Permanent Capital Losses after Banking Crises

Matthew Baron, Luc Laeven, Julien Pénasse, and Yevhenii Usenko[†]

March 2025

Abstract:

We study the persistence of bank distress and the effectiveness of policy interventions in restoring bank capitalization across banking crises in 46 economies since 1870. We find that bank stocks experience large, permanent declines at the onset of crises. These losses predict commensurate long-term declines in banks' cash flows rather than elevated future equity returns. Forceful liquidity-based interventions predict only small, temporary increases in bank market value. Banks' losses during crises are primarily driven by write-downs of nonperforming assets. Early interventions can avert banking panics before the onset of large bank equity declines. However, after large bank equity declines are realized, policy responses have historically been insufficient in preventing persistent bank undercapitalization.

JEL Codes: G01, G11, G12, G15, G21

[†] Baron: Cornell University, baron@cornell.edu; Laeven: European Central Bank, Tilburg University, and CEPR, luc.laeven@ecb.europa.eu; Pénasse: University of Luxembourg, julien.penasse@uni.lu; Usenko: MIT, yusenko@mit.edu. The views expressed are our own and do not reflect those of the ECB or the Eurosystem.

I. Introduction

Banking crises have been a recurrent feature of financial systems, often leading to significant economic disruptions. A key issue for macroeconomic modeling of banking crises and the design of effective policy interventions is understanding the nature of bank losses. Bank losses, by depleting banks' equity capitalizations, can impair banks' capacity to intermediate funds from savers to firms and households. They can also lead to widespread bank failures, significant disruptions to capital markets, and high fiscal costs of policy interventions. Given the fundamental importance of bank losses, we empirically investigate in this paper the key mechanisms driving bank losses across the history of banking crises in 46 economies since 1870.

A key divide across theoretical models—critical to the correct diagnosis of underlying causes and mechanisms—is whether bank losses during banking crises are primarily temporary or permanent. Several prominent classes of models posit that losses of financial intermediaries during crises are primarily *temporary*, as crises are times when assets held by financial intermediaries trade at sharp discounts. This could be due either to binding borrowing constraints of financial intermediaries (e.g., Gertler and Kiyotaki 2010, Gertler and Karadi 2011, He and Krishnamurthy 2012) or to temporary illiquidity (driven by depositor fragility or informational frictions, Allen and Gale 1998, Gorton and Huang 2004, Bolton, Santos, and Scheinkman 2011, Dang, Gorton, and Holmström 2020, Gertler, Kiyotaki, and Prestipino 2020, Amador and Bianchi 2024). These mechanisms lead to sharp but reversible declines in values of assets held by financial intermediaries due to fire sale pricing and high discount rates. In these models, to the extent that central banks quickly provide liquidity before substantial asset liquidations occur, bank assets—and therefore bank equity—recover as discount rates normalize and liquidity returns to the market.

A second view is that banking crises primarily result in *permanent* bank losses. If central bank liquidity interventions are insufficient, banks might be forced into fire sales, liquidating assets at depressed prices to meet liquidity demands or regulatory capital requirements (e.g., Diamond and Dybvig 1983, Shleifer and Vishny 1997, 2011). Alternatively, permanent losses could be due to deterioration in banks' asset quality, which could stem either from poor lending practices prior to the crisis or from a liquidity shock to borrowers causing them to default. Nonperforming assets and defaults in both cases would lead to significant asset impairments and write-downs, resulting

in permanently lower asset values and cash flows for banks and severe consequences for the real economy (e.g., Kiyotaki and Moore 1997, Holmström and Tirole 1997, Kashyap and Stein 2000, Peek and Rosengren 2000, Caballero, Hoshi, and Kashyap 2008). In contrast to the first view, which suggests that central banks can substantially reverse banking sector losses through ample liquidity provision, bank losses in this view persist even after funding and market liquidity are restored. In the absence of timely bank recapitalizations and loan restructurings, the nonperforming asset problem becomes long-lasting and can lead to persistent banking sector undercapitalization.

These two views of banking crises are not mutual exclusive and may both be empirically relevant to varying degrees. However, these views imply different testable predictions for the market dynamics of bank equity during banking crises and the role of policy interventions in restoring bank capitalization. Conceptually, in our analyses, we view the market value of bank equity as primarily representing a leveraged portfolio of bank assets as valued by equity markets. According to the first view, the decline in market valuations of bank equity would be temporary, driven by high discount rates of bank assets during crises. As a result, bank equity returns following banking crises would be elevated. Furthermore, according to this view, bank equity would recover much of its losses when central banks intervene with extensive liquidity support and stop the panic. On the other hand, in the second view of crises, the market valuation of bank equity would experience a permanent, cash-flow-driven shock around the onset of the crisis and would not realize elevated returns thereafter. Bank equity would improve little after liquidity-based interventions if bank losses are primarily due to fundamental asset weaknesses. Absent forceful government recapitalization efforts, banks would experience low long-run capitalizations.

To disentangle these two views of banking crises, we construct several new historical datasets on stock returns, bank losses, and banking crisis interventions across 46 economies since 1870, constituting a significant new data contribution to the study of banking crises. The first of these datasets builds on Baron, Verner, and Xiong (2021, henceforth "BVX") and contains the country-level bank and nonfinancial equity index total returns spanning 46 economies since 1870 at both monthly and yearly frequency. The second dataset contains the equity returns, balance sheet quantities, net income, and equity issuance at the *individual bank level* for the ten largest banks by total assets within each country and around each banking crisis. Given the detailed historical resources needed for its construction, this dataset is limited to the 17 economies covered in Jordà, Schularick, and Taylor (2011, henceforth "JST"). The third dataset, building on the work

of Laeven and Valencia (2020) and Metrick and Schmelzing (2024), reports the monthly starting dates of liquidity-based interventions around each crisis, along with detailed information on historical government recapitalization programs, with statistics on their size, timing, and breadth.

Equipped with these historical datasets, we address the following three research questions.

1. Are banking crises permanent or temporary shocks to bank value?

We start by examining the evolution of equity returns of banks and nonfinancial firms after times of large market-value bank equity losses. To do so, we refine BVX's definition of a "bank equity crisis" to create a purely data-driven, real-time indicator that captures banking-crisis-like episodes of large declines in the aggregate market value of bank equity. Using this definition, we find that both bank and nonfinancial equity sharply decline in the year of the bank equity crisis, resulting in average abnormal returns of -68 and -36 log-points, respectively. Over the next five years, bank equity does not earn elevated returns, instead earning roughly the same returns as the country's unconditional average (as measured by either excess or real total index returns). In contrast, nonfinancial firms' equity values do feature elevated returns over the five-year period after the start of the crisis and recover to pre-crisis levels within five years. Overall, the results indicate that large bank equity declines primarily result in permanent capital losses for the banking sector. These results are robust to various alternative approaches to timing the onset of banking crises using either annual or monthly data.

Zooming in at monthly frequency, we find that bank stocks do feature some short-term recoveries from their troughs, consistent with the "temporary" view. However, even with perfect market timing, the magnitude of the bounce-back from trough to peak is only about 30% of the initial bank equity drop. Furthermore, this bounce-back partially reverses on average after twelve months. The result is that the cumulative average return over the entire five-year horizon is not elevated relative to the unconditional average. Thus, while bank equity dynamics show some recovery at shorter horizons, consistent with the "temporary" view, the evidence at longer horizons primarily indicates large permanent losses.

Returning to the annual data, we find that the initial decline in bank equity at the onset of a bank equity crisis is mainly cash-flow driven, as the market price decline mirrors a commensurate drop in banks' long-term future earnings and dividends. This cash-flow-driven permanent collapse

of bank equities contrasts with the discount-rate-driven view that bank losses are temporary due to market or funding illiquidity or binding leverage constraints of financial intermediaries.

2. What accounts for the permanent losses to bank value during bank equity crises?

We find that across historical bank equity crises, bank losses are best explained by long-run deterioration in asset quality (i.e., asset write-downs), although losses from asset liquidations can be substantial for banks that hold a large fraction of securities in their portfolios. Several analyses support this conclusion.

First, we compare realized accounting losses of banks with the market equity losses following the onset of banking crises. If banks were forced by funding pressure to liquidate substantial assets at below-fundamental values, we would observe large immediate realized losses during banking panics and a strong co-movement between book losses and declines in market value. However, this is not observed. Realized book losses in the first two years after crisis onset, when all banking panics occur, are only about 20% of banks' market-value losses. Most realized losses occur years later, consistent with the slow recognition of impaired assets on banks' accounting statements, even though equity markets recognize most of these losses in the initial year of the banking crisis.

Second, most realized accounting losses take the form of write-downs, defined as acknowledged valuation losses on assets that remain on the balance sheet. Specifically, we decompose banks' book net income across historical crises into write-downs, gains and losses from securities trading and asset sales, and other income categories, and find that most of the market-value equity declines can be accounted for by eventual write-downs. The contribution from gains and losses from securities trading and asset sales is generally small. An exception is for banks that hold a large fraction of securities on their balance sheet, in which case realized losses are more immediate and take the form of trading losses.

Third, we find a strong association across crises between banks' market equity declines and peak levels of nonperforming loans across crises, supporting the view that permanent bank losses are mostly explained by a deterioration in asset quality. We conclude that most bank losses across historical banking crises are not due to asset sales during banking panics but to the poor quality of assets remaining on banks' balance sheets, whose value is only slowly written down.

3. To what extent do policy interventions restore bank capitalization?

We analyze two important *liquidity-based* interventions: extraordinary central bank liquidity support and the announcement of blanket liability guarantees. We find that for bank equity crises, these interventions are not followed by large or permanent increases in bank value. This result argues against the view that forceful liquidity-based interventions can partially substitute for direct recapitalizations (Gertler and Karadi 2011, Brunnermeier and Sannikov 2016).

We next turn to studying the role of equity issuance as a more direct tool for restoring the banking sector's equity capitalization. To establish a baseline, we find that, excluding new equity issuance, bank capitalization remains permanently lower in the five years following crises, inconsistent with the view that banks can earn elevated returns or self-recapitalize through higher profitability following crises (e.g., Gertler and Kiyotaki 2015). We show that while bank recapitalizations, whether government- or privately led, can restore bank capitalization, they tend to be limited historically. Most government recapitalization programs are small relative to estimated bank equity losses, are narrowly targeted to a small number of banks, and are only implemented years after the initial bank losses. We conclude that decisive policy action in the form of government recapitalization programs typically comes too little, too late.

Other types of banking crises

Overall, our results indicate that once a bank equity crisis is reached (based on real-time indicators that a policymaker can observe), bank equity does not earn high future returns, the banking sector sees a persistent rise in nonperforming loans and asset write-downs, and liquidity-based interventions are not sufficient to restore bank capitalization. But do these dynamics hold in other types of banking crises, such as bank-run events without large bank equity declines? Furthermore, under what circumstances can bank-run events turn into large bank equity declines, or vice versa? Can different types of banking crises be averted in the first place by early decisive liquidity interventions?

Contrasting bank equity crises to banking panics without large bank equity declines, which we call "panic-only crises", we find that panic-only crises evolve very differently, with high future bank equity returns, large positive responses to liquidity-based interventions, and minimal macroeconomic output loss. These results suggest different underlying mechanisms and different sensitivities to policy interventions, which can be separated out in real time. One may wonder if

this implies that most bank equity crises in our sample could have been prevented in the first place by early liquidity interventions when they were panic-only. Our answer is typically no. In most cases, the bank equity decline happens strictly prior to the banking panic, as previously shown by BVX (2021), suggesting that fundamental weaknesses in the banking system are present from the early stages of the crisis and not the result of subsequent banking panics. There are only a few examples in our sample of the converse: liquidity events being followed by bank equity declines—what we call "mismanaged banking panics", the US Great Depression being one such case. Our results suggest that policymakers tend to successfully prevent liquidity crises from deteriorating, but only in cases where the panic is not yet preceded by a large bank equity decline. In contrast, if a large bank equity decline is realized, these crises (both in cases with and without subsequent panics) are more intractable, typically featuring permanent bank losses, a persistent rise in nonperforming loans, and long-lasting banking sector undercapitalization.

Relation to prior literature

Our results contribute to understanding the dynamics of banking crises, opening avenues for further theoretical work. The most parsimonious interpretation of our findings is that banking crises with large losses are best explained by permanent deteriorations in bank value, which in turn depress macroeconomic activity. While bank runs may result, the feedback loops between bank value and funding liquidity are short-lived and modest compared to the long-run decline in bank value. Furthermore, bank losses persist after funding liquidity is restored. Models relying primarily on temporary liquidity shocks thus provide an incomplete picture of how banking crises evolve and how policy interventions can help restore bank capitalization. While these models have been successful in explaining how liquidity shocks amplify bank distress and destabilize financial markets, relying exclusively on them gives policymakers a misplaced confidence that liquidity-based policies alone can fully resolve banking problems and restore banking sector health.

Our findings build on a literature showing that banking crisis recessions tend to be unusually deep and persistent compared to noncrisis recessions, in large part due to balance sheet problems in the household and banking sectors (Mian and Sufi 2009, Reinhart and Rogoff 2009, JST 2011). Our results are also consistent with a literature stressing the role of fundamental losses as the primary cause of banking crises (Calomiris and Mason 2003, Correia, Luck, and Verner 2024) and research documenting the long length of time that it takes to clean up bad loans in the

banking sector (Kane 1989, Hoshi and Kashyap 2004). Such losses are often related to a credit boom-gone-bust (Schularick and Taylor 2012) and can be driven by a sudden shift in investor beliefs (Gennaioli and Shleifer 2018).

