crashes in Narrative Crisis episodes and outside them.

corporate spreads (the AAA-Govt and BAA-AAA spreads) and interbank lending spreads (the LIBOR-OIS spread) relative to baseline levels remained under one percentage point until the panic phase of the crisis in September 2008, a full 21 months after bank equity had started declining.[28] We will show in this section that these patterns also hold in other historical episodes on the BVX Crisis List.

A. Bank equity crashes and panics

Figure 6 presents the dynamics of bank equity returns, relative to other financial market measures, systematically across all crises on the BVX Crisis List.[29] We focus on a three-year window around the crises on the BVX Crisis List and compute the average evolution of equity indexes and credit spreads. Time 0 in event time is defined as January of the BVX crisis year, and equity indexes (measured on the left axis) and credit spread measures (right axis) are normalized to zero in this month. In the same figure, we plot the frequency distribution of panics, conditional on panics occurring, to provide a visual sense of whether panics tend to occur before or after large bank equity declines.[30] Panel A in Figure 6 presents the average dynamics for the full sample, and the remaining panels present results for various subsamples.

We start by focusing on the relative timing of bank equity declines and panics. The blue line in Figure 6 plots the average dynamics of bank equity returns, and the orange line represents a frequency plot of the first panic month, with the area under this curve normalized to one. Figure 6 shows that on average bank equity falls substantially before the panic phase of the crisis. Panics tend to occur during the crisis year (months 0 to 11 in event time), while bank equity generally peaks and begins declining in the year prior to when the crisis is dated.

[28] Equity and bond prices for Lehman Brothers, whose failure precipitated the panic phase of the 2007-08 crisis, display similar dynamics. Lehman Brothers' stock price saw a gradual but large decline of 67% relative to the S&P 500 from its peak in January 2008 to the week before its bankruptcy in September 2008. In contrast, returns on Lehman bonds were much more stable throughout the spring and summer of 2008. Relative to January 2008, the cumulative abnormal return on Lehman bonds was only -3% one week before its bankruptcy. Lehman bonds then fell sharply in the week leading up to its bankruptcy (Denison, Fleming, and Sarkar 2019).

[29] Figure A13 presents the same results across crises on the Narrative Crisis list, demonstrating that these results are robust to alternative banking crisis lists.

[30] The starting month of each panic, according to narrative accounts, is reported in Table A2. Appendix I.B links to extensive historical documentation on the onset month of panics.

Table 4 Panel A analyzes the timing of bank equity declines and panics more formally. Column 1 computes the average number of months between the "bank equity crash" (defined here as when bank equity has declined *cumulatively* by 30% from its previous peak) and the month of the panic. For example, in the U.S. in 2008, the bank equity crash occurs in February 2008, while the panic occurs in September 2008, giving this episode a value of seven months. On average across BVX Crisis List episodes with a panic, the panic occurs 7.5 months after the bank equity crash. Column 1 also reveals that in 74% (69 out of 93) of crises with panics for which we have data, the bank equity crash strictly precedes the panic. In contrast, panics occur before bank equity crashes in only 20% of cases (19 out of 93).[31] This difference is statistically significant based on a *p*-value calculated under the null hypothesis that the event "bank equity crash happens before the panic" is Bernoulli-distributed with parameter 0.50.[32]

Figure 7 Panel A presents the full distribution of bank equity declines from the previous peak to the month just prior to the panic for the sample of banking crises with panics. On average across BVX Crisis List episodes, bank equity declines by 36% from the peak to the month strictly prior to the panic. Figure 7 Panel B plots the distribution of bank equity declines at the month strictly prior to the panic expressed as a percent of its total eventual peak-to-trough decline. On average across banking crises with panics, bank equity has sustained 55% of its total eventual peak-to-trough decline before the panic occurs.

Overall, the evidence shows that panics, when they occur, tend to occur substantially after the crisis has been detected by bank equity and large losses have been realized by bank equity investors. This pattern therefore implies that a non-trivial proportion of bank losses are already present at the early stages of a crisis, before the panic, rather than being caused by the panic. Panics thus tend to represent the final, most extreme phase of a crisis that arises after substantial losses have been realized. This general pattern lends support to the second group of theories discussed in

[31] Gorton (1988) finds that panics in the U.S. National Banking Era (1863-1914) typically occurred a few months after NBER business cycle peaks. He argues these panics were due to systematic responses by depositors to changing perceptions of risk, based on the arrival of new information about a coming recession and resulting loan losses. Calomiris and Gorton (1991) also focus on panics in the U.S. National Banking Era and find that panics were preceded by sharp declines in stock prices.

[32] Appendix Table A9 shows these results are robust to using the sample of episodes on the Narrative Crisis List, demonstrating that the result is not specific to the BVX Crisis List.

Section I.A, i.e., Goldstein and Pauzner (2005) and He and Xiong (2012), which highlights panic bank runs as an amplification mechanism of initial negative fundamental shocks.

Do bank equity declines pick up crises before or after the crisis dates from previous narrative approaches? Table 4 Panel A shows that bank equity crashes pick up banking crises 3.2 months before the Reinhart and Rogoff (2009) dates and 2.9 months before the *Narrative Crisis* dates (defined as the earliest date across the six narrative approaches). This calculation uses January as the starting month of each Narrative Crisis, as narrative chronologies usually only provide the year of the crisis, so this estimate is conservative. Given that narrative chronologies often date crises based on the year when the panic starts, this provides further support for the result that bank equity declines precede panics. It also suggests that narrative accounts tend to date crises late. This result is consistent with Boyd, De Nicolo, and Rodionova (2019), who show that bank lending contracts before crises are dated by narrative approaches.

B. Bank equity crashes and credit spread spikes

What is the relationship between bank equity declines and credit spread increases? As we discussed earlier, policy makers tend to use disruptions in credit-markets as indicators of panics by bank creditors. Credit spread spikes serve as our proxy of disruptions in credit markets. Figure 6 shows that, in all subsamples of the data, bank equity falls by large amounts well ahead of the credit spread increases. Both interbank lending spreads (the green line) and corporate credit spreads (the black line) increase after the start of the crisis, while bank equity falls prior to the year of the crisis. The spike in credit spreads tends to coincide with the occurrence of panics (the orange line), confirming that credit spread spikes proxy for the occurrence of panics. Because credit spreads are only available for a smaller subset of crises, Panel B in Figure 6 presents the same event study for a consistent sample with non-missing equity measures and bank credit spreads. Panel B confirms that the differences in the timing of bank equity declines and credit spread spikes are not driven by different underlying samples. The fact that bank equity falls first before the spike in credit spreads is consistent with our earlier discussion that credit-market instruments tend to have lower information sensitivity than bank equity because equity holders take first losses while creditors suffer losses only when banks approach default.

Table 5 reinforces the evidence that bank equity tends to lead credit spreads by showing the distribution of credit spread increases conditional on bank equity falling by a certain amount. For example, Panel A shows that, by examining BVX Crisis List episodes, when bank equity first falls by more than 30% (row 3), the median credit spread increase is only 52 basis points (bps). In more than 20% of cases, bank credit spreads have not increased at all at this point. Only in 10% of cases has the bank credit spread increased by more than 1 percentage point. For reference, the median trough-to-peak bank credit spread spike across BVX Crisis List episodes is 2.5 percentage points.

Panel B in Table 5 presents the results for corporate credit spreads, rather than bank credit spreads. Similar to the results in Panel A, when bank equity first falls by more than 30% (row 3), the median corporate credit spread increase is only 2 bps, and in over 40% of cases corporate credit spreads have not increased at all. For reference, the median trough-to-peak corporate credit spread spike across BVX Crisis List episodes is 1.7%.[33]

Taken together, the analysis in this subsection shows that bank equity declines tend to precede credit spread spikes, which motivates policy makers to pay more attention to bank equity declines in assessing the developing risk of an emerging banking crisis.

C. Bank and nonfinancial equity crashes

Figure 6 also shows that bank equity tends to peak and decline earlier that nonfinancial equity during banking crises. Column 1 in Table 4 Panel B confirms this result by showing that bank equity crashes precede similarly defined nonfinancial equity crashes by a statistically significant average of 1.94 months. Similarly, Column 2 in Table 4 Panel B shows that the bank equity index peaks 1.37 months before the nonfinancials index peaks. The fact that bank equity leads nonfinancial equity in declining suggests that many banking crises originate with shocks to specific segments of the economy to which banks have significant exposures (e.g., subprime exposure in 2008), rather than with broad macroeconomic shocks affecting the entire nonfinancial

[33] As a robustness check, Table 4 Panel A compares the timing of 30% bank equity crashes to the timing of credit spreads spikes. We record a credit spread "spike" as the first month in which credit spreads increase at least 1 percentage point above their pre-crisis average levels. Since a 1 percentage point increase is somewhat arbitrary, we present this evidence mainly as robustness analysis confirming the result in Figure 6. Nevertheless, Table 4 Panel A shows that 30% bank equity crashes detect the crisis 3.4 months before a 1% spike in bank credit spreads (column 5) and 4.1 months before a 1% spike in corporate credit spreads (column 7).

sector. Interestingly, Panels C and D in Figure 6 show that the pattern that bank equity leads nonfinancial equities holds mainly for post-WWII crises and advanced economies—and is often the opposite for prewar crises or emerging economies (see also Table A10). This suggests that the initial causes of banking crises may have changed over time. More recent crises in advanced economies tend to start with distress to banks exposed to specific segments of the economy, such as real estate. In contrast, prewar banking crises may have been the result of broader macroeconomic shocks that only later translated into bank equity losses.

Figure 6 Panel A also reveals several additional new facts about bank equity around banking crises. First, bank equity falls substantially more than nonfinancial equity conditional on a BVX banking crisis, even though bank equity has an unconditional market beta of 0.8 in our sample. Second, bank equity declines are "permanent," in the sense that they do not recover post-crisis, presumably reflecting permanent credit losses. In contrast, nonfinancial equity gradually recovers after the crisis. Third, bank equity declines tend to unfold gradually over several years, with an average peak-to-trough duration of 27.2 months (also see column 3 in Table 4 Panel B). This slow decline could potentially reflect a behavioral bias of overoptimistic investors initially underestimating the true depth of the crisis (e.g., Gennaioli and Shleifer, 2018), or, in a rational framework, the presence of informational frictions making it difficult for investors in real-time to assess the extent of bank losses.

VI. Forgotten crises and the BVX Crisis List

While bank equity declines allow us to screen out a relatively complete set of episodes of banking distress with and without narrative evidence of panics, some bank equity crashes may be due to equity market sentiment unrelated to banking distress. For some in-sample studies of banking crises, such as the timing analysis on specific events in the previous section, it is useful to create a chronology of clear-cut banking crisis episodes that are free of false positives, albeit at the expense of potentially selecting more severe episodes. This section provides details on constructing the BVX Crisis List, which uses bank equity returns along with narrative information on crises to refine the existing chronology of banking crises in a systematic way. There is obviously no single correct definition of a banking crisis or list of them, but our goal is to provide one possible

construction of clear-cut crisis episodes based on systematic criteria emphasizing bank equity losses, bank failures, and panics.

To construct the BVX Crisis List, we actually construct two chronologies. The first is a chronology of "bank equity crises." We build this list by first screening for cumulative 30% declines in bank equity, which may indicate *potential* banking crises, then only including the subset of these with narrative evidence of widespread bank failures. *Widespread bank failures* is defined as the failure of a top-5 (by assets) bank or more than five total banks failures above the normal rate of bank failures.[34] The second is a chronology of "panic banking crises," based on the list of panics from Table A2. The union of these two sets is the BVX Crisis List, which we present in Table 6. The BVX Crisis List distinguishes between crises involving bank equity losses and those involving panics (or both), emphasizing that banking crises take various forms. We date the start of each crisis as the year in which the bank equity index first falls more than 30% from its previous peak. (In cases in which there is no cumulative 30% decline, we use the Narrative Crisis date.) We also list the bank equity peak-to-trough real total return in Table 6 (i.e. the cumulative return from the previous peak before the crisis to the subsequent trough, based on annual data) as a measure of the severity of each banking crisis.[35,36]

Our new bank equity data allow us to uncover 27 newly-identified crises (meaning they are not Narrative Crisis episodes), which are marked with an asterisk in Table 6. While some of them are newly-identified just because they are very recent episodes (e.g., the 2011 Eurozone crises), others are "forgotten" historical crises (meaning that they do not appear to have been known by the authors of the Narrative Crisis lists), such as the following examples[37]:

---

[34] See Appendix Section I.B for a more detailed definition of "widespread bank failure" and for historical documentation of bank failures for each episode. A "bank failure" is defined broadly to include forced mergers, restructurings, government equity injections, and nationalizations of nearly failing banks.

[35] We also revise the starting years of all bank crises (see Table A12, Panel A) to correspond with the initial year of 30% bank stocks crashes. Of course, there are reasons why the narrative accounts date the starting year when they do. With the new dates, our goal is simply to offer additional and alternative information about when markets first recognized the bank equity losses. See Table A2 for a comparison with the Narrative Crisis dates, which in most cases are very similar. Also, on the BVX Crisis List, we occasionally combined several pairs of episodes occurring close together in time (see Table A12 Panel B), when it seems more appropriate to consider them as a single crisis (i.e. when bank equity returns did not show two separate declines and when the narrative evidence on bank failures conveyed a continuous sequence of banking distress across time, not clustered into two phases).

[36] In Appendix Section VI.C and Figure A15, we use these crisis severity measures to analyze episodes from the global Great Depression, in which there is some debate about which countries experienced severe banking crises.

[37] They have not been forgotten by all banking crisis historians, as we collect narrative evidence on each of these episodes, as presented here.

- Belgium in 1876. As reported by Grossman (2010): "the boom in Belgium after the Franco-Prussian war led to the establishment of new banks. Several of these failed when the international crisis of 1873 arrived in Belgium. A few smaller banks went into receivership, and the larger Banque de Belgique, Banque de Bruxelles, and Banque Central Anversoise had to be re-organized. Durviaux (1947) calls this a serious crisis, while Chelpner (1943) suggests it may have been less serious." In this episode, the bank equity total return index declined by 37.4%.

- Japan in 1922. This episode is distinct from the Japanese banking crises of 1920 and 1923. Shizume (2012) writes: "Ishii Corporation, a lumber company engaged in speculative activities, went bankrupt at the end of February 1922, triggering bank runs in Kochi Prefecture (in south-western part of Japan) and Kansai region (Osaka, Kyoto and their environs). Then, from October through December 1922, bank runs spread far across the country, from Kyushu (the westernmost part of Japan) through Kanto (Tokyo and its environs in eastern Japan)… The BOJ extended 'special loans' to 20 banks from December 1922 to April 1923." In this episode, the bank equity total return index declined by 40.5%.

Table A11 lists the "removed banking crises", which include 53 episodes from the Narrative Crisis list that are not considered banking crises on the BVX Crisis List. Of the "removed banking crises," we mark a subset of them with an asterisk which we consider "spurious banking crises," defined as episodes which have few or no characteristics typically associated with banking crises and are likely the result of clear-cut typographical or historical errors on one of the Narrative Crisis chronologies. [38] As a concrete example, our BVX Crisis List omits Germany in 1977. For this episode, Reinhart and Rogoff (2009) simply report that "Giro institutions faced problems," though we could not find any independent verification from contemporaneous German- or English-language newspaper accounts of any unusual problems affecting the banking sector at the time, and the peak-to-trough bank equity decline was small (-11.7%). These errors are often

[38] The documentation linked to Appendix I.B traces many of the sources of these errors. One problem inherent in many older accounts of crises is that the terms "financial crisis" and "panic" are used variously to describe: monetary crises, currency crises, sovereign debt crises, or even just stock market crashes, without being clear about what they are describing. These other types of financial crises often get conflated with banking crises in secondary sources that cite these original historical accounts.

perpetuated across studies that build on previous chronologies.[39] Bank equity declines thus provide an objective criterion to screen crisis episodes and remove episodes that feature little evidence of any of the features commonly associated with banking crises.

Table 7 summarizes the properties of the BVX Crisis List. Column 1 shows that the average peak-to-trough bank equity decline in BVX Crises is 46.2% and the average peak-to-trough decline in real GDP is 5.5%. Crises with a bank equity decline of greater than 30% display even larger declines in real GDP (column 2). Columns 3 and 4 in Table 7 also provide summary statistics on the newly-uncovered crises and removed crises. Column 3 shows that the newly-identified crises display larger declines in bank equity and real GDP compared to the average for all episodes on the BVX Crisis List (column 1), suggesting that these added episodes are worthy of being considered crises. In contrast, column 4 shows that the removed episodes are considerably less severe, suggesting that some of these episodes may indeed be "spurious crises".

To assess potential biases of the narrative lists, we compare the BVX Crisis List with various narrative crisis lists. Appendix Figure A16 compares the macroeconomic consequences of BVX Crisis List episodes with those from Reinhart and Rogoff (2009) and Laeven and Valencia (2013). Appendix Table A13 likewise compares along various banking crisis dimensions. Compared to Reinhart and Rogoff's list of banking crises, for example, we find the consequences of the BVX Crisis List episodes are actually slightly *more* severe in terms of the decline in real GDP and credit-to-GDP.[40] These results are discussed in detail in Appendix Section VI.D. The fact

[39] For example, Reinhart and Rogoff (2009) call Italy in 1935 a crisis, because Bordo et al. (2001) consider it a crisis, because, in turn, Bernanke and James (1991) consider it a crisis, though it is unlikely that any banking crisis, however defined, started in 1935. In fact, the main banking crisis in Italy erupted in 1930 and by 1935 was largely resolved (the entire banking sector had largely been nationalized). According to Italian government records, the only bank to fail in 1935 was Credito Marittimo, which had been nationalized years earlier and was only finally liquidated by the government in 1935.

[40] Table A13 Panel B performs the same comparison with Laeven and Valencia's crisis chronology (on the same time sample, 1970-2012). On average, BVX crisis episodes are slightly less severe than Laeven and Valencia's, perhaps because Laeven and Valencia only identify crises that are serious enough to warrant several forms of major government intervention. In unreported results we find that the BVX Crisis List episodes are more severe than Schularick and Taylor's (when compared on their sample of 14 countries) and Bordo et al.'s. As an alternative way to compare the accuracy of the BVX Crisis List and previous chronologies, Table A14 shows that a variety of crises indicators (real GDP growth, bank equity returns, and credit growth) line up more closely with the BVX Crisis List than with crises identified by Reinhart and Rogoff (2009) and Laeven and Valencia (2013).

that the BVX Crisis List is on average more severe may be, in large part, due to eliminating many spurious crises from their list.[41]

VII. Conclusion

By constructing a new historical dataset of bank equity returns for 46 countries going back to 1870, we document that large bank equity declines are a strong predictor of lower subsequent GDP growth and bank credit-to-GDP, even after controlling for nonfinancial equity returns. The relation between bank equity returns and subsequent macroeconomic outcomes is highly nonlinear, showing that bank equity is particularly informative about severe negative macroeconomic events involving a decline in intermediated credit. The informativeness of large declines in bank equity allows us to map out a broader sample of crises, including banking crises with and without panics. By separately examining these subsamples of crisis episodes, we find that while large bank equity declines coupled with narrative evidence of panics are followed by the most severe macroeconomic downturns, episodes of non-panic banking distress also translate into prolonged output gaps and non-trivial credit contractions. Moreover, panics, when they do occur, tend to come after substantial bank equity declines, reflecting the fact that large current and expected future losses have already been realized by equity investors.

Our results suggest that the defining feature of a banking crisis is a bank capital crunch. These capital crunches often, though not always, lead bank creditors to run on bank debt, especially once large current and expected future losses have been realized and banks appear sufficiently undercapitalized. However, even when panics are averted, for example by implicit or explicit guarantees, an undercapitalized banking system is still unable to adequately service the economy. Thus, it is important for regulators to focus on bank capital adequacy during emerging crises, in addition to preventing funding pressures and outright panics. Furthermore, while credit spreads directly capture panic-like disruptions in credit markets, bank equity, by being more information-sensitive to banking sector health, may give more information about the state of the banking sector in the early stages of the crisis. Our evidence suggests that simple bank equity measures, in addition

[41] On the BVX Crisis List, we removed 44 events from Reinhart and Rogoff's list, and these removed events have an average GDP decline of -2.1%. Thus, this small average GDP decline from removed crises likely biases down the average severity of Reinhart and Rogoff's crises.

to credit expansion measures, provide a useful real-time barometer of the health of the banking sector.

As a final caveat, we emphasize that while our results provide new insights into the roles of bank losses and panics, we cannot causally identify the role of bank losses and panics in depressing bank lending and output. Our episodes of large bank equity declines capture broad episodes of bank distress and output contraction, but these declines may in part be due to weak corporate and household balance sheets, beyond banking sector distress itself. We look forward to future work that attempts to disentangle the causal roles of the bank lending channel, banking panics, and non-financial balance sheet distress.

References

Admati, Anat, and Martin Hellwig. *The Bankers' New Clothes: What's Wrong with Banking and What to Do about It*. Princeton University Press, 2014.

Adrian, Tobias, Nina Boyarchenko, and Domenico Giannone. "Vulnerable Growth." *American Economic Review* 109, no. 4 (2019): 1263-89.

Allen, Franklin, and Douglas Gale. "Optimal Financial Crises." *Journal of Finance* 53, no. 4 (1998): 1245-1284.

Amiti, Mary, and David Weinstein. "Exports and Financial Shocks." *Quarterly Journal of Economics* 126, no. 4 (2011): 1841-1877.

Artavanis, Nikolaos, Daniel Paravisini, Claudia Robles-Garcia, Amit Seru, and Margarita Tsoutsoura. "Deposit Withdrawals." Working paper, 2019.

Baron, Matthew, and Wei Xiong. "Credit Expansion and Neglected Crash Risk." *Quarterly Journal of Economics* 132, no. 2 (2017): 713-764.

Bernanke, Ben, and Cara Lown. "The Credit Crunch." *Brookings Papers on Economic Activity* 1991, no. 2 (1991): 205-247.

Bernanke, Ben, and Harold James. "The Gold Standard, Deflation, and Financial Crisis in the Great Depression: An International Comparison." In *Financial Markets and Financial Crises*, pp. 33-68. University of Chicago Press, 1991.

Bernanke, Ben. "The Real Effects of the Financial Crisis." *Brookings Papers on Economic Activity* 20 (2018).

Bordalo, Pedro, Nicola Gennaioli, and Andrei Shleifer. "Diagnostic Expectations and Credit Cycles." *Journal of Finance* 73, no. 1 (2018): 199-227.

Bordo, Michael, Barry Eichengreen, Daniela Klingebiel, and Maria Soledad Martinez-Peria. "Is the Crisis Problem Growing More Severe?" *Economic Policy* 16, no. 32 (2001): 52-82.

Boyd, John, Gianni De Nicolo, and Tatiana Rodionova. "Banking Crises and Crisis Dating: Disentangling Shocks and Policy Responses." *Journal of Financial Stability* 41 (2019): 45-54.

Brunnermeier, Markus, and Yuliy Sannikov. "A Macroeconomic Model with a Financial Sector." *American Economic Review* 104, no. 2 (2014): 379-421.

Calomiris, Charles. "Banking Crises Yesterday and Today." *Financial History Review* 17, no. 1 (2010): 3-12.

Calomiris, Charles, and Charles Kahn. "The Role of Demandable Debt in Structuring Optimal Banking Arrangements." *American Economic Review* 81, no. 3 (1991): 497-513.

Calomiris, Charles, and Gary Gorton. "The Origins of Banking Panics: Models, Facts, and Bank Regulation." In *Financial Markets and Financial Crises*, pp. 109-174. University of Chicago Press, 1991.

Calomiris, Charles, and Joseph Mason. "Fundamentals, panics, and bank distress during the Depression." *American Economic Review* 93, no. 5 (2003): 1615-1647.

Caprio, Gerard, and Daniela Klingebiel. "Bank Insolvency: Bad Luck, Bad Policy, or Bad Banking?" In *Annual World Bank Conference on Development Economics*, vol. 79, World Bank publication (1996).

Caprio, Gerard, and Daniela Klingebiel. "Episodes of Systemic and Borderline Banking Crises." In *Managing the Real and Fiscal Effects of Banking Crises*, World Bank publication (2003): 31-49.

Chari, Varadarajan, and Ravi Jagannathan. "Banking Panics, Information, and Rational Expectations Equilibrium." *Journal of Finance* 43, no. 3 (1988): 749-761.

Chelpner, B. *Belgian Banking and Banking Theory*. Washington: Brookings Institution, 1943.

Chodorow-Reich, Gabriel. "The Employment Effects of Credit Market Disruptions: Firm-Level Evidence from the 2008–9 Financial Crisis." *Quarterly Journal of Economics* 129, no. 1 (2014): 1-59.

Coombs, Charles. "Treasury and Federal Reserve Foreign Exchange Operations." *Monthly Review* (New York Fed) 55 (1973): 47-65.

Covitz, Daniel, Nellie Liang, and Gustavo Suarez. "The Evolution of a Financial Crisis: Collapse of the Asset-Backed Commercial Paper Market." *Journal of Finance* 68, no. 3 (2013): 815-848.

Dang, Tri Vi, Gorton, Gary and Holmström, Bengt. "The Information View of Financial Crises." *Annual Review of Financial Economics*, forthcoming (2019).

Demirgüç-Kunt, Asli, and Enrica Detragiache. "Cross-Country Empirical Studies of Systemic Bank Distress: A Survey." *National Institute Economic Review* 192, no. 1 (2005): 68-83.

Denison, Erin, Michael Fleming, and Asani Sarkar. "The Indirect Costs of Lehman's Bankruptcy". Liberty Street Economics blog, Federal Reserve Bank of New York, 2019. https://libertystreeteconomics.newyorkfed.org/2019/01/the-indirect-costs-of-lehmans-bankruptcy.html

Diamond, Douglas, and Philip Dybvig. "Bank Runs, Deposit Insurance, and Liquidity." *Journal of Political Economy* 91, no. 3 (1983): 401-419.

Doyran, Mine Aysen. *Financial Crisis Management and the Pursuit of Power: American Pre-eminence and the Credit Crunch*. Routledge, 2016.

Driscoll, John, and Aart Kraay. "Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data." *Review of Economics and Statistics* 80, no. 4 (1998): 549-560.

Durviaux, Roland. *La Banque Mixte: Origine et Soutien de l'Expansion Économique de la Belgique*. E. Bruylant, 1947.

Fitz-Gibbon, Bryan, and Marianne Gizycki. "A History of Last-Resort Lending and Other Support for Troubled Financial Institutions in Australia." Reserve Bank of Australia Research Discussion Paper, 2001.

Friedman, Milton, and Anna Schwartz. *A Monetary History of the US 1867-1960*. Princeton University Press, 1963.

Gennaioli, Nicola, and Andrei Shleifer. *A Crisis of Beliefs: Investor Psychology and Financial Fragility*. Princeton University Press, 2018.

Gertler, Mark, and Nobuhiro Kiyotaki. "Financial Intermediation and Credit Policy in Business Cycle Analysis." In *Handbook of Monetary Economics*, vol. 3, pp. 547-599. Elsevier, 2010.

Gertler, Mark, and Nobuhiro Kiyotaki. "Banking, Liquidity, and Bank Runs in an Infinite Horizon Economy." *American Economic Review* 105, no. 7 (2015): 2011-43.

Goldstein, Itay, and Ady Pauzner. "Demand–Deposit Contracts and the Probability of Bank Runs." *Journal of Finance* 60, no. 3 (2005): 1293-1327.

Gorton, Gary. "Banking Panics and Business Cycles." *Oxford Economic Papers* 40, no. 4 (1988): 751-781.

Gorton, Gary. "The Panic of 2007." NBER Working Paper No. w14358. National Bureau of Economic Research, 2008. https://www.nber.org/papers/w14358

Gorton, Gary. "Some Reflections on the Recent Financial Crisis." *Trade, Globalization and Development*. pp. 161-184. Springer, 2014.

Gorton, Gary, and George Pennacchi. "Financial Intermediaries and Liquidity Creation." *Journal of Finance* 45, no. 1 (1990): 49-71.

Gorton, Gary, and Lixin Huang. "Banking panics and the origin of central banking." D. Altig, B. Smith (Eds.), *Evolution and Procedures of Central Banking*, Cambridge University Press, Cambridge (2003): 181-219

Greenlaw, David, Jan Hatzius, Anil Kashyap, and Hyun Song Shin. "Leveraged Losses: Lessons from the Mortgage Market Meltdown." In *Proceedings of the US Monetary Policy Forum*, vol. 2008, pp. 8-59. 2008.

Greenwood, Robin, and Samuel Hanson. "Issuer Quality and Corporate Bond Returns." *Review of Financial Studies* 26, no. 6 (2013): 1483-1525.

Greenwood, Robin, Samuel Hanson, and Lawrence Jin. "Reflexivity in Credit Markets." NBER Working Paper No. w25747, 2019. Available at SSRN: https://ssrn.com/abstract=3372051

Grossman, Richard. *Unsettled Account: The Evolution of Banking in the Industrialized World since 1800*. Princeton University Press, 2010.

He, Zhiguo, and Arvind Krishnamurthy. "Intermediary Asset Pricing." *American Economic Review* 103, no. 2 (2013): 732-70.

He, Zhiguo, and Wei Xiong. "Dynamic Debt Runs." *Review of Financial Studies* 25, no. 6 (2012): 1799-1843.

Holmström, Bengt, and Jean Tirole. "Financial Intermediation, Loanable Funds, and the Real Sector." *Quarterly Journal of Economics* 112, no. 3 (1997): 663-691.

Huber, Kilian. "Disentangling the Effects of a Banking Crisis: Evidence from German Firms and Counties." *American Economic Review* 108, no. 3 (2018): 868-98.

Jalil, Andrew. "A New History of Banking Panics in the United States, 1825-1929: Construction and Implications." *American Economic Journal: Macroeconomics* 7, no. 3 (2015): 295-330.

Jordà, Òscar and Richter, Björn and Schularick, Moritz and Taylor, Alan M. "Bank Capital Redux: Solvency, Liquidity, and Crisis." NBER Working Paper No. w23287, 2017. Available at SSRN: https://ssrn.com/abstract=2941265

Jordà, Òscar. "Estimation and Inference of Impulse Responses by Local Projections." *American Economic Review* 95, no. 1 (2005): 161-182.

Kacperczyk, Marcin, and Philipp Schnabl. "When Safe Proved Risky: Commercial Paper during the Financial Crisis of 2007-2009." *Journal of Economic Perspectives* 24, no. 1 (2010): 29-50.

Khwaja, Asim, and Atif Mian. "Tracing the Impact of Bank Liquidity Shocks: Evidence from an Emerging Market." *American Economic Review* 98, no. 4 (2008): 1413-42.

Kiefer, Nicholas, and Timothy Vogelsang. "A New Asymptotic Theory for Heteroskedasticity-Autocorrelation Robust Tests." *Econometric Theory* 21, no. 6 (2005): 1130-1164.

Krishnamurthy, Arvind and Tyler Muir. "How Credit Cycles across a Financial Crisis." Working paper, 2018.

Kryzanowski, Lawrence, and Gordon Roberts. "Canadian Banking Solvency, 1922-1940." *Journal of Money, Credit and Banking* 25, no. 3 (1993): 361-376.

Laeven, Luc, and Fabian Valencia. "Systemic Banking Crises Database." *IMF Economic Review* 61, no. 2 (2013): 225-270.

López-Salido, David, Jeremy Stein, and Egon Zakrajšek. "Credit-Market Sentiment and the Business Cycle." *Quarterly Journal of Economics* 132, no. 3 (2017): 1373-1426.

McCabe, Patrick. "The Cross Section of Money Market Fund Risks and Financial Crises." Finance and Economics Discussion Series working paper, Federal Reserve Board, 2010.

Mian, Atif, Amir Sufi, and Emil Verner. "Household Debt and Business Cycles Worldwide." *Quarterly Journal of Economics* 132, no. 4 (2017): 1755-1817.

Mian, Atif, Amir Sufi, and Emil Verner. "How Does Credit Supply Expansion Affect the Real Economy? The Productive Capacity and Household Demand Channels." *Journal of Finance* 75, no. 2 (2019): 949-994.

Nakamura, Leonard, and Carlos Zarazaga. "Banking and finance in Argentina in the period 1900-35." Working paper, (2001).

Nyberg, Peter, and Mika Vaihekoski. "A new value-weighted total return index for the Finnish stock market." In *Research in international business and finance* 24.3 (2010): 267-283.

Peek, Joe, and Eric Rosengren. "The Capital Crunch in New England." *New England Economic Review* May (1992): 21-31.

Peek, Joe, and Eric Rosengren. "Collateral Damage: Effects of the Japanese Bank Crisis on Real Activity in the United States." *American Economic Review* 90, no. 1 (2000): 30-45.

Puri, Manju, Jörg Rocholl, and Sascha Steffen. "Global Retail Lending in the Aftermath of the US Financial Crisis: Distinguishing Between Supply and Demand Effects." *Journal of Financial Economics* 100, no. 3 (2011): 556-578.

Rampini, Adriano, and S. Viswanathan. "Financial Intermediary Capital." *Review of Economic Studies* 86, no. 1 (2019): 413-455.

Reinhart, Carmen, and Kenneth Rogoff. *This Time is Different: Eight Centuries of Financial Folly*. Princeton University Press, 2009.

Romer, Christina, and David Romer. "New Evidence on the Aftermath of Financial Crises in Advanced Countries." *American Economic Review* 107, no. 10 (2017): 3072-3118.

Schroth, Enrique, Gustavo Suarez, and Lucian Taylor. "Dynamic Debt Runs and Financial Fragility: Evidence from the 2007 ABCP Crisis." *Journal of Financial Economics* 112, no. 2 (2014): 164-189.

Schularick, Moritz, and Alan Taylor. “Credit Booms Gone Bust: Monetary Policy, Leverage Cycles, and Financial Crises, 1870-2008.” *American Economic Review* 102, no. 2 (2012): 1029-61.

Schwartz, Anna. “Real and Pseudo-Financial Crises.” In *Money in Historical Perspective*, pp. 271-288. University of Chicago Press, 1987.

Shizume, Masato. “The Japanese Economy during the Interwar Period: Instability in the Financial System and the Impact of the World Depression.” In *The Gold Standard Peripheries*, pp. 211-228. Palgrave Macmillan, London, 2012.

Stock, James, and Mark Watson. “Forecasting Output and Inflation: The Role of Asset Prices.” *Journal of Economic Literature* 41, no. 3 (2003): 788-829.

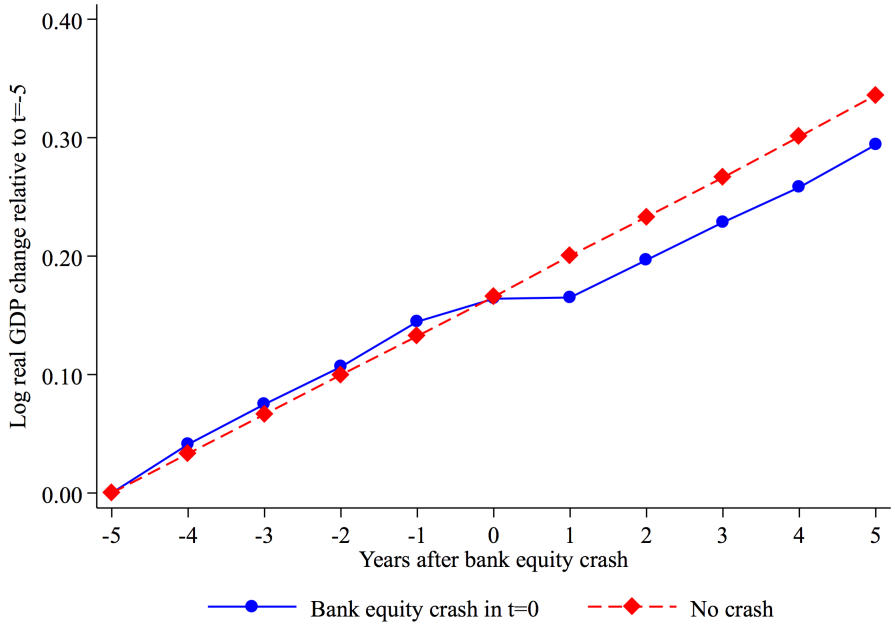
Syron, Richard. “Are We Experiencing a Credit Crunch?” *New England Economic Review*, July (1991): 3-10.

Waldenström, Daniel. “Swedish stock and bond returns, 1856–2012.” Working paper, 2014.

Figure 1: Dynamics of output and credit around bank equity crashes

This figure presents the average dynamics of real GDP and credit-to-GDP around 30% bank equity crashes. Bank equity crashes are defined to occur in year $t = 0$. Each panel plots cumulative growth in a given variable from five years before a bank equity crash ($t = -5$) to five years after the crash ($t = 5$). For comparison, average dynamics around years with no crash are presented in red.

