

BANKING CRISES WITHOUT PANICS*

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We examine historical banking crises through the lens of bank equity declines, which cover a broad sample of episodes of banking distress with and without banking panics. To do this, we construct a new data set on bank equity returns and narrative information on banking panics for 46 countries over the period of 1870 to 2016. We find that even in the absence of panics, large bank equity declines are associated with substantial credit contractions and output gaps. Although panics are 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 use bank equity returns to uncover a number of forgotten historical banking crises and create a banking crisis chronology that distinguishes between bank equity losses and panics. *JEL* Codes: G01, G15, G21, N20.

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I. INTRODUCTION

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. 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. Consistent with this theory, [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 a reflection of the influence of this panic-based view of banking crises, some have gone as far as to define banking crises as essentially banking panics ([Schwartz 1987](#); [Gorton 2014](#)).

However, 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 banking 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., [Holmström and Tirole 1997](#); [Gertler and Kiyotaki 2010](#); [He and Krishnamurthy 2013](#); [Brunnermeier and Sannikov 2014](#); [Rampini and Viswanathan 2019](#)). 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. As a result, an important debate remains about whether banking panics are essential to banking crises or whether large bank losses even without panics can also translate into severe recessions.

In this article, we take advantage of a large historical sample of bank equity returns to systematically examine the role of bank losses and panics in banking crises. Our conceptual definition of a banking crisis is an episode in which the banking sector's ability to intermediate funds is severely impaired. Because equity holders are the first to suffer losses from a banking crisis that damages banks' intermediation capacity, we assume that conceptually, a large bank equity decline is necessary for a banking crisis. By

panics, we mean episodes of severe and sudden withdrawals of funding by bank creditors from a significant part of the banking system. We assume that panics are a subset of banking crises, because not all banking crises necessarily feature panics.

Large bank equity declines offer several advantages relative to the existing approaches to studying historical banking crises (e.g., [Reinhart and Rogoff 2009](#); [Laeven and Valencia 2013](#)). First, bank equity returns provide an objective, real-time, and quantitative measure to map out historical periods of bank distress and are therefore not subject to lookback biases inherent in retrospective narrative approaches to identifying banking crises ([Romer and Romer 2017](#)). Second, large declines in bank equity cover a broad sample of episodes of banking distress with and without panics, as episodes without panics may be otherwise hard to detect because of the “quiet” nature of some such episodes of bank distress. Third, as bank equity has the lowest payoff priority among bank stakeholders, bank equity returns are sensitive to bank losses regardless of whether a bank is close to or far away from insolvency. Bank equity declines can thus serve as a continuous measure capturing early signs of banking crises for real-time policy making, in contrast to the information insensitivity of credit market instruments prior to panics.¹ Fourth, the broad availability of bank equity returns across many countries going far back in time makes bank equity returns particularly appealing for studying historical crises.

We construct a new historical data set 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 indices for nonfinancial stocks over the same sample. Our data set 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. With this

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

data set of bank equity returns, we address the following research questions related to the aforementioned debate.

1. *Are large bank equity declines associated with adverse macroeconomic consequences?* We begin by examining 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.² 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 in the banking sector.³

2. *Are panics necessary for banking crises to have severe economic consequences?* Bank equity returns allow us to address this central question, as large equity declines capture a sample

2. 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; Mehran and Thakor 2011; Puri, Rocholl, and Steffen 2011; Chodorow-Reich 2014; Huber 2018).

3. Because the bank equity index contains measurement error, it may not fully capture the capitalization of the entire banking sector in a country for two reasons. First, the bank equity index primarily covers large commercial banks and thus may not capture distress at private banks, regional banks, or nonbank financial institutions not included in the index. Second, the number of publicly traded banking institutions included in the index can be sparse in some countries and time periods, as shown in [Online Appendix Table B1](#). Despite this measurement error, we show that the bank equity index still has strong predictive power for macroeconomic outcomes and is useful for identifying periods of banking distress.

of episodes of bank distress in which banks suffer large losses from the viewpoint of equity investors. Since large bank equity declines include episodes of banking sector distress with and without banking panics, they allow us to separately examine the macroeconomic consequences of each type of episode. 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.

To capture episodes of bank distress, we define a “bank equity crash” as an annual bank equity decline of over 30%. We separate these bank equity crashes into panic versus nonpanic 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 insolvent banks or illiquid but fundamentally solvent banks. Our analysis finds that although bank equity crashes with panics tend to be followed by greater credit contractions and lower output growth, bank equity crashes without panics 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 3.5% and real GDP declines by 2.7%. This finding suggests that in a large historical sample, panics are not necessary for banking sector distress to result in severe economic consequences.

Although some nonpanic bank equity crashes might be solely driven by equity market noise, we show that many are 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 nonpanic banking distress, including Canada during the Great Depression, Spain in 1977–1982, the United States in 1990–1992, Japan in 1990–1996 and 2001–2003, and several Eurozone countries in the years following the Eurozone crisis—examples that 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 in the banking system but also bank capital crunches even in the absence of panics.

3. *If panics occur, do they tend to precipitate the crisis or occur after large declines in bank equity?*: Bank equity returns 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. If panics are driven by self-fulfilling shocks unrelated to bank fundamentals, panics would not be preceded by bank equity declines. On the other hand, evidence of bank equity declines preceding subsequent panics suggests panics are related to prior bank losses rather than nonfundamental runs causing bank losses.

Using monthly data covering over 100 banking 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 seven months after the bank equity index has already declined by 30%, suggesting that substantial bank losses are already present at the early stages of these crisis episodes, as opposed to these losses being due to the subsequent panics. Furthermore, while credit spreads are relatively insensitive to these early losses, bank equity, which has the lowest payoff priority among bank stakeholders, is more sensitive to bank losses at the early stages of the crisis, highlighting 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 panics; and panics with large bank equity declines tend to have the most severe credit contractions and output gaps.⁴ These findings highlight panics as an amplification

4. Our study thus complements the literature that links banking crises to prior credit booms, which tend to go bust due to bad lending, leaving banks vulnerable to future losses that lead to bank capital crunches or even panics. Specifically, the literature shows that 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; López-Salido, Stein, and Zakrajšek 2017; Mian, Sufi, and Verner 2017; Krishnamurthy and Muir 2018). These findings highlight that elevated sentiment or overoptimism likely plays a central role in credit booms. Following a period of positive shocks, lenders may overextrapolate 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).

mechanism, but 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, to prevent subsequent panics from erupting and to minimize adverse macroeconomic consequences.

Finally, as a by-product of our analysis, we provide a refined 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, for example, Bordo et al. (2001), Caprio and Klingebiel (2002), Demirgüç-Kunt and Detragiache (2005), Reinhart and Rogoff (2009), Schularick and Taylor (2012), and Laeven and Valencia (2013), tend to be subjective in selecting banking crisis episodes (Romer and Romer 2017) and often 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. Because 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 measures: bank equity losses, bank failures, and panics. Importantly, our approach also removes spurious episodes from the previous narrative-based banking crisis chronologies and helps 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 article is organized as follows. Section II describes our new historical data set. Section III presents the results on the informativeness of bank equity returns for macroeconomic outcomes. Section IV explores the macroeconomic implications of panics and nonpanic bank distress episodes. Section V compares the timing of bank equity declines, panics, and other indicators around banking crises, and Section VI presents our new crisis chronology.

II. DATA

This section describes how we gather and construct the historical database used in our analysis. We discuss the following types of variables: bank and nonfinancial equity real total returns, bank and nonfinancial credit spreads, macroeconomic variables, and narrative-based banking crisis chronologies. All

variables are annual (except those noted as monthly variables) and form an unbalanced country panel across 46 countries over the period of 1870–2016.⁵ The [Online Appendix](#) contains further details on data sources and data construction beyond what is presented here, and [Online Appendix](#) Tables B2 through B4 provide a comprehensive summary by country of all data sources used to construct the main variables.

II.A. Annual Bank and Nonfinancial Stock Returns

We construct a new historical data set 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 for much of our sample. This abundance of data is due to the fact that in the nineteenth and early twentieth centuries, bank stocks were highly prominent, featured in newspapers, and traded as much as railroad stocks.⁶ This contrasts with corporate bond and interbank lending spreads, as bond markets in many countries have only been developed in recent decades.⁷

5. 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), Colombia during 1899–1902, France and Germany in 1870, Greece during 1946–1949, Japan during 1894–1895, Korea during 1950–1953, Mexico during 1910–1920, South Africa during 1899–1902, and Spain during 1936–1938.

6. In the period of 1870–1939, most of the major commercial banks in the countries in our sample were publicly traded joint stock banks—with the United States being the main exception, where banks were not widely traded until the mid-1920s. Private banks in 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 most large commercial banks in each country from historical newspapers during this period.

7. In the postwar period, corporate bond markets mainly existed in the United States and the United Kingdom, while in most non-Anglophone advanced economies, corporate bond markets were very limited or nonexistent until deregulation in the 1980s (as corporate credit was channeled mainly through the banking system). For example, there was only a single corporate bond trading in Denmark and Japan before the 1980s (that of *Det Store Nordiske Telegrafskab* 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, studies using credit spreads, such as [Krishnamurthy and Muir \(2018\)](#), analyze a more limited sample because they do

For each country in the sample, we construct annual (as of December 31 of each year) price return and dividend return indices 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 price and dividend indices in a given country may not necessarily correspond to the same underlying banks due to data availability, but they are either market-capitalization-weighted or price-weighted indices of the broad domestic banking and nonfinancial sectors in each country.⁸ Each series is pieced together from a variety of sources (documentation and source tables can be found in the [Online Appendix](#)).⁹ We start by collecting premade bank equity indices from Global Financial Data (mainly price indices), Datastream (price and dividend indices), and [Baron and Xiong \(2017\)](#) (newly constructed bank dividend indices).

In addition to using premade indices, we construct bank equity price and dividend indices from individual bank and nonfinancial companies' stock prices and dividends. Our main source of new data on individual stocks is 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 31.¹⁰

not 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.

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

9. 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.