Our evidence on deterioration in asset quality driving permanent bank losses also speaks to the literature on the zombification of banks, which argues that simply providing a liquidity backstop to a banking sector saddled with bad loans might worsen the underlying problem by distorting incentives to restructure loans and recapitalize banks (Peek and Rosengren 2005, Caballero, Hoshi and Kashyap 2008, Acharya, Crosignani, Eisert, and Steffen 2022).

A related literature has shown that banking crises are predictable, with rapid growth in credit and asset prices predicting financial fragility and crisis severity (Schularick and Taylor 2012, Baron and Xiong 2017, Mian, Sufi, and Verner 2017, Greenwood, Hanson, Shleifer and Sørensen 2022, Krishnamurthy and Muir 2024). We contribute to this literature by focusing on the evolution of bank distress after the crisis starts and analyzing the nature of losses incurred.

Our results also contribute to a substantial body of evidence that discount rates rise around banking crises for a variety of asset classes (He and Krishnamurthy 2010, Gorton and Metrick 2012, Muir 2017, Krishnamurthy and Muir 2024). For example, Muir (2017) finds that banking crises are times when ex-ante measures of expected returns, such as credit spreads and dividend yields of the broad stock market index, are elevated. Our results on nonfinancial firms, whose stocks recover in the five-year period after banking crises, are consistent with these findings, though we find that bank stocks, in contrast, do not earn elevated realized returns.

II. Historical data and banking crisis dates

In this section, we describe the construction of several interconnected datasets covering stock returns and banking crisis interventions across 46 economies since 1870. We build on the country-level panel of bank and nonfinancial equity index total returns from BVX, which we use to define the starting years of "bank equity crises" in each country. We then compile a bank-level database of the equity total returns of the largest ten banks in each country around each historical bank equity crisis, along with data on each bank's annual balance sheet quantities, components of

net income, and equity issuance. Finally, we construct two databases on policy interventions around bank equity crises.

A. Annual equity index returns at the country level

We use BVX's country-level annual panel dataset, covering 46 economies from 1870 to 2019. This panel consists of three types of variables: bank equity index total returns, nonfinancial equity index total returns, and other variables (short-term government interest rates, the inflation rate, and USD exchange rates). Since the BVX dataset ends in 2016, we extend it to 2019 using the data sources listed in their data appendix.

Equity returns of the bank and nonfinancial equity indexes for each country are, unless otherwise specified, expressed as annual log excess total returns in local currency units (LCU) as of December 31. The excess total return is defined as the price return plus the dividend return of the index minus the short-term government interest rate. For historical periods in which the short-term interest rate is unavailable, we use real total returns (price return plus dividend return minus the inflation rate) in place of excess total returns. As we show in Section III, the main results of the paper are essentially unchanged if one uses real total returns instead of excess total returns.

B. Banking crisis dates

We next construct a list of the starting years of a systematic set of banking crises.[1] As Romer and Romer (2017) and BVX highlight, this task is inherently challenging. Most existing chronologies of banking crises follow a subjective, "know it when you see it" approach of selecting episodes that feature bank runs, bank failures, and large-scale government interventions from historical narrative accounts. Consequently, these chronologies may contain a look-ahead bias, where events that deteriorated over time are more likely to be labeled as banking crises, while those that quickly improved are retrospectively deemed too mild to be considered crises (Romer and Romer 2017). This bias could affect our equity predictability regressions in Section III.

[1] Throughout the paper, we always identify a "crisis" as a *country and year pair*, e.g., "Germany 1931". Thus, the "U.S. 2008" and "France 2008" are considered different "crises" in our sample. We stress that this terminology does not imply that such events across countries are economically unrelated.

To overcome this challenge, we date the start of a "bank equity crisis" using a refinement of BVX's definition, creating a purely data-driven, real-time indicator that captures banking crises with large declines in the market value of bank equity. Although we compare this type of crises to other types of banking crises (and to averted crises) in Section VI, the paper starts by focusing on crises with large bank equity losses precisely to understand the drivers of such losses.

BVX defines a "bank equity crisis" as an episode characterized by large bank equity index losses and widespread bank failures within a country. BVX shows that this definition is macroeconomically relevant (as these criteria forecast future output declines and credit crunches) and is theoretically motivated (as bank equity is a key state variable in various macrofinance and banking models). Their definition is also agnostic as to whether crises result more from solvency or liquidity difficulties, as both can lead to bank equity losses.

We modify BVX's definition to ensure that our indicator relies on simple, accessible, and objective public information that market participants could have observed and traded on in "real time." For the remainder of the paper, we thus define the starting year of a "bank equity crisis" as the first year when the following two criteria are jointly met:

1. A >30% annual decline in the bank equity index (computed using excess total returns, in any year within the past five years)
2. The failure of a top-20 bank (ranked by total assets within each country)[2]

The first criterion identifies large declines in the market capitalization of the banking sector. The second criterion refines the set of all bank equity declines, as some declines may result from broad-based stock market crashes without other symptoms typically associated with banking crises. Nevertheless, the main results of the paper are robust to running the analysis on the events that meet only the first criterion (see Figure A.7). Implementing the second criterion requires us to systematically identify the names and asset sizes of the twenty largest depository institutions around each 30% bank equity decline. This is feasible due to the comprehensive database created

[2] In practice, we implement these two criteria sequentially. In a first step, we use the panel of bank equity returns (specifically, annual excess total returns with a December 31 year-end) to select all country-year observations in which there is an annual return of less than -30%. All such bank equity declines are reported in Table A.2. In a second step, we screen for the failure of a top-20 depository institution within a 0-to-+5-year window around each bank equity decline. (The top 20 banks are ranked by asset size within each country five years prior to each failure event, since a bank can rapidly decrease in asset size upon encountering distress.) The crisis start is defined as the latest year satisfying both criteria. Note that this is a real-time definition that does not require any future information.

by Baron, Schularick, and Zimmermann (2024, henceforth BSZ).[3] The definition of a bank failure within these top-20 banks is also from BSZ.[4]

Table A.1 lists the resulting 76 bank equity crises. Table A.1 shows that, except in two cases, all our bank equity crises are also BVX bank equity crises (using their definition).

It is important to note that this definition of "bank equity crises," by design, only selects a subset of all potential bank distress events. However, our criteria provide a *real-time* diagnostic tool for policymakers and macroeconomists to identify, investigate the underlying mechanisms of, and design policy interventions for a well-defined and macroeconomically consequential type of banking crisis. As such, our definition covers nearly all episodes that are typically labeled as "systemic crises" (e.g., by Reinhart and Rogoff (2009)), including the 2007-08 banking crises and Great Depression banking crises across many countries. In Section III, we show that our main results are robust to different crisis definitions and dates, such as Laeven and Valencia (2020) banking crises and 30% year-over-year declines in bank equity using either annual or monthly data. While our definition does not cover certain events, such as the 1998 LTCM collapse or bank-run episodes without large bank equity declines, we compare bank equity crises to these other types of banking crises (and to averted crises) in Section VI, showing that other types of banking crises have different dynamics and respond differently to policy interventions. Our work thus allows policymakers and macroeconomists to systematically separate out different crisis types.

C. Monthly equity index returns around bank equity crises

[3] The BSZ database includes the identities and annual balance sheets of all banks (defined as all depository institutions, e.g., commercial banks, savings banks) in 17 economies since 1870, ensuring coverage of all banks within the top 20 in each country. For 30% bank equity declines outside of these 17 economies, we compile lists of the top 20 banks by assets using extensive historical research documented in each case.

Bank balance sheets of the largest depository institutions were observable to market participants in all 17 countries, even as far back as 1870 (BSZ 2024). Annual bank balance sheets were published for each country in government statistics released to the public and investor manuals, which is how they were collected by BSZ. Thus, the identities and sizes of the twenty largest banks were known to market participants.

[4] BSZ identify individual bank failures in their dataset using a broad definition of failure, which includes outright failures (i.e., suspensions of payments leading to liquidation, judicial bankruptcies, or resolution by a government agency), as well as nationalizations and government-arranged acquisitions of banks on the verge of failure. Additionally, we classify a bank as failing if its stock total return is less than -80% in a single year. This accounts for government guarantees to creditors and other policy interventions during crises, which can make outright bank failures rare in some countries and periods even for banks that are highly insolvent.

We use monthly bank equity index returns and nonfinancial equity index returns from BVX. All series are expressed as log excess total returns, as of month-end. We use these data for analyzing the higher-frequency response of equity prices to the onset of the crisis (in Section III) and to liquidity-based policy interventions (in Section V).

D. Individual bank returns and balance sheet characteristics around bank equity crises

A significant contribution of this paper is a new individual-bank dataset across historical crises. We build an annual panel dataset at the individual bank level for the ten largest banks by total assets within each country and around each bank equity crisis.[5] This dataset contains the following variables: bank-level equity prices and total returns (for publicly traded banks), balance sheet quantities (assets, loans, book value of common equity), shares outstanding of common equity (used to compute market capitalization), dividends, net income (and its components) and equity issuance. We describe the construction of each of these variables below.

Building this dataset was a multi-year project that involved newly uncovering many historical sources from archives worldwide. Given the detailed resources needed for its construction, this dataset is limited to the 17 economies covered in JST. Historical sources for each country are listed in the appendix, and specific sources for each bank and variable are carefully documented in the individual data files for each crisis here, which will be made publicly available.

The variables used in this dataset, all reported at the bank-year level (as of December 31), are as follows. Further details on their construction can be found in the appendix.

- Equity total returns are calculated for each stock based on the year-end price $P_{i,b,t}$ and yearly dividend $D_{i,b,t}$ for country *i*, bank *b*, and year *t*. All quantities are meticulously adjusted for effective stock splits (e.g., due to stock splits, dividends in additional shares) and other dilutions (e.g., rights issuances). Returns are then expressed as log excess total returns.
- The shares outstanding of common equity $Shares_{i,b,t}$ is recorded and used to compute equity capitalization (= $P_{i,b,t}$ * $Shares_{i,b,t}$) and equity issuance (as explained below).

[5] The top ten banks are ranked by total assets five years before the start of each bank equity crisis, to hold the sample composition constant throughout the five-year window around each bank equity crisis.

- Balance sheet quantities (assets, loans, book value of common equity) for each bank and year are taken from BSZ and cleaned to get consistent series for each bank from year -5 to +5 around each crisis. Annual growth rates are then computed for these variables at the bank level as log real growth rates (using the country's inflation rate).
- Net income is recorded for each bank and year and then divided into components: losses from write-downs, income from securities trading and asset sales, and everything else (the residual category, which net interest income and all other revenues and expenses). "Write-downs" are defined as revaluations of assets that *remain on the balance sheet* and correspond to *expected* future reductions in cash flows (e.g., possible or actual loan losses and impairments, provisions against future credit losses, additions to loan loss reserves, write-downs of the value of fixed assets, and goodwill impairment changes). In contrast, the second category, which we refer to using the short hand "trading income", broadly encompasses all realized gains and losses from securities trading and dispositions of assets, including of securities, real estate, loans, and subsidiary organizations.
- Equity issuance of common equity for each bank and year is calculated following Stephens and Weisbach (1998) and Baron (2020). The method is based on the change in common shares outstanding, accounting for whether the equity issuance is an open-market sale (thus using the market price at issuance) or a rights issuance (using the offering price, while adjusting prices and quantities to capture the effective dilution). Equity issuance data is also collected from the variable "cash flow from financing activity: equity issuance" from banks' cash flow statements; this variable is only available for a subset of banks after 1990. The full details for computing bank equity issuance can be found in the appendix.

E. Policy interventions

Monthly dates of liquidity-based interventions and recapitalizations.

We build a database of the monthly starting dates of policy interventions for all bank equity crises in our sample. We record three types of policy interventions: 1) extraordinary central bank liquidity support to the banking system, 2) announcements of bank liability blanket guarantees, and 3) government recapitalizations. We refer to the first two types of policy interventions

collectively as "liquidity-based interventions." This database expands upon Laeven and Valencia (2020) and Metrick and Schmelzing (2024): our contribution is systematically listing the starting month of these interventions, extracted from textual excerpts within these databases and also using other historical sources. The starting month is assessed based on our best interpretation of the narrative evidence for each historical banking crisis.[6]

We define these three types of policy interventions following Laeven and Valencia (2020). "Extraordinary central bank liquidity support" occurs when central bank liquidity provision first exceeds 5% of bank liabilities. "Bank liability blanket guarantees" occur when the government announces explicit protection of nearly all bank liabilities of the entire banking sector. (Actions that only raise deposit insurance coverage do not qualify.) "Government recapitalizations" occur when a government fund is created to purchase newly issued common or preferred bank equity and the fund then recapitalizes three or more banks. (Capital requirements, prompt corrective action, and other policies that compel banks to raise new equity do not qualify.) We note that these three types of policy interventions are only a subset of all possible policy interventions. Our database should not be seen as a comprehensive set of all possible responses to banking crises.

Figure A.1 plots a timeline of liquidity-based interventions and recapitalizations (or "no intervention" of these types) across the history of bank equity crises in our sample. Figure 1 shows that these types of government interventions have become more frequent over time. Recapitalizations, for the most part, are a relatively recent phenomenon.

Detailed database of government recapitalization programs

To investigate recapitalization programs across historical bank equity crises, we build a detailed database on their size, timing, and breadth. Given the extensive historical research needed for each individual case, we restrict ourselves to the 17 advanced economies from JST. We defer a detailed discussion of this database to Section V.