(A) Real GDP



(B) Credit-to-GDP

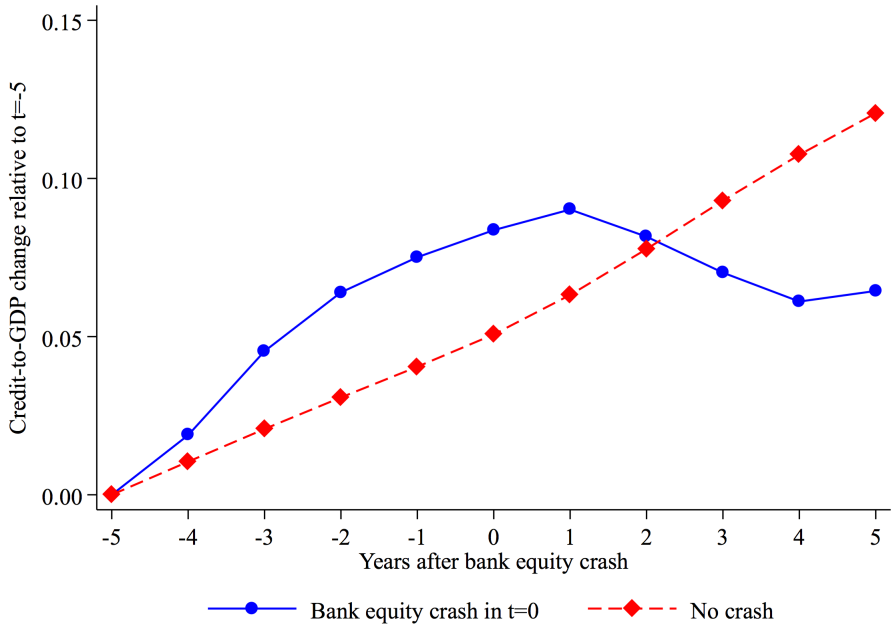
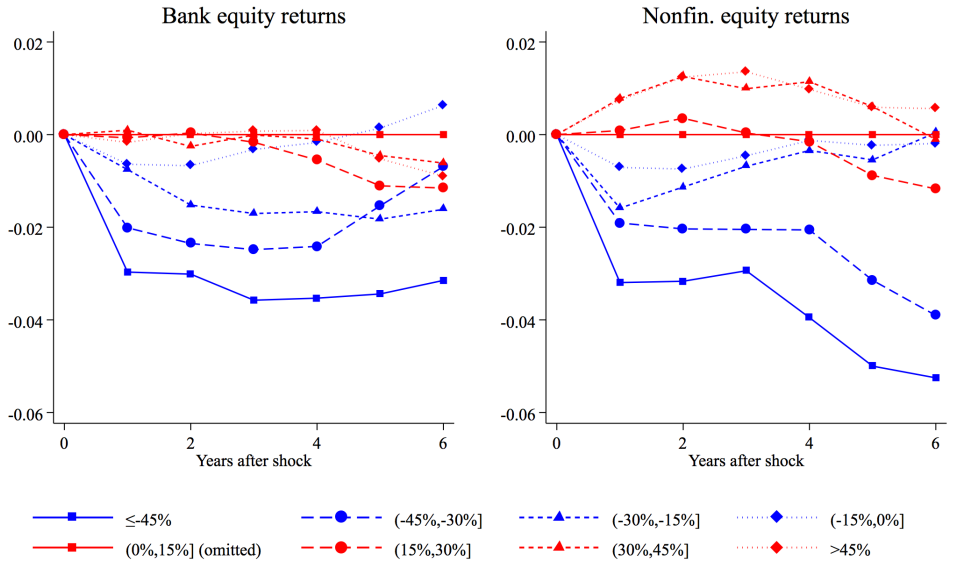


Figure 2: Bank equity crashes predict output gaps and credit contraction

This figure plots the impact of bank equity and nonfinancial equity returns on real GDP (Panel A) and bank credit-to-GDP (Panel B). The responses are estimated jointly using Equation 1, which includes eight bins of bank and nonfinancial equity returns to capture the predictive content across the return distribution. The specification controls for country fixed effects, contemporaneous real GDP growth and change in credit-to-GDP, and three lags of real GDP growth, change in credit-to-GDP, and bank and nonfinancial equity return bins. The responses to bank equity and nonfinancial equity returns are estimated jointly. The x-axis is time in years, and the y-axis is real GDP or bank credit-to-GDP relative to the omitted return bin (return between 0% and 15%).

(A) Real GDP response



(B) Credit-to-GDP response

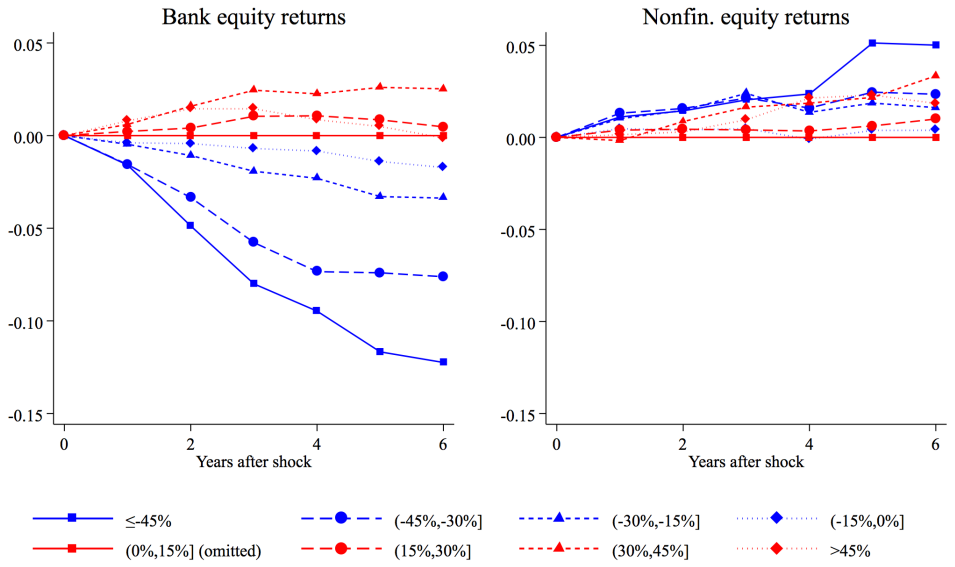
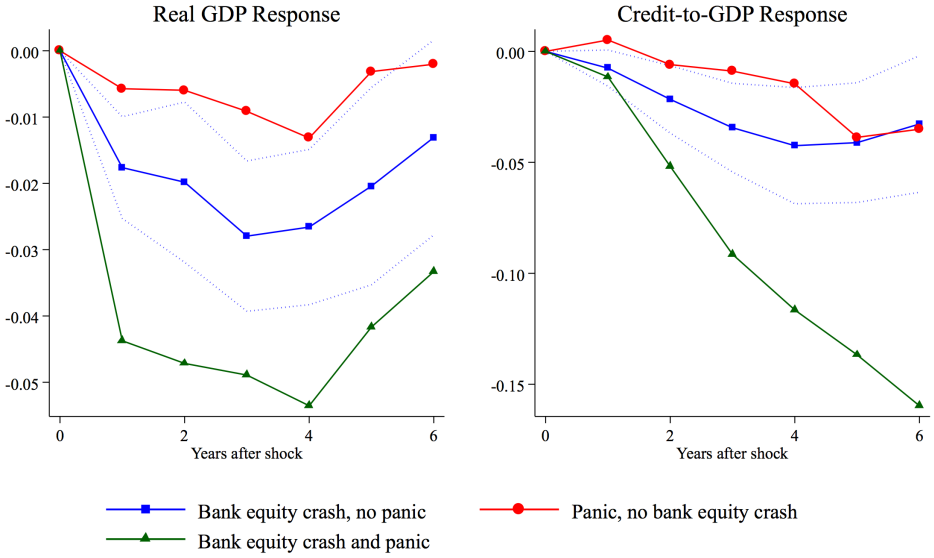


Figure 3: Banking distress with and without banking panics

This figure presents the response of real GDP and credit-to-GDP to 30% bank equity crashes, distinguishing between 30% bank equity crashes that coincide with a banking panic and crashes that are not associated with a panic. The impulse responses are estimated from Equation 3. Panel A presents the results from the baseline specification. Panel B analyzes episodes with a 30% bank equity crash *and* narrative evidence of widespread bank failures. The specification controls for country fixed effects, contemporaneous real GDP growth and change in credit-to-GDP, and three lags of real GDP growth, change in credit-to-GDP, and bank and nonfinancial equity return bins. The dashed lines represent 95% confidence intervals based on Driscoll-Kraay standard errors with a lag length of six.

(A) Baseline



(B) Conditioning on bank failures

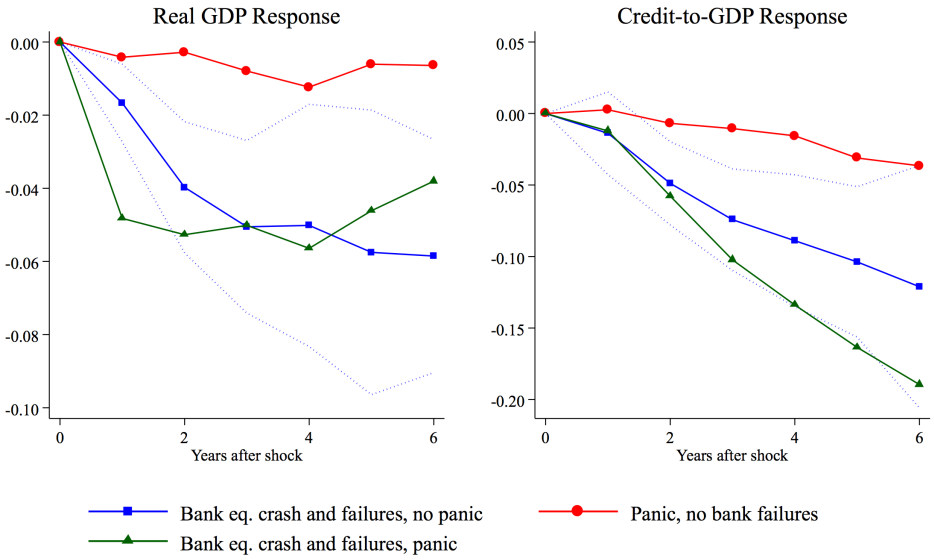
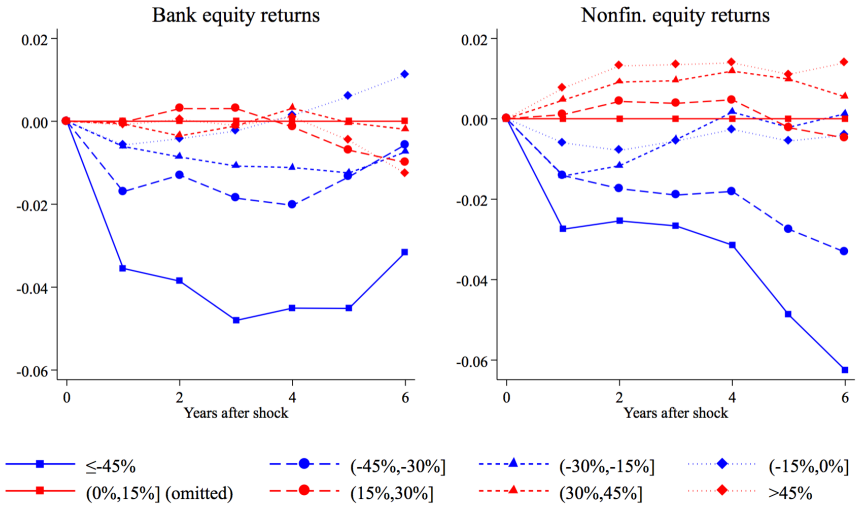


Figure 4: Impact of bank equity crashes outside of narrative banking crisis episodes

This figure shows that bank equity crashes predict output gaps and credit contraction even excluding episodes with narrative evidence of panics or widespread bank failures. Local projection impulse responses are estimated as in Figure 2 but exclude observations within a ±3-year window around a panic or an episode of widespread bank failures.

(A) Real GDP response



(B) Credit-to-GDP response

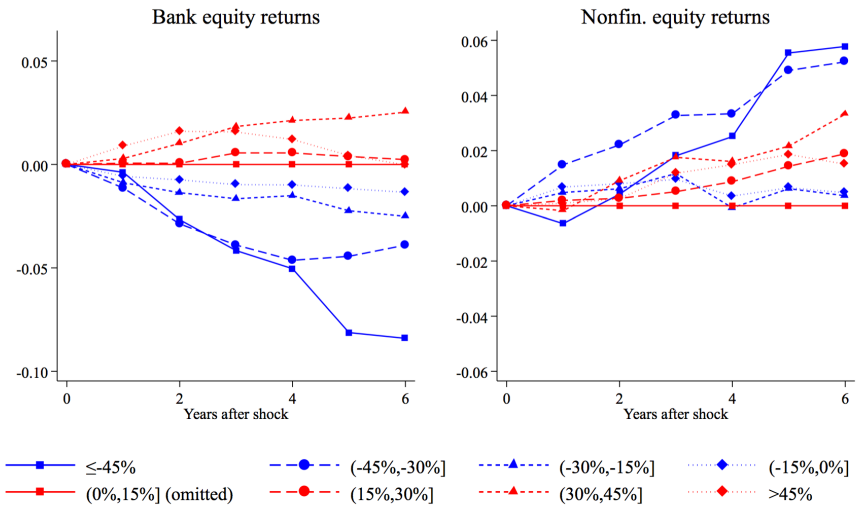


Figure 5: Equity returns and credit spreads around the U.S. 2007-8 banking crisis

This figure plots bank and nonfinancial equity total return indexes and credit spreads around the U.S. 2007-8 banking crisis. The bank equity index is in blue, the nonfinancial equity index is in red, corporate credit spreads are in black (dashed is the AAA 10-year Corporate minus 10-year Treasury spread, solid is the BAA minus AAA 10-year Corporate spread), and the 3-month LIBOR minus OIS spread is in green. The scale on the left corresponds to equity returns, and the scale on the right corresponds to bond yield spreads.

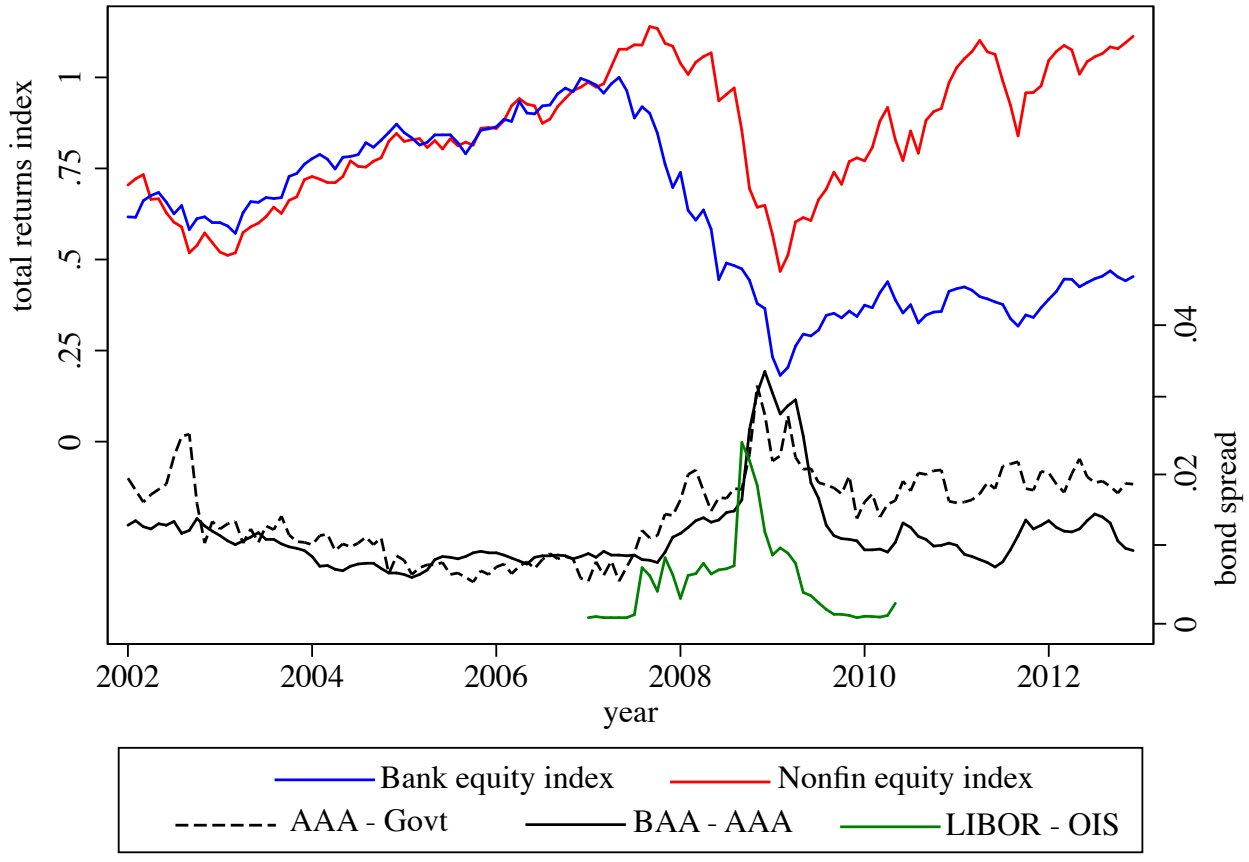
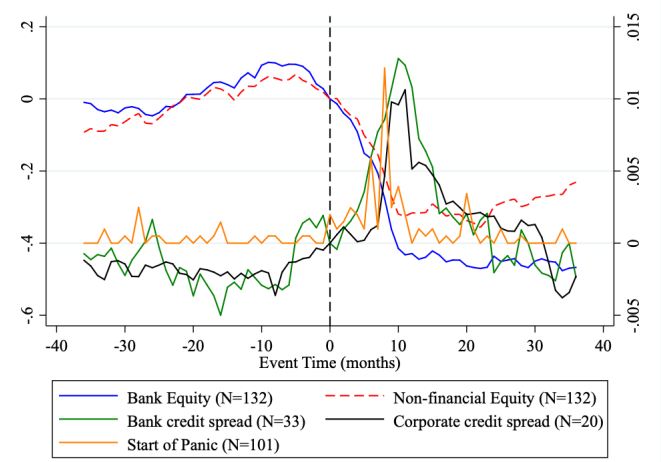


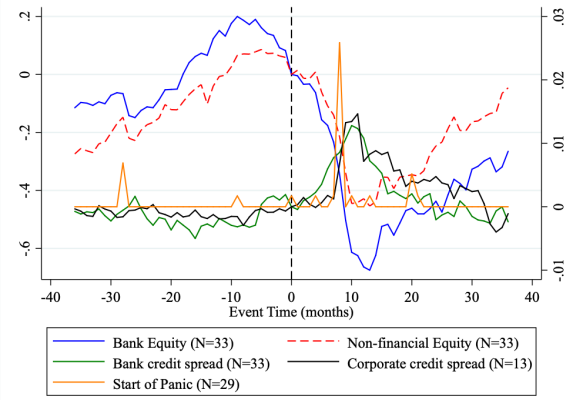
Figure 6: Timing of bank equity declines relative to panics and other financial market indicators

This figure compares the average evolution, around BVX Crises, of monthly bank equity returns relative to a series of other financial market indicators. The other financial market indicators are nonfinancial equity returns, bank credit spreads, corporate credit spreads, and the first month of a banking panic based on narrative accounts. Equity returns correspond to the left axis, and credit spreads correspond to the right axis. Equity indexes and credit spreads are normalized to 0 in event month 0, defined as January of the BVX crisis year. The curve representing the Start of Panic is a frequency plot of the first month of the banking panic based on narrative accounts. The Start of Panic curve corresponds to a third axis that we omit to minimize clutter, but the area under this curve is one. Panel A presents results for the full sample, Panel B uses a sample where bank equity, nonfinancial equity, and bank credit spreads are all non-missing, and Panels C to E present results across subsamples.

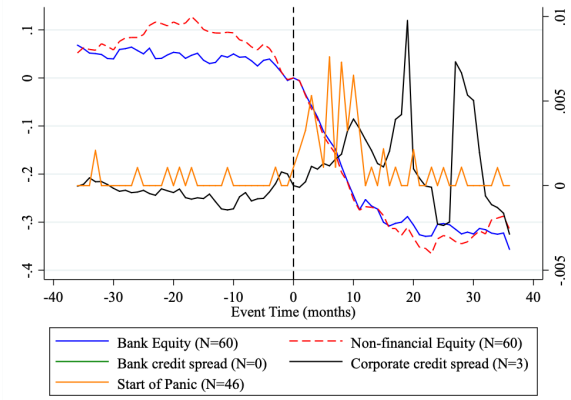
(A) Full sample



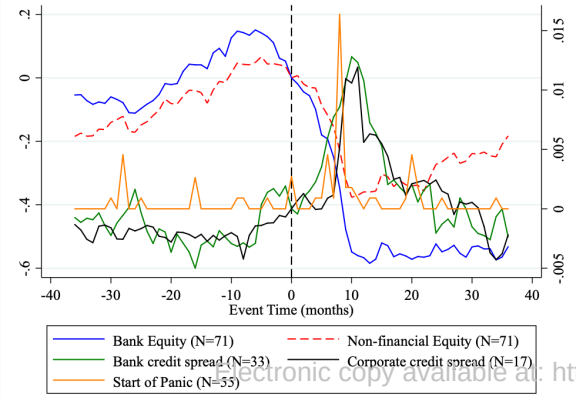
(B) Consistent sample



(C) 1870-1939



(D) 1940-2016



(E) 1940-2006

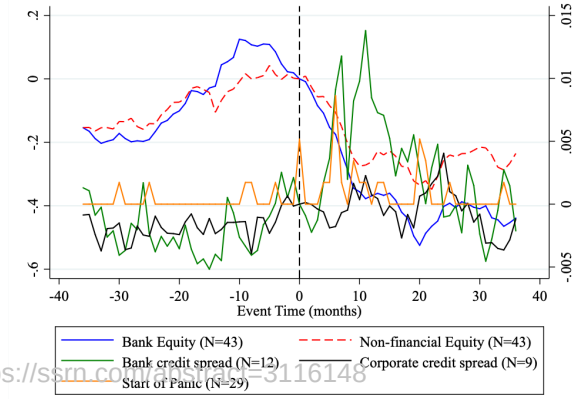
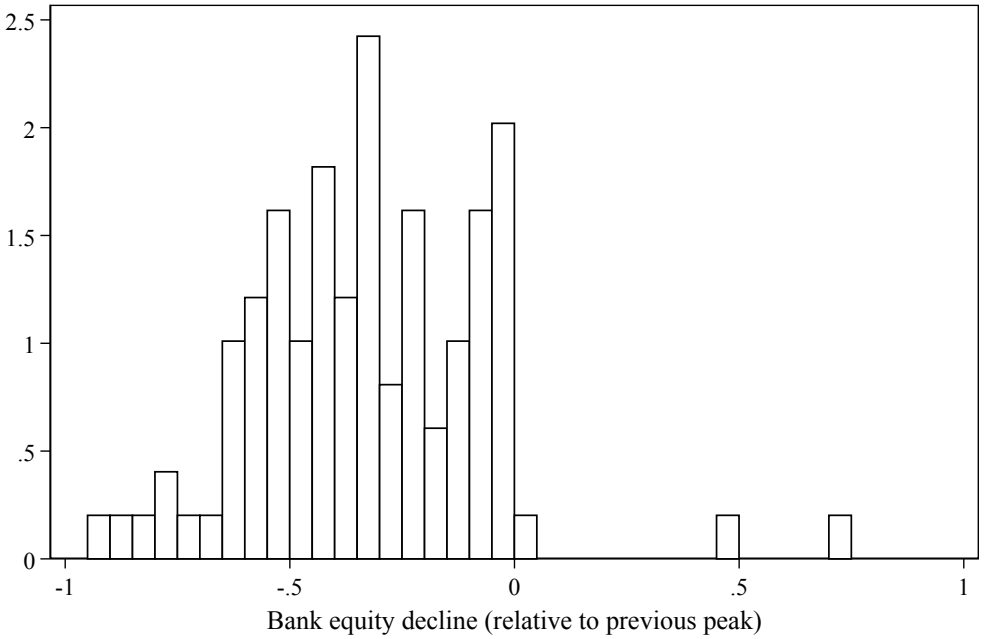


Figure 7: Bank equity falls substantially before the start of banking panics

This figure illustrates that bank equity falls substantially (on average by 36%) before a banking panic. Panel A shows the distribution of bank equity returns from its previous peak to the month before a panic. The unit of observation is an episode in which a panic occurred and the month of the panic is known. Panel B is the bank equity decline from Panel A normalized by the eventual total peak-to-trough decline.

(A) Bank equity decline up to month before panic



(B) As a percentage of total eventual peak-to-trough decline

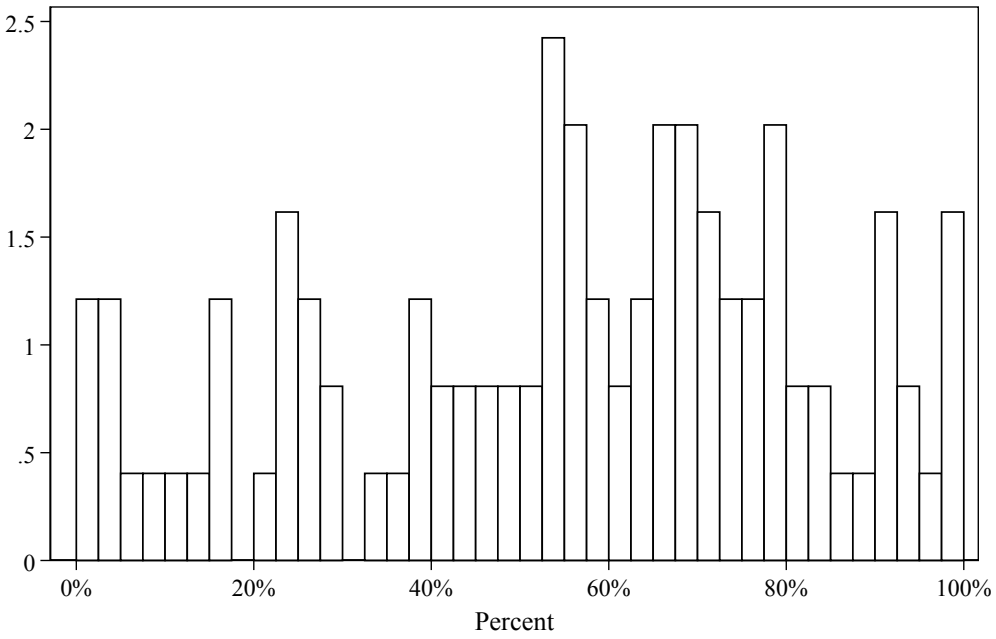


Table 1: Narrative-based banking crises in Germany

This table illustrates disagreement among narrative-based chronologies regarding the occurrence of historical banking crises, focusing on the case of Germany (similar results hold for other countries, see Appendix Table A1). It lists the occurrence of banking crises according to six prominent papers. Years listed correspond to the starting year of the banking crisis, according to each paper. A "0" means that the source reports no banking crisis in a given year, while a blank cell means that the crisis is not covered in the sample period. Note that Demirguc-Kunt and Detragiache (2005) focus on the period 1980-2002 and do not report any crises for Germany during this period.

Reinhart Rogoff	Schularick Taylor	Laeven Valencia	Bordo	Caprio Klingebiel	Demirguc-Kunt & Detragiache
0	1873				
1880	0				
1891	1891		0		
1901	1901		1901		
0	1907		0		
1925	0		0		
1929	1931		1931		
1977	0	0	0	late 1970s	
2008	2008	2008		0	

Table 2: Bank equity crashes predict output gaps and credit contraction

This table shows that bank equity crashes predict lower subsequent real GDP and credit-to-GDP. The results are estimated using Equation 2. A bank (nonfinancial) equity crash is defined as 30% decline in the bank (nonfinancial) equity real total return index from year $t-1$ to year t. Controls are contemporaneous real GDP growth and credit-to-GDP change, as well as three lags in the bank equity crash indicator, nonfinancial equity crash indicator, credit-to-GDP change, and real GDP growth. t-statistics in brackets are computed from Driscoll-Kraay standard errors with a lag length of six. *,**,*** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively, computed from fixed-b p-values based on Kiefer and Vogelsang (2005).

Panel A: Real GDP growth

	Real GDP growth$_{t,t+1}$			Real GDP growth$_{t,t+3}$		
	(1)	(2)	(3)	(4)	(5)	(6)
Bank equity crash	-0.033***	-0.026***	-0.019***	-0.045***	-0.034***	-0.029***
	[-9.90]	[-8.12]	[-8.45]	[-6.20]	[-5.92]	[-8.05]
Nonfinancial equity crash	-0.023***	-0.022***	-0.010**	-0.031**	-0.029**	-0.023**
	[-3.87]	[-5.12]	[-2.36]	[-2.61]	[-2.83]	[-2.77]
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls		✓	✓		✓	✓
Year fixed effects			✓			✓
Adj. R^2 (within)	0.11	0.19	0.09	0.05	0.11	0.07
N	2548	2548	2548	2548	2548	2548

Panel B: Credit-to-GDP change

	Credit-to-GDP change$_{t,t+1}$			Credit-to-GDP change$_{t,t+3}$		
	(1)	(2)	(3)	(4)	(5)	(6)
Bank equity crash	-0.020**	-0.010	-0.011*	-0.077***	-0.057***	-0.051***
	[-2.81]	[-1.72]	[-2.07]	[-6.10]	[-5.08]	[-4.70]
Nonfinancial equity crash	0.010**	0.0071**	0.0031	0.0077	0.0035	-0.0038
	[2.72]	[2.36]	[0.82]	[0.71]	[0.37]	[-0.32]
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls		✓	✓		✓	✓
Year fixed effects			✓			✓
Adj. R^2 (within)	0.01	0.22	0.21	0.03	0.14	0.13
N	2535	2535	2535	2535	2535	2535

Table 3: Impact of banking distress with and without panics

This table presents the response of real GDP and credit-to-GDP to 30% bank equity crashes, distinguishing between 30% bank equity crashes that coincide with a banking panic and crashes that are not associated with a panic. The coefficients are estimated from Equation 3. Panel A presents the results from the baseline specification. Panel B defines episodes of banking sector distress as years with a 30% bank equity crash *and* narrative evidence of widespread bank failures ("Bank eq. crash and failures"). The specification controls for country fixed effects, contemporaneous real GDP growth and change in credit-to-GDP, and three lags of real GDP growth, change in credit-to-GDP, and all right-hand-side variables in the table. t-statistics in brackets are computed from Driscoll-Kraay standard errors with a lag length of six. *,**,*** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively, computed from fixed-b p-values of Kiefer and Vogelsang (2005).

Panel A: Baseline

	Real GDP growth$_{t,t+3}$			Credit-GDP change$_{t,t+3}$		
	(1)	(2)	(3)	(4)	(5)	(6)
Bank equity crash	-0.030***	-0.028***	-0.023***	-0.050***	-0.034***	-0.032***
	[-3.95]	[-4.88]	[-5.60]	[-3.95]	[-3.40]	[-2.80]
Panic	-0.022**	-0.0091	0.0034	0.0046	-0.0089	-0.0084
	[-2.27]	[-0.93]	[0.37]	[0.32]	[-0.65]	[-0.56]
Bank equity crash × Panic	-0.026**	-0.012	-0.021**	-0.075***	-0.048*	-0.044*
	[-2.61]	[-1.37]	[-2.71]	[-3.26]	[-1.99]	[-1.77]
Nonfinancial equity crash	-0.029**	-0.028**	-0.024**	0.0092	0.0038	-0.0044
	[-2.39]	[-2.72]	[-2.77]	[0.77]	[0.38]	[-0.36]
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls		✓	✓		✓	✓
Year fixed effects			✓			✓
Adj. R^2 (within)	0.06	0.11	0.07	0.03	0.15	0.13
N	2548	2548	2548	2536	2536	2536

Panel B: Conditioning on bank failures

	Real GDP growth$_{t,t+3}$			Credit-GDP change$_{t,t+3}$		
	(1)	(2)	(3)	(4)	(5)	(6)
Bank eq. crash and failures	-0.062***	-0.051***	-0.039***	-0.11***	-0.074***	-0.074***
	[-4.04]	[-4.23]	[-4.50]	[-3.99]	[-4.14]	[-4.50]
Panic	-0.024**	-0.0079	0.00022	0.0021	-0.011	-0.0081
	[-2.58]	[-0.74]	[0.018]	[0.17]	[-0.87]	[-0.59]
Bank eq. crash and failures × Panic	0.0062	0.0083	0.0036	-0.028	-0.018	-0.014
	[0.38]	[0.51]	[0.23]	[-0.84]	[-0.64]	[-0.51]
Nonfinancial equity crash	-0.037***	-0.036***	-0.029***	-0.0044	-0.0046	-0.0078
	[-4.07]	[-4.55]	[-3.32]	[-0.54]	[-0.59]	[-0.70]
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls		✓	✓		✓	✓
Year fixed effects			✓			✓
Adj. R^2 (within)	0.06	0.11	0.07	0.03	0.16	0.15
N	2548	2548	2548	2536	2536	2536

Table 4: Timing of bank equity crashes relative to panics, nonfinancial equity crashes, and credit spread spikes

This table analyzes monthly data around BVX Crisis List episodes to compare the relative timing of various other financial market indicators. Panel A compares the timing of 30% bank equity crashes with the panic start date, credit spread spikes, and narrative crisis start dates. The time difference is positive if the bank equity crash is recorded before the other event and negative if after the event. Panel B column 1 records the average time difference in months between detecting a 30% bank equity crash relative to a 30% nonfinancial equity crash. Column 2 records the average time difference in months between a bank equity peak and a nonfinancial equity peak. Column 3 records the average duration of a bank equity crash from peak to trough. For each column in all panels, a t-statistic is calculated under the null hypothesis that the average time difference is zero. As an alternative non-parametric test, we also count the number of episodes the bank equity decline is recorded first ("pos"), the other event is recorded first ("neg"), or both events are recorded in the same month ("zero"). We then calculate the fraction of times that the bank equity decline happens first ("pos / (pos + neg)") and calculate a p-value under the null hypothesis that the bank equity decline happening first is Bernoulli-distributed with parameter 0.50. *,**,*** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Panel A: Bank equity crashes detect the crisis before panics, credit spread spikes, and narrative crisis dates

	Before panic	Before Reinhart-Rogoff start dates	Before earliest narrative start dates	Before 2% spike in bank credit spread	Before 1% spike in bank credit spread	Before 2% spike in corp credit spread	Before 1% spike in corp credit spread
Average (in months, signed)	7.46***	3.22**	2.94**	6.10***	3.37**	9.11***	4.11*
t-stat	4.92	2.52	2.43	5.87	1.97	6.65	1.75
N	93	94	102	40	41	19	19
Pos	69	39	33	32	23	16	12
Zero	5	33	53	4	2	1	0
Neg	19	22	16	4	16	2	7
Pos / (Pos + Neg)	78.4%***	63.9%**	67.3%**	88.89%***	59.0%	88.9%***	63.2%
p-value	0.000	0.020	0.011	0.000	0.168	0.001	0.180

Panel B: Bank equity crashes pick up the crisis first before nonfinancial equity crashes

	Before nonfin. eq. crash	Bank equity peaks before nonfin. eq. peak	Duration of bank equity decline
Average (in months, signed)	1.94**	1.37**	27.17***
t-stat	2.44	2.11	24.32
N	127	138	140
Pos	65	56	Duration $\geq$ 24 mo. = 85 episodes
Zero	16	40	
Neg	46	42	Duration $<$ 24 mo. = 55 episodes
Pos / (Pos + Neg)	58.56%**	57.1%*	% Duration $\geq$ 24 mo. = 61%***
p-value	0.044	0.094	0.007

Table 5: Distribution of credit spread increases just after bank equity crashes

This table presents the distribution of credit spread increases just after bank equity crashes around BVX Crisis List episodes. Each row presents the distribution of credit spread increases in the month following a given decrease in bank stocks (relative to the previous bank stock peak). For example, the third row of Panel A reports the distribution of credit spread increases when the bank equity index first falls by more than 30%. Panel A presents the analysis for bank credit spreads, and Panel B presents the analysis for corporate credit spreads.

Panel A: The distribution of bank credit spread increases subsequent to bank equity crashes

	... bank credit spreads increase by (in percentage points):								
	10^{th} pctile	20^{th} pctile	30^{th} pctile	40^{th} pctile	50^{th} pctile	60^{th} pctile	70^{th} pctile	80^{th} pctile	90^{th} pctile
When banks stocks fall more than...									
-20%	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.29	0.40
-25%	0.00	0.00	0.00	0.01	0.29	0.36	0.49	0.59	0.63
-30%	0.00	0.00	0.29	0.36	0.52	0.55	0.62	0.85	1.09
-35%	0.29	0.36	0.44	0.52	0.63	0.68	0.85	1.10	1.30
-40%	0.52	0.52	0.54	0.68	0.85	0.86	1.23	1.35	2.02
-45%	0.69	0.69	0.78	0.99	1.29	1.33	2.02	2.50	2.50
-50%	0.98	0.98	0.99	1.33	2.27	2.40	2.81	3.26	5.19
-55%	1.14	1.14	2.27	2.88	3.26	3.26	6.71	6.49	7.11

Panel B: The distribution of corporate credit spread increases subsequent to bank equity crashes

	... corporate credit spreads increase by (in percentage points):								
	10^{th} pctile	20^{th} pctile	30^{th} pctile	40^{th} pctile	50^{th} pctile	60^{th} pctile	70^{th} pctile	80^{th} pctile	90^{th} pctile
When banks stocks fall more than...									
-20%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
-25%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39
-30%	0.00	0.00	0.00	0.00	0.02	0.23	0.23	0.15	1.00
-35%	0.00	0.00	0.11	0.19	0.27	0.34	0.34	0.32	1.14
-40%	0.00	0.12	0.27	0.29	0.41	0.45	0.45	0.41	1.30
-45%	0.36	0.36	0.59	0.73	0.86	0.96	0.96	1.06	1.49
-50%	0.86	0.86	1.16	1.25	1.35	1.41	1.41	1.45	1.88
-55%	1.13	1.13	1.54	1.57	1.59	1.61	1.61	2.67	3.31

Table 6: The BVX Crisis List

This table lists a chronology of banking crisis episodes, covering 46 countries over the period 1870-2016, which we refer to as the BVX Crisis List. The BVX Crisis List is then divided into two (non-mutually exclusive) types of banking crisis episodes: those featuring a panic ("Panic banking crisis") and those featuring both a 30% bank equity crash *and* evidence of widespread bank failures ("Bank equity crisis"). Newly-identified banking crises (i.e., those that did not previously appear on the Narrative Crises list) are marked with a "*". The column labeled "Bank equity return" reports the peak-to-trough real total return for each episode, which is computed as the maximum cumulative decline (based on annual data) in the bank equity real total return index relative to its previous peak. "0" indicates no decline in bank equity. A blank entry indicates a lack of bank equity return data for that episode.