10. [Online Appendix](#) Figure A1 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 [Online Appendix](#) 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); *Diário 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*,

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. We hand-collect additional dividend data for individual bank and nonfinancial stocks from *Moody's Bank & Finance 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 consumer price index (CPI) for each country to get bank equity real total returns. [Online Appendix 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 United Kingdom, and the United States and even for economies that are currently 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, [Online Appendix Table B1](#) reports, for each country and decade, the number of underlying banks used to construct the bank equity return index, or, when premade indices are available, the source of the premade index. The exact range of included banks varies across countries and historical periods because of historical data limitations. However, as can be seen from [Online Appendix Table B1](#) and the associated lists of individual constituent banks (linked to in the [Online Appendix](#)), the bank equity index generally contains a broad representation of the largest

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 and [Annaert, Buelens, and De Ceuster 2012](#)); 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 [Waldenström \(2014\)](#).

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 more) and 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 may fail to capture distress of private banks.

II.B. Monthly Stock Returns and Credit Spreads for Banks and Nonfinancials

To analyze the dynamics of how crises unfold, we focus on a newly constructed set of clearly identified banking crisis episodes, referred to as the BVX Crisis List and described in detail in [Section VI](#). We construct monthly series in a three-year window around each crisis episode for the following four variables: bank equity index returns, nonfinancial equity index returns, bank credit spreads, and nonfinancial corporate credit spreads. Because of historical data availability limitations, the monthly data are a smaller subset of the larger annual data set on bank equity returns and cover 132 episodes.

The complete list of sources for monthly equity returns and credit spreads for each country is recorded in [Online Appendix Table B3](#). For monthly bank and nonfinancial equity data for the period of 1980–2016, we mainly use country-level indices from Datastream, which cover nearly all 46 countries. For the period of 1870–1979, due to the difficulty of hand-collecting monthly data from historical records, the monthly equity data are limited to 15 countries (Argentina, Australia, Belgium, Denmark, France, Germany, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom, and the United States) and three-year windows around banking crises. In this period, monthly bank and nonfinancial stock prices are transcribed from the historical newspapers listed above or obtained from other historical sources, such as *Investor's Monthly Manual* and Global Financial Data (see [Online Appendix Table B3](#) for details). Credit spreads mainly come from Global Financial Data or from newly transcribed historical statistics (again, see [Online Appendix Table B3](#)). Bank credit spreads are typically calculated from overnight interbank lending rates, and corporate credit

spreads 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 ten-year maturity) to get the corporate credit spread.

II.C. 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 Organisation for Economic Co-operation and Development, International Monetary Fund (IMF), and World Bank data sets. The same CPI used to deflate returns is used to obtain real GDP. Data on bank credit-to-GDP come mainly from the Jordà-Schularick-Taylor database (which goes back to 1870 but only for 17 countries) and from the BIS long credit series for other countries. We supplement these existing data sets 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 [Online Appendix Table B4](#).

II.D. 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 \(2002\)](#), [Demirgüç-Kunt and Detragiache \(2005\)](#), [Laeven and Valencia \(2013\)](#), [Reinhart and Rogoff \(2009, online update 2014\)](#), and [Schularick and Taylor \(2012, online update 2017\)](#). [Online Appendix 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.

[Online Appendix Table A2](#) reports a new database documenting episodes of panics and widespread bank failures. This database also collects the starting month of each panic, as indicated by narrative sources. Links to our extensive historical

documentation on episodes of panics and widespread bank failures can be found in [Online Appendix I.B.](#)

II.E. 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. [Section VI](#) discusses how we construct the new chronology.

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 banking panics accompany these declines. By showing that large bank equity declines tend to precede severe economic outcomes, this analysis establishes that bank equity declines are not simply equity market noise and instead carry important information. It highlights the relevance of bank capital crunches in a long and broad macroeconomic sample and justifies the use of large bank equity declines to analyze banking crises.

III.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 262 country-years with a 30% bank equity crash and 212 when we restrict the sample to observations with nonmissing GDP growth, credit-to-GDP, and nonfinancial equity returns.¹¹

[Figure I](#) presents an event study around these bank equity crashes. We compute the average cumulative change in log real

11. We define a “bank equity crash” as a 30% decline in a single year based on annual data and use this indicator in all specifications in [Sections III](#) and [IV](#). However, for the construction of the BVX Crisis List in [Section VI](#) and for identifying panics and widespread bank failures in [Online Appendix Table A2](#), we expand the sample of episodes to include all 30% cumulative declines in bank equity (a set which, by definition, encompasses all 30% annual declines).

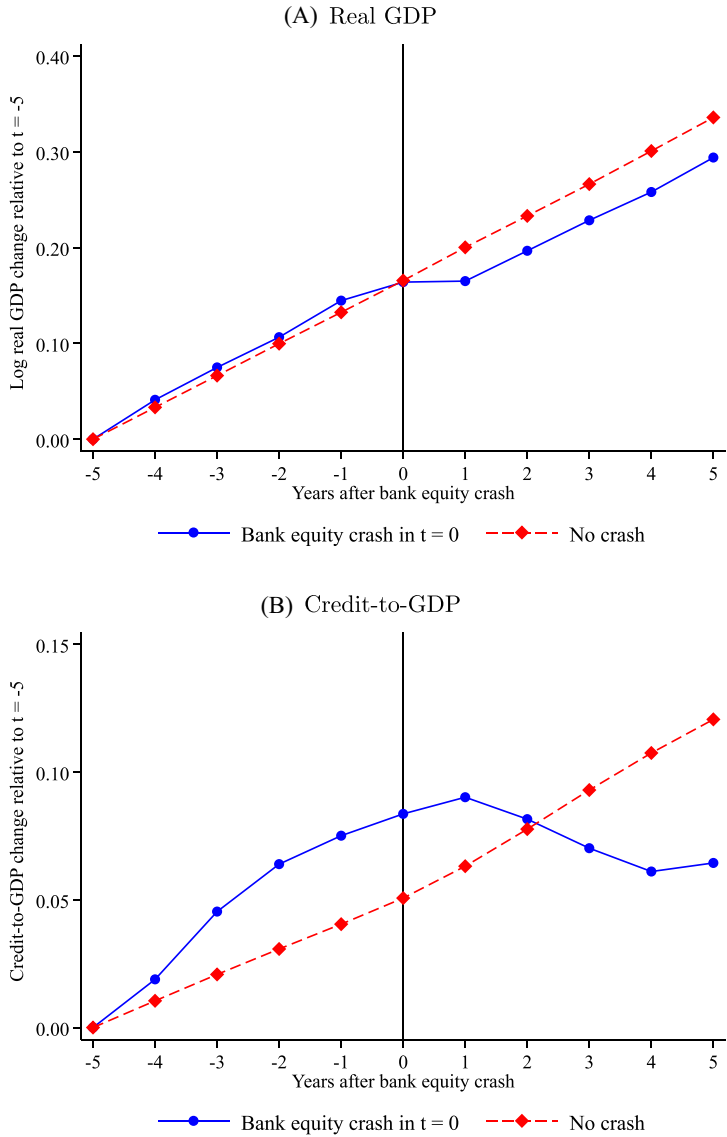


FIGURE I

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 by the dashed line.

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. Figure I, Panel A 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 8.4 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.

III.B. Bank Equity Declines and Future GDP Growth

We 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 $h = 1, \dots, 6$:

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

where $\Delta_h y_{i,t+h}$ 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 vector autoregression 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 (i.e., $t - 1$ 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. Standard errors are double-clustered on country and year, which corrects 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.¹²

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, because 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.¹³ Bank equity is probably also informative for reasons other than a banking

12. In our sample, we find that double-clustered standard errors are generally similar or slightly more conservative than Driscoll and Kraay (1998) standard errors.

13. A more nuanced question is why bank equity declines contain information 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 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

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 II](#), 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 \(1\)](#) 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 persistent, translating into a permanent loss in output after six years of about 3%. More moderate but still substantial shocks of –30% to –45% are followed by 2.5% lower output after three 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, Boyarchenko, and Giannone \(2019\)](#) find evidence of asymmetry in the response of GDP growth to financial conditions in U.S. data.

The right plot in [Figure II](#), Panel A shows the GDP response to nonfinancial equity shocks. Unsurprisingly, larger declines in nonfinancial equity predict lower subsequent output. In contrast to 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.

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.

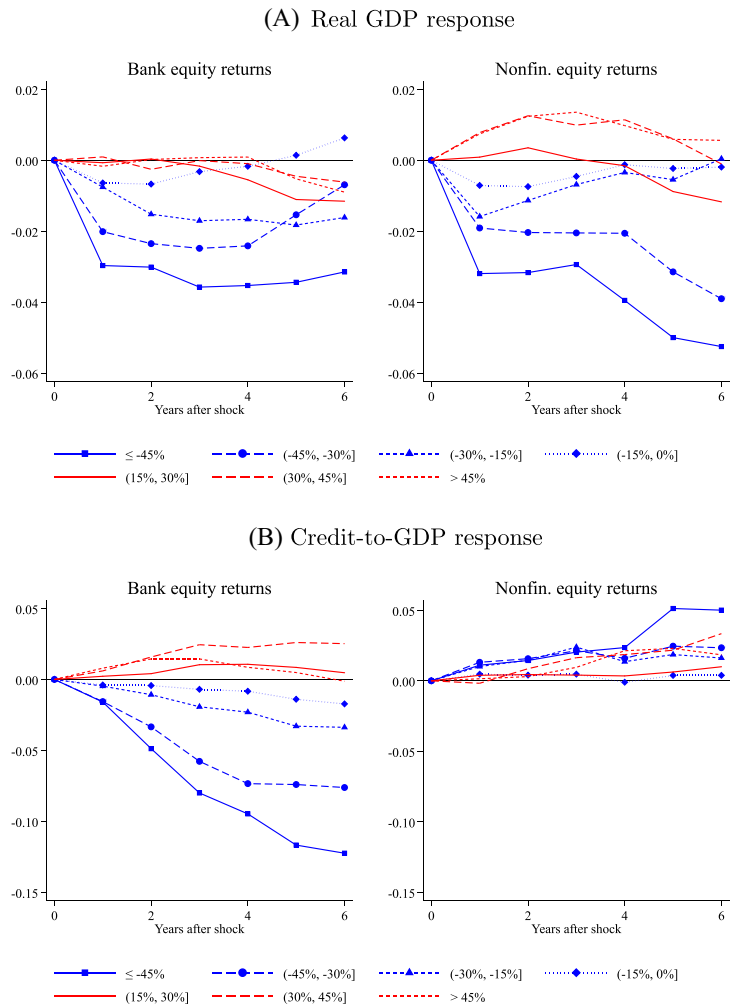


FIGURE II

Bank Equity Crashes Predict Output Gaps and Credit Contractions

This figure plots the predictive content of bank equity and nonfinancial equity returns for 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%).