F. Summary statistics

[6] Table A.1 lists the starting months of policy interventions for each bank equity crisis. Table A.3 provides descriptive statistics on the frequency of each intervention type and the time between banking crisis onset and interventions.

Table 1 reports summary statistics for the country-year panel (Panel A) and the individual bank-year panel (Panel B). Panel A shows summary statistics for the index returns of bank stocks and nonfinancial stocks across 46 economies over the period 1870-2019, expressed as either real total returns or excess total returns, along with the dividend yields and real dividend growth of bank stocks and nonfinancial stocks. Panel A also includes the real earnings growth, real market capitalization growth, and real book equity growth of banks; these metrics are aggregated from the individual bank data and are thus only available for the 17 JST economies in a ±5-year window around bank equity crises. Panel B reports similar statistics for individual banks in ±5-year windows around bank equity crises for the ten largest banks within each country.

III. Banking crises as permanent shocks to bank value

A. Returns analysis

Using the panel of yearly stock returns, we first analyze the equity returns of publicly traded banks and nonfinancial corporations around bank equity crises across 46 economies from 1870 to 2019. Figure 1 plots the buy-and-hold abnormal returns around the start of bank equity crises for the bank and nonfinancial equity indexes, estimated using the following equation:

$$r_{i,t-k,t+h} = \alpha_i + \beta^h BankingCrisis_{i,t} + \varepsilon_{i,t+h} \quad (1)$$

The dependent variable, $r_{i,t-k,t+h}$, is the cumulative log excess total returns from year *t-k* to *t+h*, for either banks or nonfinancials in LCU. $BankingCrisis_{i,t}$ equals 1 if country *i* enters a crisis in year *t*, and α_i denotes country fixed effects. Since the fixed effects subtract the country average returns, the estimated coefficient β^h captures the "abnormal" returns of the equity index for a given horizon *h*, where we define "abnormal returns" as the log excess total returns of either the bank or nonfinancial index *minus the country average* of the same index. In Figure 1, we set k = 1, so that all cumulative returns are relative to the year (t-1) before the crisis. The estimated coefficients β^h for $h \in [-5,5]$ are then plotted, where *h* measures the years relative to crisis onset. The figure also includes 95% confidence intervals based on Driscoll-Kraay standard errors.

The coefficients plotted in Figure 1 thus represent cumulative buy-and-hold abnormal returns, relative to the year before the crisis. Figure 1 shows that both bank equity (blue) and

nonfinancial equity (orange) sharply decline at the start of the bank equity crisis (i.e., from year t-1 to t), resulting in average abnormal returns of -68 and -36 log-points, respectively.

Do stocks recover to their pre-crisis level after this initial crash or earn elevated returns going forward relative to the country average? In Figure 1, since abnormal returns measure the returns relative to the country average, a flat segment parallel to the horizontal axis (represented by the dashed horizontal line) would correspond to cumulative returns that equal the country's average, while an upward- or downward-sloping segment would correspond to returns that overperform or underperform the average.

Figure 1 shows that for banks, cumulative equity returns after the start of the crisis (i.e., relative to year t) are not elevated above their country average (i.e., above the dashed horizontal line). The coefficient estimates in Table 2 measure the cumulative abnormal returns relative to year t (using Equation (1) with k = 0) and show no significantly elevated returns for bank stocks (Panels A and C). In fact, the point estimates are consistently negative for horizons of one to five years, and significantly so in years 3 and 4 after the start of the banking crisis.

In contrast, cumulative returns for nonfinancial firms after the start of the crisis tend to be significantly above their country average. Coefficients in Table 2 for nonfinancials' cumulative abnormal equity returns (Panel B and D) are uniformly positive and tend to increase with the horizon. After five years, the cumulative returns for nonfinancials are significantly elevated by roughly 30 log-points relative to the unconditional average. Related, Figure 1 shows that nonfinancials' equity returns to its pre-crisis trend by year t+5.

The collapse of bank stocks around banking crises has ramifications for the broader economy. The cumulative returns for nonfinancials following banking crises are substantially lower in countries with lower cumulative returns for banks, as demonstrated by Figure A.2 and Table A.4. This suggests that permanent shocks to bank values are associated with slower recoveries of the broader economy.

We conclude that bank stocks experience a large and permanent drop in abnormal returns in the year of the crisis (from year -1 to 0), followed by future cumulative abnormal returns that are either close to zero (statistically insignificant for years 1, 2, and 5) or significantly negative (in years 3 and 4). Either way, these results are inconsistent with theoretical models of banking crises that predict elevated returns in times of financial stress. Furthermore, bank equity does not recover

its pre-crisis level: Figure 1 shows that the decline in bank equity is permanent. In contrast, the decline in nonfinancial equity is mostly transitory, with nonfinancial equities earning above-average returns after crises.

The results remain robust across various specifications. Figure A.3 shows the results using abnormal real returns instead of abnormal excess returns. Figure A.4 and Table A.5 also report the results for the broad market equity index. Figure A.5 compares advanced versus emerging economies; compares periods before versus after 1945; and excludes the Global Financial Crisis (GFC). Figure A.6 considers alternative methods for computing abnormal return: subtracting country-specific average returns computed in expanding windows from 1870 to year t-5, subtracting country-specific average returns computed in rolling windows from year t-15 to t-5, or not subtracting anything (i.e., no country fixed effects). Figure A.7 replicates the analysis around 30% bank equity declines rather than around bank equity crises. (30% annual bank equity declines, a larger set of episodes of which bank equity crises are a subset, are listed in Table A.2.) Figure A.8 replicates the analysis using monthly data around the monthly start dates of BVX crises, Laeven and Valencia crises, or year-over-year 30% annual bank equity declines instead of bank equity crises. Figure A.9 extends the horizon to ten years before and after each banking crisis. Figure A.10 excludes the 22 banking crisis episodes for which data are unavailable for the full ±5-year window, demonstrating that the results in Figure 2 are not driven by shifts in the composition of episodes. Figure A.11 rebuilds the bank indexes for the 17 JST economies using the individual-bank data but excluding banks that fail or exit at any point, demonstrating that the performance of the bank equity index is not driven by banks that fail but by the performance the surviving banks. Figure A.12 shows that the results are robust to deliberately timing crises late.[7] The results of all the above analyses are similar to our main results.

[7] The potential concern is that if one marks the crisis too early, the subsequent low cumulative returns might be driven by the tail end of the initial crash. This is not the case for several reasons. First, the analysis in Figure A.12 shows that the main results are robust to deliberately marking the crisis six or twelve months late. Second, as Figure 1 shows, the low average future returns are mainly driven by underperformance in years two and three after the crisis onset, not in year one. Third, our definition of a bank equity crisis already tends to select the crisis slightly *later* than BVX crises: on average 0.6 years later and in only one case (out of 76) before BVX crises. Furthermore, in all but four cases, our definition selects the crisis after the start of the panic phase. For example, all GFC crises are dated as of December 2008 or later (several months after the panic triggered by Lehman Brothers's collapse), and all Great Depression crises are dated as of December 1931 or later (after the start of the nationwide U.S. banking panic in fall 1931 and the European panics in summer-fall 1931). Selecting the crisis later is advantageous to us, since it captures crises after the sharp initial bank equity decline associated with the crisis onset, and thus the future returns after the crisis are not driven by the tail end of the initial crash.

We also perform several robustness exercises that analyze returns after controlling for volatility, factor portfolio returns, and classical market anomalies. Figure A.13 controls for factor returns (market, value, size, momentum, and global equity market factors of Karolyi and Wu (2021)). Table A.6 and A.7 controls for time-series momentum. Table A.8 further analyzes risk-adjusted returns by building trading strategies around bank equity crises and computing a variety of performance metrics of these strategies that control for risk and factor portfolio returns. These analyses strengthen our main conclusions by showing that bank returns after the start of banking crises are even lower than in our main analyses after accounting for higher levels of measured risk.

B. Bounce-backs at short horizons

In this section, we examine bank equity returns at a monthly frequency around bank equity crises. At this higher frequency, we can observe that bank equity returns often do bounce back some from their troughs during the most acute phase of a crisis and that these bounce-backs typically occur around the end of the banking panic phase of the crisis. However, the bounce-back is generally modest in magnitude compared to the initial crisis drop and reverses at longer horizons. Hence, bank return dynamics align with temporary illiquidity or discount rate-driven theories of banking crises, but only at shorter horizons. The evidence at longer horizons indicates permanent losses.

We first highlight these results around selected bank equity crises to showcase the full range of dynamics, which can get averaged out when aggregating across crises, before turning to a systematic analysis across all bank equity crises. Figure A.15 plots bank equity index returns (here regular excess returns, *not* abnormal excess returns) around selected banking crises. Each plot displays monthly cumulative log excess total returns relative to the pre-crisis bank equity index peak. The figure highlights key events with vertical lines: the start of the panic (red solid line), the panic end (green solid line), liquidity-based interventions (light blue dashed line), and government recapitalizations (orange dashed line).

Monthly returns in Figure A.15 reveal a bounce-back in bank equity returns that begins around the month the banking panic ends and policy interventions occur. However, in the eight selected cases in Panels A and B, the bounce-back is small compared to the initial crisis drop, and the bounce-back reverses at longer horizons ranging from one to seven years. Even in the largest

bounce-back (Germany 2008), the recovery is only 40% of the initial decline and reverses within three years. Bank equity does not return to its pre-crisis level. Thus, while bank equity dynamics are consistent with temporary illiquidity or discount rate-driven theories at shorter horizons, the evidence at longer horizons points to permanent losses.

We next show that these claims hold true systematically across all bank equity crises and even relative to the lowest point in the crisis. Figure 2 plots bank and nonfinancial returns relative to the monthly trough in cumulative bank excess returns around each bank equity crisis. To construct this figure, we calculate log excess total returns for banks and nonfinancials relative to the trough in the cumulative bank excess return index around each crisis, and then average these values across crises. The figure shows that, even relative to the worst point in the crisis, the bounce-back in returns for bank stocks is modest compared to the initial crisis drop and partially reverses itself after approximately one year.

This analysis purposely assumes retrospective knowledge of when the trough occurs, which is unrealistic for an investor in real time. However, the point of this analysis is that even if one could time the trough perfectly, the bounce-back for bank stocks is still modest relative to the initial crisis drop. These returns correspond to an *upper bound* on what a long-only buy-and-hold bank equity investor could obtain. It should be noted that the above results primarily hold for bank equity (blue); in contrast, nonfinancial equity (orange) recovers to nearly 80% its pre-crisis peak, though only after five years.

C. Cash flows around banking crises

Discount rate-driven theories of banking crises predict that bank stocks experience a large but mostly temporary drop in value. We have shown that bank equities do not earn elevated returns or recover in the five years after a crisis, thus interpreting the initial shock to bank equity as permanent. We next show that the sharp decline in bank equity returns at the crisis onset predicts declines in future cash flows. We thus interpret the bank equity declines around crises as due to a cash flow effect, rather than a discount-rate effect. In other words, bank equity falls permanently because bank cash flows also decline permanently.

Figure 3 plots the real dividend-per-share index and real earnings-per-share index for the bank and nonfinancial equity indexes, averaged across banking crises, along with the interquartile range across crises. To construct Figure 3, we compute market-capitalization-weighted indexes of cash flows $CF_{i,t+h}$ (the real dividends index and the real earnings index) in the $h \in [-5,5]$ window around all banking crises, where t is the starting year of a banking crisis. We normalize $CF_{i,t+h}$ by its value $CF_{i,t-1}$ in the year before the start of the crisis and then compute the average and interquartile range of $CF_{i,t+h}/CF_{i,t-1}$ at each horizon $h \in [-5,5]$ across crises. As a result, Figure 3 plots the average level of real dividends per share (Panel A) or earnings per share (Panel B) relative to the year before the crisis.

Figure 5 shows that both banks and nonfinancial firms significantly cut their dividends and report lower earnings following a crisis. For banks, dividends and earnings remain well below their long-term average five years post-crisis, while for nonfinancial firms, they rebound, though only slowly through year 5.[8] While bank dividend cuts around the onset of the crisis may be partly driven by government mandates, the fact that both dividends and earnings are persistently low five years out suggests that this cannot fully account for our results.

We then analyze whether the initial declines in bank equity at the crisis onset capture long-term decreases in banks' cash flows. Table 3 presents results from panel regressions of long-term changes in cash flows after a bank equity crisis on bank excess returns in the crisis year. Panel A reports regression estimates at the country level using Equation (2a), while Panel B reports regression estimates at the individual bank level (for the ten largest banks by assets in each country around each bank equity crisis) using Equation (2b).

$$\Delta y_{i,t-1,t+5} = \alpha_i + \beta r_{i,t-1,t} + \varepsilon_{i,t} \tag{2a}$$

$$\Delta y_{i,b,t-1,t+5} = \alpha_b + \beta r_{i,b,t-1,t} + \varepsilon_{i,b,t} \tag{2b}$$

The dependent variables used in different specifications are the changes in real earnings and real dividends from one year before a banking crisis starts to five years after, using the country

[8] Data on banking sector earnings per share (EPS) for Panel B is calculated by aggregating the bank-level data for the ten largest banks into a market capitalization-weighted country-level index for banks' EPS (analogous to how the dividend indexes were created by BVX). Since this data was aggregated from the bank-level data, it only covers 17 economies since 1870. For nonfinancial firms, comprehensive data on their aggregate earnings since 1870 is unavailable across all these countries and hence not plotted.

index (Equation (2a)) or bank-level data (Equation (2b)). The independent variable is the bank log excess total return in the crisis year using either the country index or bank-level data. The regressions are estimated conditional on a banking crisis.[9]

We observe coefficients at both the country and bank levels that are statistically significant and roughly in the range of 1 to 2, suggesting an approximately commensurate relationship between the initial stock decline and subsequent decreases in cash flows. Panel A shows that banking crises with larger initial bank equity declines at onset have larger long-run declines in aggregate bank real earnings and real dividends. Panel B shows that in the cross-section of individual banks, those with larger initial equity declines experience larger long-run declines in real earnings and real dividends. These bank-level results hold with crisis fixed effects (even-numbered columns in Panel B), meaning that within a crisis, banks with relatively worse returns also have relatively worse cash flows.[10]

Overall, the evidence indicates that the market decline in bank equity at the crisis onset predicts a roughly commensurate long-run decline in bank cash flows, both at the country and individual-bank level. This cash-flow effect contrasts with theories of banking crises stressing temporary illiquidity or binding leverage constraints as the main driver of bank losses, as these theories predict that much of the decline in bank equity should be discount-rate driven.