Country	BVX starting year	Bank equity return	Panic banking crisis	Bank equity crisis	Country	BVX starting year	Bank equity return	Panic banking crisis	Bank equity crisis	Country	BVX starting year	Bank equity return	Panic banking crisis	Bank equity crisis
Argentina	1891	-0.307	1	1	Chile (cont.)	1914		1	0	Greece	1929	-0.727	1	1
	1914	-0.473	1	0		1925		1	1		2008	-0.671	1	0
	1930	-0.819	1	0		1931*	-0.356	1	1		2010*	-0.961	1	1
	1934	-0.563	1	1		1976	0	1	0	Hong Kong	1892*	-0.565	1	1
	1980		1	1		1982	-0.837	1	1		1965	-0.196	1	0
	1985		1	1	Colombia	1931*	-0.675	1	0		1982	-0.445	1	1
	1989		1	1		1982	-0.831	0	1		1991	-0.096	1	0
	1995	-0.305	1	1		1998	-0.813	1	1		1998	-0.464	1	1
	2000	-0.656	1	1	Czech	1923		1	1	Hungary	1873*	-0.518	1	1
Australia	1893	-0.469	1	1		1991		1	1		1931		1	1
	1931	-0.230	1	0		1995	-0.904	1	1		1991		0	1
	1989	-0.281	1	0	Denmark	1877	-0.207	1	0		1995*	-0.398	1	1
Austria	1873	-0.715	1	1		1885	-0.043	1	0		2008	-0.671	1	0
	1924	-0.344	0	1		1907	-0.269	1	0	Iceland	1920*	-0.535	1	1
	1931	-0.566	1	1		1919	-0.347	1	1		1930*	-0.359	1	1
	2008	-0.673	1	1		1992	-0.425	0	1		1985		0	1
	2011*	-0.509	0	1		2008	-0.739	1	1		1993		0	1
Belgium	1870	-0.018	1	0		2011*	-0.444	0	1		2008	-0.963	1	1
	1876*	-0.374	1	1	Egypt	1907	-0.132	1	0	India	1913	-0.249	1	0
	1883	-0.139	1	0		1914	-0.407	1	0		1920	-0.495	0	1
	1914		1	1		1931	-0.608	1	1		1993	-0.561	0	1
	1929	-0.831	1	1	Finland	1900		1	1	Indonesia	1990	-0.659	1	1
	1939	-0.511	1	1		1921	-0.569	0	1		1998	-0.88	1	1
	2008	-0.842	1	1		1931	-0.252	1	0	Ireland	2007	-0.918	1	1
	2011*	-0.755	0	1		1990	-0.814	1	1		2010*	-0.908	1	1
Brazil	1890	-0.275	1	0	France	1871		1	0	Israel	1983	-0.499	0	1
	1900	0	1	0		1882	-0.456	1	1	Italy	1873	-0.237	1	0
	1914	-0.374	1	0		1889	-0.106	1	0		1889	-0.348	1	1
	1929	-0.182	1	0		1914	-0.475	1	0		1891	-0.453	1	1
	1985		1	1		1930	-0.571	1	1		1907	-0.24	1	1
	1990		1	0		1937*	-0.435	1	0		1914	-0.333	1	1
	1994		1	1		2008	-0.64	1	0		1921	-0.55	1	1
Canada	1873	0	1	0	Germany	1874	-0.371	1	1		1930	-0.073	1	0
	1920	-0.426	1	1		1891	-0.23	1	0		1992	-0.397	0	1
	1982	-0.164	1	0		1901	-0.05	1	0		2008	-0.575	1	0
Chile	1878		1	1		1914		1	0		2011*	-0.601	0	1
	1898	-0.003	1	0		1930	-0.489	1	1		2016*	-0.304	0	1
	1907		1	1		2008	-0.728	1	1					

Table 6: The BVX Crisis List (cont.)

Country	BVX starting year	Bank equity return	Panic banking crisis	Bank equity crisis	Country	BVX starting year	Bank equity return	Panic banking crisis	Bank equity crisis	Country	BVX starting year	Bank equity return	Panic banking crisis	Bank equity crisis
Japan	1871		1	1	Peru	1876		1	1	Switzerland	1870	-0.418	1	0
	1882		1	1		1914*	-0.612	1	0		1914		1	0
	1890		1	1		1931*	-0.373	1	1		1919	-0.432	0	1
	1901	-0.221	1	0		1981	-0.980	0	1		1931	-0.559	1	1
	1907	-0.377	1	1		1998	-0.396	0	1		1990	-0.326	1	1
	1920	-0.405	1	1	Philippines	1971*	-0.781	1	0		2008	-0.676	1	0
	1922*	-0.405	1	1		1981	-0.719	1	1	Taiwan	1923		1	0
	1923	-0.157	1	1		1997	-0.687	0	1		1927		1	1
	1927	-0.168	1	0	Portugal	1876		1	1		1983		1	1
	1990	-0.546	0	1		1890		1	1		1995	-0.307	1	1
	1997	-0.605	1	1		1921	-0.643	1	1		1998	-0.557	0	1
	2001*	-0.808	0	1		1923	-0.684	1	1	Thailand	1979	-0.461	0	1
Korea	1997	-0.726	1	1		1931	-0.597	1	1		1983	0	1	0
Luxembourg	2008	-0.474	1	1		2008	-0.613	1	1		1997	-0.734	1	1
Malaysia	1985	-0.368	1	1		2011*	-0.725	0	1	Turkey	1914*	-0.654	1	1
	1997	-0.686	1	1		2014*	-0.800	0	1		1930	-0.719	1	1
Mexico	1883		1	1	Russia	1875	-0.188	1	0		1980	-0.409	1	1
	1893	-0.325	1	0		1900	-0.401	1	1		1991	-0.758	1	0
	1913	-0.596	1	1		1995		1	1		1994	-0.203	1	0
	1921		1	1		1998	-0.751	1	1		2001	-0.622	1	1
	1928	-0.839	1	1		2008	-0.723	1	1	U.K.	1878	-0.132	1	0
	1981		1	1	Singapore	(no crises)					1890	-0.128	1	0
	1994	-0.602	1	1	South Africa	1881	-0.27	1	0		1914		1	0
Netherlands	1907	-0.083	1	0		1890	-0.062	1	0		1973	-0.737	1	1
	1914	-0.093	1	0	Spain	1882	-0.349	1	1		1991	-0.147	1	0
	1921	-0.334	0	1		1890	-0.124	1	0		2008	-0.707	1	1
	1931*	-0.418	0	1		1913	-0.038	1	0	U.S.	1873	-0.172	1	0
	2008	-0.562	1	1		1920	-0.14	1	0		1884	0	1	0
New Zealand	1888	-0.549	1	1		1924	-0.222	1	0		1890	0	1	0
	1987	-0.892	1	1		1931	-0.336	1	1		1893	-0.29	1	0
Norway	1898		1	1		1975	-0.814	0	1		1907	-0.334	1	1
	1914		1	0		2008	-0.466	1	1		1930	-0.654	1	1
	1919	-0.71	1	1		2010*	-0.411	0	1		1984	-0.263	1	0
	1931	0	1	0	Sweden	1878		1	1		1990	-0.332	0	1
	1987	-0.464	1	1		1907	-0.135	1	0		2007	-0.676	1	1
	2008*	-0.670	1	0		1919	-0.395	0	1	Venezuela	1981	-0.34	1	1
						1991	-0.787	1	1		1992	-0.839	1	1
						2008	-0.519	1	1		2008	-0.614	1	1

Table 7: BVX Crisis List summary statistics

This table reports average outcomes for episodes on the BVX Crisis List, BVX Crisis List episodes having a bank equity decline of more than -30%, newly-uncovered banking crises on the BVX Crisis List, and episodes that are recorded as crises on the list of Narrative Crises but that do not appear on the BVX Crisis List ("Removed crises").

	BVX Crisis List		BVX Crisis List (Bank equity decline > -30%)		Newly-uncovered crises		Removed crises	
Bank equity decline	-0.462	(N=183)	-0.603	(N=113)	-0.550	(N=27)	-0.116	(N=47)
Abnormal bank equity decline	-0.344	(N=170)	-0.420	(N=99)	-0.329	(N=22)	-0.180	(N=45)
Bank market cap decline	-0.416	(N=79)	-0.523	(N=53)	-0.536	(N=13)	-0.116	(N=23)
Real GDP decline (pk to tr)	-0.055	(N=210)	-0.063	(N=109)	-0.082	(N=30)	-0.021	(N=54)
Real GDP growth decline (pk to tr)	-0.085	(N=209)	-0.091	(N=108)	-0.085	(N=29)	-0.057	(N=54)
Real GDP growth (max dev from trend)	-0.060	(N=210)	-0.066	(N=111)	-0.072	(N=30)	-0.036	(N=54)
Failed banks (% of total bank assets)	0.296	(N=66)	0.317	(N=47)	0.322	(N=1)	0.060	(N=11)
NPL at peak	0.171	(N=79)	0.170	(N=61)	0.188	(N=9)	0.054	(N=8)
Decline in deposits (pre-war only)	-0.196	(N=49)	-0.209	(N=24)	-0.143	(N=3)	-0.051	(N=18)
Significant liability guarantees	0.561	(N=148)	0.638	(N=94)	0.545	(N=22)	0.357	(N=28)
Significant liquidity support	0.761	(N=159)	0.827	(N=98)	0.783	(N=23)	0.407	(N=27)

ONLINE APPENDIX

Banking Crises Without Panics

Matthew Baron, Emil Verner, and Wei Xiong

March 2020

I. Data

A. Narrative Crises

Table A1 reports the list of Narrative Crises, defined as the union of all banking crises from six prominent papers: Bordo et al. (2001), Caprio and Klingebiel (2003) Demirgüç-Kunt and Detragiache (2005), Laeven and Valencia (2013), Reinhart and Rogoff (2009, and online spreadsheets updated 2014)[1], and Schularick and Taylor (2012, online update 2017). We use the most recent update of each paper. The years listed correspond to the starting year of the banking crisis, according to each paper. The starting year of the Narrative Crisis list (reported in column 8) is the earliest year across all six papers. In the table, a "0" means that the source reports no banking crisis in a given year, while a blank cell means that the crisis is not covered in the sample period (i.e. no information provided either way as to whether a banking crisis occurred).

B. Master list of episodes

Table A2 reports the master list of episodes, which is intended to be a very broad list of *potential* crises, many of which may not necessarily be "banking crises" according to any definition. The master list of episodes is the union of: a) the Narrative Crises list defined in Table A1, and b) years in which the bank equity real total return index *cumulatively* declines by more than 30% relative to its previous peak.[2] The year of each episode, reported in column 2, is defined

[1] Reinhart and Rogoff (2009) present three slightly different banking crisis lists: in their Appendix A3, Appendix A4, and online spreadsheets (we use the latest 2014 update). We generally take the union of these lists; however, when there is a small disagreement regarding the starting date of a banking crisis, we use the most recent online update.

[2] Note that 30% bank equity crashes in a single year (i.e. the episodes analyzed in Section IV of the main paper) are a subset of the 30% *cumulative* declines listed in Table A2. Thus, Table A2 is a broader list that encompasses all 30% bank equity crashes analyzed in Section IV.

as the first year in which the bank equity index cumulatively falls by more than 30% from its previous peak. In cases in which the bank equity index does not decline by 30% or more, the year in column 2 is the year from the Narrative Crises list. Column 3 indicates whether the episode is a Narrative Crisis. If the year from the Narrative Crisis list is different from the year defined by the bank equity decline (Column 2), that is also indicated in Column 3.

Column 5 indicates the presence or absence of a banking "panic." As stated in the main text, we define a "panic" as an episode containing (within a ±3-year window) any of the following criteria appearing in narrative accounts: 1) severe and sudden depositor or creditor withdrawals at more than one of a country's largest banks or more than ten smaller banks, that lead these banks to be on the verge of collapse; 2) severe and sudden strains in interbank lending markets; or 3) severe and sudden foreign-currency capital outflows from the banking sector. Column 6 records the starting month of the panic, according to narrative accounts. Column 7 records whether there is a 30% cumulative bank equity decline associated with a given episode. Column 8 indicates the presence or absence of narrative evidence of widespread bank failures, which is defined as the failure of a top-5 (by assets) bank or more than five total banks failures above the normal rate of bank failures. A "bank failure" is defined broadly to include liquidations, bankruptcies, forced mergers, substantial restructurings, nationalizations, suspensions of payment, etc. Detailed narrative evidence of panics (or their absence) and widespread bank failures (or their absence) for each episode, to support the classification in Table A2, is documented in the following link:

https://blogs.cornell.edu/baron/documentation-bank-panics-and-failures/

C. A new database of banking crises characteristics and policy responses

We construct a new historical database of banking crises. Our dataset is similar to that of Laeven and Valencia (2013), which covers the period 1970–2012, though we extend their database back to 1870. This database consists of all episodes on the master list (Table A2). We code the various characteristics of banking crises, including the extent of: deposit runs, bank failures, non-performing loans, and various forms of government intervention into the banking sector like liquidity support and equity injections. Following Laeven and Valencia (2013), we define the following variables for each potential crisis in our sample:

- Decline in deposits (the peak-to-trough % decline in aggregate deposits of the banking sector, only calculated for pre-1945 banking crises, since postwar crises are generally not associated with a loss in aggregate deposits);
- Widespread bank failures (as defined in Appendix Section I.B, a 0 or 1 indicator variable);
- Failed banks (% of total bank assets or deposits);
- Largest banks failing (1 if any of the failed banks are among the top-5 by assets banks in the country, 0 otherwise)
- NPL at peak (the peak level of non-performing loans of the banking sector or of the largest banks);
- Significant liability guarantees (1 if the central bank or government provides extraordinary guarantees of bank deposits and other short-term liabilities, 0 otherwise);
- Significant liquidity support (1 if the central bank or government provides extraordinary liquidity support to the banking sector, 0 otherwise);
- Banks nationalized (1 if the government nationalizes any major banks, 0 otherwise);
- Government equity injections (1 if the government purchases newly issued equity of major banks in an effort to recapitalize the banking sector, 0 otherwise).

The above variables are gathered for each of the crises on the master list, which involved a major data collection effort using an extensive number of primary and secondary sources. First, we started with the dataset of Laeven and Valencia (2013), which collected all the above variables for their set of crises over the period 1970-2012. To extend our dataset back further, we examined the descriptions of crises from 400+ primary and secondary sources and gathered information on the above variables, whenever it was present. We back up this new database of banking crises with extensive documentation derived from these primary and secondary sources. Some of the sources are relatively well-known, such as Reinhart and Rogoff (2009, Appendix A3), Bordo et al. (2001), Caprio and Klingebiel (2003), Kindleberger (1993), Mehrez and Kaufmann (2000), Rocha and Solomou (2015), Conant (1915), Sumner (1896), and Grossman (2010). One important primary source is the "League of Nations: Money and Banking Statistics", volumes from 1925 to 1939, which contained data on bank failures and deposit declines in a wide range of countries during the interwar period. Many other sources are new archival primary sources that we uncovered (e.g., newspaper articles, contemporaneous accounts, bank financial reports, corporate manuals) covering individual countries and specific banking crisis episodes. We also have hundreds of

secondary sources by historians written about specific crisis episodes. We plan to provide this new database to other researchers studying historical banking crises, along with the extensive narrative documentation.

D. Documentation of sources

Figure A1 provides examples of historical newspapers used to construct our bank equity return data. The full list of historical newspapers used to construct our bank and nonfinancial equity return data is available in Table B2, described below.

Table B1 provides an overview of the coverage and sources for the bank equity index total return variable. Cells with numbers indicate the number of underlying banks used to construct new bank equity return indexes. Shaded areas refer to pre-made bank equity indexes, which are constructed from a large number of banks.

Table B2 lists in detail all the sources used to construct the *annual* equity variables: yearly bank stock prices, year bank stock dividends, yearly nonfinancial stock prices, and yearly nonfinancial stock dividends.

As noted in Table B2, some of the annual bank price return and dividend yield indexes are constructed from individual stock data that we gathered. The individual bank names, sample coverage, and the original data sources for the bank stocks used to construct these annual indexes are listed in the following document:

https://blogs.cornell.edu/baron/individual-banks-used-for-yearly-price-and-dividend-indexes-1n23632/

Table B3 lists in detail all the sources used to construct the *monthly* equity and credit spread variables: monthly bank stock returns, monthly nonfinancial stock returns, monthly bank credit spreads, and monthly corporate credit spreads.

As one can see in the link above, we include banks based on which country they lend in, not the country in which their stocks trade. Thus, for an "overseas bank" like Anglo-Argentine Bank, it is considered an Argentinian bank, not a U.K. bank.

As noted in Table B3, some of the monthly data is constructed from individual securities from banks or nonfinancial firms. The banks' and nonfinancials' company names, sample

coverage, and the original data sources used to construct these indexes are listed in the following document:

https://blogs.cornell.edu/baron/individual-stocks-and-bonds-for-monthly-data-1phvomt/

Table B4 lists in detail all the sources used to construct the yearly macroeconomic variables, such as bank credit, nominal GDP, inflation, unemployment, and other variables.

II. Validation

To help validate bank equity returns as an informative measure of banking crises, we show that bank equity has a better signal-to-noise ratio than other financial and macroeconomic variables, in terms of identifying narrative crises in real-time. In other words, bank equity declines, compared to a host of other indicators, most closely coincide with the onset of Narrative Crises. Later, in Appendix Section IV, as another form of validation, we show that, conditional on a Narrative Crisis episode, the magnitude of the peak-to-trough bank equity decline is correlated with the economic severity of banking crises and many of the characteristics and policy responses commonly associated with banking crises (e.g., deposit runs, bank failures, non-performing loans).

A. Bank equity provides the best real-time signal of a banking crisis.

Using receiver operating characteristic (ROC) analysis, a standard tool for assessing classification performance, we find that bank equity returns provide the best real-time signal of narrative banking crisis relative to a host of other variables, including nonfinancial equity returns, credit spreads, and macroeconomic conditions. To be clear, the goal of this analysis not *predicting* banking crises, but simply asking which variable best *coincides* with banking crises identified from existing classifications.

ROC curves are plotted in Figure A2. A ROC curve is a simple tool that allows one to assess the signal-to-noise ratio of bank equity in identifying Narrative Crises in real-time. For a given variable, say bank equity returns, ROC analysis works by classifying observations into "banking crises" or "non-banking crises" using a given threshold X (e.g., a more than -30% decline in bank equity). By using the *Narrative Crises* as our "true" list of banking crises, ROC analysis

plots the "true positive" rate against the "false positive" rate using this classification threshold *X*.[3] Then, by varying the threshold *X* across *all possible thresholds*, it produces the full ROC curve. For a given classifying variable, a higher value of the ROC curve indicates a better classifying variable, as it implies a higher "true positive rate" for a given "false positive" rate. It is typical in this literature to use the area under the curve (AUC) as a summary measure of the performance of the classifying variable. Note that the 45-degree line represents the benchmark uninformative classifier for a variable having no information content, which has an AUC of 0.50.

Panel A compares the ROC curve constructed from bank equity returns with ROC curves constructed using other equity market variables, while Panels B and C perform the comparison with credit market and macroeconomic variables. Each panel uses the sample for which all variables are non-missing. The bank equity ROC curve therefore varies across panels.

All the panels in Figure A2 suggest that bank equity returns provide the best real-time signal of narrative banking crises. Panel A, which compares bank equity to returns on nonfinancial equity, broad market equity, and bank minus nonfinancial equity, shows that bank equity has the highest ROC curve and therefore the highest area under the curve (AUC = 0.71) and thus the highest signal-to-noise ratio. Panel B shows that bank equity also provides a better signal of a crisis compared to bank credit spreads and corporate credit spreads. Bank credit spreads provide the next best signal of a Narrative Crisis after bank equity, with an AUC of 0.63 (compared to 0.69 for bank equity on this sample).[4] Finally, Panel C repeats the ROC analysis for several macroeconomic variables, showing that bank equity returns provide a more accurate real-time signal of a Narrative Crisis than the increase in the unemployment rate, the decline in GDP growth, and future credit contraction from t to t+5.[5] Adverse changes in macroeconomic conditions are not as useful for detecting narrative banking crises because they frequently also occur during "normal" recessions, thus generating many "false positives" and a lower signal-to-noise ratio.

[3] We use the Narrative Crisis list as the set of "true" banking crises, simply because it is a natural starting point from which to evaluate the informativeness of bank equity. We do not use the BVX Crisis List because it incorporates information from bank equity and might give bank equity returns an unfair advantage in picking up these crises.

[4] The ROC curve for corporate credit spreads in Figure A2 uses the *level* of corporate credit spreads. The diagnostic performance of corporate credit spreads is similar, albeit slightly weaker, using the change in the spread or the spread relative to its five-year moving average. We should note that we only have credit spreads for about one-third of our overall sample.

[5] Boyd et al. (2019) use a bank credit contraction as their definition of a "systemic bank shock."

B. Distribution of bank and nonfinancial equity returns

Figure A3 presents histograms of annual bank and nonfinancial equity real total returns during Narrative Crisis years. For comparison, we also present the histogram during other years ("No crisis"). The figure shows that the bank equity return distribution for Narrative Crisis years relative to non-crisis years is shifted further left and more left-skewed. These patterns are qualitatively similar but quantitatively weaker for the nonfinancial equity return distribution.

III. Robustness analysis

A. Bank equity and subsequent macroeconomic outcomes: robustness to alternative specifications

We start with Table A3, which simply restates the estimates from Figure 2 (the impact of bank equity and nonfinancial equity returns on real GDP and bank credit-to-GDP) but in table form and at the three-year horizon.

The following analysis shows that the results in Figure 2 are robust to a variety of other specifications. As in Figure 2, these impulse responses are all estimated using Jordà (2005) local projections with controls for three lags in the bank and nonfinancial equity variables, country fixed effects, and contemporaneous and lagged of real GDP growth and credit-to-GDP change.

Figure A4 presents the same impulse responses as in Figure 2 but the specification includes year fixed effects, in addition to the baseline controls. This figure shows that the results in Figure 2 are not sensitive to the inclusion of year fixed effects.

Figure A5 presents the same impulse responses as in Figure 2, but the specification adjusts the timing to allow for bank and nonfinancial equity returns to affect the outcome variable within the same year, instead of with a one-year lag. Figure A5 shows that bank equity crashes are associated with larger declines in real GDP and credit-to-GDP when bank equity crashes are assumed to affect the outcome variable within the same year.

Figure A6 demonstrates the robustness of the results in Figure 2 to other alternative specifications. Panel A plots the response of real GDP and credit-to-GDP to 30% crashes in bank equity and nonfinancial equity. It shows that a 30% crash in bank equity (controlling for the nonfinancial equity decline) is associated with a future decline in output of around 3 percentage points and future decline in credit-to-GDP of around 8 percentage points. The dashed lines represent 95% confidence intervals based on Driscoll-Kraay standard errors.

Panel B plots the response to continuous innovations in bank and nonfinancial equity returns. It shows that a hypothetical 100% log-decline in bank equity is associated with a maximum 2.5 percentage point decrease in real GDP and 6 percentage point decrease in credit-to-GDP, though this specification does not distinguish between a positive or negative sign of the bank equity return or any potential nonlinearities. Therefore, Table A4 explores this nonlinearity in the alternative specification by showing that the predictive content of bank equity returns is nonlinear by including quadratic terms (columns 2 and 5) and by separately estimating the predictive content of positive and negative bank and nonfinancial equity returns (columns 3 and 6).

B. Bank equity crashes and subsequent macroeconomic outcomes: subsample analysis

Figure A7 demonstrates the robustness of the results in Figure 2 to various subsamples of countries and time periods. Because of the limited data in such subsamples, we choose a simpler nonlinear specification in which we look at the impulse response subsequent to 30% declines in both bank and nonfinancial equity estimated jointly, as in Figure A6, Panel A.[6] Similar to Figure 2, impulse responses are estimated using Jordà (2005) local projections with controls for three lags in the bank and nonfinancial equity crash variables, country fixed effects, and contemporaneous and three-year lagged values of real GDP growth and credit-to-GDP change. The dashed lines represent 95% confidence intervals based on Driscoll-Kraay standard errors.

Figure A7 shows the results are qualitatively similar in the following subsamples: excluding the Great Depression and the Great Recession (Panel A), the pre-WWII subsample (Panel B), the post-WWII subsample (Panel C), the period 1946-1970 (Panel D), the period 1971 to 2016 (Panel E). Results are reported in regression table form in Table A5.

Figure A8 also reports the same results but for the U.S. only. Figure A8 is estimated just for the U.S. on the full sample (Panel A) and excluding the Great Depression and the Great Recession (Panel B). Results are qualitatively similar to those on the full panel.

[6] One can estimate the full nonlinear specification on the subsamples, and the results are qualitatively similar to those in Figure A5. However, because of the large number of indicator variables used in the full nonlinear specification relative to the number of observations, the impulse responses are often noisy and have large confidence bands.

IV. Analysis conditional on Narrative Crises

Here we show that, conditional on a Narrative Crisis episode, the magnitude of the peak-to-trough bank equity decline is correlated with the economic severity of banking crises and many of the characteristics and policy responses commonly associated with banking crises (e.g., deposit runs, bank failures, non-performing loans). This analysis serves as validation to show that bank equity declines are an informative measure capturing the severity of banking crises along several dimensions.

A. Bank equity declines are correlated with the severity and symptoms of banking crises

We next validate the usefulness of bank equity declines by showing that they are correlated with the real economic severity of banking crises, conditional on a crisis as defined by narrative accounts. The regression equation is estimated with the unit of observation being a single banking crisis from the Narrative Crises list. Thus, we can ask whether banking crises with larger peak-to-trough bank equity declines are more severe across a number of dimensions.

We estimate the following regression equation, with each observation being a single banking crisis from the Narrative Crises list,

$$y_{i,t} = \alpha_i + \beta r_{i,t}^{B} + \gamma 1_t^{postwar} + \varepsilon_{i,t} \quad \text{(A1)}$$

where α_i is a country fixed effect, $1_t^{postwar}$ is a dummy variable that takes on the value of 1 if the year of the crisis is greater than 1945, and r_{it}^{B} is the peak-to-trough change in the real bank equity total return index during the crisis.[7] The sample size of regressions across the different dependent variables varies due to differences in data availability. As with the ROC analysis, we take the Narrative Crises as a starting point from which to evaluate the informativeness of bank equity.

Panel A in Table A6 presents estimates of Equation A1 where the dependent variable is a measure of the decline in real GDP. The table shows that greater declines in bank equity are associated with larger output declines. For example, columns 1-3 show that a 100% peak-to-trough decline in bank equity returns is associated with a 13.9% peak-to-trough decline in real GDP, a

[7] The postwar dummy is important because, empirically, we find that bank equity declines have to be greater in the postwar period to get the same crisis symptoms, perhaps because of greater government protections and assistance for the banking sector, countercyclical fiscal and monetary policy, etc. Without the postwar dummy, the coefficient estimates in Table A6 are similar, but the R^2 is substantially reduced.

13.0 percentage point decline in the real GDP growth rate (peak-to-trough), and a 9.1 percentage point decline in the real GDP growth rate from its past 10-year average.

Panel B shows that bank equity peak-to-trough declines during Narrative Crises are correlated with other characteristics of banking crises. Larger bank equity declines are associated with a significantly larger declines in bank deposits, an increased incidence of failure of the largest banks, and higher non-performing loans. Moreover, larger bank equity declines predict an increased probability of various forms of government intervention including significant liquidity support, bank nationalization, and government equity injections. We conclude that greater bank equity declines are associated with increased likelihood and severity of typical banking crisis characteristics and policy responses.

B. Using alternative measures of bank equity declines

We next show that the validation results in the previous subsection are robust to two alternative measures of bank equity declines: *bank abnormal returns* (bank minus nonfinancial returns) and *bank market capitalization returns* (which seeks to capture the total change in the market value of equity within the banking sector).

One may be concerned, for example, that in the validation analysis of the previous subsection, the bank equity decline simply reflects a general decline in equity markets, rather than something specific about bank equity. Therefore, Table A7 Panel A, shows that our results are robust to replacing bank equity returns with *bank abnormal returns* (defined as bank equity total returns minus nonfinancial equity total returns). However, it is important to note that, in terms of the magnitude of the estimates and the adjusted R^2, the bank equity return is a substantially better predictor of crisis severity than bank abnormal return. For example, the adjusted R^2 for real GDP peak-to-trough decline on the bank equity decline is 18.6%, compared to 7.0% for the bank abnormal returns. Thus, both as a signal of a Narrative Crisis and as a measure of crisis severity, bank equity returns dominate bank abnormal returns. Nonfinancial equities fall substantially during severe bank crisis, likely in part because of banking sector distress, and the overall level of bank equity provides valuable information beyond the differential information contained in *bank abnormal returns*.

Panel B re-estimates Equation A1 with *bank market capitalization returns* as the independent variable. *Bank market capitalization returns* is defined specifically as the bank equity price returns plus new issuance of bank equity. This variable seeks to capture the change in the market value of equity within the banking sector. Equity issuance is new capital raised by the bank, which may be important as banks seek to recapitalize. Price returns rather than total returns are used to calculate *bank market capitalization returns*, because dividends are paid out from the bank and hence deplete bank equity. An index of bank equity issuance is constructed for each country using new historical data and the methodology from Baron (2019). Data sources include *Moody's Bank and Finance* manuals, *Investor's Monthly Manual*, and Jane's and Beerman's manuals of European firms. It is important to note that *bank market capitalization returns* can only be constructed on a subsample of the data, due to historical data limitations on the availability of data on new bank equity issuance.

Panel B shows that *bank market capitalization* declines strongly predict output declines. Given that theory (e.g. Bernanke, Gertler, and Gilchrist, 1999; Brunnermeier and Sannikov, 2014) links the net equity of the banking sector to macroeconomic outcomes, we should expect *bank market capitalization returns* to have the strongest predictability for output. Indeed, this is the case, as Panel B shows the adjusted R^2 to be 23.4%, substantially higher than 18.6% in Table A6.

Panel C of Table A7 is similar to Table A6 but has an additional independent variable, the *bank equity recovery* (the positive returns in the bank equity total returns index subsequent to the trough within three years after a banking crisis). Rebounds in bank equity returns may be due to unexpected policy interventions or to the fact that the crisis may not have been as severe as initially perceived by equity investors. However, surprisingly, Panel C shows that the *bank equity recovery* has no predictive power for economic output, a result which is robust to various other measures of bank equity recoveries.

V. Additional results on non-panic bank distress

A. Bank equity crashes outside Narrative Crisis episodes

Figure 4 in the main text plots impulse responses of future real GDP and bank credit-to-GDP excluding Narrative Crisis episodes and shows the magnitudes of the real GDP and bank

credit decline are just as large excluding narrative-based banking crises as they are in the full sample.

Similar results are presented here in tabular form in Table A8. Table A8 is obtained by estimating a specification similar to Equation 3 but interacting the bank equity crash indicator variables with an indicator variable for whether a given observation falls within a ±3-year window of a Narrative Crisis episode. According to the estimates at the $t + 1$ and $t + 3$ horizons reported in Table A8, the interaction term with a Narrative Crisis episode is small in magnitude and not statistically significant for output, thus signifying that the predictive content from bank equity crashes is similar in magnitude outside of Narrative Crises. We conclude, as for Figure 4, there is generally little difference in the predictive content of bank equity between banking crisis and non-banking crisis episodes.

B. Bank equity crashes outside panic episodes

Figure 4 in the main text demonstrates bank equity crashes predict output gaps and credit contraction even excluding narrative-based banking crisis episodes. We show here, as a robustness test and as a related result, that bank equity crashes also predict real output and credit contraction even excluding panic episodes.

Specifically, Figure A9 plots estimates of local projection impulse responses to bank equity returns across different bins, as in Figure 2, but excluding observations within a ±3-year window of a Panic as defined in Table A2. The results in Figure A9 are nearly identical to those in Figure 2, demonstrating that the predictability from bank equity returns holds even out of panic events.

C. Alternative specifications

Figure A10 demonstrates the robustness of the results in Figure 3, which plots the impact of bank equity declines on real GDP and bank credit-to-GDP around "panic" and "non-panic" episodes, to alternative specifications. Specifically, Figure A10 presents local projection impulse responses estimated using a specification, detailed in the caption of Figure A10, that contains both an indicator variable of a "panic" episode and a continuous measure of (negative) bank equity returns. In Figure A10, the blue line plots the response to a bank equity return innovation and the red line plots the response to a "panic" episode. The dashed lines represent 95% confidence

intervals based on Driscoll-Kraay standard errors. Figure A10 demonstrates that both "panic" episodes and the continuous measure of (negative) bank equity returns forecast lower GDP and credit-to-GDP in an additive fashion.

D. Results using a finer panic classification

Figure A11 is similar to Figure 3 but uses a finer classification for creditor runs. The figure distinguishes between episodes with "isolated runs," defined as episodes featuring isolated runs on a single large bank or a few small banks or borderline episodes with inconclusive historical evidence, and "clear-cut panics," defined as all panic episodes from Table A2 not labeled as "isolated runs." The responses of real GDP and credit-to-GDP are estimated using local projections, as in Figure 3.

E. Frequency of panic and non-panic crises across decades

Figure A12 plots the frequency of crisis episodes for each decade for the 46 countries in our sample. The frequency is calculated as the number of crises divided by the total number of country-years in each decade.

F. Timing of bank equity declines relative to panic dates and other crisis indicators: robustness

Figure A13 shows that the timing of bank equity declines relative to panic dates and other crisis indicators is robust to conducting the analysis on the sample of Narrative Crises instead of episodes on the BVX Crisis List. Figure A13 presents the same results as in Figure 6, but on the sample of Narrative Crises instead of episodes on the BVX Crisis List. Similarly, Table A9 shows that the timing results reported in Table 4 are robust to conducting the analysis on the sample of Narrative Crises instead of the BVX Crisis List.

G. Timing of bank vs nonfinancial equity crashes: country and time subsamples

Table A10 compares the timing of bank versus nonfinancial equity crashes as in Table 4 but on country and time subsamples. Table A10 shows that bank equity declines tend to precede nonfinancial equity declines in post-WWII and advanced economy banking crises but is often the

opposite for prewar and emerging market crises. Panel A performs the analysis on the BVX Crisis List sample, and Panel B uses the Narrative Crisis List sample as robustness, as in Table A9.

VI. BVX Crisis List: additional details

A. Additional information on constructing the BVX Crisis List

We describe some additional information on constructing the BVX Crisis List reported in Table 6.

Table A11 lists the "removed banking crises", episodes from the Narrative Crisis list that are not considered banking crises on the BVX Crisis List. Of the "removed banking crises", we mark a subset of them with a "*" which we consider "spurious banking crises", defined as episodes which have few or no characteristics typically associated with banking crises and are likely the result of clear-cut typographical or historical errors on one of the Narrative Crisis chronologies (e.g., in Reinhart and Rogoff 2009). Several of these spurious banking crises have missing bank equity returns data; because there is discretion in marking these events as spurious, along with the lack of quantitative evidence in these cases, we list them separately at the bottom of Table A11 in order to be transparent about the fact that these episodes could not be verified with bank equity data.

Turning back to the BVX Crisis List reported in Table 6, we compute the peak-to-trough decline in bank equity as an "intensity measure" of each banking crisis, also reported in Table 6. We date the start of each crisis as the year in which the bank equity real total return first falls more than -30% from its peak. Of course, there are important reasons why the narrative accounts date the starting year when they do. With the new dates, our goal is simply to offer additional and alternative information about when markets first recognized the bank equity losses. Table A12, Panel A, lists all the changes to starting dates on the BVX Crisis List. See Table A2 for a comparison with the Narrative Crisis dates, which in most cases are very similar.

We occasionally combined several pairs of episodes occurring close together in time, when it seems more appropriate to consider them as a single crisis (i.e. when bank equity prices did not show two separate declines and when the narrative evidence on bank failures and panics conveyed a continuous sequence of banking distress across time, not clustered into two phases). These combined episodes are listed in Table A12, Panel B.

B. Bank and nonfinancial equity around BVX banking crises and normal recessions

Figure A14 plots the average dynamics of bank equity and nonfinancial equity around BVX banking crisis recessions and ordinary recessions. A recession is defined as a period in which real GDP declines. As in Jordà, Schularick, and Taylor (2013), the first year of the recession is marked as the real GDP peak, and if there are two peaks in three years, then it is the first peak. Banking crisis recessions are defined as recessions that coincide with a BVX Crisis List episode. Normal recessions are the remaining recessions in the sample.

Figure A14, Panel A, shows that the dynamics of bank and nonfinancial equity are similar around normal recessions, with a fall in both bank and nonfinancial equity of ~10% on average in the year prior to the start of the recession, followed by a quick recovery afterwards. If anything, bank equity falls slightly less than nonfinancial equity in a normal recession, which is consistent with the finding that the bank equity index has an unconditional beta (on the full sample) slightly less than 1.

Figure A14, Panel B, in contrast, show that, conditional on a banking crisis recession, bank equity falls substantially more than nonfinancial equity – over 60% on average for bank equity, compared to 30% for nonfinancial equity – and that the bank equity decline, unlike the nonfinancial equity decline, is persistent over the 5-year window. This result is consistent with the results in Figures 5 and 6 of the main text.