Table I presents the tabular version of Figure II at the one- and three-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% :¹⁴

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

We report results with and without including our dynamic controls, as well as with and without including year fixed effects, γ_t^h . In Table I, 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 (column (2)) and 3.4% after three years (column (5)). These estimated coefficients are statistically significant and largely similar to the estimates without controls (columns (1) and (4)). A crash of 30% in nonfinancial equity also predicts significant and persistently lower real output, and the magnitude is similar to the effect of a bank equity crash.

III.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 II, 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 six 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 sizable credit contractions, amounting to a credit-to-GDP decline of 8 percentage points after six years. Table I, Panel B presents the tabular version of Figure II, 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 II, 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 a sharp credit contraction,

14. Table A3 presents the table version of Figure II with all eight return bins for the three-year forecast horizon.

TABLE I
BANK EQUITY CRASHES PREDICT OUTPUT GAPS AND CREDIT CONTRACTION

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*** [-6.73]	-0.026*** [-6.38]	-0.019*** [-4.98]	-0.045*** [-5.92]	-0.034*** [-5.50]	-0.029*** [-5.84]
Nonfinancial equity crash	-0.023*** [-3.80]	-0.022*** [-4.33]	-0.010** [-2.32]	-0.031*** [-2.79]	-0.029*** [-3.07]	-0.023** [-2.44]
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls		✓	✓		✓	✓
Year fixed effects			✓			✓
Adj. R ² (within)	0.11	0.19	0.09	0.05	0.11	0.07
N	2,548	2,548	2,548	2,548	2,548	2,548

TABLE I
CONTINUED

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*** [-2.71]	-0.010* [-1.72]	-0.011* [-1.87]	-0.077*** [-4.75]	-0.057*** [-4.27]	-0.051*** [-3.72]
Nonfinancial equity crash	0.010** [2.26]	0.0071 [1.56]	0.0031 [0.69]	0.0077 [0.73]	0.0035 [0.25]	-0.0038 [-0.29]
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls		✓	✓		✓	✓
Year fixed effects			✓			✓
Adj. R ² (within)	0.01	0.22	0.21	0.03	0.14	0.13
N	2,535	2,535	2,535	2,535	2,535	2,535

Notes. 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 a 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 standard errors double-clustered on country and year. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

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 up against their capital constraint and therefore to contract the asset side of their balance sheet.

The right plot in [Figure II](#), 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 effect on the subsequent credit-to-GDP ratio. This sharp contrast provides a 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.

III.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. [Online Appendix](#) Figure A4 shows that the results in [Figure II](#) are quantitatively similar when including year fixed effects to control for global shocks. [Online Appendix](#) Figure A5 explores an alternative timing in which bank equity returns affect real GDP and credit-to-GDP in the same year. Because 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. [Online Appendix](#) Figure A6, Panel A shows that a simpler specification with just a single indicator variable for 30% bank equity crashes (as in [Table I](#)) 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 bank equity and nonfinancial equity predict subsequent output growth. The right plot shows that only bank equity

returns predict future credit-to-GDP. [Online Appendix](#) 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.

[Online Appendix](#) Figure A7 and Table A5 estimate the responses to 30% bank and nonfinancial equity crashes for various subsamples. [Online Appendix](#) 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 estimates similar to the full sample. Panel B focuses on the pre-war sample and finds weaker relationships between bank equity crashes and 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](#). [Online Appendix](#) Figure A8 presents estimates for the United States only and finds qualitatively similar results, even when excluding the Great Depression and Great Recession years.¹⁵

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, [Online Appendix](#) 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 [Online Appendix](#) Section II.A. Specifically, bank equity declines best coincide with Narrative Crises identified in terms of the signal-to-noise ratio (i.e., a higher “true positive” rate for a given “false positive” rate) relative to all the other indicators. In particular, 57% of Narrative Crises involve a bank

15. The episodes of 30% annual bank equity crashes for the United States capture the most serious episodes of banking distress in 1907, 1930, 1931, 1937, 1974, 1990, 2007, and 2008.

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 information content of bank equity returns, we focus on the predictive content of bank equity declines conditional on Narrative Crisis episodes. [Online Appendix 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. General declines in equity markets do not drive these findings, as these findings also hold (albeit not as strongly) when using bank returns in excess of nonfinancial equity returns, as reported in [Online Appendix Table A7](#). See the full discussion in [Online Appendix 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 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. The central role attributed to panics in banking crises has a long-standing theoretical underpinning. In the classic model of [Diamond and Dybvig \(1983\)](#), a panic occurs in the form of self-fulfilling multiple equilibria and leads depositors to withdraw demand deposits, a type of short-term debt, from a fundamentally solvent but illiquid bank.¹⁶ The

16. Although financial systems include nonbank financial institutions and nondeposit funding, short-term debt remains the most important form of financing, because of its important advantages in disciplining borrowers in the presence of moral hazard, for example, [Calomiris and Kahn \(1991\)](#), and in

coordination problem among short-term debt holders may also exacerbate negative fundamental shocks to banks and nonbank financial institutions (e.g., Goldstein and Pauzner 2005; He and Xiong 2012). On the other hand, theories of the bank-lending channel, for example, Holmström and Tirole (1997), highlight that 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 use bank equity declines to compare the macroeconomic consequences of banking distress with and without panics.

From a conceptual standpoint, bank equity crashes are likely to be necessary, but not sufficient, for banking panics to occur. Panics lead to bank failures and therefore to large losses for equity holders. However, not all bank equity crashes necessarily involve panics.¹⁷ 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 “nonpanic.” In practice, however, there are also episodes with narrative evidence of panics but without bank equity crashes due to measurement error in the bank equity return index (see our discussion of this issue further below), so we also examine episodes on the list of Narrative Crises and code whether they involved a banking panic. Online Appendix Table A2 provides a summary of our classification. We research each individual episode, drawing on standard narrative accounts of crises and new narrative sources (e.g., newspaper articles, research papers, IMF and governmental reports, and firsthand accounts). Links to our systematic historical documentation for each episode regarding the presence or absence of panics can be found in Online Appendix Section I.B.

Following Calomiris and Gorton (1991) and Gorton and Huang (2003), we define a “panic” as an episode containing any of the following criteria appearing in narrative accounts: (i) severe and sudden depositor or creditor withdrawals at more than one of a country’s largest banks or more than 10 smaller banks,

alleviating adverse-selection problems in secondary markets, for example, Gorton and Pennacchi (1990) and Dang, Gorton and Holmström (2019).

17. Historically, this is often due to a combination of implicit creditor guarantees, regulatory forbearance, and opacity regarding the extent of banking problems, lack of maturity mismatch (for example, long-term credit banks or European mortgage banks are often financed mainly through long-term debentures), and forceful government interventions, such as liquidity backstops and nationalizations/forced mergers of distressed banks before the occurrence of panics.

that lead these banks to be on the verge of collapse; (ii) severe and sudden strains in interbank lending markets; or (iii) severe and sudden foreign-currency capital outflows from the banking sector.¹⁸ In short, we define a panic as an episode when banks experienced sudden salient funding pressures.¹⁹ Our goal is to err on the side of being overly inclusive in calling episodes a panic and including all potential types of panics. By being overly inclusive, we ensure that the nonpanic distress episodes that we are most interested in do not include any of these characteristics.

IV.A. *Bank Equity Declines with and without Panics*

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, $Panic_{i,t}$.²⁰ The

18. Our empirical mapping of panics is based on the definition of [Gorton and Huang \(2003\)](#), who, following [Calomiris and Gorton \(1991, 113\)](#), 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.” Our broad definition of a panic is motivated by the fact that traditional depositor runs are rare in modern banking crises and we want our definition of banking panics to be sufficiently broad enough to also capture modern banking panics. 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.

19. 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 driven by fundamental uncertainty.

20. Specifically, the indicator $Panic_{i,t}$ takes the value of 1 in the year of a bank equity crash if there is an associated panic according to [Online Appendix Table A2](#). Note that in [Online Appendix Table A2](#), the year of the bank equity crash (column (2)) may not be same as the year of the panic (column (6)), but the events are linked based on narrative sources documented in [Online Appendix Section I.B](#). For example, Finland’s bank equity crash in 1990 is coded as a “panic

specification we estimate is:

$$(3) \quad \Delta_h y_{i,t+h} = \alpha_i^h + \beta_1^h 1[r_{i,t}^B \leq -30\%] + \beta_2^h \text{Panic}_{i,t} \\ + \beta_3^h 1[r_{i,t}^B \leq -30\%] \times \text{Panic}_{i,t} + \Gamma^h X_{i,t} + \varepsilon_{i,t}^h.$$

As in [equation \(2\)](#), [equation \(3\)](#) 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, a 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 nonpanic distress are also associated with subsequent downturns. Furthermore, because 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 nonpanic bank equity crashes.

Impulse responses of real GDP and bank credit-to-GDP are plotted in [Figure III](#). The responses represent the effect of (i) nonpanic bank equity crash episodes β_1^h (109 observations in the estimation); (ii) panic episodes without a bank equity crash β_2^h (34 observations); and (iii) panic episodes with bank equity crashes, $\beta_1^h + \beta_2^h + \beta_3^h$ (67 observations). [Figure III](#), Panel A shows that both panic and nonpanic bank equity crashes predict lower subsequent output and credit contraction, although the magnitudes are stronger for panic episodes. The corresponding coefficient estimates at the $t+3$ horizon are reported in [Table II](#), Panel A. Nonpanic bank equity crashes predict 2.7% lower output (column (2)) and 3.5% lower credit-to-GDP (column (5)) after three years,

bank equity crash” based on the panic recorded in 1991. In addition, consecutive bank equity crashes associated with panics are also coded as panic years. In the example of Finland’s crisis, 1991 and 1992 are also recorded as a “panic bank equity crash,” because bank equity also declined by over 30% in each of those years. On the other hand, Germany’s bank equity crash in 2011 is not considered a panic based on the “panic bank equity crash” in 2008 because those crashes were not successive, reflecting that these were two separate episodes. In all other times not near a crash, $\text{Panic}_{i,t}$ takes the value of 1 just in the year of the panic. The results are similar if $\text{Panic}_{i,t}$ is coded to take a value of 1 just in the year of the panic.