D. Heterogeneity across banks within bank equity crises

Are all banks similarly hit in crises, or are losses concentrated in specific institutions? To answer this question, we analyze the cross-section of banks. We show that most crises are driven by losses concentrated in a few institutions that are persistently and severely distressed. These institutions have predictable future negative returns, large lending contractions, persistently lower capitalizations (as measured both by book and market values), and large accounting losses

[9] Note that the dependent and independent variables in these regressions have overlapping horizons by design. This is because we are asking whether the bank equity decline in year t reflects cash flow declines both in year t and in future years through t+5, given that stock prices should reflect both contemporaneous and future changes in cash flows. Thus, these regression estimates should be thought of as capturing correlations, not predictions.

[10] Baron and Xiong (2017) show that equity investors do *not* tend to anticipate future bank distress in the years *before* the crisis onset. In other words, the bank equity crash at the crisis onset tends to systematically come as a surprise to equity investors. However, once this "Minsky moment" occurs and asset prices crash, market prices at this point do *mostly* (though not always perfectly, see subsection III.E) anticipate future bank fundamental decline.

(especially in the form of write-downs); these bank-level outcomes are predictable in the year of the crisis onset with five-year-ahead prediction horizons.

We implement this analysis by exploiting banks' market-to-book ratios. As Begenau et al. (2024) shows for U.S. banks around the 2008 crisis, and as we show here for an international sample of banks across historical crises, the market-to-book (M/B) ratio of banks is a highly informative variable that captures the cross-section of bank distress during crises. We start by sorting the largest ten banks by country into five bins based on their market-to-book (M/B) ratio in the year of banking crisis onset. The five bins consist of M/B ratios of: 0 to 0.2, 0.2 to 0.4, 0.4 to 0.6, 0.6 to 0.8, and >0.8. We call banks with the lowest M/B ratios the most distressed banks, and those with the highest M/B ratios the least distressed or the healthiest. As Figure A.18 shows, before bank equity crises, banks in all these bins have similar average M/B ratios around 1.2, which then fall sharply around the start of crises. Figure A.16 traces the evolution of the M/B ratio over the five years after crisis onset and finds that M/B is persistently low. This is because market values (M) permanently crash at the crisis onset, as previously shown in this section, while book values (B) are sticky, reflecting slow write-downs of book value, as we will see in Section IV.

Figure A.16 panels B-D plot the dynamics of several outcome variables (future excess bank returns, real credit growth, and net income) over a future five-year horizon after the onset of crises and finds that the most distressed banks, as measured by M/B in the year of the crisis onset, have persistently worse outcomes. Figure A.17 plots the distribution of these outcome variables five years after crisis onset across banks and finds negative skewness (even after including a crisis episode fixed effect), demonstrating that large losses and severe outcomes are concentrated in a few institutions in the left tail.

To analyze these patterns more formally, we estimate Equation (3) at the individual bank level, using bank-level M/B ratios in the year of the crisis onset to predict outcomes five years ahead. Equation (3) presents the following nonparametric specification:

$$\Delta y_{i,b,t,t+5} = \alpha_i + \sum_k \beta_k \, M/B(lower_k, upper_k)_{i,b,t} + \varepsilon_{i,t} \tag{3}$$

The equation is estimated on bank-year observations corresponding to the onset of bank equity crises (denoted year *t*) for the largest ten banks within each country, with individual banks indexed by b. The regressions include indicator variables, $M/B(lower_k, upper_k)_{i,b,t}$, that take the value of one if the bank has a market-to-book ratio within a certain range.

Results are reported in Table A.10. The results show that the banks with low M/B at the crisis onset have lower future excess total returns (column 1), lower real credit growth (column 2), lower real book equity growth (column 3), lower net income (column 4), and greater losses due to write-downs (column 5) at the future five-year horizons, relative to the high-M/B banks. The differences are large in magnitude. The coefficients are monotonic across M/B bins, from the most distressed banks with M/B < 0.2 to the healthiest banks with M/B > 0.8 in the year of the crisis onset. Overall, these results suggest that the negative aggregate outcomes after banking crises are driven by losses concentrated in a few institutions that are persistently and severely distressed.[11]

E. Heterogeneity in outcomes across bank equity crises

Substantial heterogeneity exists in bank equity outcomes across crises. Recall Figure A.15, which plots the monthly cumulative returns around twelve selected bank equity crises. The episodes plotted in panels A and B present crises with low long-run bank equity (i.e., no recovery); low future returns are typical across the majority of bank equity crises in our sample. Panel A depicts four European economies during the Global Financial Crisis (Germany, Netherlands, Switzerland, and the UK), showcasing near-zero or even negative cumulative returns in the ten years after crisis onset. We stress again that Figure A.15 shows excess total returns, not abnormal returns, so the negative cumulative excess returns are not being driven by any transformation. Panel B plots another four examples of bank equity crises further back in history also with near-zero average long-run returns: France in 1931, the United States in 1931, Japan in 1997, and Thailand in 1997. In contrast, Panel C provides examples of banking crises followed by high bank equity returns after crises, which include Sweden in 1991 and the US in 2008. Bank equity crises with high long-term returns after crisis onset are less typical in our sample. Thus, the high returns of bank stocks in the United States after 2008 should be seen as an exception and not the rule.

[11] Table A.11 reports an additional result that, while recapitalizations predict improved future outcomes for the least-distressed (high M/B) banks within a crisis, they predict no future improvement for the most-distressed (low M/B) banks. This result follows from a specification similar to Equation (3) that interacts M/B ratios in the crisis onset year with bank-level recapitalizations to predict five-year-ahead bank-level outcomes. In interpreting this result, it should be noted that equity issuance is endogenous to the crisis severity. However, the result does show that recapitalizations have historically been insufficient at the most-distressed banks, as highly negative outcomes still subsequently occur.

Figure A.18 systematically explores heterogeneity across bank equity crises, plotting the median and interquartile range of the cumulative abnormal excess returns across crises. Figure A.18 shows that the interquartile range for bank equity lies entirely below the horizontal axis, suggesting that at least 75% of crises do not see recoveries in bank equity.[12]

The above evidence suggests that most bank equity crises see low future returns for banks after crises, with modest to no bounce-backs or recoveries. There are, however, a small number of cases (e.g., Sweden in 1991, the US in 2008) which have large recoveries. Which factors predict high returns after crises? While such an analysis is limited by the small sample size (75 bank equity crises for which subsequent returns data to t + 5 is available), Table A.13 reports estimates from a regression across bank equity crises, in which the dependent variable is the log excess total returns of the bank equity index (Panel A) or cumulative real GDP growth (Panel B) from year t + 1 to t + 5 (relative to the start of the bank equity crisis in year t). The regressor variables are modified to reflect only information known by the end of year t + 1, as to avoid any look-ahead bias. Table A.13 shows that accommodative monetary policy and fiscal policy, quick write-downs (relative to market-value losses), and quick banking sector recapitalizations—all before or at year t + 1—predict higher future bank returns. These results are also visualized in Figure A.19, which splits the sample of bank equity crises by these predictor variables.[13]

Table A.13 also shows that the long-run underperformance of banks is substantially more pronounced when a crisis is preceded by a credit boom.[14] To see the impact of credit booms more clearly, Figure A.20 and Table A.14 replicate the main analysis from Figure 1, splitting banking crises into those that are preceded by a credit boom and those that are not. A preceding credit boom is defined as an above-median change in the credit-to-GDP ratio, measured over the pre-crisis trough to peak. When a credit boom precedes a crisis, we observe an *additional* 60 log-point

[12] In a related analysis, Table A.12 explores heterogeneity across crises in bank-level outcomes, policy interventions, and other observables, comparing the 1870-1945 period to the 1946-2019 period, along with comparing advanced economies to developing economies. Table A.12 shows, among other things, that bounce-backs and recoveries in bank equity returns are no more or less common in any of these subsamples.

[13] As we show in Section V, the US in 2008 and Sweden in 1991 were notable examples of countries that implemented large and prompt recapitalization programs, which also forced banks to rapidly acknowledge asset losses. The so-called "Swedish model" of crisis resolution is often credited as a key factor in Sweden's quick recovery after the 1991-93 crisis (Jonung 2009).

[14] Note that this result is different from those of Schularick and Taylor (2012) and Baron and Xiong (2017) on the predictability from credit booms. In this analysis, we skip the first two years of the crisis (years t and t + 1) when most of the bank equity crash and GDP crash happen, instead focusing on predicting subsequent returns up until year t + 5.

abnormal decline in bank equity excess total returns occurring in year 3 after the crisis starts and persisting through year 5 and beyond. In contrast, crises not preceded by credit booms earn returns similar to the country's unconditional average return. This result supports the hypothesis that bank equity underperformance in these cases could be driven by unexpected future deterioration in bank asset quality from a credit boom-gone-bust. Nevertheless, all crises result in permanent losses in the banking sector.[15]

IV. Deterioration in asset quality as a key mechanism explaining bank losses

Thus far, we have shown that the market value of bank equity declines permanently at the onset of banking crises, and this decline predicts future deterioration in banks' cash flows. In this section, we analyze banks' accounting losses to analyze the drivers of the permanent equity declines. We present evidence that across historical bank equity crises banks' losses are mostly explained by write-downs, rather than by asset sales during panics, although losses from asset sales can be substantial for banks that hold a large fraction of securities in their portfolios.

A. Decomposition of banks' accounting losses during bank equity crises

There is substantial evidence that fire sales are an important aspect of financial crises; see Shleifer and Vishny (2011) for a comprehensive review. During fire sales, banks may be forced to liquidate assets, usually securities, at values substantially below their long-run fundamental values, imposing large immediate accounting losses on the sector (Shleifer and Vishny 1997, 2010; Diamond and Rajan 2011; Gorton and Metrick 2012).

Another view of financial crises is that permanent losses in banks' market values arise from a deterioration in asset quality (e.g., Calomiris and Mason 2003). According to this view, bank losses arise from shocks to the value of bank assets, with banks being slow to recognize accounting

[15] Figure A.13 shows that housing returns are persistently negative in the five years after banking crises and do not recover to pre-crisis levels. To the extent that credit booms and busts are often driven by real estate (Jordà, Schularick, and Taylor 2015) and that banks in many historical banking crises have large real estate exposures, the slow and persistent decline in real estate prices after crises may be one factor helping to explain our results of why bank returns underperform in the aftermath of credit-boom-driven crises. In other words, one interpretation is that bank equity investors at the start of the crisis might not fully anticipate the depth or persistence of the future real estate decline.

losses on permanently impaired assets, even though equity markets recognize most of these losses in the initial year of the banking crisis. The literature has shown that nonperforming loans (NPLs) are a common aspect of systemic banking crises (e.g., Laeven and Valencia 2013, Ari et al. 2021) and tend to result from poor lending standards during boom periods (e.g., Dell'Ariccia and Marquez 2006). Discretion in accounting rules for loan loss provisioning encourages a delay in the recognition of loan losses (Laeven and Majnoni 2003, Bushman and Williams 2012, Laeven and Huizinga 2019). Additionally, poorly designed capital regulation can encourage risky banks to "evergreen" bad loans to existing borrowers, which can lead to further deterioration in loan quality and distortive effects on the real economy (e.g., Peek and Rosengren 2005, Caballero, Hoshi and Kashyap 2008, Acharya, Crosignani, Eisert, and Steffen 2022).

Both views of financial crises can be complementary. Indeed, fire sales and deteriorations in asset quality can reinforce each other, especially in highly leveraged institutions such as banks, resulting in downward asset price spirals (Brunnermeier 2009; Shleifer and Vishny 2011). Moreover, write-downs could result from fire sales in the broader economy (e.g., of real estate projects or corporate assets) affecting the collateral values underlying banks' assets, leading to adverse feedback effects on the net worth of banks (Kiyotaki and Moore 1998).

In this section, we demonstrate that most bank losses during bank equity crises, at least as measured directly, stem from write-downs of assets that remain on banks' balance sheets. These write-downs are slowly recognized after the crisis onset but account for nearly all of banks' market-value losses by year five after the crisis. However, in crises where banks hold a larger fraction of their assets in tradable securities, realized accounting losses are more immediate, and a larger fraction of total losses are attributable to trading losses rather than write-downs.[16]

Our analysis proceeds in two parts. First, we compare the realized accounting losses of banks with their market equity losses following the onset of banking crises. In all the balance sheet and income data we study, trading losses must be recognized in the year they occur, as securities trades and dispositions of assets are realized events immediately impacting the balance sheet.[17] If

[16] Other potential sources for the permanent loss in banks' market value after crises, which we do not analyze in this paper, include: reduced future profitability due to regulatory and supervisory limits on risk-taking, increased regulatory costs, reduced reputational value, and decreased fee-based income from financial services.