C. Revisiting the global Great Depression

As an example to showcase the usefulness of our crisis intensity measures constructed from bank equity prices, we revisit the banking crises of the Great Depression. While there is no doubt of the presence of severe banking crises in some countries (e.g., Germany and the U.S.) and their absence in other countries (e.g., Japan and the U.K.), there is considerable debate about the presence and severity of banking crises in certain countries. Additionally, because of previous data limitations, the literature has had difficulty assessing the degree to which banking crises help explain the severity of the Great Depression. For example, in their cross-country study, Bernanke and James (1991) write, "A weakness of our approach is that, lacking objective indicators of the seriousness of financial problems, we are forced to rely on dummy variables to indicate periods of crisis."

We use bank equity declines to assess the severity of banking problems across countries in the Great Depression. Figure A15 plots the peak-to-trough decline in real GDP against the peak-to-trough bank equity decline over the period 1929-1933. This figure plots all countries in the sample for which data is available, not just those that may have experienced banking crises.[8]

The decline in bank equity has moderate explanatory power (R^2 = 18%), consistent with the evidence in Bernanke and James (1991) on the role of banking crises in explaining the severity of the Great Depression. However, from Figure A15, there is still substantial unexplained heterogeneity in outcomes. Much of this is surely measurement error in real GDP plus other idiosyncratic country shocks. Other potential reasons for this heterogeneity, which are non-mutually exclusive, include: the duration of adherence to the gold standard (Eichengreen and Sachs 1985), the sharp monetary contraction in certain countries (Friedman and Schwartz 1963), the trade collapse (Madsen 2001), and political instability (e.g., the 1930 coups in Argentina and Brazil). Nevertheless, the severity of banking crises explains an important part of the variation across countries.

Do bank equity declines line up with the narrative evidence on crisis severity across countries in the Great Depression? In general, yes. For example, Figure A15 shows large declines in bank equity for well-known examples of severe banking crises: Austria, Belgium, France, Germany, Switzerland, and the U.S. Similarly, Japan and the U.K. are considered not to have had banking crises during this period and have minimal bank equity declines.

Furthermore, the quantitative data helps resolve uncertainty within narrative account about the extent of banking crises. Thus, in the BVX Crisis List, we remove Denmark and India (as in Table A11), since these countries had mild bank stock declines (less than 30%) and the narrative evidence further confirms a lack of widespread bank failures. Italy is also a country that had a relatively mild bank stock decline (though there was, in fact, a severe banking crisis), but this is due to the unusually early and vigorous policy intervention in 1931, culminating in a near-total

[8] The picture is similar if one plots the peak-to-trough decline in industrial production on the y-axis. Using our data on real GDP (taken from Maddison's database and from Schularick and Taylor 2012), in contrast to industrial production, makes the Great Depression look less severe in Belgium and the Netherlands (which may be attributable to the larger service sector in these economies) but much more severe in Latin America (attributable to the higher share of commodity production in these economies).

nationalization of the banking sector by 1933. Thus, bank stock prices did not decline as much as in other countries.

We also highlight several newly-identified banking crises to the BVX Crisis List that are overlooked in the previous narrative approaches: newly-identified banking crises in Chile, Colombia, Iceland, the Netherlands, and Peru during the Great Depression. All of these countries experienced large bank stock declines (greater than 30%), and the narrative evidence supports either panics or widespread bank failures (or both) in these countries.

Finally, there is the case of Canada in the Great Depression, which has previously been discussed in the main text in the context of quiet banking crises. While not labeled a banking crisis on the BVX Crisis List, since there were no panics and only a single tiny bank, Weyburn Security Bank, failed (though, as a historical side note, several trust companies did, in fact, fail), there was nevertheless a steep decline in bank stock prices. This evidence is consistent with the argument of Kryzanowski and Roberts (1993), that the large Canadian banks "were insolvent at market values and remained in business only due to the forbearance of regulators coupled with an implicit guarantee of all deposit", both policies being holdovers from the previous Canadian banking crisis of 1923.[9] Consistent with the section on quiet banking crises, the large and widespread bank equity losses in Canada, as reflected by the large fall in bank stock prices, may help explain the severity of the Great Depression in Canada, in which the fall in real GDP and rise in unemployment rivaled the U.S. in severity.

D. Comparison to other chronologies of banking crises

How does our BVX Crisis List compare to other banking crisis chronologies? We discuss the evidence in detail here. We find that the consequences of the BVX Crisis List episodes are actually *more* severe, compared to Reinhart and Rogoff's list of banking crises, both in terms of GDP, credit contraction, and characteristics of crises. This is due, in large part, to eliminating many spurious crises from their list.

Table A13 Panels A and B compare the average severity of crises by looking at declines in real GDP and also selected characteristics of crises. Panel A compares the BVX Crisis List to

[9] The largest Canadian bank at the time, the Bank of Montreal, had estimated non-performing loans in excess of 40% (Kryzanowski and Roberts 1993).

Reinhart and Rogoff's chronology and Panel B to Laeven and Valencia's chronology. Similarly, Figure A16 plots impulse responses of GDP and credit-to-GDP subsequent to episodes on the BVX Crisis List compared to episodes on Reinhart and Rogoff's and Laeven and Valencia's chronologies.

In the BVX Crisis List, the average crisis has a -5.4% peak-to-trough decline in real GDP. In comparison, Reinhart and Rogoff's (2014) headline number is an average peak-to-trough decline in real GDP per capita of -9.6%. However, Reinhart and Rogoff's headline statistic overstates the severity of banking crises, since it is calculated over a subsample of 100 severe banking crises (it is unclear what criteria is used to select this sample, other than ex-post severity). Instead, estimating the consequences of banking crises on Reinhart and Rogoff's entire list of banking crises, the average fall in real GDP that we calculate for Reinhart and Rogoff in Table A13 Panel A is -4.5% — and is in fact *less* severe than using the BVX Crisis List (a difference of 0.9% with a t-statistic of 2.92). Looking at the likelihood and magnitude of other symptoms of crises and policy interventions – including liability guarantees, liquidity support, deposit runs, non-performing loans, and declines in deposits – the BVX Crisis List is also more severe. We also note that, in unreported results, the BVX Crisis List episodes are more severe than Schularick and Taylor's (when compared on their sample of 14 countries) and Bordo et al.'s crises.

Panel B, which compares the BVX Crisis List to Laeven and Valencia's chronology, shows the opposite, that the BVX Crisis List is slightly less severe than Laeven and Valencia's (when compared on their time sample 1970-2012), perhaps because Laeven and Valencia only identify crises that are serious enough to warrant several forms of major government intervention.

In general, we conclude that, comparing the BVX Crisis List to previous chronologies, the aftermath of banking crises tends to be *more* severe (the exception being Laeven and Valencia), especially when restricting our chronology to crises featuring large bank equity declines. However, it is important to note that the evidence is nuanced and also that the comparisons are sensitive to the sample studied.

E. ROC curve comparisons for BVX crises and other crisis chronologies

Table A14 compares the area under the ROC curve (AUC) when using a variety of variables to classify BVX crises and Reinhart-Rogoff crises (Panel A) or BVX crises and Laeven-

Valencia crises (Panel B). The table shows that, across a variety of classifiers (e.g., real GDP growth), the AUC is generally higher for BVX crises than for Reinhart-Rogoff and Laeven-Valencia crises. Panel A compares the AUC on the full sample, while panel B focuses on the post-1970 sample covered by Laeven and Valencia (2013).

F. Other episodes of minor bank distress from narrative accounts

We list in Table A15 additional episodes of minor bank distress from narrative accounts. These episodes are listed purely for historical interest and for the aid of future researchers who are interested in other periods of minor banking distress. This list is not used in any of the analysis of this paper.

Additional references

Baron, Matthew "Countercyclical Bank Equity Issuance." *Review of Financial Studies*, forthcoming, 2020.

Bernanke, Ben, Mark Gertler, and Simon Gilchrist. "The Financial Accelerator in a Quantitative Business Cycle Framework." In *Handbook of Macroeconomics* vol. 1, pp. 1341-1393, 1999.

Conant, Charles Arthur. *A History of Modern Banks of Issue*. GP Putnam's Sons, 1915.

Eichengreen, Barry, and Jeffrey Sachs. "Exchange Rates and Economic Recovery in the 1930s." *Journal of Economic History* 45, no. 4 (1985): 925-946.

Jordà, Òscar, Moritz Schularick, and Alan Taylor. "When Credit Bites Back." *Journal of Money, Credit and Banking* 45, no. 2 (2013): 3-28.

Kindleberger, Charles. *A Financial History of Western Europe*. Oxford University Press, 1993.

Madsen, Jakob. "Trade Barriers and the Collapse of World Trade during the Great Depression." *Southern Economic Journal* (2001): 848-868.

Mehrez, Gil, and Daniel Kaufman. "Transparency, Liberalization, and Banking Crises." Policy Research Working Paper No. WPS 2289. World Bank, 2000.

Reinhart, Carmen, and Kenneth Rogoff. "Recovery from Financial Crises: Evidence from 100 Episodes." *American Economic Review* 104, no. 5 (2014): 50-55.

Rocha, Bruno, and Solomos Solomou. "The Effects of Systemic Banking Crises in the Inter-War Period." *Journal of International Money and Finance* 54 (2015): 35-49.

Sumner, William Graham. *A History of Banking in all the Leading Nations. Vol. 1, A History of Banking in the United States.* The Journal of Commerce and Commercial Bulletin, 1896.

Figure A1: Sample historical data

This figure shows scans of three historical newspapers containing bank stock price data. Panel A shows Italian bank stock prices at the end of 1904 from the newspaper *La Stampa*. Panel B shows Dutch bank stock prices at the end of 1908 from the newspaper *De Telegraaf*. Panel C shows German bank stock prices at the end of 1873 from the newspaper *Berliner Boersen-Zeitung*. The full list of historical primary sources for bank stock prices and dividends can be found in the Data Appendix.

(A) Italian bank stock prices, 1904

BORSE ITALIANE.

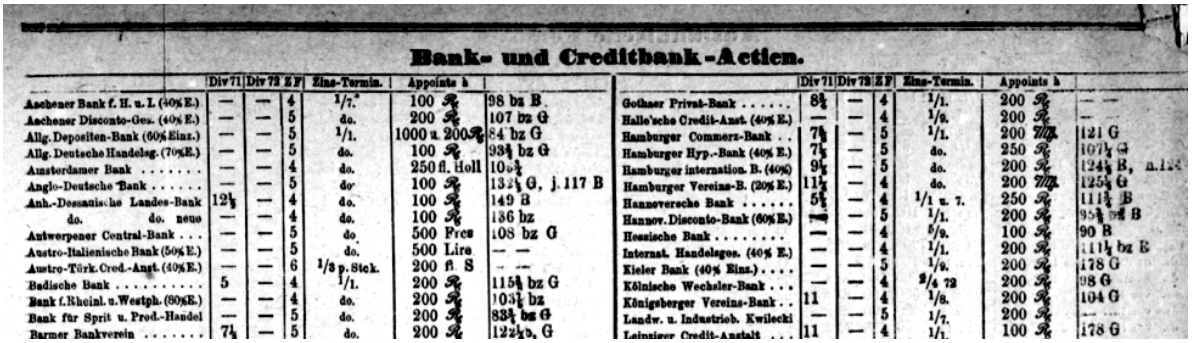
Corsi di chiusura del 28 dicembre 1904.

Valori	Roma	Milano	Genova	Firenze
Rend. it. 5 0/0 perc.	105 35	105 25	105 32 1/2	105 37
» f.m.	105 30	105 30	105 37 1/2	105 32 1/2
3 1/2 0/0 p.c.	103 45 1/2	—	—	103 25
» f.m.	103 35	103 37 1/2	103 37 1/2	103 30
Az. Banca d'It.	1132 —	1134 50	1135 50	— —
» Banca Comm.	629 —	628 50	629 —	— —
» Credito Ital.	611 —	611 —	612 —	— —
» Meridionali	736 —	736 —	736 —	736 —
» Mediterranee	— —	459 —	460 —	460 50
» Rubattino	— —	468 50	470 —	— —
» Terni	— —	1945 —	1949 —	— —
» Elba	— —	— —	— —	— —
» Savona	— —	— —	— —	— —
» Molini Alta It.	— —	— —	— —	— —
» Fridania	— —	— —	— —	— —
» Carburo Rom.	— —	— —	— —	— —

(B) Dutch bank stock prices, 1908

	V.K.	L.K.	H.K.
Amst. Liq.-Kas. dito...	115	——	——
Buit. Bankver. A-U. dito	64	——	——
Cent. Bankv. L. & N. dito	——	——	——
Cen. Cred.-Bank S.....4½	99¾	——	——
Cent. Werkg. Ris.-B. O.4½	100¾	100¾	——
Crediet-Vereen. A.....	101½	——	——
Disc. en Eff.b. 1&2ser.do.	112	——	——
Disc.-Mij te Rotterd. do.	——	——	——
Fin. Mij v. Zuid-Afr. do.	95	——	——
Geld. Crediet-vereenig.	165	——	——
Gemeente-Cred. Obl. 4	101½	——	——
dito dito dito 3½	96½	96⅛	——
dito dito dito 3	85¾	85⅝	——
dito dito dito 2½	——	——	——
Holl. Belegg. Cie. dito 4	98	——	——
Holl. Voorsch. Bk. S. b..	100	——	——
Incasso Bank Aand...	116½	——	——
Ind. Bnk. te Haarl. dito	——	——	——
Kas Vereeniging Aand.	142	142½	——

(C) German bank stock prices, 1873



Bank- und Creditbank-Actien.

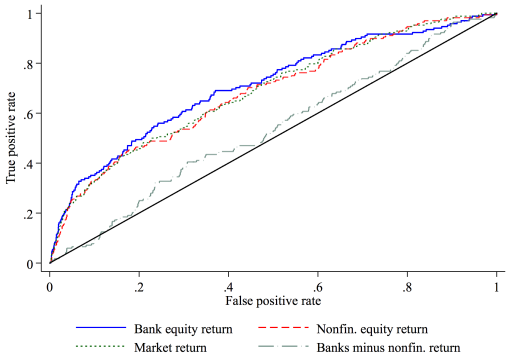
	Div 71	Div 72	E F	Einz-Termin.	Appoints b	
Aachener Bank f. H. u. L. (40% E.)	—	—	4	1/7.	100 ℛ	98 bz B
Aachener Disconto-Ges. (40% E.)	—	—	5	do.	200 ℛ	107 bz G
Allg. Depositen-Bank (60% Einz.)	—	—	5	1/1.	1000 u. 200 ℛ	84 bz G
Allg. Deutsche Handelsg. (70% E.)	—	—	5	do.	100 ℛ	93¾ bz G
Amsterdamer Bank	—	—	4	do.	250 fl. Holl	10⅝
Anglo-Deutsche Bank	—	—	5	do	100 ℛ	132½ G, j. 117 B
Anh.-Dessauische Landes-Bank	12½	—	4	do.	100 ℛ	149 B
do. do. neue	—	—	4	do.	100 ℛ	136 bz
Antwerpener Central-Bank	—	—	5	do.	500 Frcs	108 bz G
Austro-Italienische Bank (50% E.)	—	—	5	do.	500 Lire	— —
Austro-Türk. Cred.-Angt. (40% E.)	—	—	6	1/3 p. Stck.	200 fl S	— —
Badische Bank	5	—	4	1/1.	200 ℛ	115⅝ bz G
Bank f. Rheinl. u. Westph. (80% E.)	—	—	4	do.	200 ℛ	103½ bz
Bank für Sprit u. Prod.-Handel	—	—	5	do.	200 ℛ	83⅜ bz G
Barmer Bankverein	7½	—	5	do.	200 ℛ	122½b. G

	Div 71	Div 72	E F	Einz-Termin.	Appoints b	
Gothaer Privat-Bank	8½	—	4	1/1.	200 ℛ	— —
Halle'sche Credit-Anst. (40% E.)	—	—	4	1/9.	200 ℛ	— —
Hamburger Commerz-Bank ..	7⅛	—	5	1/1.	200 ℛ	121 G
Hamburger Hyp.-Bank (40% E.)	7⅛	—	5	do.	250 ℛ	107½ G
Hamburger internation. B. (40%)	9⅛	—	5	do.	200 ℛ	124⅛ B, a.12
Hamburger Vereins-B. (20% E.)	11½	—	4	do.	200 ℛ	125⅛ G
Hannoversche Bank	5⅛	—	4	1/1 u. 7.	250 ℛ	111⅛ B
Hannov. Disconto-Bank (60% E.)	—	—	5	1/1.	200 ℛ	95⅛ B
Hessische Bank	—	—	4	5/9.	100 ℛ	90 B
Internat. Handelsges. (40% E.)	—	—	4	1/1.	200 ℛ	111½ bz B
Kieler Bank (40% Einz.)	—	—	5	1/9.	200 ℛ	178 G
Kölnische Wechsler-Bank ...	—	—	4	2/4 72	200 ℛ	98 G
Königsberger Vereins-Bank ..	11	—	4	1/8.	200 ℛ	104 G
Landw. u. Industrieb. Kwilecki	—	—	5	1/7.	200 ℛ	— —
Leipziger Credit-Anstalt ...	11	—	4	1/1.	100 ℛ	178 G

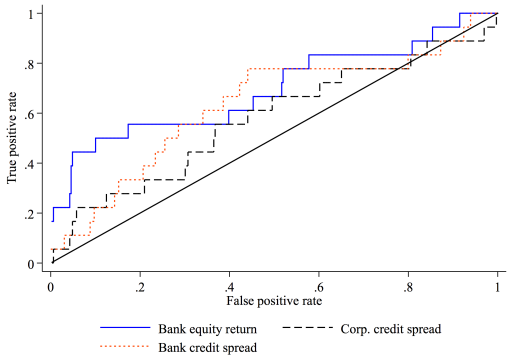
Figure A2: Bank equity returns provide the best real-time signal of narrative banking crises: ROC analysis

This figure presents receiver operating characteristic (ROC) analysis to understand which variables best coincide with banking crises from the Narrative Crisis list. The higher the ROC curve, the better a given variable is at classifying episodes on the list of Narrative Crises. Panel A compares the ROC curve constructed from bank equity returns with the ROC curves constructed using other equity market variables. Panels B and C perform the comparison with credit market and macroeconomic variables. Each panel uses the sample for which all variables are non-missing. The bank equity ROC curve therefore varies across panels.

(A) Bank equity compared with other equity market variables



(B) Bank equity compared with credit market variables



(C) Bank equity compared with macroeconomic variables

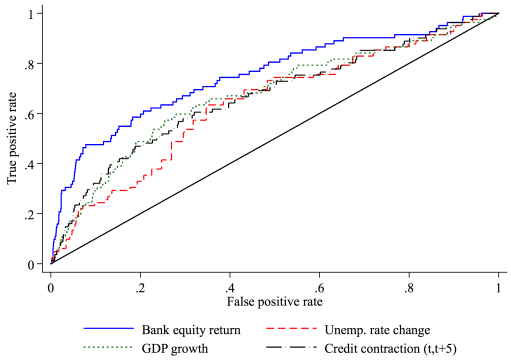


Figure A3: Distribution of bank and nonfinancial equity returns

This figure presents histograms of annual bank and nonfinancial equity returns during Narrative Crisis episodes. For comparison, it also presents the histogram during other years ("No crisis"). Bank and nonfinancial equity returns are annual real total returns. The figure shows that the bank equity return distribution for Narrative Crises relative to non-crisis years is shifted further left and more left-skewed. These patterns are qualitatively similar but quantitatively weaker for the nonfinancial equity return distribution.

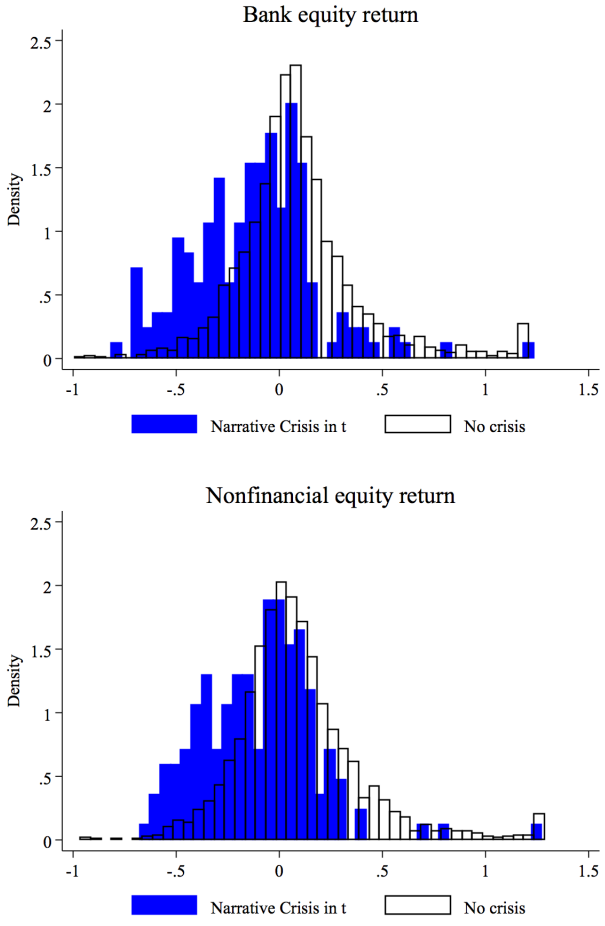
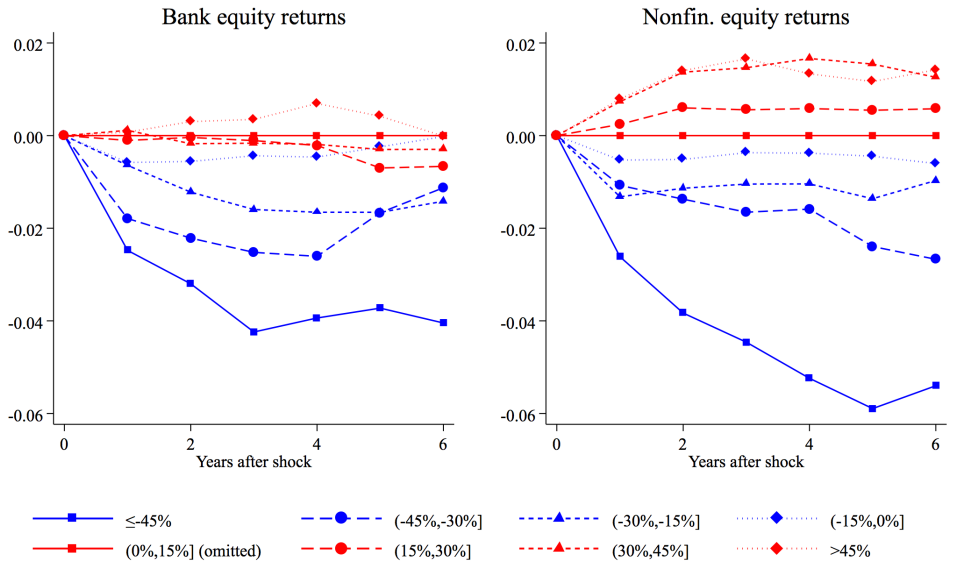


Figure A4: Bank equity crashes predict output gaps and credit contraction: robustness including year fixed effects

This figure presents the same impulse responses as in Figure 2, but the specification includes year fixed effects, in addition to the baseline controls. This figure shows that the results in Figure 2 are robust to the inclusion of year fixed effects.

(A) Real GDP response



(B) Credit-to-GDP response

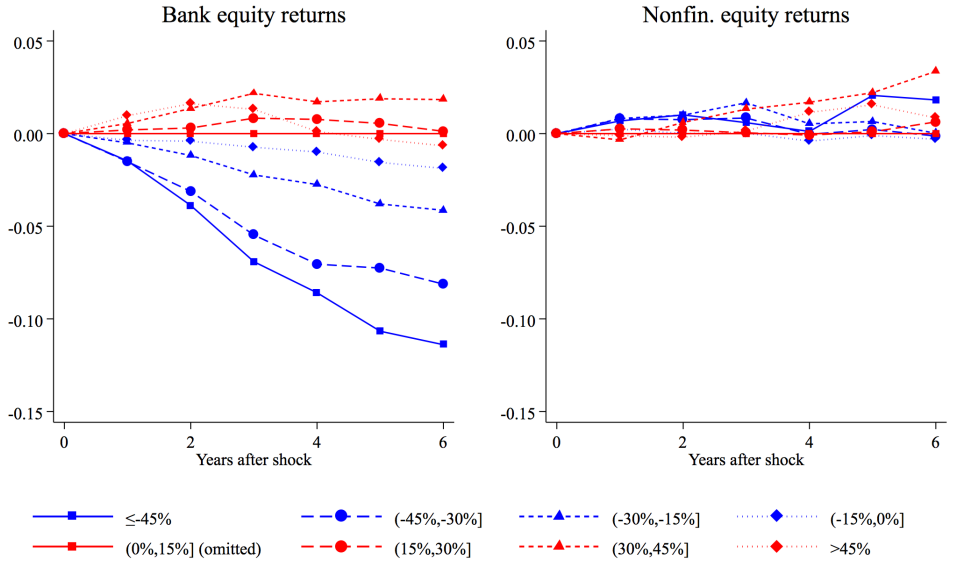
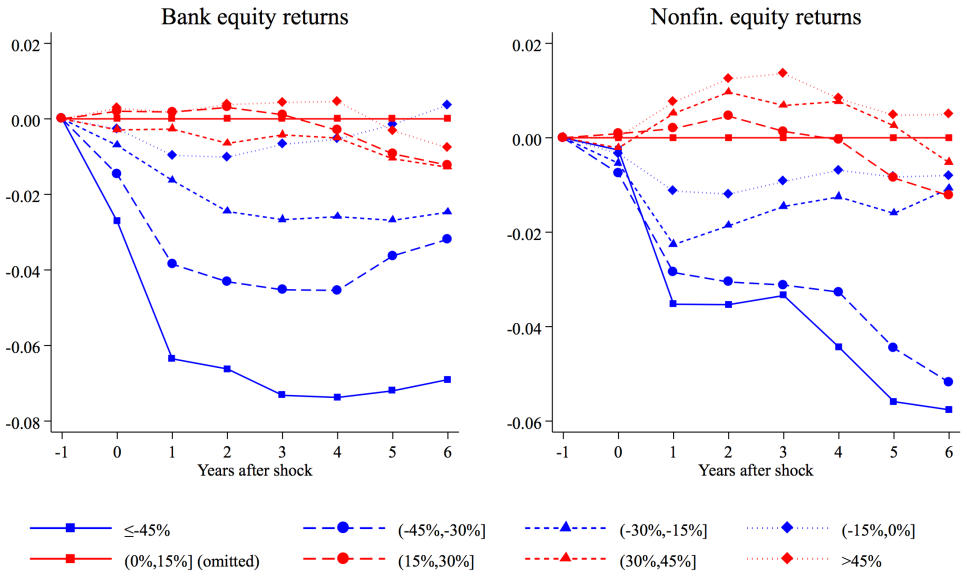


Figure A5: Bank equity crashes predict output gaps and credit contraction: alternative timing

This figure presents the same impulse responses as in Figure 2, but the specification adjusts the timing to allow for bank and nonfinancial equity returns to affect the outcome variable within the same year (year "0"), instead of with a one year lag. This figure shows that bank equity crashes are associated with larger declines in real GDP and credit-to-GDP when bank equity crashes are assumed to affect the outcome variable within the same year.

(A) Real GDP response



(B) Credit-to-GDP response

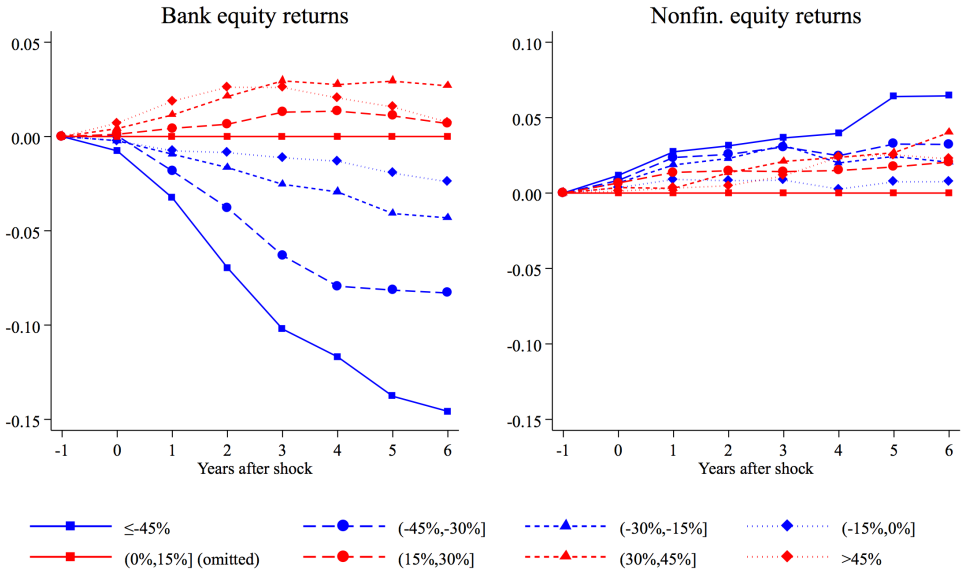
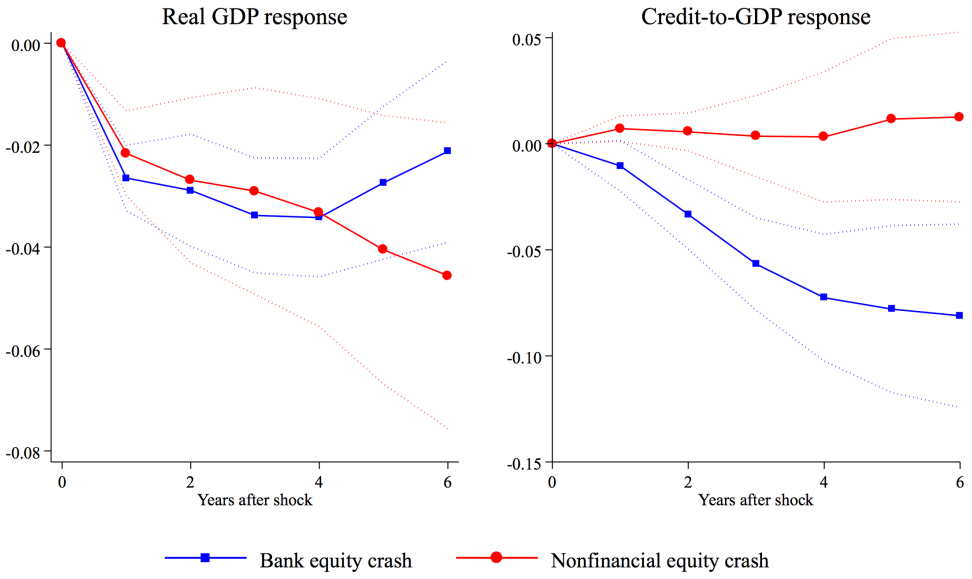


Figure A6: Bank equity and subsequent macroeconomic outcomes: Robustness to alternative specifications

Panel A plots the response of real GDP and credit-to-GDP to 30% crashes in bank equity and nonfinancial equity. Panel B plots the response to innovations in bank and nonfinancial equity continuous negative returns (i.e., returns times −1). Impulse responses are estimated using Jordà (2005) local projections with controls for three lags in the bank and nonfinancial equity variables, country fixed effects, and contemporaneous and lagged values of real GDP growth and change in credit-to-GDP. The dashed lines represent 95% confidence intervals based on Driscoll-Kraay standard errors with a lag length of six.

(A) 30% bank equity crashes



(B) Bank equity continuous negative return innovations

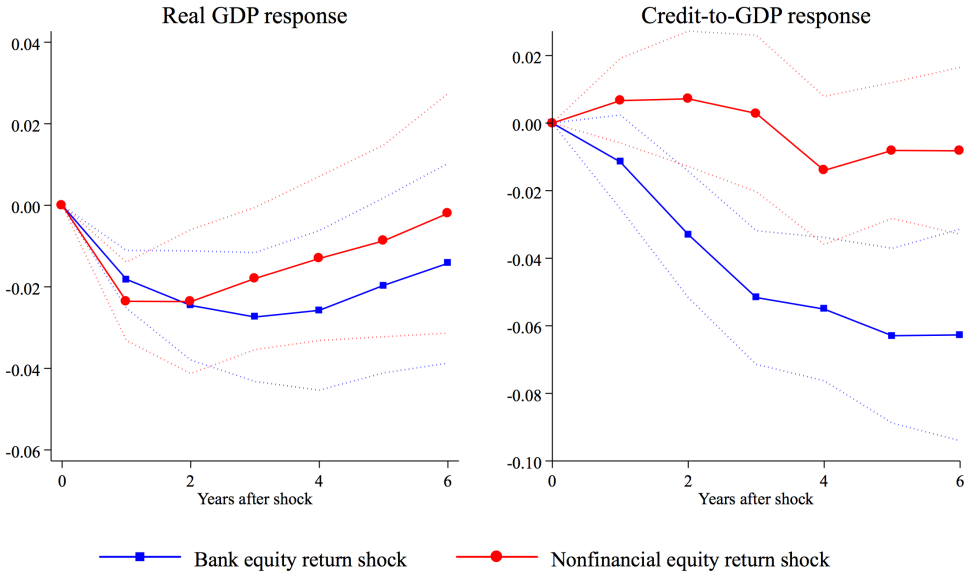
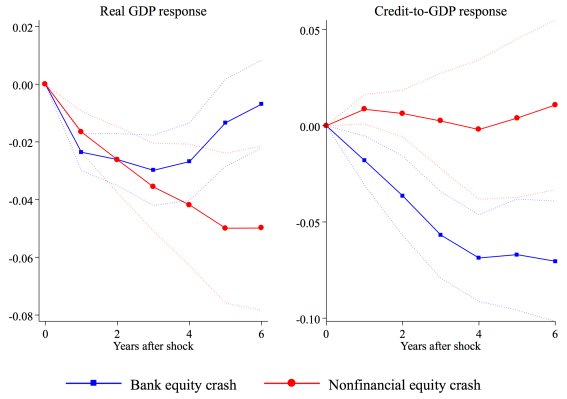


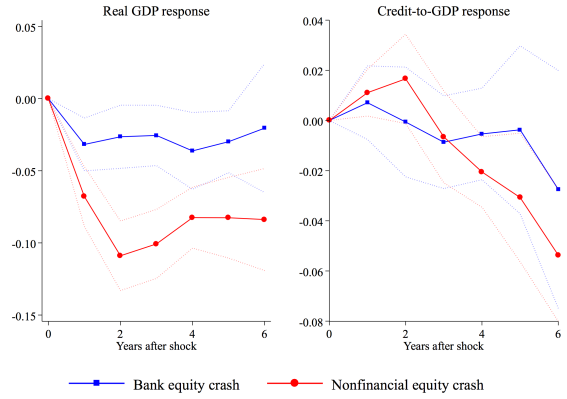
Figure A7: Bank equity crashes and subsequent macroeconomic outcomes: Subsamples

This figure plots the response of real GDP and credit-to-GDP to 30% crashes in bank equity and nonfinancial equity across various subsamples. Impulse responses are estimated using Jordà (2005) local projections with controls for three lags in the bank and nonfinancial equity crash variables, country fixed effects, and contemporaneous and lagged values of real GDP growth and change in credit-to-GDP. The dashed lines represent 95% confidence intervals based on Driscoll-Kraay standard errors with a lag length of six.