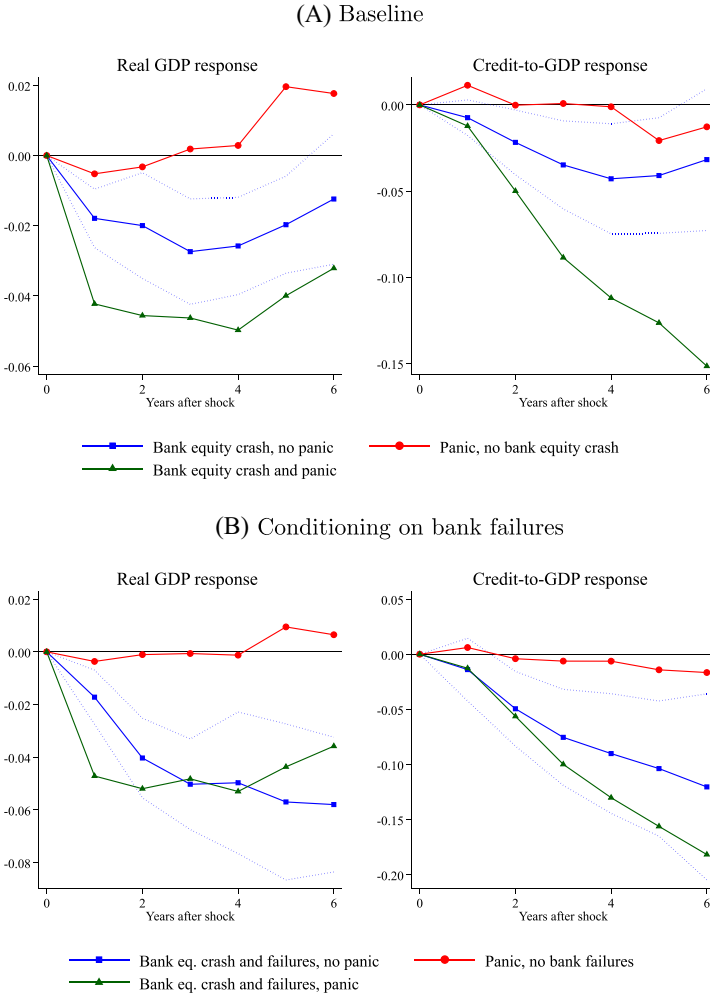


FIGURE III

Banking Distress with and without Banking Panics

This figure presents the response of real GDP and credit-to-GDP to bank equity crashes that coincide with panics, bank equity crashes without panics, and panics without bank equity crashes. The impulse responses are estimated from equation (3). Panel A presents the results from the baseline specification. Panel B analyzes episodes with a 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 dotted lines represent 95% confidence intervals based on standard errors double-clustered on country and year.

TABLE II
IMPACT OF BANKING DISTRESS WITH AND WITHOUT PANICS

Panel A: Baseline	Real GDP growth _{<i>t,t+3</i>}			Credit-GDP change _{<i>t,t+3</i>}		
	(1)	(2)	(3)	(4)	(5)	(6)
Bank equity crash	-0.030*** [-3.05]	-0.027*** [-3.57]	-0.023*** [-2.88]	-0.051*** [-3.36]	-0.035*** [-2.67]	-0.032*** [-2.71]
Panic	-0.017 [-1.05]	0.0018 [0.13]	0.017 [1.68]	-0.018 [-0.96]	0.00080 [0.041]	0.0014 [0.069]
Bank equity crash × Panic	-0.025 [-1.44]	-0.021 [-1.41]	-0.034** [-2.64]	-0.053* [-1.74]	-0.055* [-1.69]	-0.051 [-1.62]
Nonfinancial equity crash	-0.030** [-2.60]	-0.028*** [-2.85]	-0.024** [-2.36]	0.0098 [0.86]	0.0036 [0.27]	-0.0045 [-0.33]
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls		✓	✓		✓	✓
Year fixed effects			✓			✓
Adj. <i>R</i> ² (within)	0.05	0.11	0.07	0.03	0.15	0.13
<i>N</i>	2,548	2,548	2,548	2,536	2,536	2,536

TABLE II
CONTINUED

	Real GDP growth _{<i>t,t+3</i>}			Credit-GDP change _{<i>t,t+3</i>}		
	(1)	(2)	(3)	(4)	(5)	(6)
Bank eq. crash and failures	-0.062*** [-5.54]	-0.050*** [-5.73]	-0.039*** [-5.41]	-0.099*** [-4.72]	-0.075*** [-3.39]	-0.074*** [-3.85]
Panic	-0.021 [-1.39]	-0.00065 [-0.045]	0.0064 [0.51]	-0.013 [-0.79]	-0.0062 [-0.38]	-0.0032 [-0.19]
Bank eq. crash and failures × Panic	0.0091 [0.47]	0.0027 [0.16]	-0.0020 [-0.12]	-0.017 [-0.48]	-0.018 [-0.50]	-0.017 [-0.46]
Nonfinancial equity crash	-0.037*** [-3.45]	-0.036*** [-3.66]	-0.029** [-2.67]	-0.0089 [-0.75]	-0.0047 [-0.42]	-0.0078 [-0.61]
Country fixed effects	✓	✓	✓	✓	✓	✓
Controls		✓	✓		✓	✓
Year fixed effects			✓			✓
Adj. <i>R</i> ² (within)	0.06	0.11	0.07	0.03	0.16	0.15
<i>N</i>	2,548	2,548	2,548	2,536	2,536	2,536

Notes. 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 standard errors double-clustered on country and year. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

and the estimates are statistically significant at the 1% level. Episodes of panic bank equity crashes are associated with 4.6% lower output (column (2), sum of rows 1–3) and 8.9% lower credit-to-GDP (column (5), sum of rows 1–3) after three years.²¹ Though it is not surprising that panic episodes are worse, these estimates suggest that even nonpanic 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 banking 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 probably a sufficient condition for impairment of the banking system’s ability to intermediate credit. Widespread bank failure is defined as the failure of a top five (by assets) bank or of more than five banks above the normal rate of bank failures, associated with each bank distress episode in either the same year or following years, as documented in [Online Appendix](#) Section I.B. Widespread bank failures may still occur in the absence of panics because of orderly bank resolutions, for example, government-directed purchase and assumptions, nationalizations, restructurings, or judicial bankruptcies, all of which we consider bank failures. We again interact bank equity crash episodes conditional on widespread bank failures with the panic indicator and reestimate [equation \(3\)](#). [Figure III](#), Panel B presents the results, which are also reported in [Table II](#), Panel B. Once we condition on episodes of bank failures, bank equity crash episodes without panics are now as severe as episodes with panics. For example, three years

21. For robustness, [Online Appendix](#) Figure A9 plots the full nonlinear specification for bank equity returns (as in [Figure II](#)) but excluding all panic episodes. [Online Appendix](#) Figure A10 estimates the effect of episodes on the BVX Crisis List, a clear-cut list of banking crises constructed in [Section VI](#), distinguishing between panic and nonpanic episodes. The results in [Online Appendix](#) Figures A9 and A10 reinforce the finding that bank equity distress outside of panic episodes is also associated with adverse macroeconomic performance.

after the start of a nonpanic bank equity crash, real GDP is 5.0% lower (column (2)), compared with 4.8% for panic episodes (column (2), sum of rows 1–3). Over the same horizon, nonpanic bank equity crashes predict a 7.5 percentage point decline in bank credit-to-GDP (column (5)), compared to 10.0 percentage points (column (5), sum of rows 1–3) for panic episodes.²²

Figure III 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.²³ One may wonder how we can observe panics without bank equity crashes, given that we have argued that bank equity crashes are conceptually necessary for panics. In practice, measurement error can lead to observations of narrative accounts of bank panics that are not associated with bank equity crashes for at least two reasons. First, because our bank equity index primarily covers large commercial banks, it may not reflect runs on private banks, regional banks, or nonbank financial institutions. Second, panics without bank equity crashes can also be episodes of short-lived panics, in which long-run bank solvency is not severely affected and bank equity thus recovers by the end of the year. As a result, one should not view these panics without bank equity crashes as nonfundamental panics but as episodes where the solvency concerns are not fully picked up by

22. One possibility, raised by the model of [Gertler and Kiyotaki \(2015\)](#), is that low output in nonpanic 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 of a panic occurring. In practice, it is difficult to ascertain whether bank creditors assign a positive probability of a panic in our nonpanic bank equity crash episodes. Nevertheless, our results show that banking distress can be associated with adverse macroeconomic outcomes without the occurrence of a panic.

23. [Online Appendix Figure A11](#) addresses the concern that our conservative classification of panics introduces noise that biases down the estimate on the effect of panics without bank equity crashes. [Online Appendix Figure A11](#) performs a similar analysis to [Figure III](#) 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.

the index due to measurement error and other reasons. In fact, as [Online Appendix Table A16](#) documents, nearly all the panics without bank equity crashes are associated with narrative evidence of bank solvency concerns, and there is almost no evidence of nonfundamentally driven runs over our 1870–2016 sample.²⁴ Nevertheless, the macroeconomic consequences of these events are mild, due to the less severe bank solvency concerns for the large commercial banks captured by the bank equity index.²⁵

IV.B. Examples of Nonpanic Bank Distress Episodes

Nonpanic bank distress episodes have been quite common historically. From [Online Appendix Table A2](#), we find that among Narrative Crises, 32.8% of these banking crises do not feature panics. [Online Appendix Figure A12](#) plots the frequency of banking crisis episodes (using the BVX Crisis List introduced in [Section VI](#)) that are not associated with panics for each decade in our sample since the 1870s. In the nineteenth century, virtually all banking crises featured banking panics. By the interwar period, some crises did not involve banking panics, although most crises were associated with panics. In the postwar 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

24. To see this, [Online Appendix Table A16](#) counts 47 such banking panic episodes without bank equity crashes. However, of these 47 episodes, 29 (62%) are due to likely bank equity measurement errors (either the banking panics were centered around small or regional banks and thus not captured by the bank equity index, or the index contains a very small number of banks for a given episode); 14 (30%) are “near misses,” defined as episodes where the bank equity decline is between 20% and 30%; and 2 (4%) are triggered by the onset of wars. In addition to these 47 episodes, another 36 banking panic episodes do not have bank equity data, which also presents a measurement problem. Only the remaining two (4%) episodes can potentially be considered nonfundamental panics (Japan in 1927 and Hong Kong in 1991, both of which were triggered by false rumors leading to widespread runs).