[17] Unlike for loan-loss recognition, there is little possibility, for mechanical reasons, of earning smoothing or accounting discretion when it comes to securities trading or asset sales. To see the logic of this, note that an asset sale

banks were forced by funding pressure to liquidate substantial assets at below-fundamental values, we would observe large immediate bank accounting losses during banking panics and a strong co-movement between book losses and declines in market value. However, this is not observed for the average bank. Realized book losses in the first two years after crisis onset, when all banking panics occur, only account for about 20% of banks' market-value losses. The majority of realized losses occur several years later.

Second, most realized losses are reported in the form of write-downs, defined as acknowledged valuation losses of assets that remain on the balance sheet. For this analysis, we break down banks' book net income into components and find that most of the market-value equity declines after banking crises can be accounted for by eventual write-downs, not by trading losses or dispositions of assets. Total losses from securities trading or dispositions of assets are a relatively small part of the total bank losses.

These results can be seen in Figure 4, which compares banks' market-value losses (black solid line) to their cumulative abnormal book income (black dashed line) in the years following bank equity crises. "Abnormal" is defined here for each bank as its yearly net income minus its value in the year prior to the crisis onset (year t-1), in order to capture changes from pre-crisis levels. Banks' market-value losses and abnormal book income are each aggregated over the ten largest banks within each country, normalized by these banks' aggregate book equity from the year before the crisis, and then averaged across crises in the 17 advanced economies over the period 1870-2019. Results from Figure 4 are also reported in tabular form in Table 4.

Figure 4 and Table 4 break down banks' book income into its components, which are also computed as cumulative abnormal values relative to year t-1 for each bank. These components of income are: a) write-downs and b) all other book income (in Panel A), and a) write-downs, b)

---

is a realized transaction and involves a reduction in securities or loans on the balance sheet and an increase in cash (or other assets). For example, if \$50 M in securities were sold for \$40 M in cash, the balance sheet would see a reduction in \$50 M in securities, an increase in \$40 M in cash, and a \$10 M equity loss that would be passed through to the income statement, in order for the balance sheet and income statement to reconcile. Concealing or delaying recognition of a trading loss or asset sale thus requires falsification of the balance sheet of confirmable items such as cash and securities. This is certainly possibly—one can point to historical examples of accounting fraud during banking crises—but taking such steps goes beyond standard earnings smoothing or accounting discretion.

To address potential concerns about the accuracy of historical accounting data, we replicate the main results on the post-1945 subsample (see Figure A.22) where there is stronger government bank supervision and independent external audits conducted under well-defined accounting rules in all 17 countries. We find similar results for this subsample.

trading income, and c) all other book income (in Panel B).[18] "Write-downs" are defined as revaluations of assets that remain on the balance sheet and correspond to expected future reductions in cash flows (e.g., revaluation of assets, possible or actual loan losses and impairments, provisions against future credit losses), while "trading income" broadly encompasses realized gains and losses from securities trading and dispositions of all assets, not just of securities.[19] Panels A and B of Figure 4 and Table 4 show that market-value bank losses mostly all occur during the first year of a banking crisis. This is consistent with the permanent decline in equity returns documented earlier. However, Panels A and B also show that realized book losses are relatively small over the first two years. Cumulative book losses are about 21% of pre-crisis book equity on average by the end of year 1, while market losses (black) account for roughly 40%.[20] Market losses plateau after the end of year 1, while book losses slowly increase over five years. By year five, book losses amount to roughly 35% of pre-crisis book equity. Figure 4 and Table 4 further show that most of the market-value equity declines can be accounted for by eventual write-downs. In Panels A and B, write-downs (solid blue line) closely track cumulative book losses (dashed black line), demonstrating that, on net, write-downs fully account for nearly all book losses and, by year five, all market-value losses. In contrast, losses from securities trading and asset dispositions (solid red line, Panel B) account for a small portion of total book or market-value losses.

Panels C and D of Figure 4 and Table 4 show that immediate accounting losses are larger for banks that hold more securities. Banks that are in the top quartile in terms of the ratio of securities to assets experience an immediate decline in book values in the first year of the crisis that is driven to a large extent by a decline in trading income (solid red line, panel D) and represents a large fraction of the deterioration in market values (solid black line, panel D). In contrast, banks that are in the bottom quartile of securities-to-assets (and mostly hold loans) experience a less

[18] Panel A and Panel B have different sample sizes due to data availability and therefore show similar but not identical results for market-value losses, total book losses, and write-downs. Panel A is based on 37 crisis episodes for which we have the breakdown of net income into write-downs and other income, while Panel B is based on 21 crisis episodes for which we have the breakdown of net income into the three categories as described above.

[19] In the case of bank failures, unless the financial statements after failure explicitly categorize losses into other categories, asset losses are assumed to be all "trading losses", under the maximal assumption that bank failures result in disorderly liquidations. We even allow total losses to exceed book equity in the case of bank failure, if book assets fall below liabilities and lead to losses absorbed by creditors or the government. By making these assumptions for bank failures, we are likely over-estimating banks' aggregate "trading losses".

[20] Note that magnitudes between Figure 4 and Figure 1 differ slightly due to different country samples (46 countries vs. 17 JST countries) and different normalizations (book equity vs. market equity in year t-1).

immediate decline in book values (dashed black line, panel C) that is mostly driven by write-downs (solid blue line, panel C) rather than by trading income (solid red line, panel C). The six bank equity crises in our sample that rank highest in terms of the ratio of securities-to-assets (weighted across banks) all take place during the 2007-2008 crisis episode, when fire sales of securitized assets were significant (Gorton and Metrick 2012).[21] These results are consistent with the view that banks' tradable securities are particularly vulnerable to fire sales (Brunnermeier and Pedersen 2009, Shleifer and Vishny 2011).

As robustness analyses, Figure A.22 replicates Figure 4 and Table 4 but for three subperiods, 1870-1945, 1946-2005, and 2006-2019, and finds that similar results hold on all three subperiods. While the relative contribution of write-downs to total losses is greatest in the 1946-2005 period, write-downs still account for most of total losses in the 1870-1945 period, demonstrating that the nature of losses in bank equity crises was not substantially different in this period before widespread deposit insurance and modern policy interventions.[22] Figure A.23 and Table A.15 report distributions of income components (write-downs, trading losses, net interest margin, and other), showcasing heterogeneity at both bank and crisis level. For most bank equity crises, write-downs tend to account for a large share of the total losses by year five after the crisis, though not all crises fit this pattern.

Taken together, these results indicate that permanent losses of banks during bank equity crises can mostly be explained by eventual write-downs, although losses from asset sales can be substantial for banks that hold a large fraction of securities in their portfolios.[23]

---

[21] These countries are Belgium, France, Germany, Switzerland, the United Kingdom, and the United States.

[22] See Figure A.24 for two examples of historical balance sheets and income statements during the Great Depression, those of Continental Illinois, a U.S. bank, covering the period 1934-36 and of Deutsche Bank, a German bank, covering the period 1932-34, showing the prominence of write-downs. For more general corroboration of the presence of write-downs in historical crises, the complete transcribed income data of all of the largest ten banks in each country around each bank equity crisis can be downloaded here, and all the original historical scans from which this data originate will be made publicly available.

[23] One caveat is that our analysis only examines the ten largest banks in each country. In some countries and periods, smaller banks might have less stable funding and be more prone to asset sales in crises. In addition, non-banks, especially securities firms, might be more prone to asset sales in crises, given their larger holdings of securities and less stable non-deposit funding. However, BSZ (2024) shows that, excluding the United States, the largest ten banks account for 40% to 90% of banking system assets (this range is computed across the same set of years and countries), and they have larger equity losses than smaller banks within the same crisis. These facts suggest that our sample of banks accounts for the majority of aggregate banking sector losses across most crises.

B. Evidence on nonperforming loans at the country level

We show that bank returns are closely associated with high NPL rates across bank equity crises. Figure 5 shows a scatterplot of cumulative bank equity total returns against peak NPL rates across crises. The x-axis measures peak NPL rates between year 0 and 5 after the start of the banking crisis. The NPL data comes from Ari, Chen, and Ratnovski (2019). This measure uses information not available at time 0, which is necessary because banks tend to be slow to recognize nonperforming loans. The y-axis plots the unlevered cumulative log excess total return of the bank equity index (from year -1 to +5). We use unlevered bank returns to capture the market value of *asset* losses, permitting direct comparison to NPL rates. We unlever returns by dividing them by the country's aggregate banking sector book leverage.[24] We limit the sample to JST countries for which we have data on nonperforming loans. Figure 5 shows that more negative unlevered bank returns are associated with higher NPL rates after banking crises. This negative relationship is statistically significant, as shown in Table A.16. We also report the goodness-of-fit, measured using the adjusted R^2 statistic, below the scatterplot in Figure 5. For our full sample of crises for which the NPL data is available, the adjusted R^2 is 0.233. However, this relatively low value is driven by two outliers where bank stocks have highly positive returns, the U.S. in 1990 and Sweden in 1991. Excluding these two observations, the adjusted R^2 is 0.533. Since measurement standards may be different across periods, Table A.16 also reports the results for the 2008-2010 crisis episodes only. The relationship in this subsample is even stronger with an adjusted R^2 of 0.606.

In contrast, Figure A.25 shows no association between nonfinancial equity returns and NPL rates. Hence, the association we observe for banks is not merely that crises with higher NPL rates have broadly worse equity returns. We conclude that at the country level, the poor returns of bank stocks following crises is well explained by asset quality deterioration in banks' loan portfolios.

V. Policy interventions and bank capitalization

In this section, we show that policy interventions have generally not been successful in restoring bank value after bank equity crises. Liquidity-based interventions do not predict an

[24] Figure A.25 plots analogous results for *levered* (i.e., unadjusted) bank excess total returns, showing similar adjusted R^2 estimates to those in Figure 5.

increase in bank market value beyond a transient bump, while bank recapitalizations have historically been small and delayed, contributing to persistent banking sector undercapitalization.

A. Bank equity after liquidity-based interventions

According to temporary illiquidity and discount rate-driven theories of banking crises, central banks and governments can restore confidence and funding stability to the banking system by acting as a lender of last resort. Doing so alleviates market illiquidity, borrrowing constraints, and fire sale pricing and leads to a sharp bounce-back in the price of bank-held assets. As a result, according to these theories, the implementation of extraordinary central bank liquidity interventions and announcements of blanket liability guarantees for the entire banking sector, unless fully anticipated by the market, should result in large and permanent increases in bank value.

Empirically, however, we find that these two types of forceful liquidity-based interventions are not followed by large or permanent increases in bank value. To demonstrate this, Figure 6 plots the cumulative abnormal monthly returns around the monthly start dates of liquidity-based interventions: the implementation of extraordinary central bank liquidity support or bank liability blanket guarantees, whichever comes first in each crisis.[25] Methodologically, this figure is similar to Figure 1 but using monthly returns data and liquidity-based intervention months.

Figure 6 shows that for banks (blue), liquidity interventions do not predict large or permanent increases in bank value. Initially, there is a continued decline in the two months following the intervention (perhaps because interventions need to ramp up in intensity to convince creditors that policymakers will do whatever it takes to backstop the banking system), after which point bank equities increase by around 20%. However, this 20% increase is transient and soon reverses, with the bank equity index declining between the 12th and 36th months after the intervention and then remaining low. This pattern is consistent with liquidity being restored and the probability of run-driven bank failures decreasing after the liquidity-based interventions before eventually giving way to the realization of larger permanent asset losses within the banking sector.

In summary, after liquidity-based interventions, we do not observe a marked recovery in equity values to pre-crisis levels. Instead, we see temporary bump, followed by a reversal and no

[25] Figure A.26 analyzes these two types of liquidity interventions separately and shows similar results.

elevated future returns. These findings are inconsistent with theories that attribute crises purely to bank runs and loss of confidence and liquidity, as these theories predict that interventions from a lender of last resort would lead to a rapid restoration of bank value by restoring market liquidity and removing the fear of run-driven bank failures (Gertler and Kiyotaki 2015, Dang, Gorton, and Holmström 2020, Gertler, Kiyotaki, and Prestipino 2020, Amador and Bianchi 2024). While some models (Gertler and Karadi 2011, Brunnermeier and Sannikov 2016) suggest an equivalence between liquidity interventions and equity injections, our evidence suggests that liquidity-based interventions do not fully restore bank capitalization after the onset of bank equity crises.

B. Government recapitalizations tend to be small, delayed, and narrow

Motivated by the fact that bank market equity values remain low long after crises, we investigate whether new bank equity issuance helps instead to restore bank market capitalization.

We start by analyzing government recapitalizations (bank equity issuance purchased with government funds) and private recapitalizations (bank equity issuance not purchased with government funds; our definition of such issuance also includes equity issuance compelled by capital requirements or prompt corrective action but without the use of taxpayer funds), which together sum to total bank equity issuance. Figure 7 Panel A shows cumulative total banks' aggregate equity issuance (blue) and equity issuances that are part of government programs (green). As in Figure 4, we benchmark these against banks' aggregate market-value losses (black line), though we reverse the sign of this plot relative to in Figure 4, so that losses are plotted as positive values. This analysis comprises the ten largest banks by country across 17 economies over the period 1870-2019. All quantities are normalized by aggregate bank book equity in the year before each crisis.

The main conclusion from Figure 7 is that new equity issuance is modest relative to losses. Total bank equity issuance (blue) is only a fraction of both the level of pre-crisis book equity and the realized value of bank losses in crises (black). Government recapitalization programs (green) account for about a fourth of bank equity issuance.