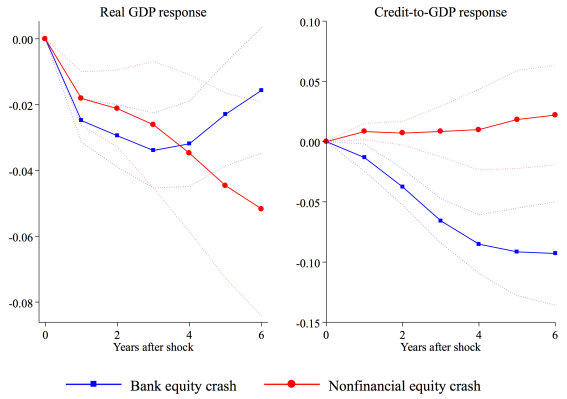
(A) Excluding the Great Depression and Great Recession



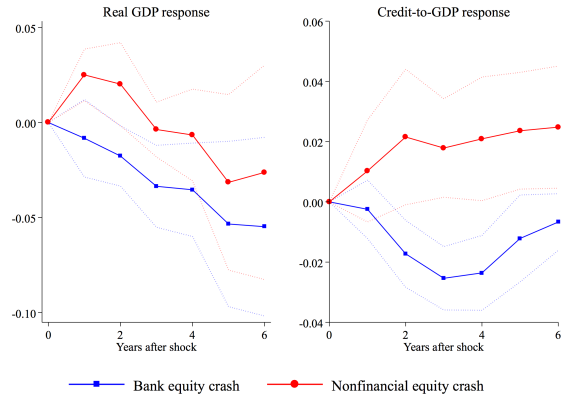
(B) Pre-WWII subsample



(C) Post-WWII subsample



(D) 1946-1970



(E) 1971-2016

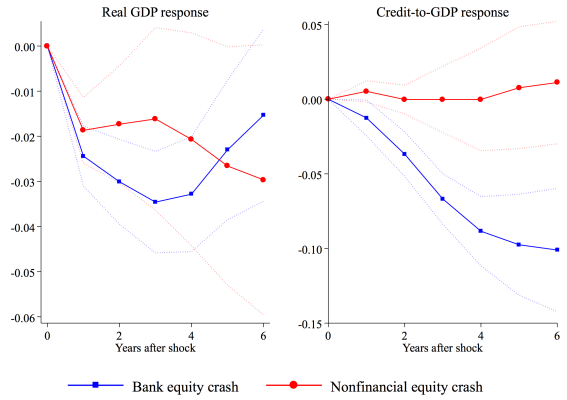
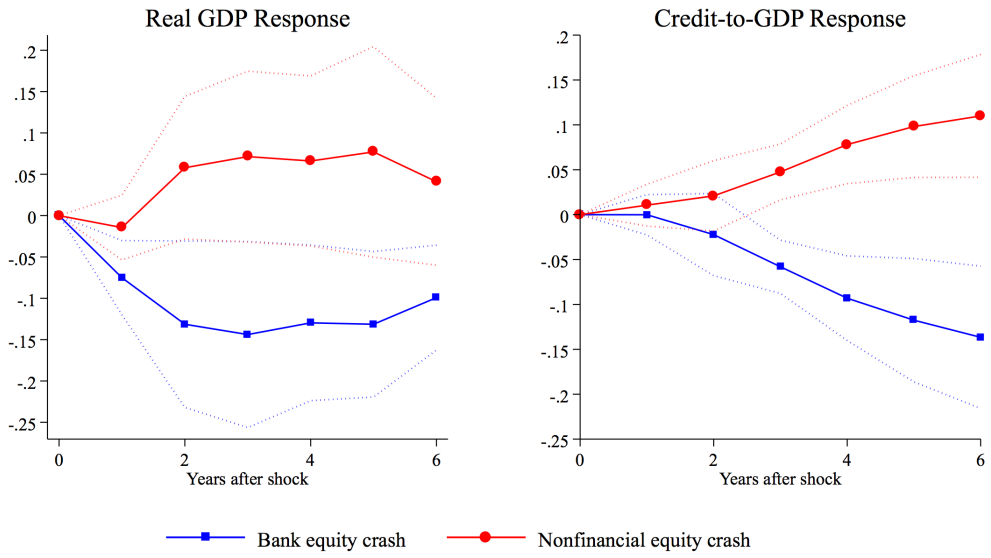


Figure A8: Bank equity crashes and subsequent macroeconomic outcomes: U.S. only

This figure plots the response of real GDP and credit-to-GDP to 30% crashes in bank equity and nonfinancial equity for the U.S. time series. The impulse responses are estimated using local projections, controlling for contemporaneous real GDP growth and change in credit-to-GDP, as well as three lags in bank equity returns, nonfinancial equity returns, real GDP growth, and change in credit-to-GDP. The dashed lines represent 95% confidence intervals based on Newey-West standard errors with six lags.

(A) Full sample



(B) Excluding the Great Recession and Great Depression

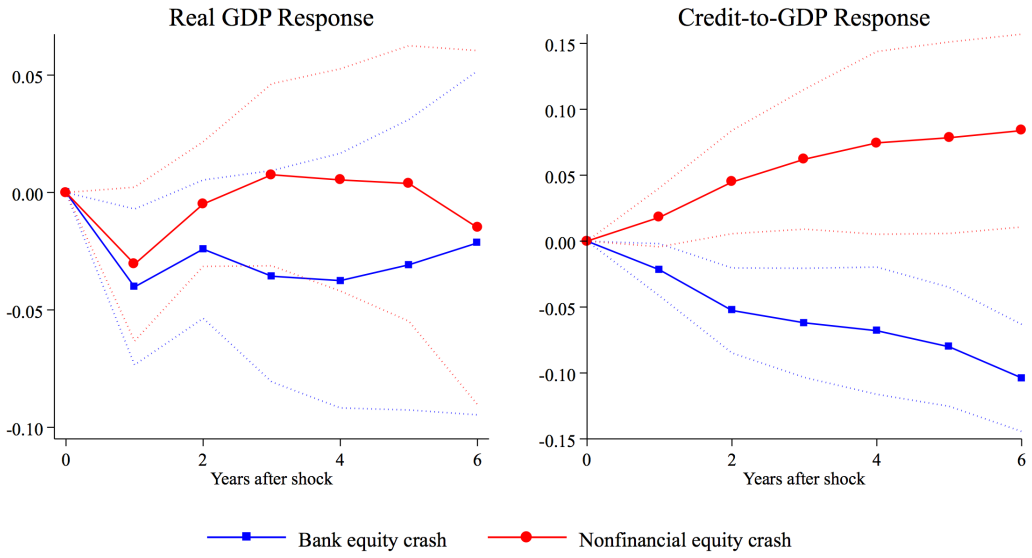
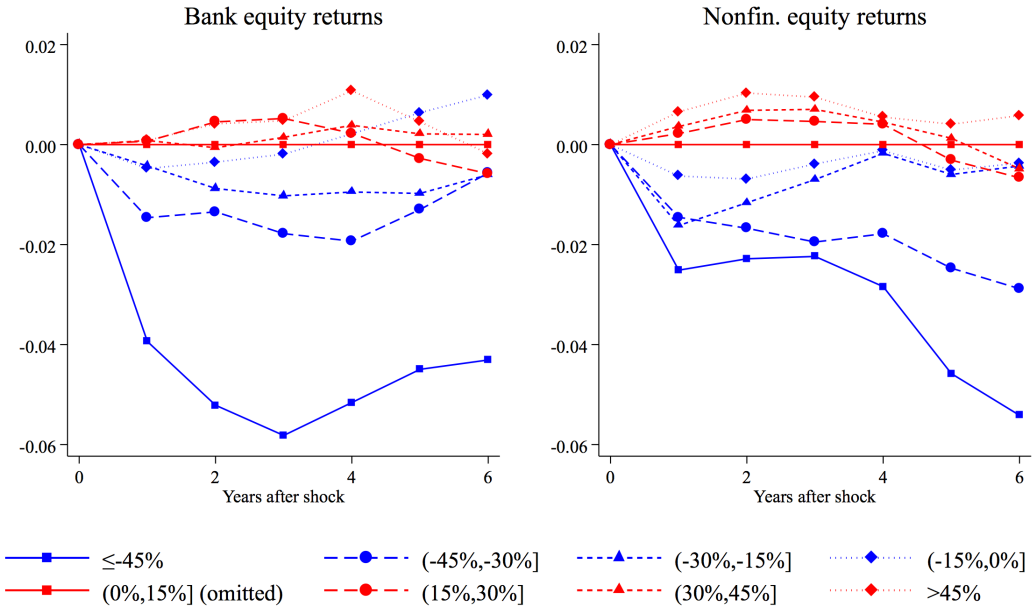


Figure A9: Bank equity crashes excluding panic episodes

This figure shows that bank equity crashes predict real output and credit contraction even excluding panic episodes. We estimate local projection impulse responses to bank equity returns across different bins, as in Figure 2, but excluding observations within a ±3-year window of a panic (as defined in Table A2).

(A) Real GDP response excluding panic episodes



(B) Credit-to-GDP response excluding panic episodes

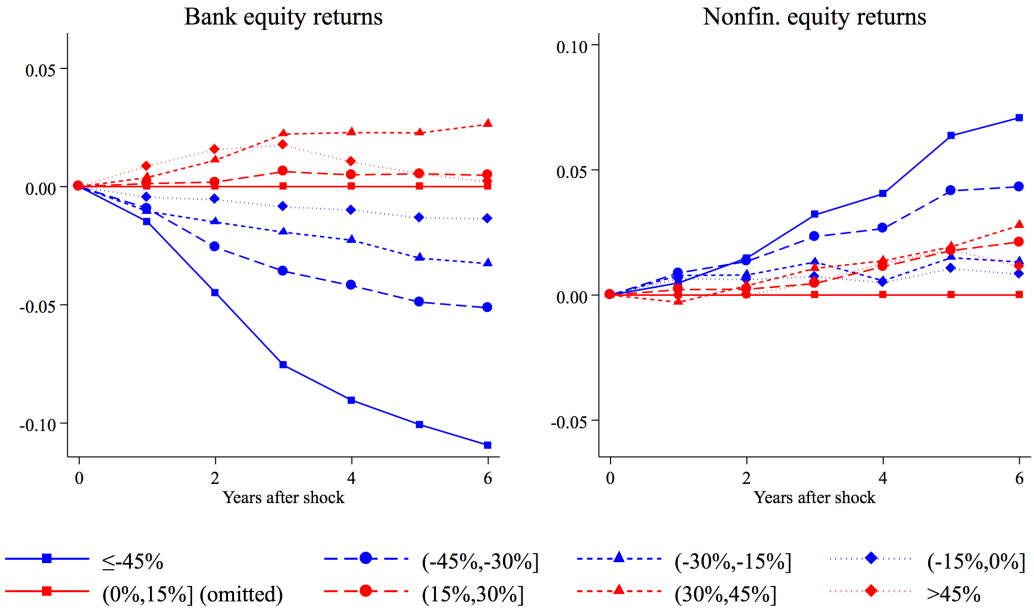


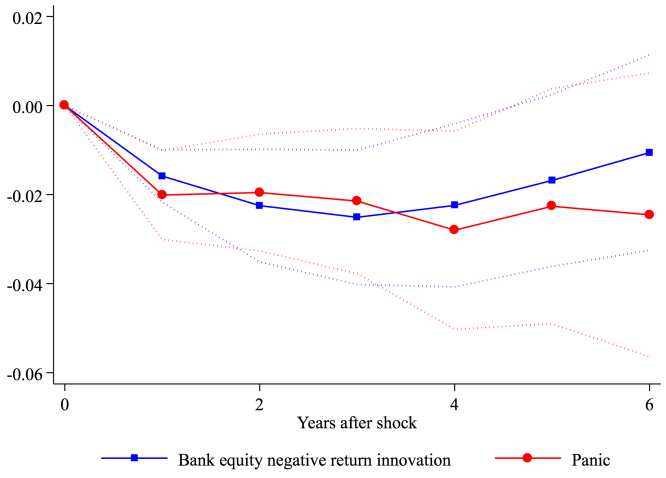
Figure A10: Bank equity continuous returns and panics

This figure presents local projection impulse responses estimated using

$$\Delta_h y_{i,t+h} = \alpha_i + \sum_{j=0}^{3}[\beta_j^h(-r_{i,t-j}^B) + \gamma_j^h Panic_{i,t-j}] + \sum_{j=0}^{3}\Gamma X_{i,t-j} + \epsilon_{i,t+h}, \quad h = 1, 2, \ldots.$$

The blue line plots the response to a negative bank equity return innovation ($\{\beta_0^h\}$) and the red line plots the response to a panic episode ($\{\gamma_0^h\}$). The dashed lines represent 95% confidence intervals based on Driscoll-Kraay standard errors with six lags.

(A) Real GDP response



(B) Credit-to-GDP response

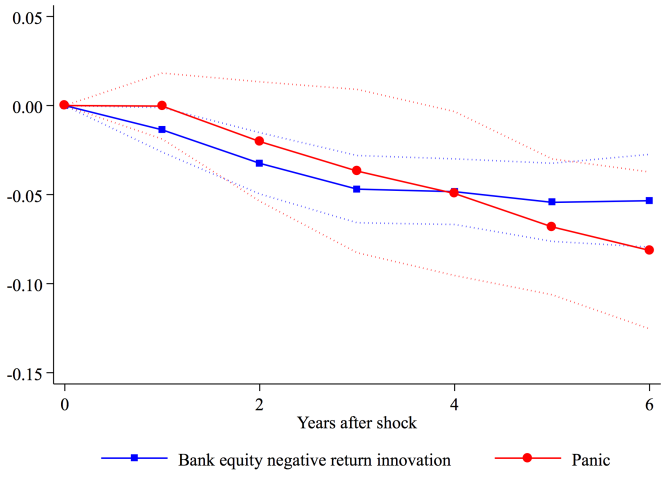
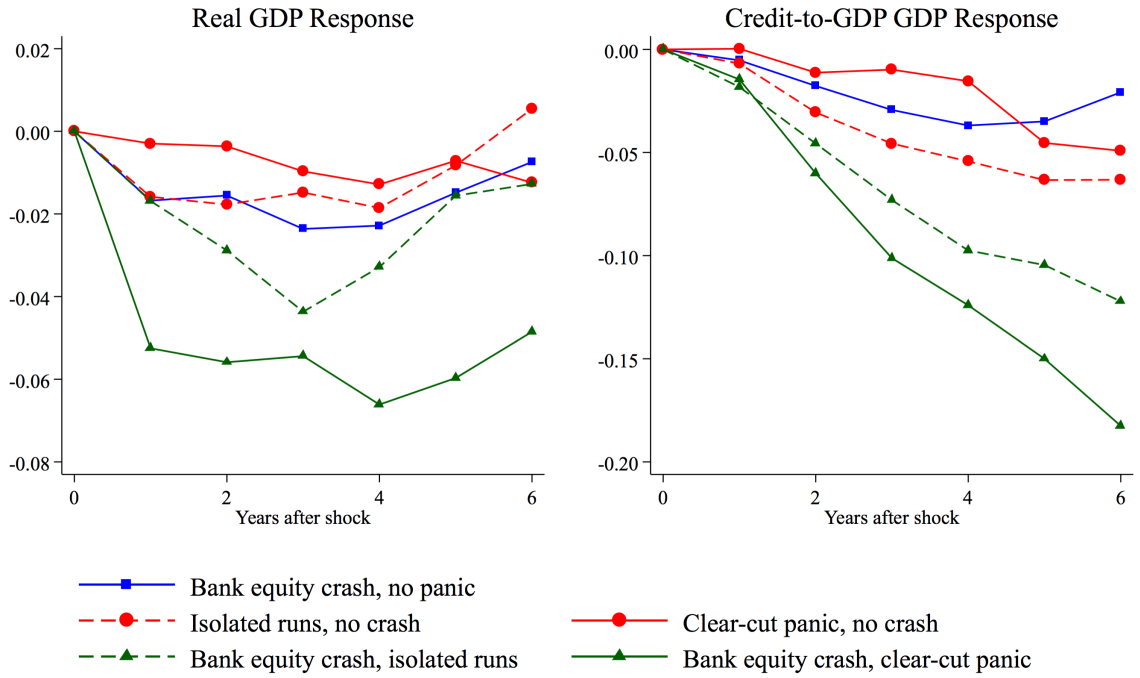


Figure A11: Banking distress with and without banking panics: Finer panics classification

This figure is similar to Figure 3 but uses a finer classification for creditor runs. The figure distinguishes between episodes with "isolated runs," defined as episodes featuring isolated runs on a single large bank or a few small banks or borderline episodes with inconclusive historical evidence, and "clear-cut panics," defined as all panic episodes from Table A2 not labeled as "isolated runs." The responses of real GDP and credit-to-GDP are estimated using local projections, as in Figure 3.

(A) Baseline



(B) Conditioning on bank failures

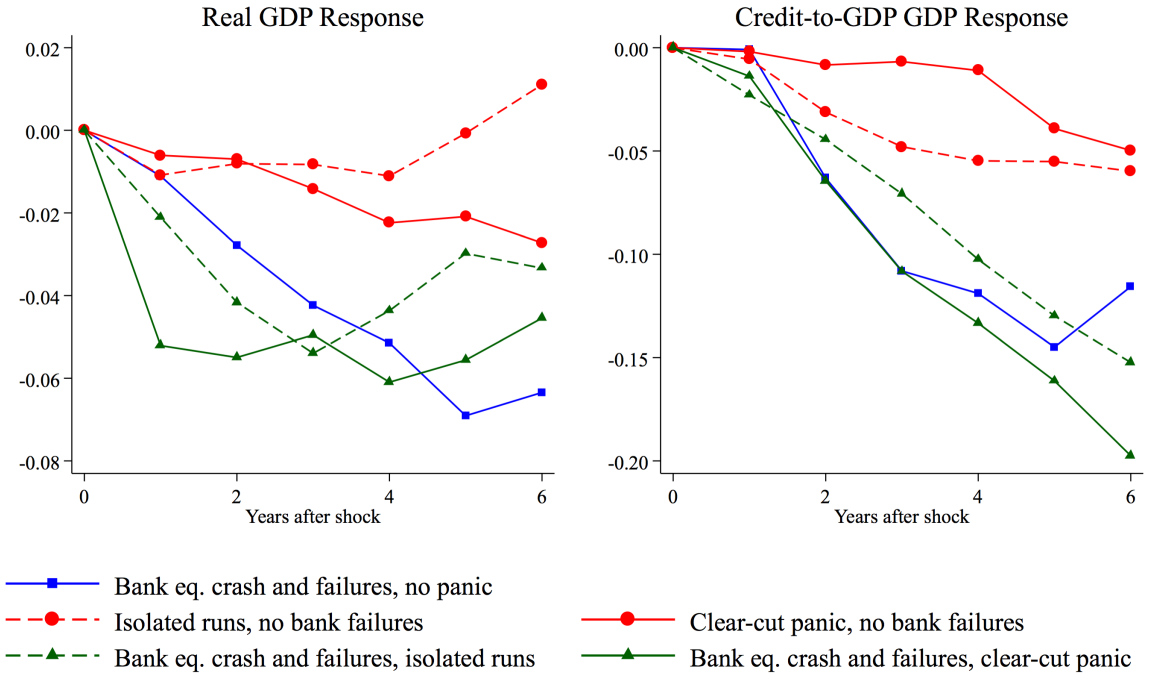


Figure A12: Frequency of panic and non-panic crises across decades

This figure plots the frequency of crisis episodes for each decade for the 46 countries in our sample. The frequency is calculated as the number of crises divided by the total number of country-years in each decade. "BVX panic crisis" refers to episodes on the BVX Crisis List with a panic. "BVX non-panic crisis" refers to episodes on the BVX Crisis List that do not feature a banking panic. "All 30% bank equity declines without panic" refers to all 30% bank equity declines that are not associated a panic, including episodes on the BVX Crisis List and other episodes (i.e., episodes without narrative evidence of bank failures).

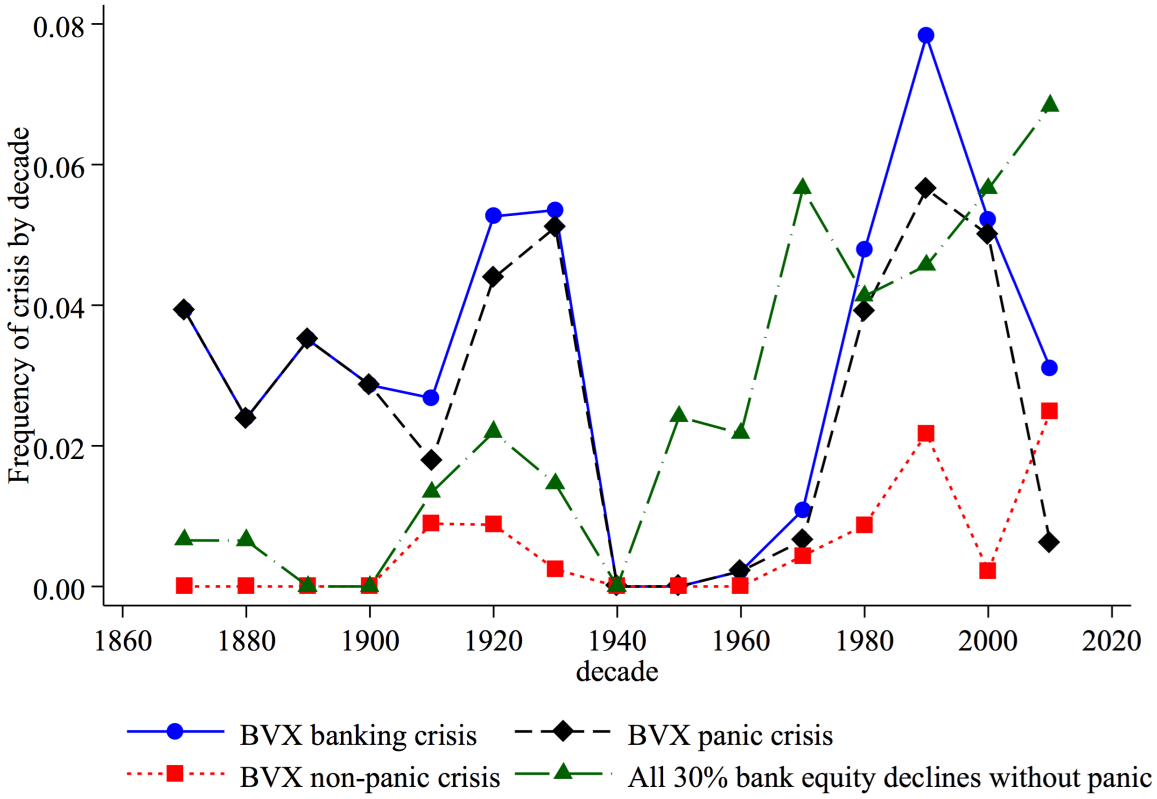
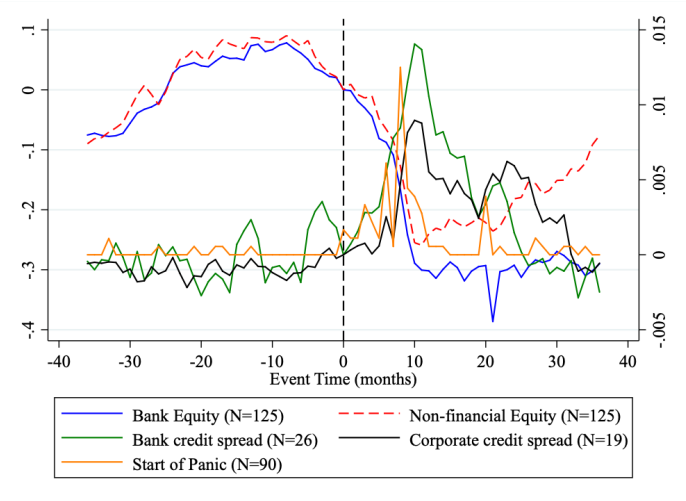


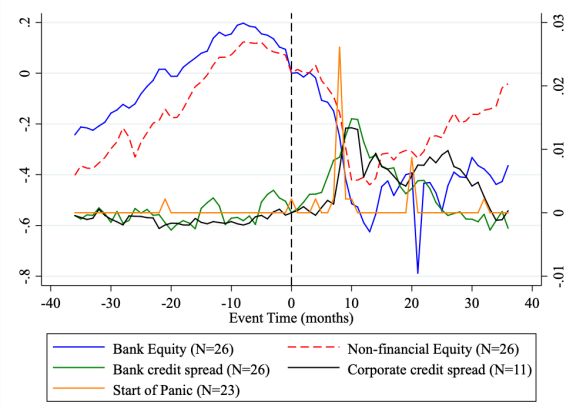
Figure A13: Timing of bank equity declines relative to panic dates and other financial market indicators: robustness on the sample of Narrative Crises

This figure presents the same results as in Figure 6, but on the sample of Narrative Crises instead of episodes on the BVX Crisis List.

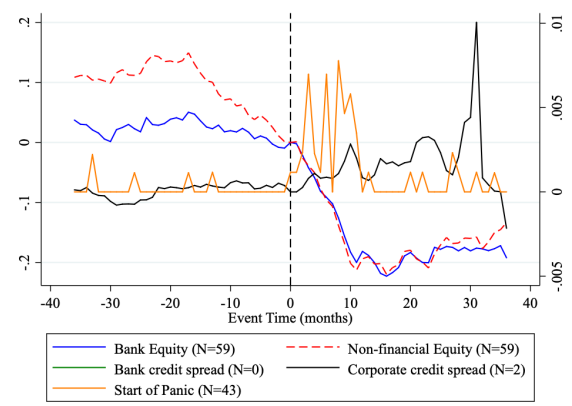
(A) Full sample



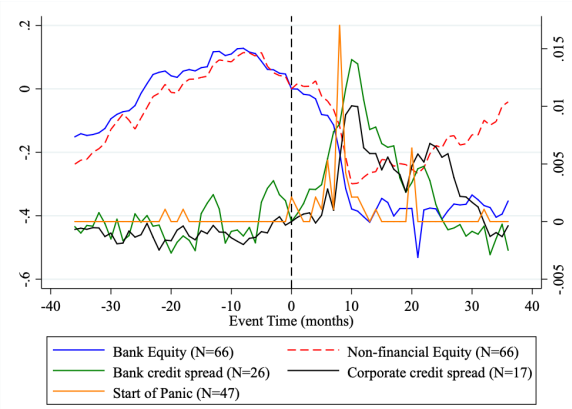
(B) Consistent sample



(C) 1870-1939



(D) 1940-2016



(E) 1940-2006

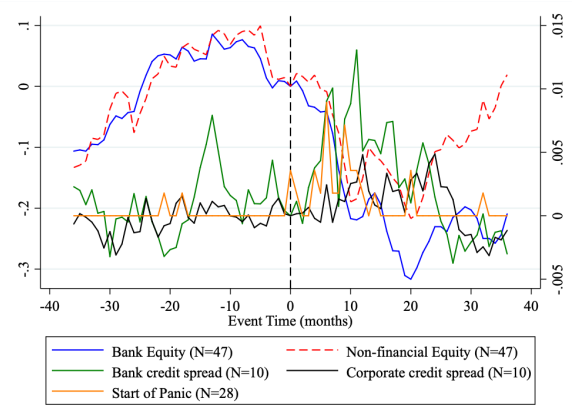
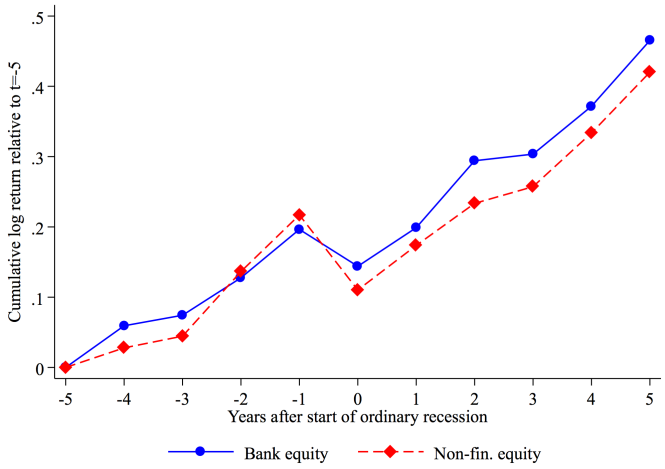


Figure A14: Bank and nonfinancial equity in banking crisis and normal recessions

This figure plots the average dynamics of bank equity and nonfinancial equity around banking crisis recessions and normal (i.e. non-banking crisis) recessions. Banking crisis recessions are defined as recessions that coincide with a BVX Crisis List episode within a year of the peak in GDP. Normal recessions are the remaining recessions in the sample. Time $t = 0$ refers to the GDP peak year.

(A) Normal recessions



(B) Banking crisis recessions

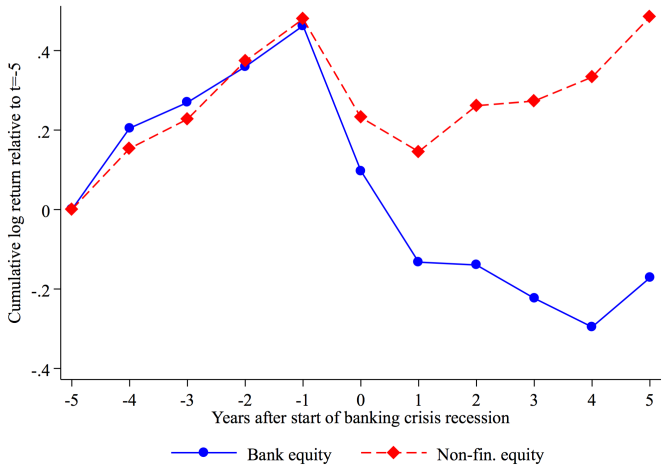


Figure A15: Bank equity declines and the global Great Depression

This figure plots the peak-to-trough decline in real GDP against the peak-to-trough bank equity decline over the period 1929-1933. Note that this figure plots all countries in the sample for which data is available, not just those that experienced banking crises.

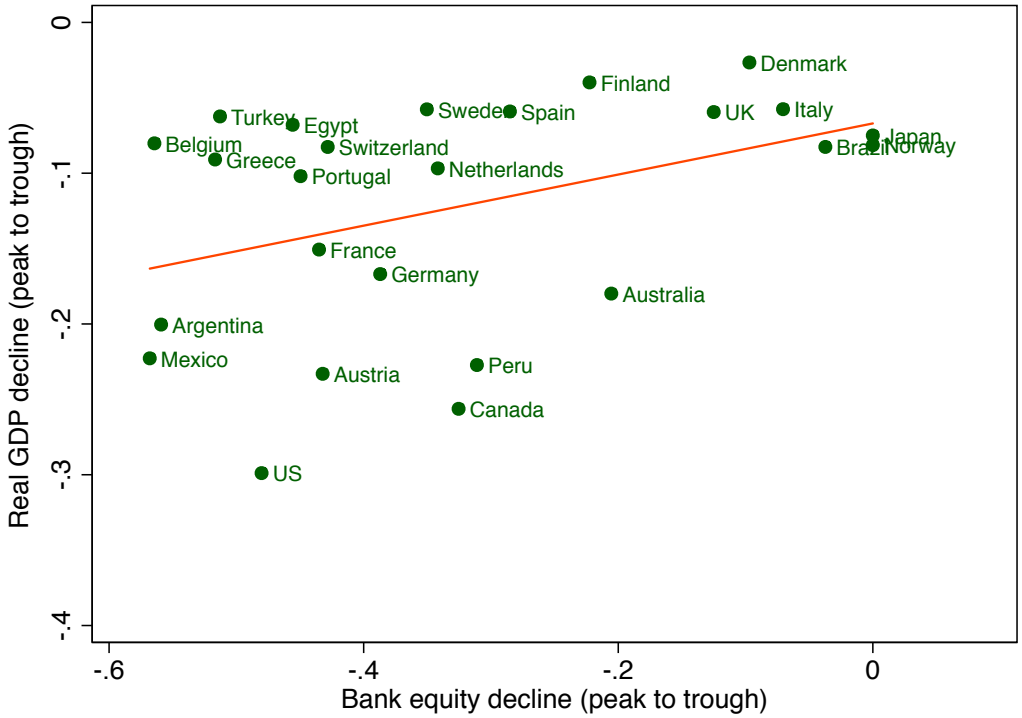
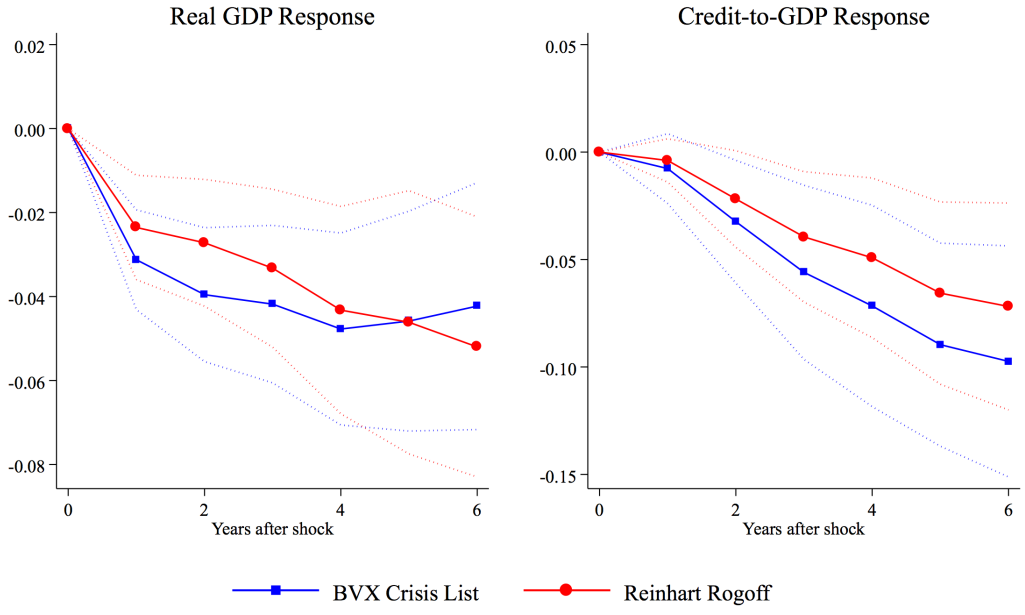


Figure A16: Comparison with other banking crisis chronologies

This figure compares the BVX Crisis List with the Reinhart and Rogoff (2009) and Laeven and Valencia (2013) banking crisis chronologies. The comparisons in each panel are estimated separately using local projections on consistent samples (i.e. the same sample covered by Reinhart and Rogoff (2009) or Laeven and Valencia (2013)). All specifications control for country fixed effects, along with contemporaneous and lagged real GDP growth and change in credit-to-GDP. The dashed lines represent 95% confidence intervals based on Driscoll-Kraay standard errors with six lags.

(A) Comparison with Reinhart and Rogoff



(B) Comparison with Laeven and Valencia

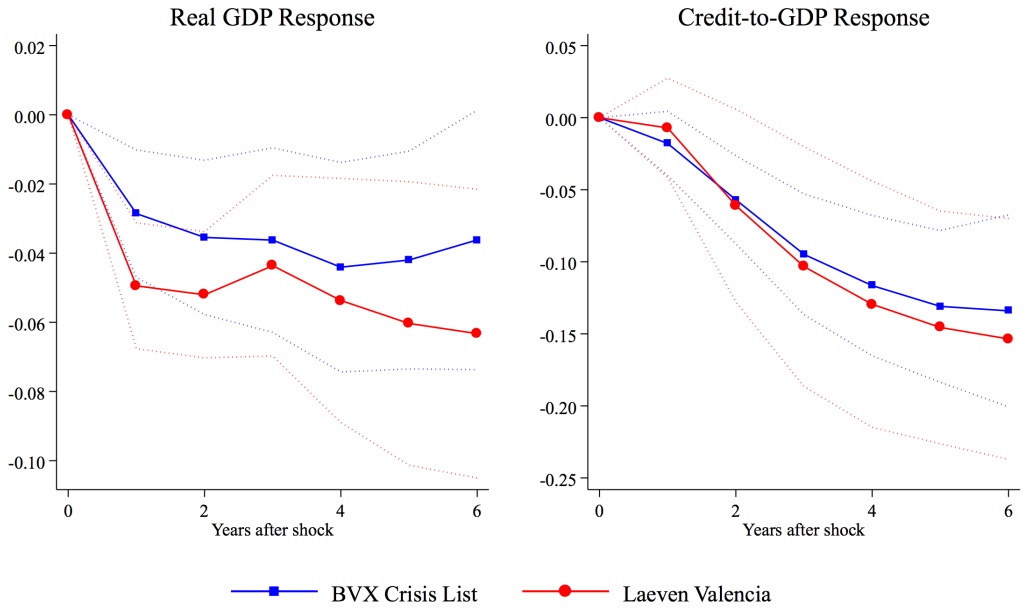


Table A1: Narrative Crises

This table reports the list of Narrative Crises, defined as the union of all banking crises from six prominent papers: Bordo et al. (2001), Caprio and Klingebiel (2003) Demirgüç-Kunt and Detragiache (2005), Laeven and Valencia (2013), Reinhart and Rogoff (2009, and online spreadsheets updated 2014), and Schularick and Taylor (2012, online update 2017). We use the most recent update of each paper. The years listed correspond to the starting year of the banking crisis according to each paper. The starting year of the Narrative Crisis list (reported in column 8) is the earliest year across all six papers. A "0" means that the source reports no banking crisis in a given year, while a blank cell means that the crisis is not covered in the sample period (i.e. no information provided either way as to whether a banking crisis occurred).