25. Our finding on the negligible macroeconomic impact of panics without bank equity crashes is consistent with [Calomiris \(2000\)](#), who writes that most pre–Great Depression panics in the United States were driven by small fundamental shocks compared with those in modern crises, due to the absence of a proper lender of last resort, which created a lower threshold for bank losses to lead to panics. [Calomiris \(2000\)](#) argues that the macroeconomic consequences of these panics were generally mild, consistent with the smaller fundamental shocks, despite the “temporary confusion” of depositors.

of last resort facilities, deposit insurance, and expanded fiscal capacity for regulatory forbearance. The twentieth century also witnessed a gradual increase in banking sector leverage (Jordà et al. 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 nonpanic bank distress is the initial stage 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 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 “nonpanic bank distress.”) This situation lasted until fall 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 (1997–1998). 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 United States in 1990–1992. For example, a number of studies argue that bank losses contributed to the severity of the 1990–1991 recession in the United States, despite the absence of panics, especially in the Northeast region (Syron 1991; Bernanke and Lown 1991; Peek and Rosengren 1992; Mian, Sufi and Verner 2019).²⁶

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

26. For example, writing about the U.S. 1990–1991 recession, Syron (1991, 4) argues, “In substantial measure, this period of tight credit is the result of a loss of bank capital, rather than a loss of deposits.” Although it is not included on our list of nonpanic bank equity crash episodes because the bank equity decline is less than 30% in magnitude, the 1920–1921 period in the United States, in which strong monetary contraction and the collapse of commodity prices and rural land prices induced waves of bank failures and a large aggregate credit contraction, is an important example, too.

- 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.²⁷
- 1973–1975: Many countries experienced bank distress during the global downturn of 1973–1975, including Australia, Finland, France, Greece, Hong Kong, Ireland, Italy, Singapore, Switzerland, Turkey, and the United States, all of which saw large drops in bank equity in absolute terms and relative to nonfinancial equity.²⁸ The recessions in these countries were relatively deep and prolonged compared to previous postwar recessions.

27. Kryzanowski and Roberts (1993, 362) 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 deposits,” which were policies that had been held over from the 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%.

28. Among these nonpanic 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 affected 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. In the United States in particular, there were large aggregate bank losses, widespread symptoms of financial distress, and several prominent failures of large regional banks. Doyran (2016, 55) 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 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.”

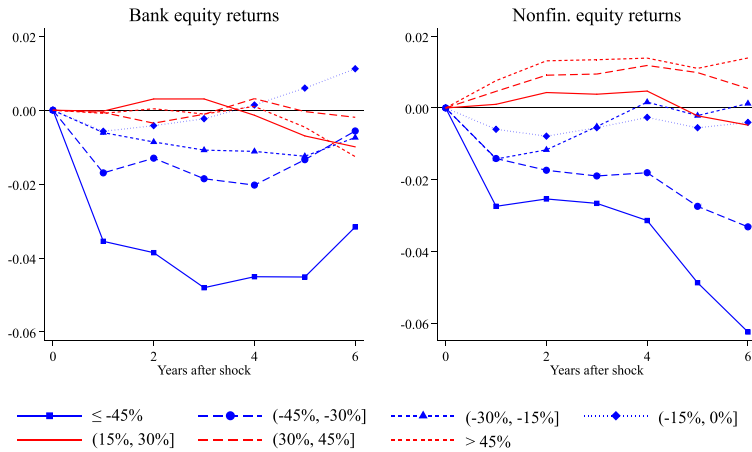
- 2002–2003: Several countries, including Germany, Greece, Israel, Italy, Japan, and Portugal, saw large drops in bank equity in absolute terms and relative to nonfinancial equity. In Germany, for example, according to the IMF's financial stability report in 2003, three out of the four largest private commercial banks suffered major losses in 2002, and due to serious difficulties, a number of small and medium-sized institutions had to be merged, closed by regulators, or assisted. In Israel, banks suffered large credit losses, with the collapse of Trade Bank and large losses at Discount Bank. In Japan, which was 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 into Resona Bank, one of Japan's largest banks, which was effectively insolvent, and nationalized Ashikaga Bank, a large regional bank.

IV.C. *Quiet Crises*

In this subsection, we ask whether large bank equity declines predict subsequent output and credit contractions even in the absence of narrative evidence of either banking panics or widespread bank failures. We refer to episodes of banking sector distress with neither panics nor narrative evidence of bank failures 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. 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. As a result, narrative-based approaches have difficulty detecting quiet crises, as acknowledged by [Caprio and Klingebiel \(1996, 2002\)](#). However, any losses experienced by a bank may still lead to tighter credit conditions.

Are quiet crises associated with negative macroeconomic consequences? We reestimate [equation \(1\)](#) but now exclude country-year observations within a \pm three-year window around episodes with either a panic or widespread bank failure in [Online Appendix Table A2](#). As before, we control for nonfinancial equity return indicators along with the standard control variables. [Figure IV](#) plots impulse responses from local projections for future real GDP and bank credit-to-GDP. As can be seen in this

(A) Real GDP response



(B) Credit-to-GDP response

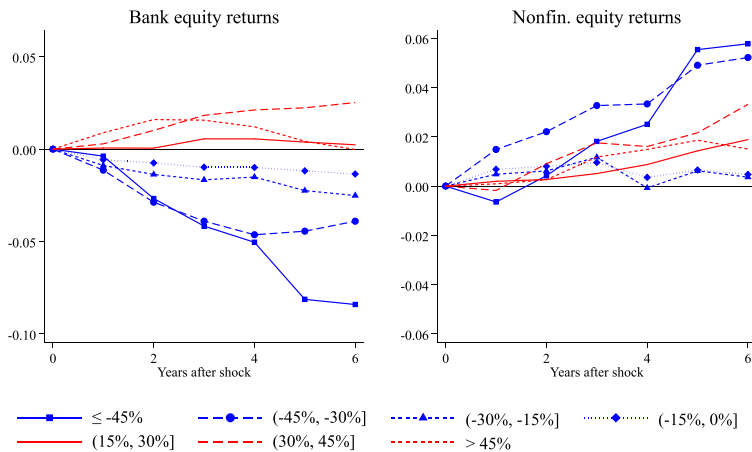


FIGURE IV

Impact of Bank Equity Crashes Outside of Episodes with Either a Panic or Widespread Bank Failures

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 II but exclude observations within a three-year window around a panic or an episode of widespread bank failures.

nonparametric specification, the magnitudes of the real GDP decline are nearly as large when excluding episodes with panics or bank failures as they are in the full sample (Figure II).²⁹ 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 nonpanic bank distress are associated with substantial macroeconomic consequences.

V. RELATIVE TIMING OF BANK EQUITY CRASHES, PANICS, AND OTHER 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 crashes relative to the start of panics and other indicators. To do this, we use monthly data around banking crises on the BVX Crisis List, which is 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 crashes, panics, credit spread spikes, and nonfinancial equity crashes. This analysis 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, since even quarterly macroeconomic data is often not available for many crises far back in time. This higher-frequency information allows us to show that bank equity crashes usually precede panics and credit spread increases during these clear-cut banking crisis episodes.

The U.S. 2007–2008 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 V shows that, for the 2007–2008 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, 10 months before the nonfinancial index peak in October 2007; similarly, bank equity cumulatively fell 30% by February 2008, while nonfinancial

29. Similarly, Online Appendix Table A8 shows that bank equity crashes also predict subsequent declines in output and credit-to-GDP outside of Narrative Crisis episodes.

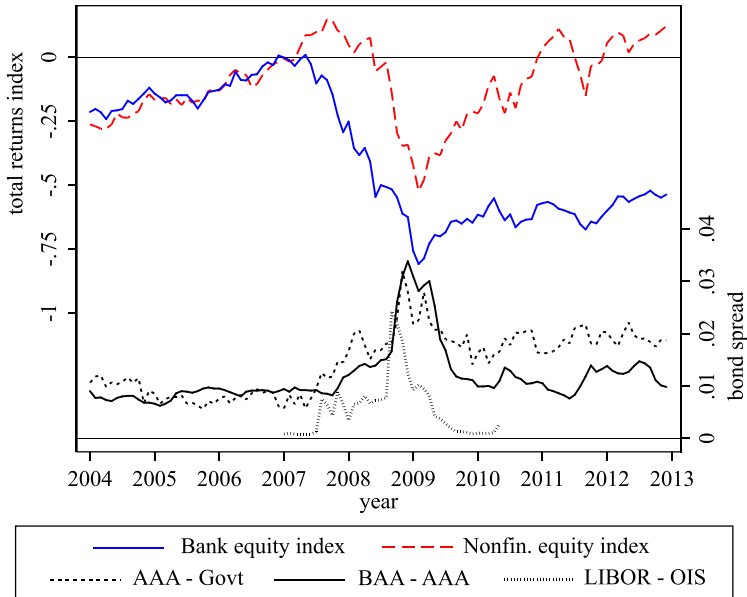


FIGURE V

Equity Returns and Credit Spreads around the U.S. 2007–2008 Banking Crisis

This figure plots bank and nonfinancial equity total return indices and credit spreads around the U.S. 2007–2008 banking crisis. The scale on the left corresponds to equity returns (which are normalized to zero in January 2007), and the scale on the right corresponds to bond yield spreads.

equity did not do so until September 2008. Meanwhile, corporate spreads (the AAA-Govt and BAA-AAA spreads) and interbank lending spreads (the LIBOR-OIS spread), though moderately elevated starting in August 2007, remained under 1 percentage point relative to their precrisis troughs until the panic phase of the crisis in September 2008, a full 21 months after bank equity had started declining.³⁰ We show here that these patterns also hold in other historical episodes on the BVX Crisis List.