Panel B plots the change in the real aggregate market capitalization of banks, relative to the year before the onset of the crisis. Market capitalization is aggregated across the ten largest

banks within each country and averaged across bank equity crises. We find that banks' market capitalization is persistently lower after crises, both because bank equity prices are persistently lower (as previously shown in Section II) and because of modest new equity issuance, as we show in this section. To quantify the contribution from the latter, Panel B also plots a dashed line, which shows banks' market capitalization if bank equity issuance was counterfactually equal to zero after the crisis onset. The difference between the solid and dashed lines represents the increase in market capitalization due to equity issuance, which is only a fraction of the overall market capitalization loss. Overall, these results are inconsistent with models (e.g., Gertler, Kiyotaki, and Queralto 2012) in which outside equity slowly but eventually flows into the banking sector, due to high returns to scarce intermediary capital, helping to restore the banking sector's net wealth.

We next study government recapitalization programs in more detail to understand why they have historically been insufficient in restoring the capitalization of the aggregate banking sector. We comprehensively examine all government recapitalization programs across 17 economies since 1870. For the purposes of this database, a "government recapitalization" occurs when a government fund is created to purchase newly issued common or preferred equity in three or more banks. This database is the first of its type and allows one to see the full range of government recapitalization programs throughout history. Based mostly on new archival research that builds on the databases of Laeven and Valencia (2020) and Metrick and Schmelzing (2024), we focus on collecting detailed statistics on three key dimensions—the size, timing, and breadth—of all historical government recapitalization programs. Given the extensive historical research needed for each recapitalization, we restrict our sample to 17 JST economies over the period 1870-2019.

Table 5 presents this database, with summary statistics for each variable (mean, standard deviation, and percentiles) at the bottom of each panel. Panel A reports variables related to the *size* of government recapitalizations, while Panel B reports variables related to their *speed* (Columns 3-6) and *breadth* (Columns 7-10). Our main result from this analysis is that government capitalization programs have historically tended to be small, delayed, and narrow.

Regarding the *size* of recapitalizations, Panel A reports on the legislative allocation (column 3) and the amount actually used to purchase newly issued common or preferred equity in banks (column 4). Column 6 normalizes the latter by banking sector total equity in the year before the crisis onset (from column 5). Column 7 reports total bank equity issuance across all ten-largest

banks in the country from year 0 to year 5 around the crisis (normalized by book equity in year t-1), regardless of whether there was a government recapitalization, computed from the individual-bank data. Column 8 only includes the bank equity issuance during years that coincided with a government recapitalization program. Column 10 normalizes the total bank equity issuance by the market value of bank equity losses (column 9). Histograms of the distribution of these variables across bank equity crises are plotted in Figure A.27. The main takeaway is that the size of government recapitalizations tends to be small relative to both pre-crisis book equity and to the realized value of bank losses in crises. Table 5 reports that on average government recapitalizations amounted to 24% of book equity (column 7) and 43% of losses (column 10). There is wide variation, with some programs being substantially larger (like Sweden's 1993 recapitalization).

Regarding the *speed* of recapitalizations, Panel B reports the delay between the start of the banking panic and the first recapitalization program in columns 5 and 6, along with whether and when additional second or third rounds of recapitalization programs were instituted (column 4). Regarding the breadth of recapitalizations, Panel B classifies recapitalizations as broad or narrow. Broad recapitalizations, in our interpretation of the historical evidence, include a large number of both healthy and distressed banks, whereas narrow recapitalizations target only a few distressed banks. Panel B thus reports the number of banks recapitalized (column 8), the percent of the top-10 banks that were recapitalized (column 9), and an estimate of the percent of the entire banking system (weighted by assets) that was recapitalized (column 10).

We classify 65% of recapitalizations as narrow, and the median number of banks recapitalized is five. However, the percent of the banking system recapitalized (weighted by assets) is 56%, as narrow recapitalizations tend to target the largest banks. While the Troubled Asset Relief Program (TARP) in the U.S. after the 2008 financial crisis was unique in recapitalizing over 700 banks (broad) and was implemented about one month following the banking panic that started with the collapse of Lehman Brothers (timely), this is often not the case elsewhere. An example of extreme delay is the Japanese banking crisis of the 1990s. The crisis started with the real estate collapse in 1990, followed by prominent bank failures starting in 1994, and a major banking panic in the fall of 1997. The Japanese government implemented a recapitalization program only in March 1999, with a second program following in 2003. Two examples of narrow recapitalization programs are in Germany and Italy in 2008. Germany's SoFFin program only recapitalized five banks (out of hundreds in Germany), with major banks such as Deutsche Bank resisting the

government recapitalization program. Italy likewise only recapitalized four medium-sized banks, with nearly all major banks including UniCredit and Intesa Sanpaolo resisting the government recapitalization program.

In our view, government recapitalizations should be sufficiently large, timely, and broad. Table 5 suggests that most historical government recapitalizations did not meet these criteria.

VI. Comparison to other types of banking crises

Overall, our results indicate that once a bank equity crisis is reached (based on real-time indicators that a policymaker can observe), bank equity does not earn high future returns, the banking sector sees a sharp and persistent rise in nonperforming loans and asset write-downs, and liquidity-based interventions are not sufficient to restore bank capitalization. But do these dynamics hold for other types of banking crises, such as bank-run events without large bank equity declines? Furthermore, under what circumstances can bank-run events turn into large bank equity declines, or vice versa? And can different types of banking crises be averted in the first place by early decisive liquidity interventions? We analyze these issues in this section.

A. Comparison to "panic-only" banking crises

We start by contrasting bank equity crises to banking panics without large bank equity declines, which we call "panic-only crises", following BVX's distinction between bank equity crises and panic crises.[26] We find that panic-only crises evolve very differently, with high future bank equity returns, large positive responses to liquidity-based interventions, and smaller macroeconomic output losses. These results suggest different underlying mechanisms and different sensitivities to policy interventions.

Table A.17 lists the full sample of various types of banking crises. Panic-only crises are those identified as panics (indicated by column 5) without bank equity crises (column 6).

[26] Most banking crises analyzed by BVX are both types. Of the crises of just one type, BVX focus on banking crises without panics (also called "quiet banking crises"). Here, we analyze panic-only crises.

Our main result, shown in Figure A.28, is that panic-only crises (Panel A) are followed by elevated bank equity returns that return to pre-crisis levels by year five, in contrast to the permanently lower bank returns in bank equity crises (Panel B, replication of Figure 1). Furthermore, panic-only crises are followed by only a small, temporary reduction in bank dividends (Panel C), in contrast to the large and permanent reduction in bank equity crises (Panel D, replication of Figure 3). Similarly, Figure A.29 shows that panic-only crises see a full bounce back in bank equity prices in the month of extensive central bank liquidity interventions or announcements of blanket bank liability guarantees (Panel A), in contrast to the small response and long-term reversal in the case of bank equity crises (Panel B, replication of Figure 6). Collectively, these results suggest that the dynamics of panic-only crisis can be consistent with temporary illiquidity or discount rate-driven theories.

Relatedly, Figure A.30 shows that panic-only crises tend to be less macroeconomically severe. They are followed by shallow real GDP declines (Panel A) and bank credit contraction (Panel B), in contrast to the large and permanent responses for bank equity crises.[27]

Finally, Figure A.32 and Figure A.33 compares bank equity crises (Panels A and B) to other types of crises: nonfinancial equity crashes (Panel C), currency crises (Panel D), real consumption drops (Panel E), and real GDP drops (panel F). See the captions of these figures for definitions of these other types of crises. These other types of crises all feature elevated returns after crises for both bank and nonfinancial equity and only temporary reductions in dividends, consistent with discount-rate-based mechanisms driving the return dynamics.

B. Can early policy intervention avert banking crises?

We have seen that once bank equity declines 30% or more, which along with a bank failure indicates a bank equity crisis, bank equity does not earn high future returns, there is a sharp and persistent rise in nonperforming loans and asset write-downs, and there is no sustained recovery

[27] Figure A.31 analyzes cross-predictability across countries and shows a consistent result. This analysis asks, if some countries experienced bank equity crises in, e.g., 2008, what happened in other countries without bank equity crises? The intuition is that these other countries (e.g., those in East Asia or Latin America) were hit by a liquidity shock but did not see a 30% decline in bank equity (presumably because their banking sectors were not heavily exposed to US mortgage-backed securities or the US-European housing boom/bust). Figure A.31 shows that while the country in the bank equity crisis suffers a permanent drop in bank equity, other countries see a quick bounce-back in their equity prices at the same time, consistent with temporary illiquidity or discount rate-driven theories.

in bank value after liquidity-based interventions. Our interpretation of these findings is that once a bank equity crash is realized, bank distress is persistent and difficult to reverse.

One may wonder if bank equity crises can be prevented in the first place by early liquidity interventions when these episodes are still panic-only crises, before they reach a 30% bank equity decline. Our answer is, for the most part, no. We show that the bank equity decline in most cases happens strictly prior to the banking panic (as BVX also show). Consequently, the crisis in these cases could not have been prevented by early liquidity intervention in the initial banking panic phase, because *there was no* initial banking-panic phase: the bank equity decline came first.[28] Most historical bank equity crises are *not* the result of a liquidity crisis that morphs into a solvency crisis. Instead, fundamental weaknesses in the banking system, resulting in a bank equity decline, appear at the onset of most crises.

To see this result, Figure A.34 maps out the temporal relationship between banking panics and 30% bank equity crashes in the form of a tree diagram representing all the paths taken by various types of historical banking crises, using the sample of events in Table A.17. It starts by categorizing episodes as to whether the bank equity decline happened strictly before the banking panic by at least three months (bottom tree) or not (top tree).[29] Then, depending on how the crisis evolves and on policy interventions, an eventual outcome is reached (e.g., a bank equity crisis, a panic-only crisis) indicated on the right side of the diagram.

We find that the bank equity decline happens strictly first in the majority of cases (N = 57, or 75% of the 76 total episodes that eventually become bank equity crises). Only in a minority of cases (N = 19, or 25% of cases) does the panic occur first or contemporaneously (within three months) of the bank equity decline. These latter cases, which we call "mismanaged banking panics"—the US Great Depression being one prominent example—occurred mostly within the 1870-1945 period and for countries on the Gold Standard (i.e., when central banks had less flexibility as lenders-of-last-resort). In our interpretation, the relative rarity of "mismanaged banking panics" is precisely because liquidity interventions have historically been both frequent

[28] For example, in the US 2007-08 crisis, the bank equity index fell by 30% by December 2007, while the panic erupted in September 2008 after the collapse of Lehman Brothers. See BVX for a systematic analysis of the relative timing of bank equity declines versus panics across historical banking crises.

[29] In cases without a 30% bank equity decline ever, by default we consider the panic (or the incipient panic) to occur first. Similarly, in cases without a banking panic, by default we consider the 30% bank equity decline to occur first.

and successful (see Table A.17), making it relatively uncommon for liquidity crises to morph into bank equity crises. Instead, we conclude that most bank equity crises arise because of early problems manifested by an initial crash in bank equity prices, which later might morph into a banking panic.[30]

In contrast to bank equity crises, panic-only crises can be averted in the first place by early decisive liquidity interventions, as we now show. We then analyze conditions under which interventions are most likely to be successful in doing so. We define an "averted crisis" as an incipient banking panic that resolves within two months without any bank failures (as documented in the spreadsheet accompanying Table A.17). Using this definition, we map out, using the tree diagram in Figure A.34, all the ways that various types of events evolve to be either averted crises or realized crises (that is, either realized bank equity crises or panic crises).[31]

We then use characteristics to predict which events turn into averted crises, estimating a probit regression and reporting the marginal effects in Table A.18. In this probit regression, the sample of events is all events from Table A.17, and the outcome variable is an indicator variable of averted crises. The predictor variables are as follows: *Small BE Decline* is an indicator variable of whether the bank equity decline preceding the incipient panic is less than 30%; *Early Liq. Interv.* is an indicator variable of whether there were liquidity interventions (of the two types analyzed in Section V) within one month of the incipient panic; *War* is an indicator variable of whether the incipient panic occurred at the outbreak of a war; and *Single Bank* is an indicator variable of whether the incipient panic was mainly focused around a single institution.

The results in Table A.18 Panel A show that these four variables strongly predict whether an incipient panic is averted (as opposed to becoming a realized banking panic, either with or without a 30% bank equity decline). The two best predictor variables are *Small BE Decline* and *Early Liq. Interv.* In fact, both indicators are essentially necessary conditions for an averted panic:

[30] Bank equity crises followed by early liquidity interventions often turn into "quiet banking crises", i.e., bank equity crises without panics, as shown in Table A.17. BVX demonstrate that "quiet banking crisis" are nearly as macroeconomically severe as bank equity crises with panics. "Quiet banking crisis" feature large output gaps, credit contractions, bank failures, and other symptoms of banking sector distress, even though outright runs are suppressed by government action.

[31] Note that all averted panics are in the top tree: they all start out as events of a panic without a 30% bank equity decline and all feature early liquidity interventions; this is an empirical finding, not a mechanical consequence of our definitions.

all averted panic occur when the bank equity decline is smaller than 30% in magnitude (with one exception), and all averted panics follow early liquidity interventions. The other two variables, *War* and *Single Bank,* are likewise associated with a higher probability of the incipient panic being successfully averted. Averted crises are thus more likely when the liquidity event is due to the outbreak of a war or when the run is initially limited to problems at a single bank.[32]

Overall, we conclude that incipient crises can be averted with liquidity interventions only in cases that have not yet seen a steep bank equity decline. Incipient crises are also more likely to be averted in special circumstances, such as after the outbreak of a war or when the liquidity problems initially involve a run only on a single bank. In contrast, if a large bank equity decline is realized, these crises (both in cases with and without subsequent panics) are more intractable, typically featuring permanent bank losses, a persistent rise in nonperforming loans, and long-lasting banking sector undercapitalization.