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Country	Reinhart Rogoff	Schularick Taylor	Laeven Valencia	Bordo	Caprio Klingebiel	Demirgüç-Kunt Detrag.	Narrative Crises
Argentina	1885						1885
	1890			1890			1890
	1914			1914			1914
	1931			1931			1931
	1934			1934			1934
	1980		1980	1980	1980	1980	1980
	1985		0	0	0	0	1985
	1989		1989	1989	1989	1989	1989
	1995		1995	1995	1995	1995	1995
	2001		2001		2001	2001	2001
Australia	1893	1893		1893			1893
	1931	0		0			1931
	1989	1989	0	1989	1989	0	1989
Austria	1873						1873
	1924						1924
	1929						1929
	1931						1931
	2008		2008				2008
Belgium	1870	1870					1870
	0	1885					1885
	1914	0		1914			1914
	1925	1925		1925			1925
	1931	1931		1931			1931
	1934	1934		1934			1934
	1939	1939		1939			1939
	2008	2008	2008				2008
Brazil	1890			1890			1890
	1897			1897			1897
	1900			1900			1900
	1914			1914			1914
	1923			1923			1923
	1926			0			1926
	1929			0			1929
	1963			1963			1963
	1985		0	0	0	0	1985
	1990		1990	1990	1990	1990	1990
	1994		1994	1994	1994	1994	1994
Canada	1873	0					1873
	1906	0					1906
	1908	1907					1907
	1912	0					1912

Continued on next page

Table A1: Narrative Crises

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Country	Reinhart Rogoff	Schularick Taylor	Laeven Valencia	Bordo	Caprio Klingebiel	Demirgüç-Kunt Detrag.	Narrative Crises
	1923	0		1923			1923
	1983	0	0	1983	1982	0	1982
Chile	1890			1889			1889
	1898			1898			1898
	1907			1907			1907
	1914			1914			1914
	1926			1925			1925
	1976		1976	1976	1976		1976
	1980		1981	1981	1981	1981	1980
Colombia	1982		1982	1982	1982	1982	1982
	1998		1998	0	0	1999	1998
Czech	1931						1931
	1991		0		1991		1991
	0		1996		0		1996
Denmark	1877	1877					1877
	1885	1885		1885			1885
	1902	0		0			1902
	1907	1908		1907			1907
	1914	0		1914			1914
	1921	1921		1921			1921
	1931	1931		1931			1931
	1987	1987	0	1987	1987	0	1987
	2008	2008	2008				2008
Egypt	1907						1907
	1931						1931
	1980		1980	1981	1980s	0	1980
	1990		0	1991	1991	0	1990
Finland	0	1877					1877
	1900	1900		1900			1900
	1921	1921		1921			1921
	1931	1931		1931			1931
	1939	0		1939			1939
	1991	1991	1991	1991	1991	1991	1991
France	1871						1871
	1882	1882		1882			1882
	1889	1889		1889			1889
	1904	0		0			1904
	1907	0		1907			1907
	1914	0		0			1914
	1930	1930		1930			1930
	1939	0		0			1939
	1994	0	0	1994	1994	0	1994
	2008	2008	2008				2008
Germany	0	1873					1873
	1880	0					1880
	1891	1891		0			1891
	1901	1901		1901			1901
	0	1907		0			1907
	1925	0		0			1925
	1929	1931		1931			1929
	1977	0	0	0	late 1970s		1977

Continued on next page

Table A1: Narrative Crises

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Country	Reinhart Rogoff	Schularick Taylor	Laeven Valencia	Bordo	Caprio Klingebiel	Demirgüç-Kunt Detrag.	Narrative Crises
	2008	2008	2008		0		2008
Greece	1931			1931			1931
	1991		0	1991	1991	0	1991
	2008		2008				2008
Hong Kong	1982		0	1982	1982		1982
	1983		0	1983	1983		1983
	1998		0		1998		1998
Hungary	1931						1931
	1991		1991		1991	0	1991
	2008		2008				2008
Iceland	1985		0	1985	1985	0	1985
	1993		0	1993	1993	0	1993
	2007		2008				2007
India	1908						1908
	1913						1913
	1921						1921
	1929						1929
	1947						1947
	1993		1993	1993	1993	1991	1991
Indonesia	1992		0	0	0	1992	1992
	1994		0	1994	1994	0	1994
	1997		1997	1997	1997	1997	1997
Ireland	2007		2008				2007
Israel	1977		1977	1977	1977	0	1977
	1983		0	counted above	counted above	1983	1983
Italy	0	1873					1873
	1887	1887					1887
	1891	0		1891			1891
	1893	1893		1893			1893
	1907	1907		1907			1907
	1914	0		1914			1914
	1921	1921		1921			1921
	1930	1930		1930			1930
	1935	1935		1935			1935
	1990	1990	0	1990	1990	1990	1990
	2008	2008	2008				2008
Japan	1872	1871					1871
	1882	0					1882
	0	1890		0			1890
	1901	0		1901			1901
	1907	1907		1907			1907
	1914	0		0			1914
	1917	0		1917			1917
	0	1920		0			1920
	1923	0		0			1923
	1927	1927		1927			1927
	1992			1992	1991	1992	1991
	counted above	1997	1997	counted above	counted above	counted above	1997
Korea	1983		0	0	0	0	1983
	1986		0	0	0	0	1986
	1997		1997	1997	1997	1997	1997

Continued on next page

Table A1: Narrative Crises

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Country	Reinhart Rogoff	Schularick Taylor	Laeven Valencia	Bordo	Caprio Klingebiel	Demirgüç-Kunt Detrag.	Narrative Crises
Luxembourg			2008				2008
Malaysia	1985		0	1985	1985	1985	1985
	1997		1997	1997	1997	1997	1997
Mexico	1883						1883
	1893						1893
	1908						1908
	1913						1913
	1920						1920
	1929						1929
	1981		1981	1981	1981	0	1981
	1982		counted above	0	counted above	1982	1982
	1992		0	0	0	0	1992
	1994		1994	1995	1994	1994	1994
Netherlands	0	1893		0			1893
	1897	0		1897			1897
	0	1907		0			1907
	1914	0		1914			1914
	1921	1921		1921			1921
	1939	1939		1939			1939
	2008	2008	2008				2008
New Zealand	1890						1890
	1893						1893
	1987		0	1987	1987	0	1987
Norway	1898	1899		0			1898
	1914	0		0			1914
	1921	1922		1921			1921
	1927	0		0			1927
	1931	1931		1931			1931
	1936	0		0			1936
	1987	1988	1991	1987	1987	1987	1987
Peru	1872						1872
	1983		1983	1983	1983	1983	1983
	1999		0		0	0	1999
Philippines	1981		1983	1983	1981	1981	1981
	1997		1997		1998	1998	1997
Portugal	1890	1890		1891			1890
	1920	1920		1920			1920
	1923	1923		1923			1923
	1931	1931		1931			1931
	0	0	0	0	0	1986	1986
	2008	2008	2008				2008
Russia	1875						1875
	1896						1896
	1995		0		1995	0	1995
	1998		1998		1998	0	1998
	2008		2008				2008
Singapore	1982		0	1982	1982		1982
South Africa	1877						1877
	1881						1881
	1890						1890
	1977		0	1977	1977		1977

Continued on next page

Table A1: Narrative Crises

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Country	Reinhart Rogoff	Schularick Taylor	Laeven Valencia	Bordo	Caprio Klingebiel	Demirgüç-Kunt Detrag.	Narrative Crises
	0		0	0	0	1985	1985
	1989		0	0	1989	0	1989
Spain	0	1883					1883
	0	1890		0			1890
	0	1913		0			1913
	1920	1920		1920			1920
	1924	1924		1924			1924
	1931	1931		1931			1931
	1977	1977	1977	1977	1977		1977
	2008	2008	2008				2008
Sweden	1876	1878					1876
	1897	0		1897			1897
	1907	1907		1907			1907
	1922	1922		0			1922
	1931	1931		1931			1931
	1991	1991	1991	1991	1991	1990	1990
	2008	2008	2008				2008
Switzerland	1870	1870					1870
	1910	1910		0			1910
	1921	0		0			1921
	1931	1931		1931			1931
	1933	0		1933			1933
	0	1991	0	0	0	0	1991
	2008	2008	2008				2008
Taiwan	1923						1923
	1927						1927
	1983			1983	1983	0	1983
	1995			1995	1995	0	1995
	1997			1997	1997	1997	1997
Thailand	1979		0	0	0		1979
	1983		1983	1983	1983	1983	1983
	1996		1997	1997	1997	1997	1996
Turkey	1931						1931
	1982		1982	1982	1982	1982	1982
	1991		0	0	0	1991	1991
	1994		0	1994	1994	1994	1994
	2000		2000		2000	2000	2000
U.K.	1878	0					1878
	1890	1890		1890			1890
	1908	0		0			1908
	1914	0		0			1914
	1974	1974	0	1974	1974		1974
	1984	0	0	0	1980s-90s	0	1984
	1991	1991	0	0	0	0	1991
	1995	0	0	0	0	0	1995
	2007	2007	2007				2007
U.S.	1873	1873					1873
	1884	0		1884			1884
	1890	0		0			1890
	1893	1893		1893			1893
	1907	1907		1907			1907

Continued on next page

Table A1: Narrative Crises

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Country	Reinhart Rogoff	Schularick Taylor	Laeven Valencia	Bordo	Caprio Klingebiel	Demirgüç-Kunt Detrag.	Narrative Crises
	1914	0		1914			1914
	1929	1929		1930			1929
	1984	1984	1988	1984	1984	1980	1984
	counted above	counted above	counted above	0	counted above	counted above	1990
	2007	2007	2007				2007
Venezuela	1978		0	1978	late 1970s		1978
	1993		1994	1994	1994	1993	1993
	2009		0				2009

Table A2: Master list of episodes

This table reports the master list of episodes, which is intended to be a very broad list of potential crises, many of which may not necessarily be "banking crises" according to any definition. The master list of episodes is the union of: a) the Narrative Crises list defined in Table A1, and b) years in which the bank equity real total return index cumulatively declines by more than 30% (relative to its previous peak). The year of each episode, reported in column 2, is defined as the first year in which the bank equity index cumulatively falls by more than 30% from its previous peak. In cases in which the bank equity index does not decline by 30% or more, the year in column 2 is the year from the Narrative Crises list. Column 3 indicates whether the episode is a Narrative Crisis. If the year from the Narrative Crisis list is different from the year defined by the bank equity decline (Column 2), that is also indicated in Column 3. Column 5 indicates the presence or absence of a banking "panic," which is defined in the main text. Column 6 records the starting month of the panic, according to narrative accounts. Column 7 records whether there is a 30% cumulative bank equity decline associated with a given episode (or blank if there is no bank equity data). Column 8 indicates the presence or absence of narrative evidence of widespread bank failures, which is defined in the main text. Column 9 records whether the episode is included on the BVX Crisis List.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Country	Year by bank eq. decline	Narrative Crisis (Narrative start year, if different)	Excluded due to war	Panic	Panic month	Bank eq. 30% cumulative decline	Widespread bank failures	BVX Crisis List
Argentina	1885	1		0		0	0	
Argentina	1891	1890		1	March 1890	1	1	1
Argentina	1914	1	1	1	July 1914	1	0	1
Argentina	1930	1931		1	April 1931	1	0	1
Argentina	1934	1		1	September 1934	1	1	1
Argentina	1980	1		1	March 1980		1	1
Argentina	1985	1		1	May 1985		1	1
Argentina	1989	1		1	April 1989		1	1
Argentina	1995	1		1	December 1994	1	1	1
Argentina	2000	2001		1	March 2001	1	1	1
Argentina	2008			0		1	0	
Argentina	2011			0		1	0	
Australia	1893	1		1	April 1893	1	1	1
Australia	1931	1		1	April 1931	0	0	1
Australia	1952			0		1	0	
Australia	1974			0		1	0	
Australia	1989	1		1	March 1990	0	1	1
Australia	2008			0		1	0	
Austria	1873	1		1	May 1873	1	1	1
Austria	1888			0		1	0	
Austria	1920			0		1	0	
Austria	1924	1		0		1	1	1
Austria	1931	1929, 1931		1	May 1931	1	1	1
Austria	1966			0		1	0	
Austria	1982			0		1	0	
Austria	1995			0		1	0	
Austria	2008	1		1	September 2008	1	1	1
Austria	2011			0		1	1	1
Belgium	1870	1		1	July 1870	0	0	1
Belgium	1876			1	March 1876	1	1	1

Continued on next page

Table A2: Master list of episodes

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Country	Year by bank eq. decline	Narrative Crisis (Narrative start year, if different)	Excluded due to war	Panic	Panic month	Bank eq. 30% cumulative decline	Widespread bank failures	BVX Crisis List
Belgium	1883	1885		1		0	1	1
Belgium	1914	1	1	1	July 1914		1	1
Belgium	1925	1		0		0	0	
Belgium	1929	1931, 1934		1	May 1931	1	1	1
Belgium	1939	1	1	1	December 1939		1	1
Belgium	1974			0		1	0	
Belgium	1980			0		1	0	
Belgium	2002			0		1	0	
Belgium	2008	1		1	September 2008	1	1	1
Belgium	2011			0		1	1	1
Brazil	1890	1		1	December 1890	0	1	1
Brazil	1897	1		0		0	0	
Brazil	1900	1		1	October 1900	0	1	1
Brazil	1914	1	1	1	July 1914	1	0	1
Brazil	1923	1		0		0	0	
Brazil	1926	1		0		0	0	
Brazil	1929	1		1	June 1932	0	0	1
Brazil	1953			0		1	0	
Brazil	1957			0		1	0	
Brazil	1962	1963		0			0	
Brazil	1985	1		1	September 1985		1	1
Brazil	1990	1		1	February 1990		0	1
Brazil	1994	1		1	July 1994		1	1
Brazil	1998			0		1	0	
Brazil	2008			0		1	0	
Brazil	2012			0		1	0	
Canada	1873	1		1	July 1879	0	1	1
Canada	1906	1		0		0	0	
Canada	1907	1		0		0	1	
Canada	1912	1		0		0	0	
Canada	1920	1923		1	December 1921	1	1	1
Canada	1932			0		1	0	
Canada	1974			0		1	0	
Canada	1982	1		1	July 1982	0	1	1
Canada	2008			0		1	0	
Chile	1878			1	December 1877		1	1
Chile	1889	1		0		0	0	
Chile	1898	1		1	July 1898	0	1	1
Chile	1907	1		1	October 1907		1	1
Chile	1914	1	1	1	July 1914		0	1
Chile	1925	1		1	December 1925		1	1
Chile	1931			1	June 1932	1	1	1
Chile	1954			0		1	0	
Chile	1962			0		1	0	
Chile	1970			0		1	0	

Continued on next page

Table A2: Master list of episodes

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Country	Year by bank eq. decline	Narrative Crisis (Narrative start year, if different)	Excluded due to war	Panic	Panic month	Bank eq. 30% cumulative decline	Widespread bank failures	BVX Crisis List
Chile	1976	1		1	June 1975	0	1	1
Chile	1982	1980		1	September 1981	1	1	1
Chile	1998			0		1	0	
Colombia	1931			1	June 1929	1	0	1
Colombia	1972			0		1	0	
Colombia	1982	1		0		1	1	1
Colombia	1998	1		1	June 1998	1	1	1
Colombia	2008			0		1	0	
Czech	1923			1	May 1923		1	1
Czech	1931	1		0		0	0	
Czech	1991	1		1	April 1994		1	1
Czech	1995	1996		1	June 2000	1	1	1
Denmark	1877	1		1		0	1	1
Denmark	1885	1		1	September 1885	0	1	1
Denmark	1902	1		0		0	0	
Denmark	1907	1		1	February 1908	0	1	1
Denmark	1914	1	1	0			0	
Denmark	1919	1921		1	September 1922	1	1	1
Denmark	1931	1		0		0	0	
Denmark	1974			0		1	0	
Denmark	1992	1987		0		1	1	1
Denmark	2008	1		1	September 2008	1	1	1
Denmark	2011			0		1	1	1
Egypt	1907	1		1	May 1907	0	1	1
Egypt	1914		1	1	July 1914	1	0	1
Egypt	1931	1		1	July 1931	1	1	1
Egypt	1980	1		0			0	
Egypt	1990	1		0			0	
Finland	1877	1		0			0	
Finland	1900	1		1	November 1900		1	1
Finland	1921	1		0		1	1	1
Finland	1931	1		1	October 1931	0	1	1
Finland	1939	1	1	0		0	0	
Finland	1974			0		1	0	
Finland	1990	1991		1	September 1991	1	1	1
Finland	2002			0		1	0	
Finland	2008			0		1	0	
France	1871	1	1	1			0	1
France	1882	1		1	January 1882	1	1	1
France	1889	1		1	March 1889	0	1	1
France	1904	1		0		0	0	
France	1907	1		0		0	0	
France	1914	1	1	1	July 1914	1	0	1
France	1919			0		1	0	
France	1930	1		1	October 1930	1	1	1

Continued on next page

Table A2: Master list of episodes

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Country	Year by bank eq. decline	Narrative Crisis (Narrative start year, if different)	Excluded due to war	Panic	Panic month	Bank eq. 30% cumulative decline	Widespread bank failures	BVX Crisis List
France	1937			1	September 1938	1	0	1
France	1939	1	1	0		0	0	
France	1974			0		1	0	
France	1987			0		1	0	
France	1994	1		0		0	1	
France	2008	1		1	September 2008	1	0	1
France	2011			0		1	0	
Germany	1874	1873		1	October 1873	1	1	1
Germany	1880	1		0		0	0	
Germany	1891	1		1	September 1891	0	1	1
Germany	1901	1		1	June 1901	0	1	1
Germany	1907	1		0		0	0	
Germany	1914		1	1	July 1914		0	1
Germany	1920			0		1	0	
Germany	1925	1		0		0	0	
Germany	1930	1929		1	April 1931	1	1	1
Germany	1962			0		1	0	
Germany	1973			0		1	0	
Germany	1977	1		0		0	0	
Germany	1987			0		1	0	
Germany	2002			0		1	0	
Germany	2008	1		1	September 2008	1	1	1
Germany	2011			0		1	0	
Greece	1929	1931		1	September 1931	1	1	1
Greece	1973			0		1	0	
Greece	1980			0		1	0	
Greece	1988			0		1	0	
Greece	1992	1991		0		1	0	
Greece	2001			0		1	0	
Greece	2008	1		1	September 2008	1	0	1
Greece	2010			1	August 2011	1	1	1
Hong Kong	1874			0		1	0	
Hong Kong	1892			1	March 1892	1	1	1
Hong Kong	1950			0		1	0	
Hong Kong	1965			1	February 1965	0	1	1
Hong Kong	1974			0		1	0	
Hong Kong	1982	1982, 1983		1	September 1983	1	1	1
Hong Kong	1991			1	July 1991	0	0	1
Hong Kong	1998	1		1	January 1998	1	1	1
Hong Kong	2011			0		1	0	
Hungary	1873			1	July 1873	1	1	1
Hungary	1883			0		1	0	
Hungary	1924			0		1	0	
Hungary	1931	1		1	October 1930		1	1
Hungary	1991	1		0			1	1

Continued on next page

Table A2: Master list of episodes

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Country	Year by bank eq. decline	Narrative Crisis (Narrative start year, if different)	Excluded due to war	Panic	Panic month	Bank eq. 30% cumulative decline	Widespread bank failures	BVX Crisis List
Hungary	1995			1	February 1997	1	1	1
Hungary	2008	1		1	September 2008	1	0	1
Hungary	2011			0		1	0	
Iceland	1920			1	Late 1920	1	1	1
Iceland	1930			1	February 1930	1	1	1
Iceland	1985	1		0			1	1
Iceland	1993	1		0			1	1
Iceland	2008	2007		1	September 2008	1	1	1
India	1908	1		0		0	0	
India	1913	1		1	November 1913	0	1	1
India	1920	1921		0		1	1	1
India	1929	1		0		0	0	
India	1947	1	1	0			0	
India	1993	1991		0		1	1	1
India	1998			0		1	0	
India	2011			0		1	0	
Indonesia	1990	1992, 1994		1	November 1992	1	1	1
Indonesia	1998	1997		1	January 1998	1	1	1
Ireland	1974			0		1	0	
Ireland	1990			0		1	0	
Ireland	2007	1		1	September 2008	1	1	1
Ireland	2010			1	November 2010	1	1	1
Ireland	2016			0		1	0	
Israel	1977	1		0		0	0	
Israel	1983	1		0		1	1	1
Israel	1988			0		1	0	
Israel	2002			0		1	0	
Israel	2008			0		1	0	
Israel	2011			0		1	0	
Italy	1873	1		1		0	1	1
Italy	1889	1887		1	August 1889	1	1	1
Italy	1891	1891, 1893		1	November 1893	1	1	1
Italy	1907	1		1	September 1907	1	1	1
Italy	1914	1	1	1	July 1914	1	1	1
Italy	1921	1		1	November 1921	1	1	1
Italy	1930	1		1	December 1930	0	1	1
Italy	1935	1		0			0	
Italy	1962			0		1	0	
Italy	1974			0		1	0	
Italy	1982			0		1	0	
Italy	1992	1990		0		1	1	1
Italy	2001			0		1	0	
Italy	2008	1		1	September 2008	1	0	1
Italy	2011			0		1	1	1
Italy	2016			0		1	1	1

Continued on next page

Table A2: Master list of episodes

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Country	Year by bank eq. decline	Narrative Crisis (Narrative start year, if different)	Excluded due to war	Panic	Panic month	Bank eq. 30% cumulative decline	Widespread bank failures	BVX Crisis List
Japan	1871	1		1	August 1871		1	1
Japan	1882	1		1			1	1
Japan	1890	1		1			1	1
Japan	1901	1		1	April 1901	0	1	1
Japan	1907	1		1	February 1907	1	1	1
Japan	1914	1	1	0		0	0	
Japan	1917	1	1	0		0	0	
Japan	1920	1		1	April 1920	1	1	1
Japan	1922			1	February 1922	1	1	1
Japan	1923	1		1	September 1923	1	1	1
Japan	1927	1		1	March 1927	0	1	1
Japan	1953			0		1	0	
Japan	1974			0		1	0	
Japan	1990	1991		0		1	1	1
Japan	1997	1		1	November 1997	1	1	1
Japan	2001			0		1	1	1
Japan	2008			0		1	0	
Korea	1976			0		1	0	
Korea	1984	1983		0		1	0	
Korea	1986	1		0		0	0	
Korea	1990			0		1	0	
Korea	1997	1		1	October 1997	1	1	1
Korea	2008			0		1	0	
Luxembourg	1879			0		1	0	
Luxembourg	1924			0		1	0	
Luxembourg	1930			0		1	0	
Luxembourg	2008	1		1	September 2008	1	1	1
Luxembourg	2012			0		1	0	
Malaysia	1973			0		1	0	
Malaysia	1985	1		1	July 1985	1	1	1
Malaysia	1997	1		1	August 1997	1	1	1
Malaysia	2008			0		1	0	
Mexico	1883	1		1	March 1883		1	1
Mexico	1893	1		1		1	0	1
Mexico	1908	1		0		0	1	
Mexico	1913	1	1	1	November 1913		1	1
Mexico	1921	1920		1	December 1920		1	1
Mexico	1924			0		1	0	
Mexico	1928	1929		1	July 1931	1	1	1
Mexico	1974			0		1	0	
Mexico	1981	1981, 1982		1	September 1982		1	1
Mexico	1992	1		0		0	0	
Mexico	1994	1		1	December 1994	1	1	1
Mexico	1998			0		1	0	
Netherlands	1893	1		0		0	0	

Continued on next page

Table A2: Master list of episodes

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Country	Year by bank eq. decline	Narrative Crisis (Narrative start year, if different)	Excluded due to war	Panic	Panic month	Bank eq. 30% cumulative decline	Widespread bank failures	BVX Crisis List
Netherlands	1897	1		0		0	0	
Netherlands	1907	1		1	November 1907	0	1	1
Netherlands	1914	1	1	1	July 1914		0	1
Netherlands	1921	1		0		1	1	1
Netherlands	1931			0		1	1	1
Netherlands	1939	1	1	0			0	
Netherlands	1957			0		1	0	
Netherlands	1965			0		1	0	
Netherlands	1987			0		1	0	
Netherlands	2002			0		1	0	
Netherlands	2008	1		1	September 2008	1	1	1
Netherlands	2011			0		1	0	
New Zealand	1888	1893		1	January 1893	1	1	1
New Zealand	1931			0		1	0	
New Zealand	1960			0		1	0	
New Zealand	1984			0		1	0	
New Zealand	1987	1		1	August 1988	1	1	1
New Zealand	1998			0		1	0	
New Zealand	2008			0		1	0	
Norway	1898	1		1	June 1899		1	1
Norway	1914	1	1	1	July 1914		0	1
Norway	1919	1921		1	April 1923	1	1	1
Norway	1927	1		0		0	0	
Norway	1931	1		1	December 1931	0	1	1
Norway	1936	1		0		0	0	
Norway	1951			0		1	0	
Norway	1964			0		1	0	
Norway	1971			0		1	0	
Norway	1987	1		1	October 1991	1	1	1
Norway	2008			1	September 2008	1	0	1
Peru	1876	1872		1	August 1875	1	1	1
Peru	1914		1	1	July 1914	1	0	1
Peru	1931			1	October 1930	1	1	1
Peru	1981	1983		0		1	1	1
Peru	1987			0		1	0	
Peru	1998	1999		0		1	1	1
Philippines	1971			1	June 1974	1	0	1
Philippines	1981	1		1	January 1981	1	1	1
Philippines	1997	1		0		1	1	1
Philippines	2008			0		1	0	
Portugal	1876			1	August 1876		1	1
Portugal	1890	1		1	May 1891		1	1
Portugal	1921	1920		1		1	1	1
Portugal	1923	1		1		1	1	1
Portugal	1931	1		1	November 1930	1	1	1

Continued on next page

Table A2: Master list of episodes

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Country	Year by bank eq. decline	Narrative Crisis (Narrative start year, if different)	Excluded due to war	Panic	Panic month	Bank eq. 30% cumulative decline	Widespread bank failures	BVX Crisis List
Portugal	1956			0		1	0	
Portugal	1986	1		0			0	
Portugal	2002			0		1	0	
Portugal	2008	1		1	September 2008	1	1	1
Portugal	2011			0		1	1	1
Portugal	2014			0		1	1	1
Russia	1875	1		1	October 1875	0	1	1
Russia	1900	1896		1	August 1899	1	1	1
Russia	1995	1		1	August 1995		1	1
Russia	1998	1		1	August 1998	1	1	1
Russia	2008	1		1	September 2008	1	1	1
Singapore	1973			0		1	0	
Singapore	1982	1		0		0	0	
South Africa	1877	1		0		0	0	
South Africa	1881	1		1		0	1	1
South Africa	1890	1		1	September 1890	0	1	1
South Africa	1920			0		1	0	
South Africa	1969			0		1	0	
South Africa	1973			0		1	0	
South Africa	1977	1		0		0	0	
South Africa	1984	1985		0		1	0	
South Africa	1989	1		0		0	0	
Spain	1882	1883		1	February 1882	1	1	1
Spain	1890	1		1	November 1890	0	1	1
Spain	1913	1		1	December 1913	0	1	1
Spain	1920	1		1	November 1920	0	1	1
Spain	1924	1		1	September 1924	0	1	1
Spain	1931	1		1	April 1931	1	1	1
Spain	1958			0		1	0	
Spain	1971			0		1	0	
Spain	1975	1977		0		1	1	1
Spain	1991			0		1	0	
Spain	2002			0		1	0	
Spain	2008	1		1	September 2008	1	1	1
Spain	2010			0		1	1	1
Sweden	1878	1876		1	December 1878		1	1
Sweden	1897	1		0		0	0	
Sweden	1907	1		1	October 1907	0	1	1
Sweden	1919	1922		0		1	1	1
Sweden	1932	1931		0		1	0	
Sweden	1991	1990		1	September 1992	1	1	1
Sweden	2002			0		1	0	
Sweden	2008	1		1	September 2008	1	1	1
Switzerland	1870	1		1	July 1870	0	1	1
Switzerland	1910	1		0		0	1	

Continued on next page

Table A2: Master list of episodes

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Country	Year by bank eq. decline	Narrative Crisis (Narrative start year, if different)	Excluded due to war	Panic	Panic month	Bank eq. 30% cumulative decline	Widespread bank failures	BVX Crisis List
Switzerland	1914		1	1	July 1914		0	1
Switzerland	1919	1921		0		1	1	1
Switzerland	1931	1931, 1933		1	July 1931	1	1	1
Switzerland	1963			0		1	0	
Switzerland	1974			0		1	0	
Switzerland	1987			0		1	0	
Switzerland	1990	1991		1	October 1991	1	1	1
Switzerland	2008	1		1	September 2008	1	0	1
Taiwan	1923	1		1	September 1923		0	1
Taiwan	1927	1		1	April 1927		1	1
Taiwan	1983	1		1	August 1985		1	1
Taiwan	1990			0		1	0	
Taiwan	1995	1		1	July 1995	1	1	1
Taiwan	1998	1997		0		1	1	1
Taiwan	2008			0		1	0	
Thailand	1979	1		0		1	1	1
Thailand	1983	1		1	October 1983	0	1	1
Thailand	1997	1996		1	May 1996	1	1	1
Thailand	2008			0		1	0	
Turkey	1875			0		1	0	
Turkey	1883			0		1	0	
Turkey	1914		1	1	August 1914	1	1	1
Turkey	1930	1931		1	July 1931	1	1	1
Turkey	1974			0		1	0	
Turkey	1980	1982		1	November 1983	1	1	1
Turkey	1988			0		1	0	
Turkey	1991	1		1	January 1991	1	0	1
Turkey	1994	1		1	April 1994	0	1	1
Turkey	1998			0		1	0	
Turkey	2001	2000		1	November 2000	1	1	1
Turkey	2008			0		1	0	
Turkey	2011			0		1	0	
U.K.	1878	1		1	September 1878	0	1	1
U.K.	1890	1		1	November 1890	0	0	1
U.K.	1908	1		0		0	0	
U.K.	1914	1	1	1	July 1914	1	0	1
U.K.	1951			0		1	0	
U.K.	1973	1974		1	February 1974	1	1	1
U.K.	1984	1		0		0	0	
U.K.	1991	1		1	July 1991	0	1	1
U.K.	1995	1		0		0	0	
U.K.	2008	2007		1	September 2008	1	1	1
U.K.	2011			0		1	0	
U.S.	1873	1		1	September 1873	0	1	1
U.S.	1884	1		1	May 1884	0	1	1

Continued on next page

Table A2: Master list of episodes

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Country	Year by bank eq. decline	Narrative Crisis (Narrative start year, if different)	Excluded due to war	Panic	Panic month	Bank eq. 30% cumulative decline	Widespread bank failures	BVX Crisis List
U.S.	1890	1		1	November 1890	0	1	1
U.S.	1893	1		1	May 1893	0	1	1
U.S.	1907	1		1	October 1907	1	1	1
U.S.	1914	1	1	0		0	0	
U.S.	1930	1929		1	November 1930	1	1	1
U.S.	1937			0		1	0	
U.S.	1974			0		1	0	
U.S.	1984	1		1	May 1984	0	1	1
U.S.	1990	1		0		1	1	1
U.S.	2007	1		1	September 2008	1	1	1
Venezuela	1960			0		1	0	
Venezuela	1981	1978		1	December 1978	1	1	1
Venezuela	1988			0		1	0	
Venezuela	1992	1993		1	October 1993	1	1	1
Venezuela	1998			0		1	0	
Venezuela	2008	2009		1	November 2009	1	1	1
Venezuela	2014			0		1	0	

Table A3: Bank equity return bins, real GDP, and credit-to-GDP

This table presents the predictive content of bank equity return bins for real GDP growth and the change in credit-to-GDP. The table corresponds to the estimates in Figure 2 at the three year horizon. Nonfinancial equity bin controls refer to the same bins in nonfinancial equity returns from $t-1$ to t. Other controls refer to contemporaneous real GDP growth and credit-to-GDP change, three lags of real GDP growth and credit-to-GDP change, as well as three lags of the bank and nonfinancial equity return bins. t-statistics in brackets are computed from Driscoll-Kraay standard errors with a lag length of six. *,**,*** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively, computed from fixed-b p-values based on Kiefer and Vogelsang (2005).

	Real GDP growth$_{t,t+3}$			Credit-GDP change$_{t,t+3}$		
	(1)	(2)	(3)	(4)	(5)	(6)
$r^B_{it} \leq -45\%$	-0.065***	-0.036***	-0.042***	-0.12***	-0.080***	-0.069***
	[-4.12]	[-3.83]	[-4.80]	[-5.93]	[-4.24]	[-4.33]
$-45\% < r^B_{it} \leq -30\%$	-0.039***	-0.025***	-0.025***	-0.071***	-0.058***	-0.055***
	[-4.68]	[-3.58]	[-5.69]	[-5.03]	[-4.20]	[-3.93]
$-30\% < r^B_{it} \leq -15\%$	-0.022***	-0.017***	-0.016***	-0.031***	-0.019**	-0.022**
	[-4.09]	[-3.63]	[-2.89]	[-3.79]	[-2.58]	[-2.63]
$-15\% < r^B_{it} \leq 0\%$	-0.0052	-0.0032	-0.0043	-0.013**	-0.0070	-0.0074
	[-1.12]	[-0.96]	[-1.17]	[-2.29]	[-1.28]	[-1.16]
$15\% < r^B_{it} \leq 30\%$	-0.0021	-0.0017	-0.0011	0.012	0.010	0.0083
	[-0.37]	[-0.30]	[-0.30]	[1.48]	[1.47]	[1.54]
$30\% < r^B_{it} \leq 45\%$	-0.0040	-0.000095	-0.0016	0.025*	0.024*	0.022*
	[-0.93]	[-0.024]	[-0.39]	[2.03]	[1.83]	[2.01]
$r^B_{it} > 45\%$	0.0025	0.00073	0.0035	0.016	0.014*	0.013
	[0.30]	[0.100]	[0.43]	[1.63]	[1.85]	[1.55]
Country fixed effects	✓	✓	✓	✓	✓	✓
Nonfin. eq. bins	✓	✓	✓	✓	✓	✓
Other controls		✓	✓		✓	✓
Year fixed effects			✓			✓
Adj. R^2 (within)	0.06	0.17	0.10	0.04	0.17	0.15
N	2548	2548	2548	2536	2536	2536

Table A4: Bank equity returns, output, and credit: Alternative specifications

This table presents the predictive content of bank and nonfinancial equity continuous returns for real GDP growth and the change in credit-to-GDP. Both outcome variables are measured from years t to $t+3$. The table also shows that the predictive content of bank equity returns is nonlinear by including quadratic terms (columns 2 and 5) and by separately estimating the predictive content of positive and negative bank and nonfinancial equity returns (columns 3 and 6). Controls variables are contemporaneous real GDP growth and credit-to-GDP change, three lags of real GDP growth and credit-to-GDP change, as well as three lags of the independent variables reported in each respective column. t-statistics in brackets are computed from Driscoll-Kraay standard errors with a lag length of six. *,**,*** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively, computed from fixed-b p-values based on Kiefer and Vogelsang (2005).

	Real GDP growth$_{t,t+3}$			Credit-to-GDP change$_{t,t+3}$		
	(1)	(2)	(3)	(4)	(5)	(6)
Bank eq. ret.	0.027***	0.041***		0.052***	0.075***	
	[3.42]	[6.41]		[5.15]	[5.01]	
(Bank eq. ret.)^2		-0.033***			-0.048***	
		[-3.04]			[-3.09]	
Nonfin. eq. ret.	0.018*	0.025		-0.0029	-0.013	
	[2.03]	[1.69]		[-0.25]	[-1.16]	
(Nonfin. eq. ret.)^2		-0.015			0.017	
		[-0.96]			[1.09]	
Positive bank eq. ret.			0.0050			0.030***
			[0.48]			[3.22]
Negative bank eq. ret.			0.078***			0.11***
			[6.40]			[3.75]
Positive nonfin. eq. ret.			0.013			0.010
			[1.38]			[0.58]
Negative nonfin. eq. ret.			0.028			-0.042**
			[1.01]			[-2.43]
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Adj. R^2 (within)	0.13	0.14	0.14	0.14	0.15	0.15
N	2548	2548	2548	2536	2536	2536

Table A5: Bank equity crashes and subsequent GDP and credit growth: Subsample analysis

This table is similar to Table 2 but estimates the results on subsamples. A bank (nonfinancial) equity crash is defined as an annual return of less than -30% of the bank (nonfinancial) equity total return index. Controls variables are contemporaneous real GDP growth and credit-to-GDP change, as well as three lags of the bank equity crash, nonfinancial equity crash, credit-to-GDP change, and real GDP growth. t-statistics in brackets are computed from Driscoll-Kraay standard errors with a lag length of six. *,**,*** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively, computed from fixed-b p-values based on Kiefer and Vogelsang (2005).

Panel A: Real GDP growth from year t to $t+3$

	Pre-1939		1946-1970		1971-2016	
	(1)	(2)	(3)	(4)	(5)	(6)
Bank equity crash	-0.018	-0.026**	-0.027*	-0.034**	-0.042***	-0.035***
	[-1.51]	[-2.45]	[-2.80]	[-3.18]	[-6.57]	[-6.13]
Nonfinancial equity crash	-0.12***	-0.10***	-0.011	-0.0037	-0.017	-0.016
	[-5.80]	[-8.47]	[-1.36]	[-0.52]	[-1.95]	[-1.59]
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls		✓		✓		✓
Adj. R^2 (within)	0.05	0.17	0.01	0.10	0.06	0.13
N	545	545	525	525	1478	1478

Panel B: Credit-to-GDP change from year t to $t+3$

	Pre-1939		1946-1970		1971-2016	
	(1)	(2)	(3)	(4)	(5)	(6)
Bank equity crash	-0.036**	-0.0087	-0.029**	-0.027***	-0.096***	-0.065***
	[-2.85]	[-0.94]	[-3.80]	[-4.87]	[-9.01]	[-7.79]
Nonfinancial equity crash	-0.0052	-0.0065	0.016	0.018*	0.0086	-0.0042
	[-0.39]	[-0.72]	[2.16]	[2.48]	[0.67]	[-0.38]
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls		✓		✓		✓
Adj. R^2 (within)	0.00	0.19	0.01	0.05	0.04	0.19
N	544	544	607	607	1384	1384

Table A6: Bank equity captures the symptoms and severity of banking crises

This table shows that bank equity peak-to-trough declines during Narrative Crises are correlated with characteristics of banking crises and their economic severity. The table reports estimates from Equation A1, which regresses various dependent variables (in the various columns) on the bank equity peak-to-trough decline (which is always a negative number, if there is a decline, or zero, if there is no decline). Each observation is an individual Narrative Crisis episode. We control for an indicator variable that equals one in the post-1945 sample, as pre-war data tends to be more volatile, but results are similar without this indicator. The sample size in different columns varies due to data availability of the dependent variable. t-statistics in brackets are computed using robust standard errors. *,**,*** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Panel A: Severity of banking crises – Real GDP

	Real GDP (peak-to-trough decline)	Real GDP growth (%.-pt. decline, peak-to-trough)	Real GDP growth (max deviation from trend)
	(1)	(2)	(3)
Bank equity peak-to-trough decline	0.139***	0.130***	0.0906***
	[5.488]	[6.594]	[4.890]
Post-1945 dummy	✓	✓	✓
Adj. R^2 (within)	0.186	0.195	0.131
N	183	183	183

Panel B: Characteristics of banking crises

	Decline in deposits (pre-war only)	Widespread bank failures	Failed banks (% of total bank assets)	Largest banks failing	NPL at peak
	(1)	(2)	(3)	(4)	(5)
Bank equity peak-to-tr. decline	0.314***	-0.210*	-0.476***	-0.631***	-0.221**
	[3.152]	[-1.657]	[-3.282]	[-2.620]	[-2.290]
Post-1945 dummy	✓	✓	✓	✓	✓
Adj. R^2 (within)	0.133	0.021	0.084	0.053	0.058
N	56	155	67	127	71
	Significant liability guarantees	Significant liquidity support	Banks nationalized	Govt equity injections	
	(6)	(7)	(8)	(9)	
Bank equity peak-to-tr. decline	-0.464*	-0.882***	-0.794***	-1.519***	
	[-1.935]	[-3.935]	[-2.833]	[-6.159]	
Post-1945 dummy	✓	✓	✓	✓	
Adj. R^2 (within)	0.021	0.104	0.077	0.282	
N	135	142	110	94	

Table A7: Alternative measures of bank equity declines

This table is similar to Table A6 but uses alternate measures of bank equity declines as the independent variable. In Panel A, the independent variable is the *abnormal bank equity decline*, which is defined as the peak-to-trough decline of the bank equity total return minus nonfinancial equity total return. In Panel B, the independent variable is *bank market capitalization decline*, defined as the peak-to-trough decline in an index defined by annual returns of (1+bank equity price returns)·(1+bank equity new issuance). Panel C has two independent variables: *bank equity peak-to-trough decline* (as in Table A6) and *bank equity recovery* (positive returns in the bank equity total returns index subsequent to the trough within three years after a banking crisis).