30. Equity and bond prices for Lehman Brothers, whose failure precipitated the panic phase of the 2007–2008 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).

V.A. *Bank Equity Crashes and Panics*

Figure VI presents the dynamics of bank equity returns, relative to other financial market measures, systematically across all crises on the BVX Crisis List.³¹ We focus on a three-year window around the crises on the BVX Crisis List and compute the average evolution of equity indices and credit spreads. Time 0 in event time is defined as January of the BVX crisis year, and equity indices (measured on the left axis) and credit spread measures (right axis) are normalized to zero in this month. In the same figure, we also 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. The area under the panic frequency distribution is normalized to one. Figure VI, Panel A 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. Figure VI 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 starts to decline in the year prior to month 0 when the crisis is dated.

Table III, Panel A analyzes the timing of bank equity crashes 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 United States in 2008, the bank equity crash occurred in February, while the panic occurred in September, 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

31. [Online Appendix](#) Figure A13 presents the same results across crises on the Narrative Crisis list, demonstrating that these results are robust to alternative banking crisis lists.

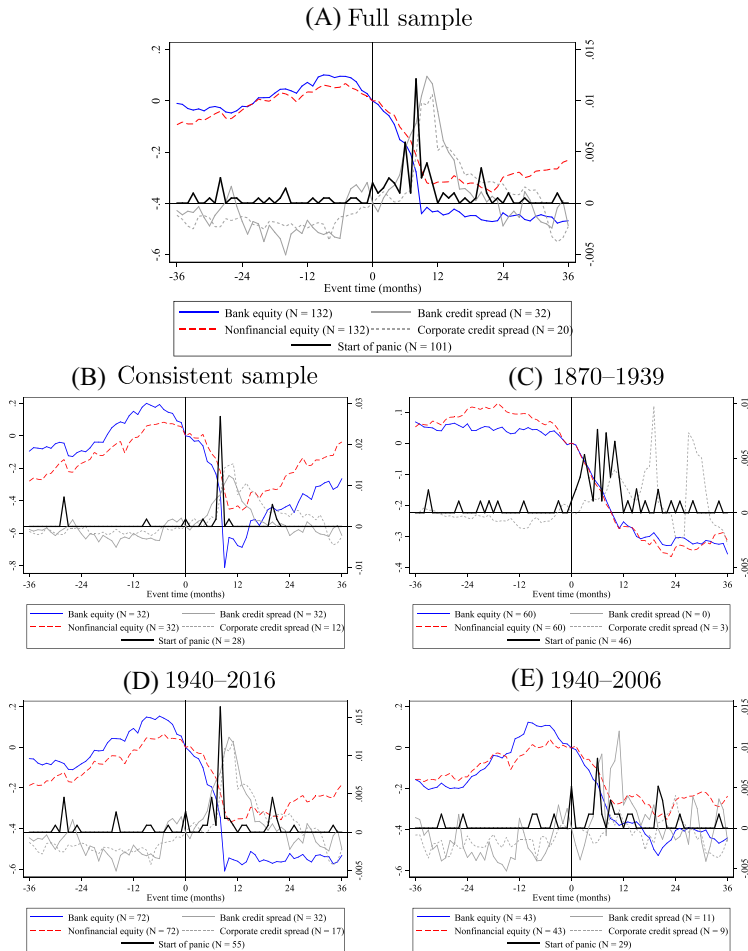


FIGURE VI

Timing of Bank Equity Crashes Relative to Panics and Other Indicators

This figure compares the average evolution of monthly bank equity returns relative to a series of other indicators around BVX crises. The other 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 indices and credit spreads are normalized to zero 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, 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.

TABLE III
TIMING OF BANK EQUITY CRASHES RELATIVE TO PANICS, CREDIT SPREAD SPIKES, AND NONFINANCIAL EQUITY CRASHES

Panel A: Bank equity crashes detect the crisis before panics, narrative crisis dates, and credit spread spikes									
	Before								
	Before panic	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***	3.20**	2.85**	6.18***	3.44**	8.84***	4.26*		
<i>t</i> -stat	4.92	2.48	2.34	6.14	2.03	6.75	1.80		
<i>N</i>	93	93	101	40	41	19	19		
Pos.	69	38	32	32	23	16	12		
Zero	5	33	53	4	2	1	0		
Neg.	19	22	16	4	16	2	7		
$\frac{Pos.}{(Pos.+Neg.)}$	78.4%***	63.3%***	66.6%**	88.9%***	58.9%	88.9%***	63.2%		
<i>p</i> -value	.000	.026	.015	.000	.168	.001	.180		

TABLE III
CONTINUED

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
Average (in months, signed)	1.94**	1.38**
t-stat	2.44	
N	127	23.95
Pos.	65	139
Zero	16	57
Neg.	46	40
$\frac{Pos.}{(Pos.+Neg.)}$	58.56%**	42
p-value	.044	57.6%**
		.080
		26.97***
		23.95
		141
		Duration ≥ 24 mo. = 85 episodes
		Duration < 24 mo. = 56 episodes
		% Duration ≥ 24 mo. = 60.3%***
		.009

Notes. This table analyzes monthly data around BVX Crisis List episodes to compare the relative timing of various financial market indicators. Panel A compares the timing of 30% bank equity crashes with the panic start date, narrative crisis start dates, and credit spread spikes (i.e., the increase in credit spreads relative to their precrisis troughs). 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 nonparametric test, we also count the number of episodes the bank equity crash 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 crash happens first $\frac{Pos.}{(Pos.+Neg.)}$ and calculate a p-value under the null hypothesis that the bank equity crash happening first is Bernoulli-distributed with a parameter of 0.50. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

crashes in only 20% of cases (19 out of 93).³² These point estimates are 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 a parameter of 0.50.³³

Figure VII, 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, and 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 strictly 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 nontrivial 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 is less consistent with banking crises as unanticipated, nonfundamental panics (Diamond and Dybvig 1983) and lends support to theories that highlight panic bank runs as an amplification mechanism of initial bank losses due to negative fundamental shocks (Goldstein and Pauzner 2005; He and Xiong 2012).

Do bank equity crashes pick up crises before or after the crisis dates from previous narrative approaches? Table III, 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

32. 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 and increases in corporate bankruptcies.

33. Online 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.

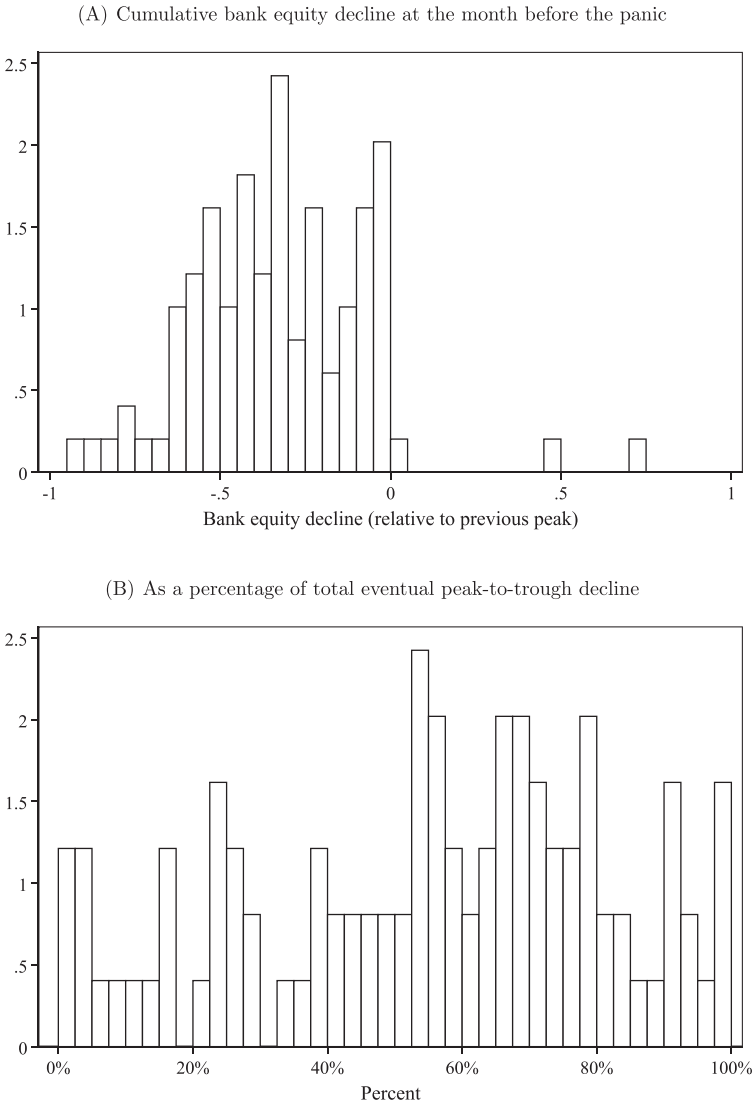


FIGURE VII

Bank Equity Falls Substantially before the Start of Banking Panics

This figure illustrates that bank equity falls substantially before a banking panic. Panel A shows the distribution of bank equity returns from its previous peak to the month strictly 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.

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 crashes 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 declines prior to the start of banking crises as dated by narrative approaches.

V.B. Bank Equity Crashes and Credit Spread Spikes

What is the relationship between bank equity declines and credit spread increases? 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 VI](#) 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 and corporate credit spreads increase after the start of the crisis, whereas bank equity falls prior to the year of the crisis. The spike in credit spreads tends to coincide with panics, confirming that credit spread spikes proxy for panics. Because credit spreads are only available for a smaller subset of crises, [Figure VI](#), Panel B presents the same event study for a consistent sample with nonmissing equity measures and bank credit spreads. Panel B confirms that the difference in the timing of bank equity crashes and credit spread spikes is not driven by different underlying samples. The fact that bank equity falls first before the spike in credit spreads is consistent with credit market instruments having lower information sensitivity than bank equity because equity holders take first losses while creditors suffer losses only when banks approach default ([Gorton and Pennachi 1990](#)). This implies that although it is particularly difficult for policy makers to predict panic runs using information-insensitive short-term credit market instruments, bank equity declines can signal the risk of future panics, precisely because bank equity is information sensitive.