VII. Conclusions

We have shown that bank equity returns tend to exhibit a large permanent decline following banking crises, which predicts long run deterioration in bank cash flows and low future bank equity returns. Evidence from accounting data suggests that banks' permanent losses during crises are mainly due to asset write-downs, not early liquidations during panics. Bank capital remains depleted many years after banking crises, even in countries with large-scale liquidity injections by the government or central bank. These findings imply that liquidity-based policies alone are not always sufficient to resolve banking crises, and that recapitalization policies are needed to restore the banking sector to long-term health. However, government recapitalizations historically have often been insufficient to offset banking sector losses, resulting in persistently low levels of market capitalization relative to pre-crisis levels.

[32] One can go beyond the functional form imposed by the probit regression and make even better predictions based on simple rules using these four predictor variables. In Panel B, one can predict averted panics based on whether *Small BE Decline* and *Early Liq. Interv.* are both equal to one. This predicts whether the crisis is averted with a perfect true-positive rate of 91 / 92 = 99% and with a low false-positive rate of 35 / 148 = 24%. *Small BE Decline* and *Early Liq. Interv.* are thus essentially necessary conditions for the crisis to be averted. In Panel C, one can add a third condition to predict whether the crisis is averted, whether either *War* or *Single Bank* equals one. In this case the true-positive rate is lower at 46 / 92 = 50%, but the false-positive rate is minimal at 5/148 = 3%. This suggests that nearly all liquidity crises due to the outbreak of wars or due to single bank runs are averted. We interpret *War* or *Single Bank* as essentially being sufficient conditions for an averted crisis.

References

Barberis, Nicholas, Robin Greenwood, Lawrence Jin, and Andrei Shleifer. 2015. "X-CAPM: An extrapolative capital asset pricing model." *Journal of Financial Economics* 115 (1): 1–24.

Baron, Matthew, and Tyler Muir. 2020. "Intermediaries and asset prices: International evidence since 1870." Available at SSRN: https://ssrn.com/abstract=3116417.

Baron, Matthew, Emil Verner, and Wei Xiong. 2021. "Banking crises without panics." *Quarterly Journal of Economics* 136, no. 1 (February): 51–113.

Baron, Matthew, and Wei Xiong. 2017. "Credit expansion and neglected crash risk." *Quarterly Journal of Economics* 132 (2): 713–764.

Benartzi, Shlomo, and Richard H. Thaler. 1995. "Myopic loss aversion and the equity pre- mium puzzle." *Quarterly Journal of Economics* 110 (1): 73–92.

Blanchard, Olivier J. 2009. "The crisis: Basic mechanisms, and appropriate policies." MIT Department of Economics Working Paper No. 09-01.

Bordalo, Pedro, Nicola Gennaioli, Yueran Ma, and Andrei Shleifer. 2020. "Overreaction in macroeconomic expectations." *American Economic Review* 110 (9): 2748–82.

Brunnermeier, Markus K., and Lasse Heje Pedersen. 2009. "Market liquidity and funding liquidity." *Review of Financial Studies* 22 (6): 2201–2238.

Brunnermeier, Markus K., and Yuliy Sannikov. 2014. "A macroeconomic model with a fi- nancial sector." *American Economic Review* 104 (2): 379–421.

Burnside, Craig, Martin Eichenbaum, and Sergio Rebelo. 2007. "The returns to currency speculation in emerging markets." *American Economic Review* 97 (2): 333–338.

Calomiris, Charles W., and Gary Gorton. 1991. "The origins of banking panics: Models, facts, and bank regulation." In *Financial markets and financial crises*, 109–174. University of Chicago Press.

Campbell, John Y., and Robert J. Shiller. 1988a. "Stock prices, earnings, and expected dividends." *Journal of Finance* 43 (3): 661–676.

————. 1988b. "The dividend-price ratio and expectations of future dividends and discount factors." *Review of Financial Studies* 1, no. 3 (April): 195–228.

Flanagan, Thomas, and Amiyatosh Purnanandam. 2020. "Did Banks Pay 'Fair' Return to Taxpayers on TARP?" Available at SSRN: https://ssrn.com/abstract=3595763.

Gennaioli, Nicola, Andrei Shleifer, and Robert W. Vishny. 2012. "Neglected risks, financial innovation, and financial fragility." *Journal of Financial Economics* 104 (3): 452–468.

Gorton, Gary, and Lixin Huang. 2004. "Liquidity, efficiency, and bank bailouts." *American Economic Review* 94 (3): 455–483.

Greenwood, Robin, Samuel G. Hanson, Andrei Shleifer, and Jakob Ahm Sørensen, 2022. "Predictable financial crises." Journal of Finance 77 (2): 863–921.

He, Zhiguo, and Arvind Krishnamurthy. 2013. "Intermediary asset pricing." *American Eco- nomic Review* 103 (2): 732–70.

Hoshi, Takeo, and Anil K. Kashyap. 2004. "Japan's financial crisis and economic stagnation." *Journal of Economic Perspectives* 18 (1): 3–26.

Huljak, Ivan, Reiner Martin, Diego Moccero, and Cosimo Pancaro. 2020. "Do non-performing loans matter for bank lending and the business cycle in euro area countries?" ECB Working Paper, no. 2411.

Jordà, Òscar, Moritz Schularick, and Alan M. Taylor. 2011. "Financial crises, credit booms, and external imbalances: 140 years of lessons." *IMF Economic Review* 59 (2): 340–378.

Kaminsky, Graciela L., and Carmen M. Reinhart. 1999. "The twin crises: The causes of banking and balance-of-payments problems." *American Economic Review* 89 (3): 473– 500.

Kane, Edward. 1989. *The S&L insurance mess: How did it happen?* The Urban Institute.

Laeven, Luc, and Fabian Valencia. 2008. "Systemic banking crises: A new database." IMF Working Paper, 1–78.

————. 2020. "Systemic banking crises database II." *IMF Economic Review*: 1–55.

Mian, Atif, and Amir Sufi. 2009. "The consequences of mortgage credit expansion: Evidence from the US mortgage default crisis." *Quarterly Journal of Economics* 124 (4): 1449–1496.

Mian, Atif, Amir Sufi, and Emil Verner. 2017. "Household debt and business cycles world- wide." *Quarterly Journal of Economics* 132, no. 4 (May): 1755–1817.

Muir, Tyler. 2017. "Financial crises and risk premia." *Quarterly Journal of Economics* 132 (2): 765–809.

Reinhart, Carmen M., and Kenneth S. Rogoff. 2009. *This time is different: Eight centuries of financial folly*. Princeton University Press.

Schularick, Moritz, and Alan M. Taylor. 2012. "Credit booms gone bust: Monetary policy, leverage cycles, and financial crises, 1870-2008." *American Economic Review* 102 (2): 1029–61.

Shleifer, Andrei, and Robert W. Vishny. 1992. "Liquidation values and debt capacity: A market equilibrium approach." *Journal of Finance* 47 (4): 1343–1366.

————. 1997. "The limits of arbitrage." *Journal of Finance* 52 (1): 35–55.

————. 2010. "Unstable banking." *Journal of Financial Economics* 97 (3): 306–318.

Stein, Jeremy C. 1995. "Prices and trading volume in the housing market: A model with down-payment effects." *Quarterly Journal of Economics* 110 (2): 379–406.

Figure 1: Cumulative abnormal equity returns around bank equity crises

This figure plots the cumulative abnormal returns around bank equity crises for the bank and nonfinancials equity indexes, normalized to zero in year $t = -1$, where $t = 0$ is the year of the bank equity crisis. Abnormal returns are defined as the log excess total returns of the equity index for a given horizon around the crisis minus the out-of-crisis country average of the same index, and are estimated using Equation (1) with $k = -1$. 95% confidence intervals (CI) are computed using Driscoll-Kraay standard errors. The dashed black lines emanating from $t = 0$ represent zero abnormal return starting from $t = 0$ for banks and nonfinancials, separately. Cumulative abnormal returns above those lines indicate positive abnormal returns following the crisis, and vice versa.

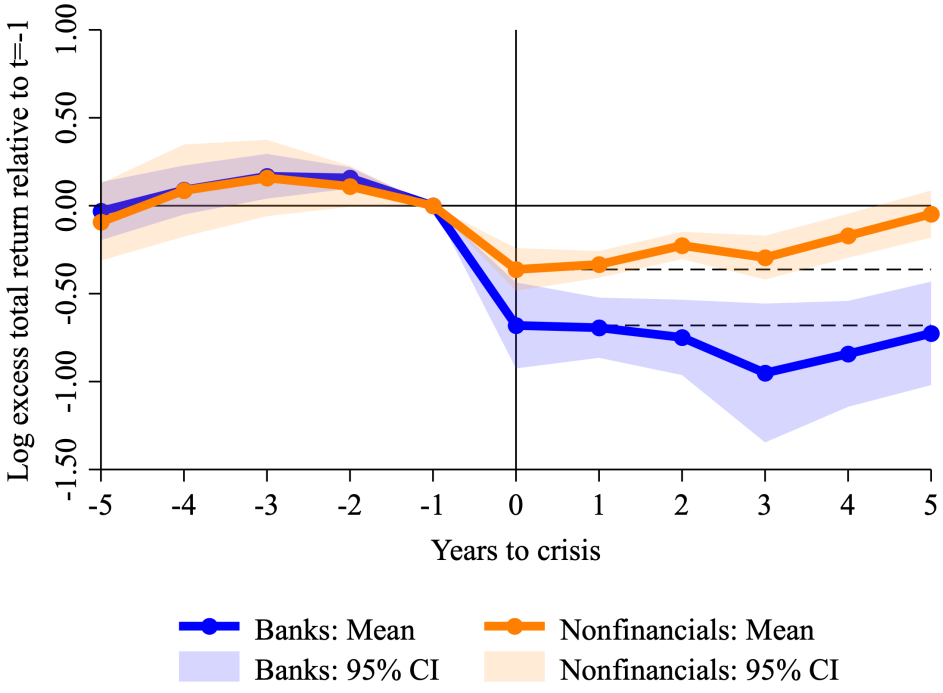


Figure 2: Equity returns assuming perfect timing of troughs around bank equity crises

This figure plots the cumulative abnormal returns around bank equity crises for the bank and nonfinancials equity indexes, normalized to zero in the month of the trough of the bank equity returns index (looking in the $t = -6$ to $t = 18$-month window around the crisis start, and using the panic start month when bank equity returns do not have a trough in this window). The cumulative abnormal returns are computed by demeaning monthly log excess total returns for each month $h \in [-60, 60]$ around the troughs using the unconditional country average (for banks and nonfinancials, respectively) to produce abnormal returns, and then cumulating over time, the result then being normalized to zero in the month of the trough for each individual bank equity crisis. The mean and interquartile range are then computed across bank equity crises and plotted in this figure.

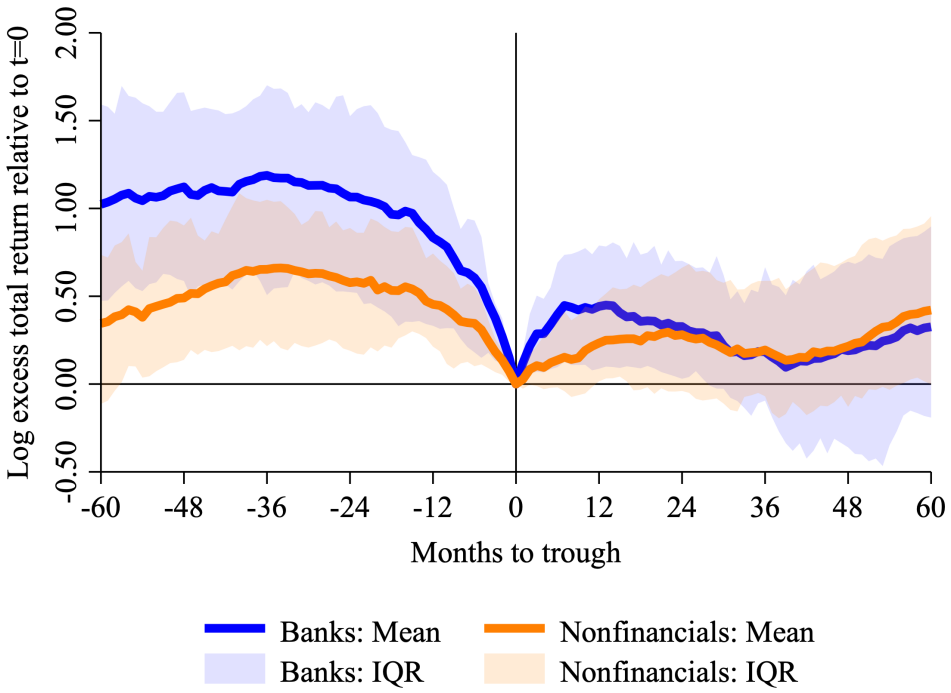
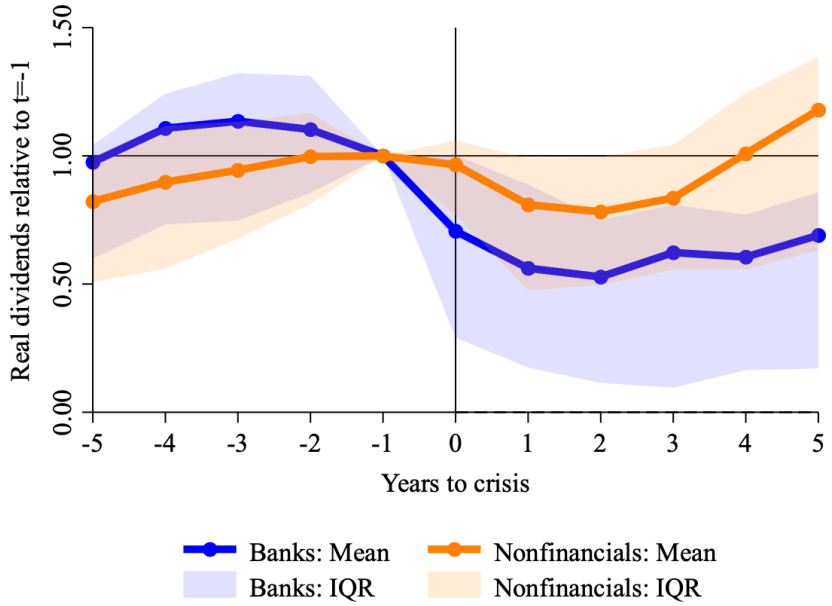