Panel A: Abnormal bank equity decline (i.e. bank equity minus nonfinancial equity returns)

	Real GDP (peak-to-trough decline)	Real GDP growth (%.-pt. decline, peak-to-trough)	Real GDP growth (max deviation from trend)
	(1)	(2)	(3)
Abnormal bank decline	0.0569***	0.0480***	0.0385***
	[3.273]	[3.500]	[3.243]
Post-1945 dummy	✓	✓	✓
Adj. R^2 (within)	0.0704	0.0585	0.0529
N	174	174	174

Panel B: Bank market capitalization decline

	Real GDP (peak-to-trough decline)	Real GDP growth (%.-pt. decline, peak-to-trough)	Real GDP growth (max deviation from trend)
	(1)	(2)	(3)
Bank market cap decline	0.109***	0.0829***	0.0763***
	[4.046]	[4.912]	[5.181]
Post-1945 dummy	✓	✓	✓
Adj. R^2 (within)	0.234	0.194	0.212
N	78	78	78

Panel C: Bank equity recoveries

	Real GDP (peak-to-trough decline)	Real GDP growth (%.-pt. decline, peak-to-trough)	Real GDP growth (max deviation from trend)
	(1)	(2)	(3)
Bank equity decline	0.143***	0.125***	0.0856***
	[4.581]	[5.638]	[4.238]
Bank equity recovery	0.00973	-0.0134	-0.0120
	[0.364]	[-0.647]	[-0.591]
Post-1945 dummy	✓	✓	✓
Adj. R^2 (within)	0.182	0.193	0.128
N	183	183	183

Table A8: Impact of bank equity crashes outside of Narrative Crises

This table shows that bank equity crashes predict output gaps and credit contraction even outside of narrative-based banking crisis episodes. *Narrative crisis* is an indicator for a three-year window around a crisis on the list of Narrative Crises. The specification controls for country fixed effects, contemporaneous real GDP growth and change in credit-to-GDP, and three lags of real GDP growth, change in credit-to-GDP, and all right-hand-side variables in the table. t-statistics in brackets are computed from Driscoll-Kraay standard errors with a lag length of six. *,**,*** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively, computed from fixed-b p-values of Kiefer and Vogelsang (2005).

Panel A: Real GDP growth

	Real GDP growth$_{t,t+1}$		Real GDP growth$_{t,t+3}$	
	(1)	(2)	(3)	(4)
Bank equity crash	-0.024***	-0.021***	-0.028***	-0.026***
	[-7.27]	[-5.17]	[-4.13]	[-3.00]
Narrative crisis	-0.0034	-0.0029	-0.031***	-0.030***
	[-1.24]	[-0.99]	[-3.07]	[-2.92]
Bank eq. crash × Narrative crisis		-0.0061		-0.0047
		[-1.16]		[-0.37]
Non-financial equity crash	-0.021***	-0.021***	-0.028**	-0.028**
	[-4.86]	[-4.91]	[-2.83]	[-2.85]
Country fixed effects	✓	✓	✓	✓
Controls	✓	✓	✓	✓
Adj. R^2 (within)	0.20	0.20	0.16	0.16
N	2548	2548	2548	2548

Panel B: Credit-to-GDP change

	Credit/GDP change$_{t,t+1}$		Credit/GDP change$_{t,t+3}$	
	(1)	(2)	(3)	(4)
Bank equity crash	-0.0086	0.0011	-0.046***	-0.016
	[-1.36]	[0.22]	[-4.85]	[-1.44]
Narrative crisis	0.017***	0.018***	0.046***	0.051***
	[3.39]	[3.90]	[3.44]	[4.01]
Bank eq. crash × Narrative crisis		-0.018*		-0.058***
		[-1.99]		[-3.90]
Non-financial equity crash	0.0070**	0.0068**	0.0045	0.0037
	[2.55]	[2.33]	[0.55]	[0.43]
Country fixed effects	✓	✓	✓	✓
Controls	✓	✓	✓	✓
Adj. R^2 (within)	0.24	0.24	0.17	0.18
N	2535	2535	2536	2536

Table A9: Timing of bank equity crashes relative to panics, nonfinancial equity crashes, and credit spread spikes: robustness on the sample of Narrative Crises

This table shows that the results reported in Table 4 are robust to conducting the analysis on the sample of Narrative Crises (crises identified by six prominent previous studies) instead of the BVX Crisis List.

Panel A: Bank equity crashes detect the crisis before panics, credit spread spikes, and narrative crisis dates

	Before panic	Before Reinhart-Rogoff start dates	Before earliest narrative start dates	Before 2% spike in bank credit spread	Before 1% spike in bank credit spread	Before 2% spike in corp credit spread	Before 1% spike in corp credit spread
Average (in months, signed)	8.25***	2.97***	2.63**	6.23***	3.43*	9.25***	4.5**
t-stat	5.29	2.40	2.25	5.89	1.95	7.07	1.99
N	85	98	107	39	40	20	20
Pos	64	39	33	31	22	17	13
Zero	6	36	56	4	2	1	0
Neg	15	23	18	4	16	2	7
Pos / (Pos + Neg)	81.0%***	62.9%**	64.7%**	88.6%***	57.9%	89.5%***	65.0%
p-value	0.000	0.028	0.024	0.000	0.209	0.000	0.132

Panel B: Bank equity crashes pick up the crisis first before nonfinancial equity crashes

	Before nonfin. eq. crash	Bank equity peak before nonfin eq peak	Duration of bank equity decline
Average (in months, signed)	1.53*	1.14*	27.36***
t-stat	1.83	1.85	24.99
N	131	146	148
Pos	66	60	Duration $\geq$ 24 mo. = 89 episodes
Zero	15	41	
Neg	50	45	Duration $<$ 24 mo. = 59 episodes
Pos / (Pos + Neg)	56.9%*	57.1%*	% Duration $\geq$ 24 mo. = 60%***
p-value	0.082	0.086	0.008

Table A10: Timing of bank vs. nonfinancial equity crashes: subsample analysis

This table performs the same analysis as Table 4 Panel B column 1 for various subsamples. The table shows that bank equity declines tend to precede nonfinancial equity declines in postwar and advanced economy banking crises, but not in prewar and emerging market crises. Panel A performs the analysis on the BVX Crisis List sample. Panel B uses the Narrative Crisis List sample as robustness, as in Table A9.

Panel A: BVX Crisis List sample

	Prewar	Postwar	Postwar & Emerging	Postwar & Advanced	Postwar (pre-2006) & Advanced
Average (in months, signed)	-0.27	3.42***	0.89	5.82***	3.87*
t-stat	-0.20	3.71	0.69	4.82	1.75
N	50	79	40	39	16
Pos	21	44	17	27	9
Zero	4	12	5	7	2
Neg	26	20	15	5	4
Pos / (Pos + Neg)	44.7%	68.8%***	53.1%	84.4%***	69.2%
p-value	0.809	0.002	0.430	0.000	0.133

Panel B: Narrative Crisis List sample

	Prewar	Postwar	Postwar & Emerging	Postwar & Advanced	Postwar (pre-2006) & Advanced
Average (in months, signed)	-0.96	1.90*	0.05	4.23***	3.80*
t-stat	-0.66	1.91	0.03	3.70	1.74
N	49	70	39	31	15
Pos	19	37	17	20	9
Zero	3	11	5	6	2
Neg	27	22	17	5	4
Pos / (Pos + Neg)	41.3%*	62.7%**	50.0%	80%***	69.2%
p-value	0.092	0.034	0.568	0.002	0.133

Table A11: Removed banking crises

This table lists episodes from the list of Narrative Crises (crises identified by six previous prominent studies) that do not appear on the the BVX Crisis List. "Spurious banking crises", episodes which have few or no characteristics typically associated with banking crises and are likely the result of typographical or historical errors, are marked with a "*"

Country	Starting year of crisis	Bank equity return	Country	Starting year of crisis	Bank equity return
Argentina	1885	0	Israel	1977	0
Belgium	1925	-0.193	Japan	1914	-0.232
Brazil	1897	0		1917*	-0.239
	1923	-0.131	Korea	1984	-0.326
	1926*	0		1986*	0
Canada	1906	0	Mexico	1908	-0.029
	1907	-0.081		1992*	0
	1912	-0.002	Netherlands	1893	0
Chile	1889	-0.254		1897*	0
Czech	1931	-0.099	Norway	1927*	0
Denmark	1902*	0		1936*	-0.209
	1914	-0.296	Singapore	1982	-0.275
	1931	-0.102	South Africa	1877	-0.004
Finland	1939	-0.111		1977	-0.153
France	1904*	0		1984	-0.492
	1907*	-0.049		1989	0
	1939	-0.121	Sweden	1897*	-0.183
	1994	-0.246		1932	-0.431
Germany	1880*	0	Switzerland	1910	0
	1907	-0.051	U.K.	1908*	-0.011
	1977*	-0.117		1984	0
Greece	1992	-0.391		1995	-0.159
India	1908	0	U.S.	1914	-0.158
	1929	0			
Probably spurious banking crises, but with no bank equity data					
Brazil	1963*		Italy	1935*	
Germany	1925*		Netherlands	1939*	
India	1947*		Portugal	1986*	

Table A12: Changes to start years of banking crises based on bank equity crashes

This table lists other modifications made in constructing the BVX Crisis List. Panel A lists changes in start dates of banking crises that were made by examining the year in which bank equity returns index declined -30% or more. Panel B lists episodes from the Narrative Crises list which were deemed to be part of the same episode and thus combined.

Panel A: Changes in starting dates of banking crises

Country	Change in starting date	Country	Change in starting date
Argentina	1890 → 1891	New Zealand	1890 → 1888
	1931 → 1930	Norway	1921 → 1919
	2001 → 2000	Peru	1872 → 1876
Austria	1929 → 1931		1983 → 1981
Belgium	1885 → 1883		1999 → 1998
	1931 → 1929	Portugal	1920 → 1921
Brazil	1963 → 1962	Russia	1896 → 1900
Canada	1923 → 1920	South Africa	1985 → 1984
	1982 → 1983	Spain	1977 → 1975
Chile	1980 → 1982		1883 → 1882
Czech	1996 → 1995	Sweden	1876 → 1878
Denmark	1921 → 1919		1922 → 1919
	1987 → 1992		1931 → 1932
Finland	1991 → 1990		1990 → 1991
Germany	1873 → 1874	Switzerland	1921 → 1919
	1929 → 1930		1991 → 1990
Greece	1931 → 1929	Taiwan	1997 → 1998
	1991 → 1992	Thailand	1996 → 1997
Iceland	2007 → 2008	Turkey	1931 → 1930
India	1921 → 1920		1982 → 1980
	1991 → 1993		2000 → 2001
Indonesia	1992 → 1990	U.K.	1974 → 1973
	1997 → 1998		2007 → 2008
Italy	1887 → 1889	U.S.	1929 → 1930
	1990 → 1992	Venezuela	1978 → 1981
Japan	1991 → 1990		1993 → 1992
Korea	1983 → 1984		2009 → 2008
Mexico	1920 → 1921		
	1929 → 1928		

Panel B: Combined episodes for the BVX Crisis List

Country	Combined Events
Austria	1929 and 1931
Belgium	1931 and 1934
Hong Kong	1982 and 1983
Indonesia	1992 and 1994
Italy	1891 and 1893
Mexico	1981 and 1982
Switzerland	1931 and 1933

Table A13: Comparison of banking crisis chronologies

This table compares key outcomes in episodes on the BVX Crisis List to episodes on other crisis chronologies. Panel A compares episodes from Reinhart and Rogoff's (2009) chronology to episodes on the BVX Crisis List. Panel B compares episodes from Laeven and Valencia's (2013) chronology to episodes on the BVX Crisis List. The table reports differences in averages (computed as Reinhart-Rogoff or Laeven-Valencia minus BVX) and t-statistics (in brackets), computed using the pooled variance across the differenced groups.

Panel A: Comparison of Reinhart and Rogoff episodes with BVX Crisis List episodes

	Reinhart Rogoff	Difference with BVX Crisis List		Difference with BVX Crisis List having bank eq. decline $> -30\%$	
Bank equity decline	-0.375	0.087	[6.35]	0.228	[16.60]
Abnormal bank equity decline	-0.311	0.033	[2.29]	0.108	[6.83]
Bank market cap decline	-0.318	0.097	[4.85]	0.204	[10.03]
Real GDP decline (pk to tr)	-0.045	0.009	[2.92]	0.018	[5.01]
Real GDP growth decline (pk to tr)	-0.080	0.005	[1.76]	0.011	[3.76]
Real GDP growth (max dev from trend)	-0.055	0.006	[2.47]	0.011	[4.42]
Failed banks (% of total bank assets)	0.260	-0.036	[-1.65]	-0.057	[-2.37]
NPL at peak	0.160	-0.01	[-1.01]	-0.01	[-0.88]
Decline in deposits (pre-war only)	-0.165	0.031	[2.32]	0.044	[2.97]
Significant liability guarantees	0.523	-0.037	[-1.29]	-0.115	[-3.62]
Significant liquidity support	0.701	-0.06	[-2.38]	-0.125	[-4.62]

Panel B: Comparison of Laeven and Valencia episodes with BVX Crisis List episodes

	Laeven Valencia	Difference with BVX Crisis List		Difference with BVX Crisis List having bank eq. decline > -30%	
Bank equity decline	-0.641	-0.046	[-2.30]	0.012	[0.63]
Abnormal bank equity decline	-0.472	-0.038	[-1.36]	-0.006	[-0.22]
Bank market cap decline	-0.625	-0.068	[-2.93]	-0.028	[-1.38]
Real GDP decline (pk to tr)	-0.053	-0.006	[-1.51]	-0.007	[-1.53]
Real GDP growth decline (pk to tr)	-0.093	-0.015	[-3.87]	-0.014	[-3.58]
Real GDP growth (max dev from trend)	-0.070	-0.011	[-3.32]	-0.009	[-2.50]
Failed banks (% of total bank assets)	0.406	0.037	[1.01]	0.013	[0.33]
NPL at peak	0.168	-0.007	[-0.48]	-0.011	[-0.76]
Decline in deposits (pre-war only)			N/A		
Significant liability guarantees	0.630	-0.05	[-1.14]	-0.12	[-2.62]
Significant liquidity support	0.913	0.056	[1.84]	-0.014	[-0.52]

Table A14: Area under the ROC curve for BVX crises and other crisis chronologies

The table compares the area under the ROC curve (AUC) when using a variety of variables to classify BVX crises and Reinhart-Rogoff crises (panel A) or BVX crises and Laeven-Valencia crises (panel B). The table shows that, across a variety of classifiers (e.g., real GDP growth), the AUC is generally higher for BVX crises than Reinhart-Rogoff and Laeven-Valencia crises. Panel A compares the AUC on the full sample, while panel B focuses on the post-1970 sample covered by Laeven and Valencia (2013).

Panel A: Comparison of AUCs for BVX and Reihart-Rogoff crises

	BVX Crisis		Reinhart-Rogoff Crisis	
	AUC	se(AUC)	AUC	se(AUC)
Real GDP growth, $t-1$ to t	0.67	0.02	0.62	0.02
Bank eq. return, $t-1$ to t	0.86	0.02	0.71	0.02
Nonfin. eq. return, $t-1$ to t	0.78	0.02	0.66	0.02
Credit-to-GDP change, t to $t+5$	0.66	0.02	0.63	0.02

Panel B: Comparison of AUCs for BVX and Laeven-Valencia crises

	BVX Crisis		Laeven-Valencia Crisis	
	AUC	se(AUC)	AUC	se(AUC)
Real GDP growth, $t-1$ to t	0.67	0.03	0.66	0.04
Bank eq. return, $t-1$ to t	0.91	0.02	0.84	0.04
Nonfin. eq. return, $t-1$ to t	0.79	0.03	0.77	0.04
Credit-to-GDP change, t to $t+5$	0.72	0.03	0.75	0.04

Table A15: Additional episodes of minor bank distress from narrative accounts

This table lists additional episodes of minor bank distress that are not classified as banking crises on the BVX Crisis List or as episodes in Table A2 (because the bank equity declines are less than -30% in magnitude). These episodes are listed purely for historical interest and are not analyzed in this paper. These episodes are generally instances of a single idiosyncratic bank failure or failures of many small banks that collectively do not rise to the level of a "crisis."

Country	Starting year of bank distress
Australia	1974
Belgium	1900, 1920
Canada	1887, 1891, 1901, 1905, 1908, 1912, 1966, 1991
Czech	1884, 1931, 1936
Denmark	1914, 1931, 1984
France	1991, 1994
Germany	1907, 1974, 2002
Hong Kong	1914, 1961
India	1914, 1938
Ireland	1885
Israel	1935
Italy	1926, 1982, 1997
Netherlands	1981
Norway	1886
Peru	1992
Philippines	1968
South Africa	1977, 1991
Spain	1991
Switzerland	1910
Turkey	1998
U.K.	1911, 1984, 1995
U.S.	1998

Table B1: Bank equity index coverage and sources

This figure provides an overview of the coverage and sources for the bank equity index total return variable. Cells with numbers indicate the number of underlying banks used to construct new bank equity return indexes. Shaded areas refer to pre-made indexes.

	1870	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	2010
Argentina	2	3	4	Nakamura-Zaragoza index									Datastream index		
Australia	11	S&P/ASX 200 Banking Index from GFD													
Austria	5	6	4	5	4	Austria National Bank Banks Index from GFD				2	Austria Bank and Insurance Stocks" index from GFD		Baron-Xiong bank index		
Belgium	Annaert, Buelens, and De Ceuster (2012, Appendix 2) financials index					3	Two bank price indexes from GFD							Baron-Xiong bank index	
Brazil	2	2	2	1	1	1	3	1	1	1			Datastream index		
Canada	4	3	6	5	Canada S&P/TSX Banks index from GFD										
Chile			1	Chile BEC Finance price index from GFD											
Colombia	Colombia IBOMED Financial Sector price index from GFD														
Czech	Czech Bank index from GFD												Datastream index		
Denmark	6	6	7	7	Copenhagen SE Banks index from GFD										
Egypt	3	3	2	6	5	4	4	1	1				Datastream index		
Finland					11	14	8	6	4	Finland Unitas Banks index from GFD			Datastream index		
France	14	17	13	14	13	16	14	France INSEE Credit Banks index from GFD					Paris CAC financials index from GFD		
Germany	6	8	8	10	10	10	CDAX Banks Price index from GFD								
Greece	1	1	1	2	2	4	4	Greece National Bank Finance index from GFD							
Hong Kong	1	1	1	1	1	1	1	1	1	1	Datastream index				
Hungary	Hungary Korosy Bank index from GFD					2							Datastream index		
Iceland														Datastream index	
India	4	3	3	3	3	2							Datastream index		
Indonesia													Datastream index		
Ireland	9	9	9	8	8	7	6		2	3	Datastream index				
Israel										Israel Finance and Insurance Composite	Datastream index				
Italy	7	9	11	7	5	6	6		2	6	Datastream index				

Table B1: Bank equity index coverage and sources (cont.)

	1870	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	2010
Japan				7	4	3	6	Oriental Economist Bank & Trust index from GFD			Japan TOPIX Banks index from GFD				
Korea											Korea SE Banks/Finance index from GFD				
Luxembourg	1	1	1	1	1	1	Luxembourg SE Banks index from GFD						Datastream index		
Malaysia											Malaysia KLSE Financial Index from GFD				
Mexico		2	2	4	4	3	Mexico Nacional Financiera Bank index from GFD						Datastream index		
Netherlands	2	4	4	5	5	5	Netherlands ANP-CBS Banks & Insurance index from GFD					Netherlands CBS Banks index from GFD			
New Zeal.	4	3	3	3	2	2	2	2	1	1		4	Datastream index		
Norway					Oslo SE Banks and Insurance Index from GFD								Baron-Xiong bank index		
Peru	2				1	Lima SE Banks index from GFD							Datastream index		
Philippines									Manila Banks index from GFD				Datastream index		
Portugal						3	4	Portugal Banks/Financials index from GFD					Datastream index		
Russia	3	3	3	3	5								Datastream index		
Singapore										4	Singapore SE Finance GFD index			Datastream index	
S. Africa	2	1	3	4	4	2	1	1	1	Johannesburg SE Financial index from GFD			Datastream index		
Spain	1	2	2	1	4	6	6	Madrid SE Banking and Finance from GFD						Baron-Xiong bank index	
Sweden			3	Stockholm SX Banks index from GFD											Datast.
Switzerland	12	16	18	13	12	12	12	SWX ICB Banks index from GFD							
Taiwan												Datastream index			
Thailand											Thailand SE Banks index		Datastream index		
Turkey	4	3	3	2	2	2	2			1	1	Datastream index			
UK	70	70	Various bank price indexes from GFD												
US	4	4	4	4	Various bank price indexes from GFD										
Venezuela								Caracas SE Financial index from GFD							

Table B2: Data sources: Annual equity variables

	Yearly bank stock prices	Yearly bank stock dividends	Yearly nonfinancial stock prices	Yearly nonfinancial stock dividends
Notes:	See document linked in Appendix text for individual bank stocks used and their sources. "Baron-Xiong" refers to indexes constructed from individual stocks in Baron and Xiong (2017). Datastream refers to the pre-constructed "DS BANKS" stock index from Datastream. The Datastream index codes used are: BANKSXX (for banks), INDUSXX (for nonfinancials), and TOTMKXX (for broad market), with XX being the two-character country code for each country.		For nonfinancial stocks only, price returns are occassionally used in place of total returns, when dividend returns are not available. Also for nonfinancial stocks only, broad market returns are occassionally used when nonfinancial returns are not available (noted in specific cases below).	
Argentina	Individual bank stocks from various sources (1870-1900, 1935-1938), Nakamura-Zarazaga index (1900-1935), Datastream (1992-2016)	Individual bank stocks from various sources (1870-1938), Datastream (1992-2016)	IMM (1882-1935), Broad market index (Buenos Aires SE General Index (_IBGD) from GFD, 1967-1993), Datastream (1994-2016)	IMM (1882-1935), Broad market index (Datastream: TOTMKAR, 1987-1993), Datastream (1994-2016, INDUSAR)
Australia	Individual bank stocks from various sources (1870-1874), "S&P/ASX 200 Banking Index" (_AXBAJD) from GFD (1875-2016)	Individual bank stocks from various sources (1870-1923), Baron-Xiong (1924-2016)	IMM (1870-1882), “Sydney SE Industrial and Commercial” (AUINCM) price index from GFD (1883-1980), “Australia ASX All-Industrials” (_AAIID) price index from GFD (1981-2002), Datastream (2003-2016)	IMM (1870-1882), Broad market index (Australia ASX Dividend Yield (SYAUSYM) from GFD, 1883-2002), Datastream (2003-2016)
Austria	Individual bank stocks from various sources (1870-1921, 1929-1968, 1981-1985),"Austria National Bank Banks Index" (ATBBANKM) from GFD (1922-1928), "Austria 6 Bank and Insurance Stocks" (ATWBANKM) index from GFD (1969-1980), Baron-Xiong (using Compustat Global) (1986-2016)	Individual bank stocks from various sources (1870-1985), Baron-Xiong (using Compustat Global) (1986-2016)	“Austria National Bank Industrials Index” (ATINDUM) price index from GFD (1921-1934), “Vienna Miscellaneous Stocks” (ATMISCM) price index from GFD (1948-1966), “Austria 36 Industrials” (ATAUT36W) price index from GFD (1967-1980), Datastream (1981-2016)	Broad market index (Vienna SE Dividend Yield (SYAUTYM) from GFD, 1925-38, 1969-80)
Belgium	Financials stock total return index from Appendix 2 of Annaert et al. (2012) (1870-1913), Individual bank stocks from various sources (1914-1933), “Belgium INS Finance and Insurance” (BEFININM) index from GFD (1934-1989), “Brussels Bank Index” (_BXSSBKD) index from GFD (1989-2005), and price index constructed from Compustat global (2005-2012) and Datastream (2013-2016).	Individual bank stocks from various sources (1872-1933), Baron-Xiong (1934-2016)	Broad market index (JST 1870-1955), “Belgium INS Industrials Index” (BEINDUSM) price index from GFD (1956-1972), Datastream (1973-2016)	Broad market index (Annaert et al., 1871-1972), Datastream (1973-2016)
Brazil	Individual bank stocks from various sources (1870-1964), Datastream (1994-2016)	Individual bank stocks from various sources (1870-1959), Datastream (1994-2016)	IMM (1873-1926), newspapers (1927-42), Broad market index (Brazil Bolsa de Valores de Sao Paulo (_BVSPD) from GFD, total returns, 1955-2016)	IMM (1873-1926), newspapers (1927-42)
Canada	Individual bank stocks from various sources (1870-1914), "Canada S&P/TSX Banks" index from GFD (1915-2016)	Individual bank stocks from various sources (1870-1923), Baron-Xiong (1923-2016)	IMM (1870-1914), “Canada Investor's Index Industrials” (CAIINDUM) price index from GFD (1915-1977), “Toronto SE-300 Industrial Products” (_TIPD) price index from GFD (1978-2004), Datastream (2005-2016)	IMM (1870-1929), Broad market index (S&P/TSX-300 Dividend Yield (SYCANYTM) from GFD, 1930-2004), Datastream (2005-2016)
Chile	Individual bank stocks from various sources (1891-1901), "Chile BEC Finance Index" (_FINANCD) price index from GFD (1927-2016)	Individual bank stocks from various sources (1891-1901, 1928-1980), Datastream (1989-2016)	IMM (1870-1928), “Chile BEC Industrials Index” (_INDUSTD) price index from GFD (1927-2009), Datastream (2010-2016)	IMM (1870-1928), Broad market index (Datastream: TOTMKCL, 1983-2009) Datastream (2010-2016, INDUSCL)
Colombia	"Colombia IBOMED Financial Sector" (_IBMFDC) price index from GFD (1923-2016)	Individual bank stocks from various sources (1928-1980), Datastream (1992-2016)	“Bogota SE Industrials (old)” (COBINDUM) price index from GFD (1928-1942), “Bogota SE Industrials Index” (COBOINDD) price index from GFD (1956-1964), “Colombia IBOMED Industrials” (_IBMID) price index from GFD (1968-2000), Datastream (2001-2016)	Datastream (2001-2016)
Czech	“Czechoslovakia Banks Index” (CZBANKSM) price index from GFD (1919-1938), Datastream (1994-2016)	Individual bank stocks from various sources (1919-1937), Datastream (1994-2016)	Czechoslovakia Industrials and Transports (CZINDTRM) from GFD (1919-1937), Datastream (1993-2016)	Datastream (1993-2016)

Table B2: Data sources: Annual equity variables (cont.)

	Yearly bank stock prices	Yearly bank stock dividends	Yearly nonfinancial stock prices	Yearly nonfinancial stock dividends
Denmark	Individual bank stocks from various sources (1870-1920), "Copenhagen SE Banks" (_CX4010D) index from GFD (1921-2011), Datastream (2012-2016)	Individual bank stocks from various sources (1870-1951), Baron-Xiong (1952-2016)	Individual nonfinancial stocks from various sources (1875-1915), Denmark Other Shares (DKOTHERM) (1915-1920), Copenhagen SE Industrials Index (_CX20PID) from GFD, 1921-2012, Datastream (2013-2016, INDUSDK)	Individual nonfinancial stocks from various sources (1876-1936), Datastream (1969-2016, INDUSDK)
Egypt	Individual bank stocks from various sources (1870-1959), Datastream (1996-2016)	Individual bank stocks from various sources (1870-1959), Datastream (1996-2016)	IMM (1906-29), Broad market index (Egyptian Stock Exchange Index (EGCAIROM) from GFD, 1949-62), Datastream (1996-2016)	IMM (1906-29), Datastream (1996-2016)
Finland	Individual bank stocks from various sources (1911-1958), "Finland Unitas Banks" (FIUBANKM) index from GFD (1959-1987), Datastream (1988-2016)	Individual bank stocks from various sources (1911-1987), Datastream (1988-2016)	Broad market index (Nyberg-Vaihekoski, 1913-32), "Finland Unitas Industrials Index" (FIUINDUD) price index from GFD (1933-1991), Datastream (1992-2016)	Broad market index (Nyberg-Vaihekoski, 1913-1970, and Datastream: TOTMKFN, 1972-1991), Datastream (1992-2016, INDUSFN)
France	Individual bank stocks from various sources (1870-1923), "France INSEE Credit Banks" (FRBANKCM) price index from GFD (1924-1990), "Euronext Paris CAC Financials 8000" (_FRFIND) price index from GFD (1991-2016)	Individual bank stocks from various sources (1870-1938), Baron-Xiong (1939-1993), Datastream (1994-2016)	Individual nonfinancial stocks from various sources (1870-1920), Euronext Paris CAC Construction and Materials (_FRCMD) from GFD (1921-2016)	Individual nonfinancial stocks from various sources (1870-1899), Broad market index (France Dividend Yield (SYFRAYM) from GFD, 1900-2016)
Germany	Individual bank stocks from various sources (1871-1902, 1915-1929), "Germany Conrad German Banks" (DECBGERM) index from GFD (1903-1914), "CDAX Banks Price" (_CXKBXD) index from GFD (1930-2016)	Individual bank stocks from various sources (1871-1929), Baron-Xiong (1930-2016)	Individual nonfinancial stocks from various sources (1870-1902), "Germany Conrad Metalworking and Machinery" (DECMACHM) index from GFD (1903-1914), "Germany Bundesamt Heavy Industry" (DEBHEAVM) index from GFD (1914-1950), "Germany CDAX Industrials" (_CXKNXD) index from GFD (1950-2016)	Individual nonfinancial stocks from various sources (1871-1929), Broad market index (Germany Dividend Yield (SYDEUYM) from GFD, 1900-2009), Datastream (2009-2016, INDUSDE)
Greece	Individual bank stocks from various sources (1870-1933), "Greece National Bank Finance" (GRFINANM) index from GFD (1952-1996), Datastream (1997-2016)	Individual bank stocks from various sources (1870-1933), Datastream (1990-2016)	Broad market index (Greece Stock Market Index (GRATHENM) from GFD, 1929-1940), "Athens SE Industrials Index" (_ATIDD) price index from GFD (1953-2005), Datastream (2006-2016)	Athens SE Dividend Yield (SYGRCYM) from GFD (1977-2005), Datastream (2006-2016)
Hong Kong	Individual bank stocks from various sources (1870-1972), Datastream (1973-2016)	Individual bank stocks from various sources (1870-1972), Datastream (1973-2016)	Broad market index (Hong Kong Hang Seng Composite Index (_HSID) from GFD, 1965-1972), Datastream (1973-2016)	Broad market index (Datastream: TOTMKHK, 1970-1972), Datastream (1973-2016)
Hungary	"Hungary Korosy Bank Stock" (HUKOBNKA) index from GFD (1874-1899), Individual bank stocks from various sources (1870-1874, 1923-1930), Datastream (1994-2016)	Individual bank stocks from various sources (1870-1890, 1923-1930), Datastream (1994-2016)	"Hungary Korosy Industrials Stock Index" (HUKOINDA) price index from GFD (1873-1898), "Hungary Stock Market Index" (HUBUDAM) price index from GFD (1921-1944), Broad market index (1992-1996), Datastream (1997-2016)	Broad market index (Datastream: TOTMKHU, 1992-1996), Datastream (1997-2016)
Iceland	Datastream (1999-2016)	Datastream (1999-2016)	Datastream (1993-2016)	Datastream (1993-2016)
India	Individual bank stocks from various sources (1870-1929), Datastream (1990-2016)	Individual bank stocks from various sources (1870-1929), Datastream (1990-2016)	IMM (1870-1928), Broad market index (Bombay SE Sensitive Index (_BSESND) from GFD, 1929-1989), Datastream (1990-2016)	IMM (1870-1928), Datastream (1990-2016)
Indonesia	Datastream (1990-2016)	Datastream (1990-2016)	Broad market index (Jakarta SE Composite Index (_JKSED) from GFD, 1978-1992), Datastream (1993-2016)	Broad market index (Datastream: TOTMKID, 1990-1992), Datastream (1993-2016)

Table B2: Data sources: Annual equity variables (cont.)

	Yearly bank stock prices	Yearly bank stock dividends	Yearly nonfinancial stock prices	Yearly nonfinancial stock dividends
Ireland	Individual bank stocks from various sources (1870-1936, 1953-1972), Datastream (1973-2016)	Individual bank stocks from various sources (1870-1936, 1953-1972), Datastream (1973-2016)	IMM (1870-1929), Broad market index (Ireland ISEQ Overall Price Index (_ISEQD) from GFD, 1934-72), Datastream (1973-2016)	IMM (1870-1929), Datastream (1973-2016)
Israel	"Israel Finance and Insurance Composite" (ILXFINSM) index from GFD (1966-1983), Datastream (1984-2016)	Individual bank stocks from various sources (1966-1994), Datastream (1995-2016)	"Tel Aviv SE Industrial and Manufacturing" (ILTLVND) from GFD (1966-1993), Datastream (1993-2016)	Datastream (1993-2016)
Italy	Individual bank stocks from various sources (1870-1972), Datastream (1973-2016)	Individual bank stocks from various sources (1870-1972), Datastream (1973-2016)	Individual bank stocks from L'Economista (1884-1894) and Corriere newspaper (1884-1894), Broad market index (Banca Commerciale Italiana Index (_BCIID) from GFD , 1905-1961), "Milan SE Industrials" (ITMILAND) price index from GFD (1962-1985), "Milan SE Historical Industrials" (_MHIDD) price index from GFD (1986-2009), Datastream (2010-2016)	Broad market index (Italy Dividend Yield (SYITAYM) from GFD, 1925-2009), Datastream (2010-2016)
Japan	Individual bank stocks from various sources (1897-1932), "Japan Oriental Economist Bank and Trust" (JPOBANKM) index from GFD (1933-1944), "Japan TOPIX Finance and Insurance" (JPFININM) index from GFD (1946-1985), "Japan TOPIX Banks" (_IBNKS_D) index from GFD (1986-2016)	Individual bank stocks from various sources (1901-1957), Baron-Xiong (1958-2016)	Broad market index (JST, 1879-1914, and Nikkei 225 Stock Average (_N225D) from GFD, 1915-1944), "Japan TOPIX Machinery" (_IMCHN_D) price index from GFD (1947-2016)	Broad market index (Tokyo SE Dividend Yield (SYJPNYM) from GFD, 1886-1944, 1947-2016)
Korea	"Korea SE Financial Institutions" (_KS49D) index from GFD (1975-1978), "Korea SE Banks" (_KS49D) index from GFD (1979-2016)	Individual bank stocks from various sources (1978-1986), Datastream (1987-2016)	Broad market index (Korea KOPSI SE Stock Price Index (_KS11D) from GFD, 1962-1987), Datastream (1988-2016)	Broad market index (Korea SE Dividend Yield (SYKORYM) from GFD, 1962-1987), Datastream (1988-2016)
Luxembourg	Individual bank stocks from various sources (1871-1929), "Luxembourg SE Banks and Finance" (LUBANKM) index from GFD (1930-1967), Datastream (1992-2016)	Individual bank stocks from various sources (1871-1929, 1947-1968), Datastream (1992-2016)	"Luxembourg SE Miscellaneous" (LUMISCM) price index from GFD (1930-1967), Broad market index (Luxembourg SE LUXX Index (_LUXXD) from GFD, 1968-1991), Datastream (1992-2016)	Broad market index (Datastream: TOTMKLX, 1982-1991), Datastream (1992-2016)
Malaysia	"Malaysia KLSE Financial Index" (_KLFID) from GFD (1969-2016)	Datastream (1985-2016)	"Malaysia KLSE Industrials" (_KLIND) price index from GFD (1969-2016)	Broad market index (Datastream: TOTMKMY, 1973-2016)
Mexico	Individual bank stocks from various sources (1884-1913, 1919-1933), "Mexico Nacional Financiera Bank" (MXBANKSM) index from GFD (1937-1976), Datastream (1988-2016)	Individual bank stocks from various sources (1884-1913, 1919-1976), Datastream (1988-2016)	IMM (1908-1929), "Banco de Mexico Industrials Index" (MXXINDUM) price index from GFD (1930-1944), "Mexico Nacional Financiera Industrials Index" (MXINDUSM) price index from GFD (1945-1976), Broad market index (Mexico SE Indice de Precios y Cotizaciones (_MXXD) from GFD, 1977-1988), Datastream (1989-2016)	IMM (1908-1929), Datastream (1989-2016)
Netherlands	Individual bank stocks from various sources (1873-1929), "Netherlands ANP-CBS Banks and Insurance" (NLDBKINM) index from GFD (1928-1971), "Netherlands CBS Banks" (NLBNKPRD) index from GFD (1972-2003), Baron-Xiong (2003-2016)	Individual bank stocks from various sources (1873-1927), Baron-Xiong (1928-2016)	Broad market index (JST, 1891-1919, and Netherlands All-Share Price Index (_AAXD) from GFD, 1891-1962), "Netherlands CBS Industrials Index" (NLINDD) price index from GFD (1963-1989), Datastream (1990-2016)	Broad market index (imputed from total returns from GFD: _AAXRD, 1951-1968, and Netherlands SE Dividend Yield (SYNLDYAM) from GFD, 1950-1989), Datastream (1990-2016)
New Zealand	Individual bank stocks from various sources (1870-1965, 1980-1992), Datastream (1998-2016)	Individual bank stocks from various sources (1870-1929, 1980-1992), Datastream (1998-2016)	IMM (1881-1913), Broad market index (New Zealand SE 40 Share Index (_NZ40D) from GFD, 1927-2016)	IMM (1881-1913), Broad market index (Datastream: TOTMKNZ, 1984-2016)

Table B2: Data sources: Annual equity variables (cont.)