[Table IV](#) 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 is only elevated by 54 basis points relative to its precrisis trough. In more than 20% of cases, bank

TABLE IV
DISTRIBUTION OF CREDIT SPREADS JUST AFTER BANK EQUITY CRASHES

Panel A: Distribution of bank credit spreads (relative to prior troughs) subsequent to bank equity crashes										
... bank credit spreads are elevated by (in percentage points):										
	10th pctile	20th pctile	30th pctile	40th pctile	50th pctile	60th pctile	70th pctile	80th pctile	90th pctile	
When banks stocks fall more than...										
-20%	0.00	0.00	0.00	0.29	0.52	0.69	0.98	1.14	5.46	
-25%	0.00	0.00	0.00	0.36	0.52	0.69	0.98	1.14	5.46	
-30%	0.00	0.00	0.29	0.44	0.54	0.78	0.99	2.27	9.23	
-35%	0.00	0.00	0.36	0.52	0.68	0.99	1.33	2.88	12.65	
-40%	0.00	0.29	0.52	0.63	0.85	1.29	2.27	3.26	48.68	
-45%	0.00	0.36	0.55	0.68	0.86	1.33	2.27	3.26	48.68	
-50%	0.10	0.49	0.62	0.85	1.23	2.01	2.81	6.64	64.71	
-55%	0.29	0.59	0.85	1.10	1.35	2.50	3.26	6.49	37.49	

TABLE IV
CONTINUED

Panel B: Distribution of corporate credit spreads (relative to prior troughs) subsequent to bank equity crashes										
... corporate credit spreads are elevated by (in percentage points):										
	10th pctile	20th pctile	30th pctile	40th pctile	50th pctile	60th pctile	70th pctile	80th pctile	90th pctile	
When banks stocks fall more than...										
-20%	0.00	0.00	0.00	0.00	0.00	0.42	0.92	1.19	1.19	2.27
-25%	0.00	0.00	0.00	0.00	0.25	0.42	0.92	1.19	1.19	2.27
-30%	0.00	0.00	0.00	0.19	0.29	0.73	1.25	1.57	1.57	2.27
-35%	0.00	0.00	0.02	0.23	0.37	0.86	1.35	1.59	1.59	2.51
-40%	0.00	0.00	0.00	0.32	0.45	0.96	1.41	1.61	1.61	3.00
-45%	0.00	0.00	0.31	0.36	0.63	1.06	1.45	1.64	1.64	3.30
-50%	0.00	0.00	0.31	0.36	0.63	1.06	1.45	1.64	1.64	3.23
-55%	0.00	0.00	0.30	0.35	0.45	1.19	1.49	2.99	2.99	4.78

Notes. This table presents the distribution of credit spreads (relative to prior troughs within the past five years) just after bank equity crashes around BVX Crisis List episodes. Each row presents the distribution of credit spreads 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 spreads 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.

credit spreads have not increased at all at this point. Only in around 30% of cases has the bank credit spread increased by more than 1 percentage point. For reference, the median eventual trough-to-peak bank credit spread increase across BVX Crisis List episodes is 2.5 percentage points.

Table IV, Panel B presents the results for corporate credit spreads, rather than bank credit spreads.³⁴ 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 elevated by 29 basis points relative to its precrisis trough, and in over 30% of cases corporate credit spreads have not increased at all. For reference, the median eventual trough-to-peak corporate credit spread increase across BVX Crisis List episodes is 1.7 percentage points.³⁵

Taken together, the analysis in this subsection shows that bank equity crashes 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.

V.C. Bank and Nonfinancial Equity Crashes

Figure VI also shows that bank equity tends to peak and decline earlier than nonfinancial equity during banking crises. Table III, Panel B, column (1) 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) shows that the bank equity index peaks 1.38 months before the nonfinancials index peaks. The fact that bank equity declines before nonfinancial equity suggests that many banking crises originate with shocks to specific segments

34. The finding that bank equity crashes tend to precede spikes in corporate credit spreads shows that the risk in bank loans is different from that in corporate bonds. This is consistent with the typical observation that banks tend to lend to small firms and households, while corporate bonds are usually only available to large firms.

35. As a robustness check, Table III, Panel A compares the timing of 30% bank equity crashes to the timing of credit spread spikes. We record a credit spread “spike” as the first month in which credit spreads increase at least 1 percentage point above their precrisis troughs. Since a 1 percentage point increase is somewhat arbitrary, we present this evidence as robustness analysis confirming the result in Figure VI. Nevertheless, Table III, 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 4.3 months before a 1% spike in corporate credit spreads (column (7)).

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 sector. Interestingly, [Figure VI](#), Panels C and D show that the pattern that bank equity declines before nonfinancial equity holds mainly for post-World War II crises and advanced economies—and is often the opposite for prewar crises or emerging economies (see also [Online Appendix 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 VI](#), Panel A also reveals several additional 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 postcrisis, 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 27.0 months ([Table III](#), Panel B, column (3)). 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

Large bank equity declines allow us to screen out a broad set of episodes of banking distress with and without narrative evidence of panics. However, 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, although 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

TABLE V
NARRATIVE-BASED BANKING CRISES IN GERMANY

Reinhart Rogoff	Schularick Taylor	Laeven Valencia	Bordo	Caprio Klingebiel	Demirgüç-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	

Notes. 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 [Online 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 [Demirgüç-Kunt and Detragiache \(2005\)](#) focus on the period of 1980–2002 and do not report any crises for Germany during this period.

on crises to refine existing chronologies of banking crises in a systematic way.

Existing chronologies identify banking crises based on narrative accounts of salient features, such as bank runs, bank failures, and large-scale government interventions (e.g., [Reinhart and Rogoff 2009](#); [Schularick and Taylor 2012](#); [Laeven and Valencia 2013](#)). A drawback of existing chronologies is that they disagree about which episodes should be regarded as banking crises. [Table V](#) highlights this disagreement in the case of Germany, and [Online Appendix Table A1](#) shows that this disagreement arises for many countries.³⁶ This disagreement is due in part to a lack of a consistent definition as to which features constitute a banking crisis.³⁷ Moreover, existing narrative approaches do not

36. [Jalil \(2015\)](#) discusses this disagreement among narrative chronologies in the case of U.S. pre-1929 banking panics.

37. 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 \(2002\)](#) 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

provide quantitative measures of bank impairment to distinguish between minor versus major crises.

There is obviously no single correct definition of a banking crisis or list of crises. Our goal is to provide one possible construction of clear-cut crisis episodes based on systematic criteria emphasizing three dimensions: bank equity losses, bank failures, and panics. To construct the BVX Crisis List, we initially construct two non-mutually exclusive chronologies. The first is a chronology of “bank equity crises.” We build this list by selecting instances of cumulative 30% declines in bank equity, which are marked in [Online Appendix Table A2](#) and indicate potential banking crises. As we have shown, bank equity has strong predictive power for macroeconomic consequences and a high signal-to-noise ratio in terms of detecting typical characteristics of banking crises and coinciding with Narrative Crises (as discussed in [Section III.D](#)). To avoid including episodes of bank equity declines purely due to equity market noise, we only select the subset of these with narrative evidence of widespread bank failures, as indicated in [Online Appendix Table A2](#). As in [Section IV.A](#), we define widespread bank failures as the failure of a top five (by assets) bank or more than five total bank failures above the normal rate of bank failures. The second is a chronology of “panic banking crises,” based on the list of panics from [Online Appendix Table A2](#). As discussed in [Section IV.A](#), one should not view “panic banking crises” that are not also “bank equity crises” as nonfundamental panics; in fact, as we argue in [Section IV.A](#), there is almost no evidence of nonfundamental panics over our 1870–2016 sample.

The union of these two overlapping sets is the BVX Crisis List, which we present in [Table VI](#). 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 date the crisis based on narrative information. [Table VI](#) also lists

experts in banking history in 17 countries. In contrast, we provide extensive historical documentation on episodes of panics and widespread bank failures in [Online Appendix I.B](#).

TABLE VI
THE BVX CRISIS LIST

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	1925	1	1	Greece	1929	-0.727	1	1
	1914	-0.473	1	0		1931*	1931*	-0.356	1		2008	-0.671	1	0
	1930	-0.819	1	0		1976	0	1	0		2010*	-0.961	1	1
	1934	-0.563	1	1		1982	-0.837	1	0		1892*	-0.565	1	1
	1980		1	1		1982	-0.675	1	0		1965	-0.196	1	0
	1985		1	1		1931*	-0.831	0	1		1982	-0.445	1	1
	1989		1	1		1982	-0.831	0	1		1981	-0.096	1	0
Australia	1995	-0.305	1	1	Czech	1998	-0.813	1	1	Hungary	1998	-0.464	1	0
	2000	-0.656	1	1		1923	1	1	1		1873*	-0.518	1	1
	1893	-0.469	1	1		1991	1	1	1		1931	1	1	1
	1931	-0.230	1	0		1995	-0.904	1	1		1991	1	1	1
	1989	-0.281	1	0		1877	-0.207	1	0		1995*	-0.398	1	1
	1873	-0.715	1	1		1885	-0.043	1	0		2008	-0.671	1	0
	1924	-0.344	0	1	Denmark	1907	-0.269	1	0		1920*	-0.535	1	1
Austria	1931	-0.566	1	1		1919	-0.347	1	1	Iceland	1930*	-0.359	1	1
	2008	-0.673	1	1		1992	-0.425	0	1		1985	0	1	1
	2011*	-0.509	0	1		2008	-0.739	1	1		1993	0	1	1
	1870	-0.018	1	0		2011*	-0.444	0	1		2008	-0.963	1	1
	1876*	-0.374	1	1		1907	-0.132	1	0		1913	-0.249	1	0
	1883	-0.139	1	0		1914	-0.407	1	1		1920	-0.495	0	1
	1914		1	1	Egypt	1931	-0.608	1	1		1993	-0.561	0	1
Brazil	1929	-0.831	1	1		1900	1	1	1	Indonesia	1990	-0.659	1	1
	1939	-0.511	1	1		1921	-0.569	0	1		1998	-0.98	1	1
	2008	-0.842	1	1		1931	-0.252	1	0		2007	-0.918	1	1
	2011*	-0.755	0	1		1990	-0.814	1	1		2010*	-0.908	1	1
	1890	-0.275	1	0	France	1871	1	1	0		1983	-0.499	0	1
	1900	0	1	0		1882	-0.456	1	1		1873	-0.237	1	0
	1914	-0.374	1	0		1889	-0.106	1	0		1889	-0.348	1	1
Canada	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
	1873	0	1	0	Germany	1874	-0.371	1	1		1930	-0.073	1	1
	1920	-0.426	1	1		1891	-0.23	1	0		1992	-0.397	0	1
	1962	-0.164	1	0		1901	-0.05	1	0		2008	-0.575	1	0
Chile	1878		1	1		1914	1	1	1		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 VI
CONTINUED