	Yearly bank stock prices	Yearly bank stock dividends	Yearly nonfinancial stock prices	Yearly nonfinancial stock dividends
Norway	"Oslo SE Finance (Banks and Insurance) TR Index" (_FINXD) from GFD (1915-1986), Baron-Xiong (1987-2016). Note these are all total returns.	Norges Bank index (implied from differencing total returns and price returns, 1920-1935), Datastream (1986-2016)	"Oslo SE Industrials TR Index" (_NOSID) Total Return price index from GFD (1914-1981), Datastream (1982-2016)	Datastream (1982-2016)
Peru	Individual bank stocks from various sources (1870-1881, 1912-1926), "Lima SE Banks" (_LMBFIND) index from GFD (1927-1993), Datastream (1994-2016)	Individual bank stocks from various sources (1870-1881, 1912-1958), Datastream (1994-2016)	"Lima SE Industrials" (_LMINDD) price index from GFD (1938-2016)	Broad market index (1993 - 2016)
Philippines	"Manila SE Finance Index" (_PSFID) from GFD (1952-1981), Datastream (1989-2016)	Datastream (1989-2016)	"Philippine SE Industrial Index" (_PSIND) price index from GFD (1953-2012), Datastream (2013-2016)	Broad market index (Datastream: TOTMKPL, 1982-2012), Datastream (2013-2016, INDUSPL)
Portugal	Individual bank stocks from various sources (1921-1938), "Portugal Banks" (PTBANKSM) index from GFD (1939-1959) "Portugal Credit and Insurance" (PTCREDIM) index from GFD (1960-1987), Datastream (1988-2016)	Individual bank stocks from various sources (1921-1931), Datastream (1988-2016)	Broad market index (Oporto PSI-20 Index (_PSI20D) from GFD, 1930-1953, 1983-1989), "Portugal Industrials" (PTINDUSM) price index from GFD (1954-1982), Datastream (1990-2016)	GFD (1954-1982), Datastream (1990-2016)
Russia	Individual bank stocks from various sources (1870-1917), Russia AK&M Bank Index (RUAKMBD) from GFD (1993-1997), Datastream (1997-2016)	Individual bank stocks from various sources (1870-1917), Datastream (1997-2016)	"Russia St. Petersburg Yale Stock Index" (RUSPSEYM) price index from GFD (1871-1914), Russia AK&M Industrials Index (_AKMED) from GFD (1993-2013), Datastream (2013-2016)	Datastream (1995-2016)
Singapore	Individual bank stocks from various sources (1966-1969), "Singapore SES Finance" (_FIAND) Index from GFD (1970-1999), Datastream (2000-2016)	Individual bank stocks from various sources (1966-1986), Datastream (1986-2016)	"Singapore Straits-Times Industrials Index" (SGSS1D) price index from GFD (1965-1998), Datastream (1999-2016)	Broad market index (Singapore SE Dividend Yield (SYSGPYM) from GFD, 1972-1998), Datastream (1999-2016)
South Africa	Individual bank stocks from various sources (1870-1959), "Johannesburg SE Financial" (_JFIND) index from GFD (1960-1985), Datastream (1986-2016)	Individual bank stocks from various sources (1870-1985), Datastream (1986-2016)	IMM (1888-1911), "Johannesburg SE Industrials" (_JIAID) price index from GFD (1912-2002), Datastream (2003-2016)	IMM (1888-1929), Broad market index (Johannesburg SE Dividend Yield (SYZAFYM) from GFD, 1954-2016).
Spain	Individual bank stocks from various sources (1873-1935), "Madrid SE Banking and Finance" (_IBAN_MD) from GFD (1940-2000), Baron-Xiong (2001-2016)	Individual bank stocks from various sources (1873-1935, 1946-1965), Baron-Xiong (1966-2016)	Broad market index (JST, 1870-1920, and Spain Pre-War Stock Index (ESZINDXM) from GFD, 1921-1936, and Madrid SE Index (ESMADM) from GFD, 2012-2016), "Madrid SE Metals" (_IMET_MD) price index from GFD (1941-2001)	Broad market index (Madrid SE Dividend Yield (SYESPYM) from GFD, 1900-1930, 1941-2016)
Sweden	Individual bank stocks from various sources (1890-1901), "Stockholm SX Banks Price" (_SX4010D) index from GFD (1906-2011), Datastream (2012-2016)	Individual bank stocks from various sources (1890-1901), Baron-Xiong (1926-2016)	Broad market index (JST, 1870-1906), "Stockholm SX Industrials Price Index" (_SX20PID) price index from GFD (1907-2011), Datastream (2012-2016)	Broad market index (Stockholm SE Dividend Yield (SYSWEYM) from GFD, 1870-2011), Datastream (2012-2016)
Switzerland	Individual bank stocks from various sources (1870-1929), "SWX ICB Banks Price Index (w/ GFD extension)" (_C8300PD) index from GFD (1930-2016)	Individual bank stocks from various sources (1870-1929), Baron-Xiong (1930-2016)	Broad market index (JST, 1900-1924, and Switzerland Price Index (_SPIXD) from GFD, 2006-2016), "Switzerland SPI Industrials Index" (_SINXD) price index from GFD (1924-2005)	Broad market index (Switzerland Dividend Yield (SYCHEYM) from GFD, 1918-1939, 1966-2016)
Taiwan	Datastream (1987-2016)	Datastream (1987-2016)	Broad market index (Taiwan SE Capitalization Weighted Index (_TWIID) from GFD, 1968-1987), Datastream (1988-2016)	Datastream (1988-2016)
Thailand	"Thailand SET Banks" (_SETBD) index from GFD (1975-1986), Datastream (1987-2016)	Individual bank stocks from various sources (1975-1986), Datastream (1987-2016)	Thailand SET Commerce Index (_SETCD) from GFD (1976-2016)	Broad market index (Datastream: TOTMKTH, 1976-2016)
Turkey	Individual bank stocks from various sources (1870-1939, 1965-1985), Datastream (1986-2016)	Individual bank stocks from various sources (1870-1931), Datastream (1986-2016)	Broad market index (Istanbul SE IMKB-100 Price Index (_XU100D) from GFD, 1986-2016)	Broad market index (Datastream: TOTMKTK, 1986-2016)

Table B2: Data sources: Annual equity variables (cont.)

	Yearly bank stock prices	Yearly bank stock dividends	Yearly nonfinancial stock prices	Yearly nonfinancial stock dividends
United Kingdom	Individual bank stocks from various sources (1870-1887), "UK Banker's Magazine All-Banks" (GBBBANKM) from GFD (1888-1955), "UK FT-Actuaries Banks" (_LCBKD) from GFD (1956-1999), "FTSE All-Share Bank" (_FTA835D) index from GFD (2000-2016)	Individual bank stocks from various sources (1870-1922), Baron-Xiong (1923-2016)	UK L&CES Industrials (GBLINDUM) index from GFD (1870-1899), FTSE All-Share Industrials (_FTASX2000) index from GFD (1900-2016)	Individual nonfinancial stocks from IMM (1870-1922), UK FT-Actuaries Dividend Yield (_DFTASD) from GFD (1923-2016)
United States	Individual bank stocks from various sources (1870-1917), "S&P Banks: Money Center (NYC)" (SPMONYD) from GFD (1918-1940), "S&P 500 Banks Index" (_5SP4010) from GFD (1941-2016)	Individual bank stocks from various sources (1870-1928), Baron-Xiong (1929-2016)	S&P 500/Cowles Composite (_SPXD) index from GFD (1870-1885), Dow Jones Industrials (_DJI3D) index from GFD (1885-1925), S&P 500 Industrials (_5SP20) index from (1925-2016)	Broad market index (S&P 500 Monthly Dividend Yield (SYUSAYM) from GFD, 1871-1925), S&P Industrials Dividend Yield (SPYINDW) from GFD, 1926-2017)
Venezuela	"Caracas SE Financial Index" (_IBCFD) index from GFD (1946-2016)	Datastream (1994-2016)	Broad market index (Caracas SE General Index (_IBCD) Total Returns from GFD, 1938-2007), "Caracas SE Industrials Index" (_IBCID) price index from GFD (2008-2016)	Datastream (2008-2016)

Table B3: Data sources: Monthly variables

	Monthly bank stock returns	Monthly nonfin stock returns	Monthly bank credit spreads	Monthly corp credit spreads
Notes:	Note that Datastream is given priority for the monthly data over GFD, given that Datastream is a total returns index, whereas the GFD indexes are price indexes. In general, a total returns monthly index is given priority over a price return index, whenever possible.			
Argentina	Nakamura-Zarazaga index (1900-1935, quarterly), Datastream (1993-2016)	Nakamura-Zarazaga index (1900-1935, quarterly), Datastream (1993-2016)	Argentina BAIBAR Overnight Interbank (IMARGD) from GFD (1990-2016), relative to Argentina Reserve Bank Discount Rate (IDARGD) from GFD (1990-2002) and Argentina 3-month BCRA Treasury Auction Yield (ITARG3D) from GFD (2002-2016)	
Australia	"S&P/ASX 200 Banking Index" (_AXBAJD) from GFD (1875-2016)	"Sydney SE Industrial and Commercial" (AUINCM) price index from GFD (1883-1980), "Australia ASX All-Industrials" (_AAIID) price index from GFD (1981-2002), Datastream (2003-2016)	Australia 3-month Interbank Rate (IBAUS3D) from GFD (1987-2016), relative to Australia 3-month Treasury Bill Yield (ITAUS3D) from GFD	Australia Corporate Bond Yield (INAUSW) from GFD (1983-2016), relative to Australia 10-year Government Bond Yield (IGAUS10D) from GFD
Austria	"Austria National Bank Banks Index" (ATBBANKM) from GFD (1922-1933), "Austria 6 Bank and Insurance Stocks" (ATWBANKM) index from GFD (1969-1980), Datastream (1986-2016)	"Austria National Bank Industrials Index" (ATINDUM) price index from GFD (1921-1934), Datastream (1973-2016)	Austria 3-month VIBOR (IBAUT3D) from GFD (1990-2001), relative to Austria 3-month (ITAUT3M, 1960-1980) and 1-year (IGAUT1D, 1980-2001) Treasury Bill Rate from GFD. EURIBOR (IBEUR3D) relative to German T-Bill (IBEUR3D minus ITDEU3D), from GFD (2002-2016)	
Belgium	Monthly bank stock index data provided by Frans Buelens (1867-1873, 1922-1936), "Belgium INS Finance and Insurance" (BEFININM) index from GFD (1934-1973), Datastream (1973-2016)	Monthly nonfin stock index data provided by Frans Buelens (1867-1873, 1922-1936), Datastream (1973-2016)		Belgium Non-Financial Company Bond Yields (INBELW) from GFD (1960-2016), relative to Belgium 10-year Government Bond Yield (IGBEL10D) from GFD
Brazil	Datastream (1994-2016)	Datastream (1994-2016)	BRAZILIAN INTERBANK RATE (BRIBCDI) from Datastream (2004-2016), relative to Brazil 3-month Treasury Bill Yield (ITBRA3D) from GFD	
Canada	"Canada S&P/TSX Banks" index from GFD (1915-1972), Datastream (1973-2016)	"Canada Investor's Index Industrials" (CAIINDUM) price index from GFD (1915-1935), Datastream (1973-2016)	Canada 3-month Interbank Rate (IBCAN3D) from GFD (1990-2016), relative to Canada 3-month Treasury Bill Yield (ITCAN3D) from GFD	Canada Long-term Corporate Bond Yields (INCANLTW) from GFD (1948-2016), relative to Canada 10-year Government Bond Yield (IGCAN10D) from GFD.
Chile	"Chile BEC Finance Index" (_FINANCD) price index from GFD (1927-1989), Datastream (1989-2016)	"Chile BEC Industrials Index" (_INDUSTD) price index from GFD (1927-1989), Datastream (1989-2016)	Chile Interbank Rate (IBCHLD) from GFD (1986-2016), relative to Chile Time Deposit Rate (ICCHLTD, 1976-1996) and Chile 3-month Nominal T-bill Auction Yield (ITCHL3D, 1997-2012) from GFD	
Colombia	Bogota SE Banks Index (COBBANKM) from GFD (1937-1971), "Colombia IBOMED Financial Sector" (_IBMFDC) price index from GFD (1923-1993), Datastream (1993-2016)	"Bogota SE Industrials (old)" (COBINDUM) price index from GFD (1928-1942), "Colombia IBOMED Industrials" (_IBMID) price index from GFD (1968-1998), Datastream (1998-2016)	Colombia TBS Interbank Rate (IBCOLD) from GFD (1998-2016), relative to Colombia 3-month Treasury Bill Yield (ITCOL3W, 1998-2016) from GFD	
Czech	"Czechoslovakia Banks Index" (CZBANKSM) price index from GFD (1919-1938), Datastream (1994-2016)	Czechoslovakia Industrials and Transports (CZINDTRM) from GFD (1919-1937), Datastream (1993-2016)	Czech Republic 3-month PRIBOR (IBCZE3D) from GFD (1992-2016), relative to Czech Republic 3-month Treasury Bill Yield (ITCZE3D) from GFD	

Table B3: Data sources: Monthly variables (cont.)

	Monthly bank stock returns	Monthly nonfin stock returns	Monthly bank credit spreads	Monthly corp credit spreads
Denmark	same as yearly	same as yearly	Denmark 3-month Interbank Rate (IBDNKDD) index (1998-2014) relative to Denmark 3-month Treasury Bill Yield (ITDNK3D) from GFD	Denmark Corporate Bond Yield (INDNKEW) from GFD (1939-2011), relative to Denmark 10-year Government Bond Yield (IGDNK10D)
Egypt	Datastream (1996-2016)	Datastream (1996-2016)	Egypt Interbank Lending Rate (IBEGYD) from GFD (2001-2016), relative to Egypt 3-month Treasury Bill Yields (ITEGY3D) from GFD	
Finland	OMX Helsinki Banks Price Index (_HX4010D) from GFD (1934-2008), Datastream (2009-2016)	"Finland Unitas Industrials Index" (FIUINDUD) price index from GFD (1933-1991), Datastream (1988-2016)	EURIBOR (IBEUR3D) relative to German T-Bill (IBEUR3D minus ITDEU3D), from GFD (2002-2016)	
France	same as yearly	same as yearly	France 3-month Interbank Rate (IBFRA3D) from GFD (1969-2001) relative to Deposit Rate (IDFRAD) from GFD. EURIBOR (IBEUR3D) relative to German T-Bill (IBEUR3D minus ITDEU3D), from GFD (2002-2016)	
Germany	same as yearly	same as yearly	Germany 3-month Interbank Rate (IBDEU3D) from GFD (1959-2001), and EURIBOR (IBEUR3D) from GFD (2002-2016), relative to German T-Bill (ITDEU3D)	Corporate bond index from "Statistisches Jahrbuch für das Deutsche Reich" (1929-1934), Germany Corporate Bond Yield (INDEUD) from GFD (1958-2016), all relative to German 10-year Government Bond (IGDEU10D)
Greece	"FTSE/Athex Banks Index" (_FTATBNK) index from GFD (1978-1990), Datastream (1990-2016)	"FTSE/Athex Industrial Goods and Services" (_FTATIND) index from GFD (1952-1988), Datastream (1988-2016)		
Hong Kong	Datastream (1973-2016)	Datastream (1973-2016)	Hong Kong 1-month HIBOR (IBHKG1D) from GFD (1982-2016), relative to Hong Kong 3-month Time Deposits (ICHKGTM, 1971-1991) and Hong Kong 3-month Treasury Bill Yield (ITHKG3D, 1991-2016) from GFD	
Hungary	Datastream (1994-2016)	Datastream (1997-2016)	Hungary 3-month BUBOR (IBHUN3D) from GFD (1991-2016), relative to Hungary 3-month Treasury Bill Yield (ITHUN3D) from GFD	
Iceland	Datastream (1999-2016)	Datastream (1993-2016)	Iceland 3-month REIBOR (IBISL3D) from GFD (1970-2016), relative to Iceland 3-month Treasury Bill Yield (ITISL3D) from GFD	
India	Datastream (1990-2016)	Datastream (1990-2016)	India 3-month MIBOR (IBIND3D) from GFD (1998-2016), relative to India 3-month Treasury Bill Yield (ITIND3D) from GFD	
Indonesia	Datastream (1990-2016)	Datastream (1993-2016)	Indonesia Overnight Interbank Rate (IMIDND) from GFD (1985-2016), relative to Indonesia Treasury Bill Yield (ITIDN3M, 2000-2008) and Indonesia 6-month Treasury Bond Yield (ITIDN6D, 2009-2016) from GFD	

Table B3: Data sources: Monthly variables (cont.)

	Monthly bank stock returns	Monthly nonfin stock returns	Monthly bank credit spreads	Monthly corp credit spreads
Ireland	Datastream (1973-2016)	Datastream (1973-2016)	Ireland 3-month Interbank Rate (IBIRL3D) from GFD (1978-2001), relative to Ireland 3-month Treasury Bill Yield (ITIRL3M) from GFD. EURIBOR (IBEUR3D) relative to German T-Bill (IBEUR3D minus ITDEU3D), from GFD (2002-2016)	
Israel	"Tel Aviv SE Commercial Banks" (ILTLVBD) from GFD, (1973-1993), Datastream (1993-2016)	"Tel Aviv SE Industrial and Manufacturing" (ILTLVND) from GFD (1966-1993), Datastream (1993-2016)	Israel 3-month TELBOR (IBISR3D) from GFD (1969-2016), relative to Israel 3-month Treasury Bill Yield (ITISR3D) from GFD	
Italy	Individual bank stocks from L'Economista (1884-1894) and Corriere newspaper (1884-1894, 1904-1934). Datastream (1973-2016)	Individual nonfinancial stocks from L'Economista (1884-1894) and Corriere newspaper (1884-1894, 1904-1934). Datastream (1973-2016)	Italy RIBOR 3 months (IBITA3D) from GFD (1971-2001), relative to Italy 3-month Treasury Bill Yield (ITITA3D) from GFD. EURIBOR (IBEUR3D) relative to German T-Bill (IBEUR3D minus ITDEU3D), from GFD (2002-2016)	
Japan	Individual bank stocks from various sources (1897-1931). Datastream (1973-2016)	Individual nonfinancial stocks from various sources (1897-1931). Datastream (1973-2016)	Japan 3-month TIBOR (IBJPN3D) from GFD (1979-2016), relative to Japan 3-month Treasury Bill Yield (ITJPN3D) from GFD	Japan Corporate Bond Yield (INJPNW) from GFD (1933-2016), relative to Japan 10-year Government Bond Yield (IGJPN10D) from GFD
Korea	"Korea SE Banks" (_KS51D) from GFD (1979-1987), Datastream (1987-2016)	"Korea SE Manufacturing" (_KS55D) from GFD (1980-1987), Datastream (1987-2016)		
Luxembourg	Datastream (1992-2016)	Datastream (1992-2016)	Luxembourg Interbank Offer Rate (IBLUXM) from GFD (1990-2001), relative to Luxembourg 3-month Time Deposit Rate (ICLUXTM) from GFD. EURIBOR (IBEUR3D) relative to German T-Bill (IBEUR3D minus ITDEU3D), from GFD (2002-2016)	Luxembourg Industrial Bonds (LUBINDM) from GFD (1963-2016), relative to Luxembourg Government Bonds (IGLUX10D) from GFD
Malaysia	"Malaysia KLSE Financial Index" (_KLFID) from GFD (1969-1986), Datastream (1986-2016)	“Malaysia KLSE Industrials” (_KLIND) price index from GFD (1969-1986), Datastream (1986-2016)	Malaysia 3-month KLIBOR (IBMYS3D) from GFD (1994-2016), relative to Malaysia 3-month T-bill Discount Rate (ITMYS3D) from GFD	
Mexico	Datastream (1989-2016)	Datastream (1989-2016)		
Netherlands	Individual bank stocks from various sources (1890-1934). "Netherlands ANP-CBS Banks and Insurance" (NLDBKINM) index from GFD (1928-1971), Datastream (1973-2016)	Individual nonfinancial stocks from various sources (1890-1934). "Netherlands ANP-CBS Consumer Goods" (NLDCONSM) from GFD (1931-1973), Datastream (1973-2016)		
New Zealand	Datastream (2010-2016)	Datastream (1994-2016)	New Zealand 6-month Interbank Rate (IBNZL6D) from GFD (1990-2013) and NZ INTERBANK RATE - 3 MONTH (NZINTER3) from Datastream (2013-2016), relative to New Zealand 3-month Treasury Bill Yield (ITNZL3D) from GFD	
Norway	“Oslo SE Finance (Banks and Insurance) TR Index” (_FINXD) from GFD (1915-1990), Datastream (1990-2016)	“Oslo SE Industrials TR Index” (_NOSID) Total Return price index from GFD (1914-1980), Datastream (1980-2016)	Norway 3-month OIBOR (IBNOR3D) from GFD (1978-2016), relative to Norway 3-month Treasury Bill Yield (ITNOR3D) from GFD	Norway 10-year Industrial Bond Yield (INNOR10D) from GFD (1921-2003), relative to Norway Government Bonds (IGNOR10D) from GFD
Peru	"Lima SE Banks" (_LMBFIND) index from GFD (1927-1993), Datastream (1994-2016)	“Lima SE Industrials” (_LMINDD) price index from GFD (1938-1991), Datastream (1991-2016)		

Table B3: Data sources: Monthly variables (cont.)

	Monthly bank stock returns	Monthly nonfin stock returns	Monthly bank credit spreads	Monthly corp credit spreads
Philippines	"Philippines Banks" (PHBANKM) from GFD (1952-1981), "Philippines Finance" (PHFINM) from GFD (1981-1989), Datastream (1989-2016)	"Philippine SE Industrial Index" (_PSIND) price index from GFD (1953-1990), Datastream (1990-2016)	Philippines Interbank Overnight Rate (IMPHLD) from GFD (1982-2016), relative to Philippines 3-month Treasury Bill Yield (ITPHL3D) from GFD	
Portugal	Datastream (1990-2016)	Datastream (1990-2016)	Portugal Overnight Interbank Rate (IMPRTD, 1975-1983) and 3-month LISBOR (IBPRT3D, 1983-2001) from GFD, relative to Portugal 3-month Treasury Bill Yield (ITPRT3M, 1985-1988) and 6-month Treasury Bill Yield (ITPRT6D, 1989-2001) from GFD. EURIBOR (IBEUR3D) relative to German T-Bill (IBEUR3D minus ITDEU3D), from GFD (2002-2016)	
Russia	Russia AK&M Bank Index (RUAKMBD) from GFD (1993-1997), Datastream (1997-2016)	Russia AK&M Industrials Index (_AKMED) from GFD (1993-2013), Datastream (2013-2016)	Russia MIACR Overnight Interbank Rate (IMRUSD) from GFD (1992-2016), relative to Russia 3-month Treasury Bill Yield (ITRUS3D) from GFD	Russia Corporate Bonds Average Yield (INRUSXD) from GFD (2003-2016), relative to Russia 10-year Bond Yield (IGRUS10D) from GFD
Singapore	Datastream (1973-2016)	Datastream (1973-2016)	Singapore 3-month SIBOR (IBSGP3D) from GFD (1973-2016), relative to Singapore 3-month Treasury Yield (ITSGP3D) from GFD	
South Africa	"FTSE/JSE Africa Banks" (_JBANKD) index from GFD (1979-1985), Datastream (1986-2016)	"Johannesburg SE Industrials" (_JIAID) price index from GFD (1912-1973), Datastream (1973-2016)	South Africa 3-month JABIR (IBZAF3D) from GFD (1997-2016), relative to South Africa 3-month Treasury Bill Yield (ITZAF3D) from GFD	South Africa Eskom Corporate Bond Yield (INZAFD) from GFD (1953-2016), relative to South Africa 10-Year Bond Yield (IGZAF10D) from GFD
Spain	Individual bank stocks from various sources (1917-1934, 1974-1980). "Madrid SE Banking and Finance" (_IBAN_MD) from GFD (1940-1987), Datastream (1987-2016)	Individual nonfinancial stocks from various sources (1917-1934, 1974-1980). "Madrid SE Metals" (_IMET_MD) price index from GFD (1941-1987), Datastream (1987-2016)	Spain 3-month MIBOR (IBESP3D) from GFD (1973-2001), relative to Spain 3-month T-Bill Yield (ITESP3D) from GFD. EURIBOR (IBEUR3D) relative to German T-Bill (IBEUR3D minus ITDEU3D), from GFD (2002-2016)	
Sweden	"Stockholm SX Banks Price" (_SX4010D) index from GFD (1906-1982), Datastream (1982-2016)	"Stockholm SX Industrials Price Index" (_SX20PID) price index from GFD (1907-1982), Datastream (1982-2016)	Sweden 3-month Interbank Rate (IBSWE3D) from GFD (1980-2016), relative to Sweden 3-month Treasury Bill Yield (ITSWE3D) from GFD	
Switzerland	Individual bank stocks from various sources (1867-1873, 1907-1934). Datastream (1973-2016)	Individual nonfinancial stocks from various sources (1867-1873, 1907-1934). Datastream (1973-2016)	Switzerland 3-month Interbank Rate (IBCHE3D) from GFD (1973-2016), relative to Switzerland 3-month Treasury-Bill Yield (ITCHE3D) from GFD	Switzerland Industrial Bond Average Yield (INCHEID) and Switzerland 7-10 year AA Corporate Bond Yields (_ZDAA7YD) from GFD (1997-2016), relative to Switzerland 10-year Government Bond (IGCHE10D) from GFD
Taiwan	Datastream (1988-2016)	Datastream (1988-2016)		Taiwan 5-year Corporate Bond Yield (INTWN5M) from GFD (1985-2016), relative to Taiwan 10-year Government Bond Yield (IGTWN10D) from GFD
Thailand	Thailand SET Banks (_SETBD) index from GFD (1975-1986), Datastream (1987-2016)	Thailand SET Commerce Index (_SETCD) from GFD (1976-1993), Datastream (1993-2016)		

Table B3: Data sources: Monthly variables (cont.)

	Monthly bank stock returns	Monthly nonfin stock returns	Monthly bank credit spreads	Monthly corp credit spreads
Turkey	Datastream (1990-2016)	Datastream (1990-2016)	Turkey Overnight Interbank Rate (IMTURD) from GFD (1986-2016), relative to Turkey 1-month Time Deposits (ICTURTM, 1973-2008) and Turkey 1-year Government Bond Yield (IGTUR1D, 2008-2016) from GFD	
United Kingdom	same as yearly	same as yearly	United Kingdom Overnight Interest Rate (IMGBRD) from GFD (1937-1965), United Kingdom 3-month Interbank Rate (IBGBR3D) from GFD (1966-2016); all relative to Bank of England Rate (IDGBRD) from GFD (1870-1899) and 3-month Treasury Bill Yield ITGBR3D (1900-2016)	Great Britain Corporate Bond Yield (INGBRW) from GFD (1937-2016), relative to UK Long-term Government Yield (IGGBR10D) from GFD
United States	same as yearly	same as yearly	United States 3-month Interbank Rate (IBUSA3D) from GFD (1963-2016), relative to USA 3-month Tbill Yield (ITUSA3D)	Moody's AAA Corporate Yield (SPAAA15W) from GFD (1900-2016), relative to USA Long-term Government Yield (IGUSA10D)
Venezuela	"Caracas SE Financial Index" (_IBCFD) index from GFD (1946-1993), Datastream (1994-2016)	“Caracas SE Industrials Index” (_IBCID) price index from GFD (1948-1990), Datastream (1990-2016)	Venezuela Interbank Overnight Rate (IMVEND) from GFD (1998-2016), relative to Venezuela 3-month Treasury Bill Yields (ITVEN3D) from GFD	

Table B4: Data sources: Macroeconomic variables

	Bank Credit	Nominal GDP	Inflation	Unemploym.	Other macro variables (real consumption, investment to GDP, broad money supply, govt debt to GDP, mortgage loans, house prices)
Notes:	**IMF*** means newly transcribed data (not available online) from IMF's International Financial Statistics (print versions), 1937-1988. **GFD** refers to Global Financial Data. **League of Nations** refers to their Memorandum on Commercial Banks (eds. 1929, 1933, 1934, 1936, and 1941) covering the period 1918-1937. **BIS** means the BIS Long Credit Series. **JST** means the Jorda, Schularick, Taylor database. Data from the **World Bank** and **IMF** accessed online on their websites. **Maddison** refers to the Maddison Project Database 2018, with occasional data from Barro and Ursua (2010) and the World Bank, when Maddison data is missing; real GDP figures are converted to Nominal GDP using the inflation data from this data set.				
Argentina	Nakamura (1901-1935), IMF* (1936-1939), BIS (1940-2016)	Maddison (1884-1991), World Bank (1992-2016)	GFD (1870-2016)	GFD (1974-2016)	
Australia	JST (1870-2016)	JST (1870-2016)	JST (1870-2016)	GFD (1901-2016)	JST (1870-2016)
Austria	Rieder (1870-1878), League of Nations (1918-1937), BIS (1949-2016)	Maddison (1870-1937), GFD (1948-2016)	GFD (1870-2016)	GFD (1931-2016)	
Belgium	JST (1885-2016)	JST (1870-2016)	JST (1870-2016)	GFD (1921-2016)	JST (1870-2016)
Brazil	Triner (1906-1930), League of Nations (1931-1939), BIS (1993-2016)	Maddison (1870-1960), World Bank (1961-2016)	GFD (1870-2016)	GFD (1976-2016)	
Canada	JST (1870-2016)	JST (1870-2016)	JST (1870-2016)	GFD (1919-2016)	JST (1870-2016)
Chile	League of Nations (1920-1936), IMF* (1937-1984), BIS (1985-2016)	Maddison (1870-2016)	GFD (1870-2016)	GFD (1966-2016)	
Colombia	League of Nations (1924-1936), IMF* (1937-1959), World Bank (1960-2016)	Maddison (1924-1959), World Bank (1960-2016)	GFD (1870-2016)	GFD (1980-2016)	
Czech	League of Nations* (1919-1937), World Bank (1993-2016)	GFD (1919-1938), World Bank (1990-2016)	GFD (1921-2016)	GFD (1990-2016)	
Denmark	JST (1870-2016)	JST (1870-2016)	JST (1870-2016)	GFD (1910-2016)	JST (1870-2016)
Egypt	IMF* (1945-1959), World Bank (1965-2016)	Maddison (1887-1959), World Bank (1960-2016)	Implied from difference between real and nominal GDP		
Finland	JST (1870-2016)	JST (1870-2016)	JST (1870-2016)	GFD (1958-2016)	JST (1870-2016)
France	JST (1900-2016)	JST (1870-2016)	JST (1870-2016)	GFD (1895-2016)	JST (1870-2016)
Germany	JST (1883-2016)	JST (1870-2016)	JST (1870-2016)	GFD (1887-2016)	JST (1870-2016)
Greece	League of Nations (1918-1936), World Bank (1960-2016)	Maddison (1946-2016)	GFD (1924-2016)	GFD (1976-2016)	
Hong Kong	BIS (1978-2016)	World Bank (1960-2016)	GFD (1948-2016)	GFD (1980-2016)	
Hungary	League of Nations (1925-1936), World Bank (1991-2016)	GFD (1870-1913, 1921-1938), World Bank (1991-2016)	GFD (1870-2016)		
Iceland	IMF* (1951-1959), World Bank (1960-2016)	GFD (1901-1959), World Bank (1960-2016)	GFD (1902-2016)	GFD (1957-2016)	

Table B4: Data sources: Macroeconomic variables (cont.)

	Bank Credit	Nominal GDP	Inflation	Unemploym.	Other macro variables (real consumption, investment to GDP, broad money supply, govt debt to GDP, mortgage loans, house prices)
India	IMF* (1937-1950), BIS (1951-2016)	Maddison (1870-1959), World Bank (1960-2016)	GFD (1871-2016)	GFD (1994-2016)	
Indonesia	IMF* (1951-1987), World Bank (1988-2016)	GFD (1921-2016)	GFD (1926-2016)	GFD (1982-2016)	
Ireland	The Economist (1903-1922), League of Nations (1923-1936), IMF* (1937-1960), World Bank (1961-1994), BIS (1995-2016)	Maddison (1870-2016)	GFD (1870-2016)	GFD (1939-2016)	
Israel	IMF* (1945-1971), World Bank (1972-2016)	GFD (1950-1980), World Bank (1981-2016)	GFD (1923-2016)	GFD (1960-2016)	
Italy	JST (1870-2016)	JST (1870-2016)	JST (1870-2016)	GFD (1947-2016)	JST (1870-2016)
Japan	JST (1875-2016)	JST (1875-2016)	JST (1870-2016)	GFD (1930-2016)	JST (1870-2016)
Korea	IMF* (1953-1961), BIS (1962-2016)	Maddison (1953-2016)	GFD (1949-2016)	GFD (1960-2016)	
Luxembourg	IMF* (1950-1959), World Bank (1960-2016)	Maddison (1950-1959), World Bank (1960-2016)	GFD (1922-2016)	GFD (1983-2016)	
Malaysia	IMF* (1952-1959), World Bank (1960-1964), BIS (1965-2016)	Maddison (1955-2016)	GFD (1949-2016)	GFD (1982-2016)	
Mexico	League of Nations (1925-1936), IMF* (1937-1959), World Bank (1960-2016)	GFD (1895-1979), World Bank (1980-2016)	GFD (1887-2016)	GFD (1975-2016)	
Netherlands	JST (1900-2016)	JST (1870-2016)	JST (1870-2016)	GFD (1911-2016)	JST (1870-2016)
New Zealand	Statistics of the Dominion of New Zealand, 1918, vol. III (1870-1918), League of Nations (1918-1939), IMF* (1940-1959), BIS (1960-2016)	Maddison (1870-2016)	GFD (1915-2016)	GFD (1971-2016)	
Norway	JST (1870-2016)	JST (1870-2016)	JST (1870-2016)	GFD (1904-2016)	JST (1870-2016)
Peru	League of Nations (1925-1936), IMF* (1937-1959), World Bank (1960-2016)	GFD (1926-1959), World Bank (1960-2016)	GFD (1900-2016)	GFD (1969-2016)	
Philippines	IMF* (1948-1988), World Bank (1989-2016)	GFD (1946-1959), World Bank (1960-2016)	GFD (1899-2016)	GFD (1980-2016)	
Portugal	JST (1870-2016)	JST (1870-2016)	JST (1870-2016)	GFD (1953-2016)	JST (1870-2016)
Russia	World Bank (1993-2016)	Maddison (1870-1917), World Bank (1993-2016)	GFD (1870-1917, 1990-2016)		
Singapore	BIS (1963-2016)	Maddison (1950-1959), World Bank (1960-2016)	GFD (1949-2016)	GFD (1968-2016)	
South Africa	League of Nations (1918-1936), IMF* (1937-1964), BIS (1965-2016)	Madisson (1911-2016)	GFD (1896-2016)	GFD (1991-2016)	
Spain	JST (1900-2016)	JST (1870-2016)	JST (1870-2016)	GFD (1964-2016)	JST (1870-2016)
Sweden	JST (1871-2016)	JST (1870-2016)	JST (1870-2016)	GFD (1919-2016)	JST (1870-2016)
Switzerland	JST (1870-2016)	JST (1870-2016)	JST (1870-2016)	GFD (1926-2016)	JST (1870-2016)

Table B4: Data sources: Macroeconomic variables (cont.)

	Bank Credit	Nominal GDP	Inflation	Unemploym.	Other macro variables (real consumption, investment to GDP, broad money supply, govt debt to GDP, mortgage loans, house prices)
Taiwan	IMF* (1950-1973)	GFD (1950-2016)	GFD (1896-2016)	GFD (1964-2016)	
Thailand	IMF* (1946-1956), BIS (1957-2016)	GFD (1946-2016)	GFD (1949-2016)	GFD (1980-2016)	
Turkey	League of Nations (1929-1936), IMF* (1937-1950), IMF (1951-1959), World Bank (1960-2016)	Maddison (1950-1959), World Bank (1960-2016)	GFD (1870-2016)	GFD (1985-2016)	
United Kingdom	JST (1880-2016)	JST (1870-2016)	JST (1870-2016)	GFD (1855-2016)	JST (1870-2016)
United States	JST (1880-2016)	JST (1870-2016)	JST (1870-2016)	GFD (1890-2016)	JST (1870-2016)
Venezuela	IMF* (1937-1987), World Bank (1988-2016)	GFD (1901-2016)	GFD (1901-2016)		

Other references:

Nakamura, Leonard and Carlos Zarazaga (2001), "BANKING AND FINANCE IN ARGENTINA IN THE PERIOD 1900-35"
Rieder, Kilian (2016), "A Historic(al) Run on Repo"
Triner, Gail, "Banking and Economic Development: Brazil, 1889-1930"
Annaert, Buelens, Cuyvers, De Ceuster, Deloof, and De Schepper (2011)
Nyberg and Vaihekoski (2010)