Country	Bank equity return	Panic banking crisis	Bank equity crisis	Country	Bank equity return	Panic banking crisis	Bank equity crisis	Country	Bank equity return	Panic banking crisis	Bank equity crisis
Japan	1871	1	1	Peru	1876	1	1	Switzerland	1870	1	0
	1882	1	1		1914*	-0.612	1		1914	-0.418	0
	1890	1	1		1931*	-0.373	1		1919	-0.432	1
	1901	1	0		1981	-0.980	0		1931	-0.559	1
	1907	1	1		1998	-0.396	0		1990	-0.326	1
	1920	1	1	Philippines	1971*	-0.781	1		2008	-0.676	0
	1922*	-0.405	1		1981	-0.719	1	Taiwan	1923	1	0
	1923	-0.157	1		1997	-0.687	0		1927	1	1
	1927	-0.168	1	Portugal	1876	1	1		1983	1	1
	1990	-0.546	0		1890	1	1		1985	-0.307	1
	1997	-0.605	1		1921	-0.643	1		1988	-0.557	1
Korea	2001*	-0.808	0		1923	-0.684	1		1979	-0.461	0
Luxembourg	1997	-0.726	1		1931	-0.597	1	Thailand	1983	0	0
	2008	-0.474	1		2008	-0.613	1		1997	-0.734	1
Malaysia	1985	-0.368	1		2011*	-0.725	0	Turkey	1914*	-0.654	1
	1997	-0.686	1		2014*	-0.800	0		1930	-0.719	1
Mexico	1883	1	1	Russia	1875	-0.188	1		1980	-0.409	1
	1893	-0.325	1		1900	-0.401	1		1991	-0.758	1
	1913	-0.596	1		1995	1	1		1994	-0.203	0
	1921	1	1		1998	-0.751	1	UK	2001	-0.622	1
	1928	-0.839	1		2008	-0.723	1		1878	-0.132	0
	1981	1	1	Singapore	(no crises)				1890	-0.128	1
	1994	-0.602	1	South Africa	1881	-0.27	1		1914	1	0
Netherlands	1907	-0.083	1		1890	-0.062	1		1973	-0.737	1
	1914	-0.093	1	Spain	1882	-0.349	1		1991	-0.147	0
	1921	-0.334	0		1890	-0.124	1		2008	-0.707	1
	1931*	-0.418	0		1913	-0.038	1	US	1873	-0.172	0
	2008	-0.562	1		1920	-0.14	1		1884	0	0
New Zealand	1888	-0.549	1		1924	-0.222	1		1890	0	0
	1987	-0.882	1		1931	-0.336	1		1893	-0.29	1
Norway	1898	1	1		1975	-0.814	0		1907	-0.334	1
	1914	1	0		2008	-0.466	1		1930	-0.654	1
	1919	-0.71	1		2010*	-0.411	0		1984	-0.263	1
	1931	0	0	Sweden	1878	1	1		1990	-0.332	0
	1987	-0.464	1		1907	-0.135	1		2007	-0.676	1
	2008*	-0.670	1		1919	-0.395	0	Venezuela	1981	-0.34	1
			0		1991	-0.787	1		1992	-0.839	1
					2008	-0.519	1		2008	-0.614	1

Notes: This table lists a chronology of banking crisis episodes covering 46 countries over the period of 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.

the bank equity peak-to-trough real total return, based on annual data, as a measure of the severity of each banking crisis.³⁸

Our new bank equity data allow us to uncover 27 newly identified crises not contained in previous narrative chronologies, which are marked with an asterisk in [Table VI](#). Although some of these are newly identified just because they are very recent episodes, for example, the 2011 Eurozone crises, others are “forgotten” historical crises that do not appear to have been known by the authors of the Narrative Crisis lists, such as the following examples.³⁹

- Belgium in 1876. As reported by [Grossman \(2010, 299\)](#): “A substantial boom in the early 1870s, fueled partially by the Franco-Prussian war, led to the establishment of a number of new banks. Several of these failed when the international crisis hit the Brussels stock exchange. A few smaller banks went into receivership, and the larger Banque de Belgique, Banque de Bruxelles, and Banque Central Anversoise had to be reorganized. [Durviaux \(1947: 75–76\)](#) calls this the third Belgian banking crisis; [Chelpner \(1943: 37\)](#) suggests that 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 \(2012, 212–213\)](#) writes: “Ishii Corporation, a lumber company engaged in speculative activities, went bankrupt at the end of

38. With the new crisis starting dates based on 30% bank equity declines, our goal is to offer additional information about when markets first recognized substantial bank equity losses. Of course, there are reasons the prior narrative accounts date the starting year when they do. See [Online Appendix Table A2](#) and [Online Appendix Table A12, Panel A](#) for a comparison with the Narrative Crisis dates, which in most cases are very similar. Also, on the BVX Crisis List, we occasionally combine several pairs of episodes occurring close together in time (see [Online Appendix Table A12, Panel B](#)), when it seems more appropriate to consider them as a single crisis, for example, 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. In [Online Appendix 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.

39. They have not been forgotten by all banking crisis historians, as we collect narrative evidence on each episode, as presented here.

February 1922, triggering bank runs in Kochi Prefecture (in the 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) to Kanto (Tokyo and its environs in eastern Japan). In 1922, operations were suspended at 15 banks, either permanently or temporarily. The Bank of Japan extended special loans to 20 banks from December 1922 to April 1923.”

Online Appendix 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 with an asterisk a subset of them that we consider “spurious banking crises,” defined as episodes with few or no characteristics typically associated with banking crises, likely the result of clear-cut typographical or historical errors on one of the Narrative Crisis chronologies.⁴⁰ As a concrete example, the BVX Crisis List omits Germany in 1977. For this episode, Reinhart and Rogoff (2009) only report that “Giro institutions faced problems,” although 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 perpetuated across studies that build on previous chronologies.⁴¹ Bank equity declines thus provide an objective criterion to screen crisis episodes and remove episodes that feature little

40. The documentation linked to in **Online Appendix I.B** traces many of the sources of these errors. One problem inherent in many older accounts of crises is that they use the terms “financial crisis” and “panic” to variously 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.

41. 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, although 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, it was largely resolved (the entire banking sector had mostly 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.

evidence of any of the features commonly associated with banking crises.

Table VII summarizes the properties of episodes on 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) 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 with 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. Online Appendix Figure A16 compares the macroeconomic consequences of BVX Crisis List episodes with those from Reinhart and Rogoff (2009) and Laeven and Valencia (2013), and Online Appendix Table A13 compares these chronologies along various other 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.⁴² These results are discussed in detail in Online Appendix VI.D. The fact that crises on the BVX Crisis List are on average more severe may be largely due to the elimination of spurious crises.⁴³

42. Online Appendix Table A13, Panel B performs the same comparison with Laeven and Valencia’s crisis chronology (on their time sample, 1970–2012). On average, BVX crisis episodes are slightly less severe than Laeven and Valencia’s, perhaps because these authors 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 to 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, Online Appendix Table A14 shows that a variety of crisis 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).

43. On the BVX Crisis List, we removed 44 events from Reinhart and Rogoff’s list. These removed events have an average GDP decline of -2.1% . Thus, this

TABLE VII
BVX CRISIS LIST SUMMARY STATISTICS

	BVX Crisis List	BVX Crisis List (Bank equity decline > 30%)	Newly uncovered crises	Removed crises
Bank equity decline	-0.462 (N = 183)	-0.610 (N = 119)	-0.550 (N = 27)	-0.116 (N = 47)
Abnormal bank equity decline	-0.344 (N = 170)	-0.437 (N = 105)	-0.329 (N = 22)	-0.180 (N = 45)
Bank market cap decline	-0.416 (N = 79)	-0.534 (N = 55)	-0.536 (N = 13)	-0.116 (N = 23)
Real GDP decline (pk to tr)	-0.055 (N = 210)	-0.063 (N = 115)	-0.082 (N = 30)	-0.021 (N = 54)
Real GDP growth decline (pk to tr)	-0.085 (N = 209)	-0.091 (N = 114)	-0.085 (N = 29)	-0.057 (N = 54)
Real GDP growth (max dev from trend)	-0.060 (N = 210)	-0.066 (N = 117)	-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 (prewar 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)

Notes. 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"). The variables Abnormal bank equity decline, Bank market cap decline, etc. are defined in [Online Appendix 1C](#) and IV.

VII. CONCLUSION

By constructing a new historical data set 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 although large bank equity declines coupled with narrative evidence of panics are followed by the most severe macroeconomic downturns, episodes of nonpanic banking distress also translate into prolonged output gaps and nontrivial 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, but 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 to credit expansion measures, provide useful real-time barometers of the health of the banking sector.

small average GDP decline from removed crises biases down the average severity of Reinhart and Rogoff's crises.

As a final caveat, we emphasize that although 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 partly 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 nonfinancial balance sheet distress.

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SUPPLEMENTARY MATERIAL

An [Online Appendix](#) for this article can be found at *The Quarterly Journal of Economics* online (qje.oxfordjournals.org).

DATA AVAILABILITY

Data and code replicating the tables and figures in this article can be found in [Baron, Verner, and Xiong \(2020\)](#), in the Harvard Dataverse, doi: 10.7910/DVN/ECC9GE.

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