Figure 3: Cash flows around bank equity crises

This figure plots the real dividends per share index for bank and nonfinancial equity, as well as the real earnings per share index for bank equity, averaged across bank equity crises. To construct this figure, we compute two market-capitalization-weighted indexes of per-share cash flows $CF_{i,t+h}$ (the real dividend index and the real earnings index) in the window of $h \in [-5, 5]$ years around all bank equity crises, where t is the starting year of a crisis. We normalize $CF_{i,t+h}$ by its value $CF_{i,t-1}$ in the year before the start of the crisis and then compute the average and interquartile range across crises of $CF_{i,t+h}/CF_{i,t-1}$ at each horizon $h \in [-5, 5]$. As a result, this figure plots the average level of annual real dividends (Panel A) or annual earnings (Panel B) relative to the year before the crisis, per a given share purchased in the year before the crisis. In Panel A, we drop three crises where the dividend index takes on extreme values (Mexico 1931, India 1993, and Venezuela 2009). In Panel B, to avoid normalizing earnings by negative or very small values in year $t-1$, we normalize by the last positive value before the crisis (instead of the $t-1$ value) in three cases: Norway 1988, USA 1990, and Denmark 1992. We do not plot the real earnings index for nonfinancials in Panel B because the requisite data are not available.

(A) Real dividends



(B) Real earnings

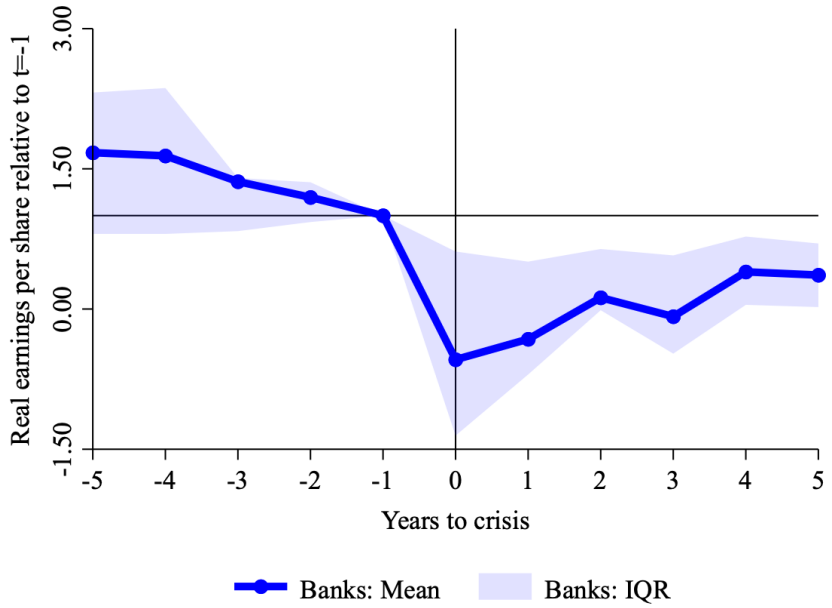
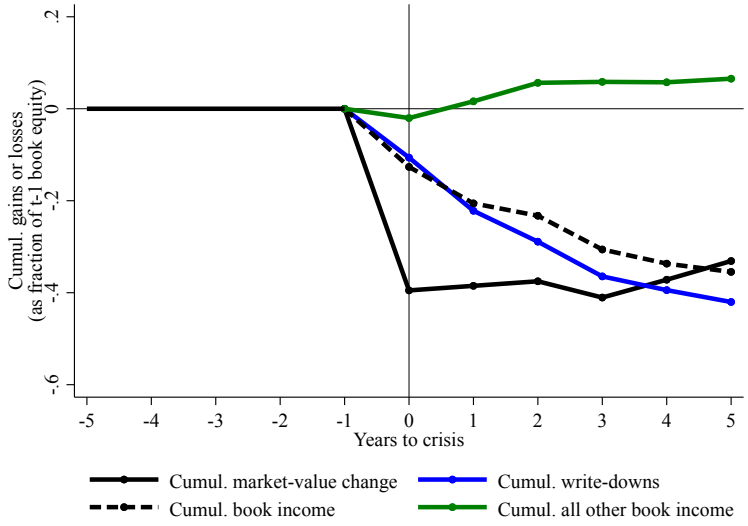


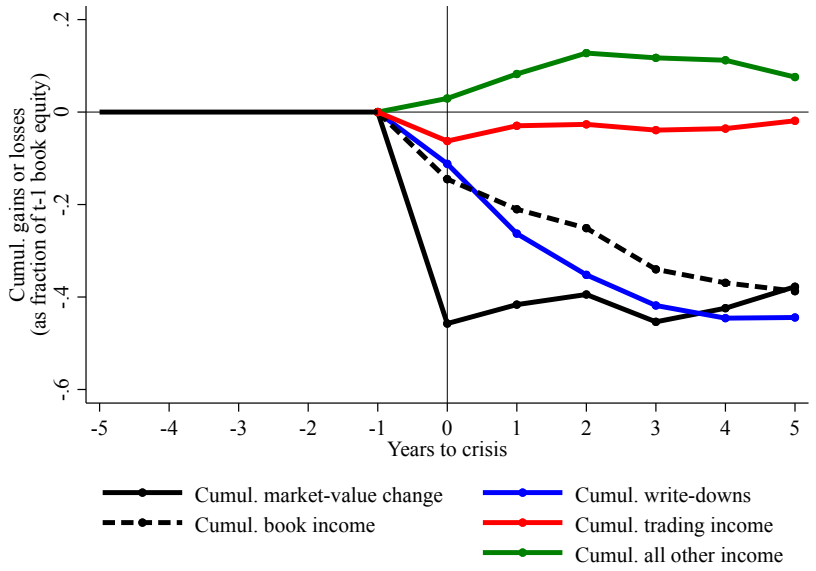
Figure 4: Banks' book income decomposed into write-downs and other income categories

This figure plots banks' cumulative abnormal book income (black dashed line) in the years following bank equity crises. "Abnormal" is defined for each bank as its yearly net income minus its value in year $t-1$. Banks' abnormal book income is then aggregated over the ten largest banks within each country, normalized by these banks' aggregate book equity from the year before the crisis (year $t-1$), and then averaged across crises in the 17 advanced economies over the period 1870-2019. The plot next compares banks' book income to their cumulative *market-equity* gains and losses (black solid line), calculated relative to year $t-1$ and aggregated in the same way. Banks' book income then is decomposed into income categories, which are also computed as cumulative abnormal values relative to year $t-1$ for each bank. Panel A decomposes banks' net income into write-downs (blue line) versus all other book income (green line), while Panel B decomposes banks' net income into write-downs (blue line), trading income (red line), and all other book income (green line). These components of net income are all defined in the main text. Panel A is based on 37 crisis episodes for which we have the breakdown of net income into write-downs and other income, while Panel B is based on 21 crisis episodes for which we have the breakdown of net income into the three categories as described above. Panels C and D are similar to Panel B but only include banks for which the securities-to-assets ratio in year $t-1$ is in the bottom or top quartile (among all banks across all crises), respectively.

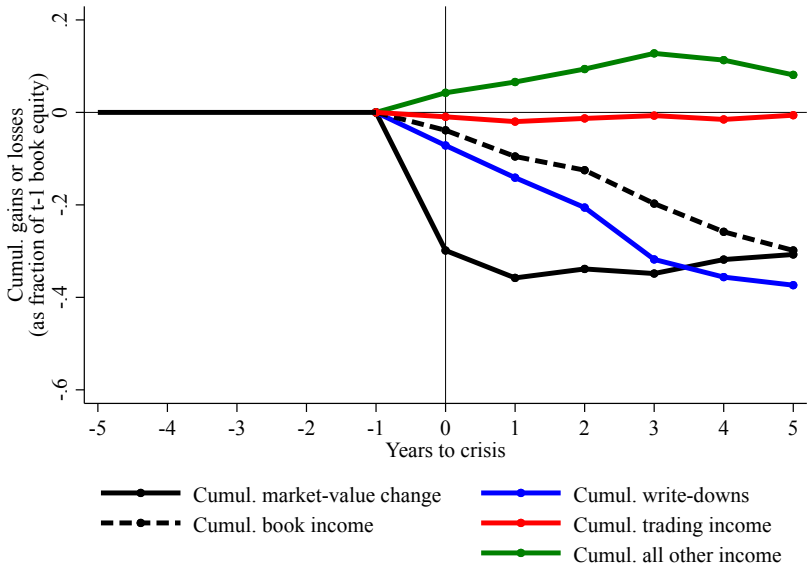
(A) Income decomposed into write-downs and all other income



(B) Income decomposed into three categories



(C) Banks in bottom quartile of (securities/assets)



(D) Banks in top quartile of (securities/assets)

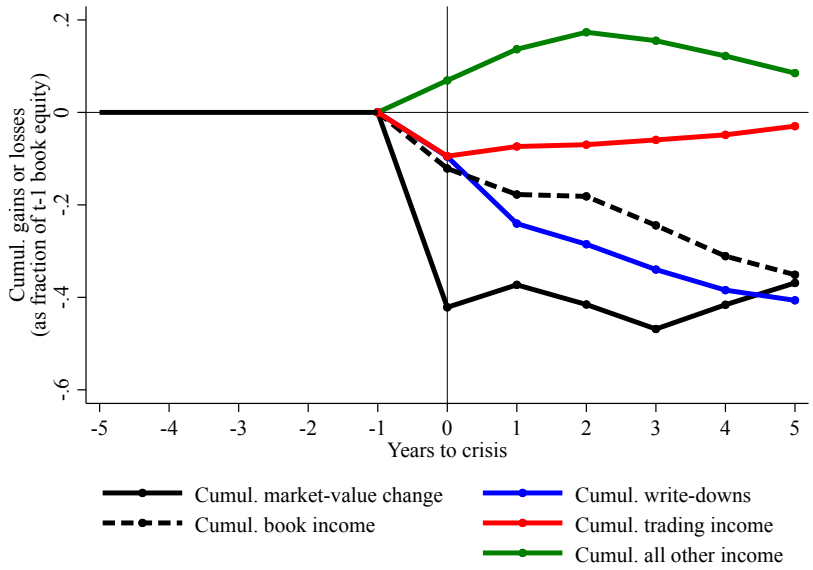
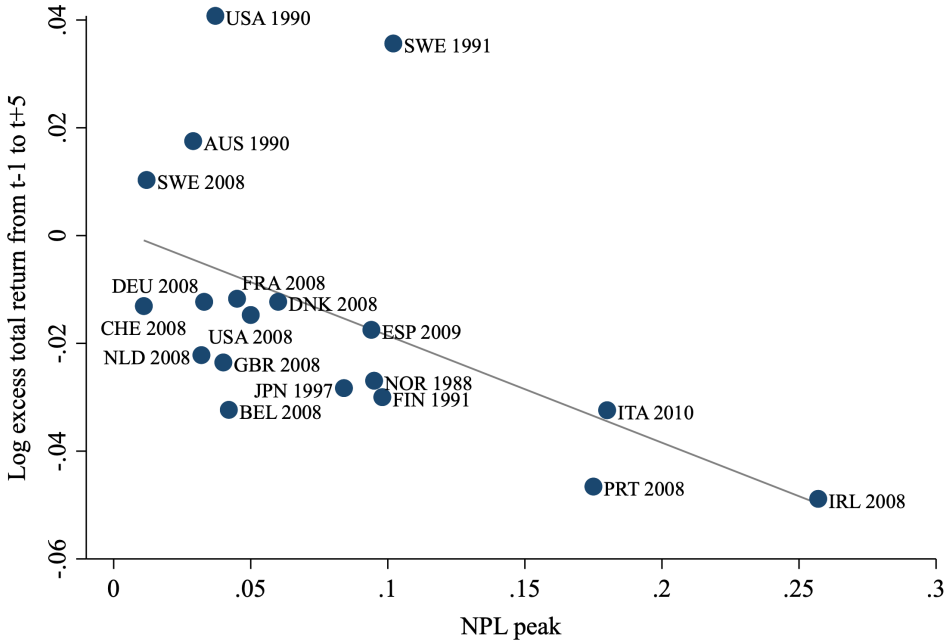


Figure 5: To what extent can NPL rates account for banks' market-equity losses?

This figure plots the unlevered cumulative log excess total return of the bank equity index (from $t-1$ to $t+5$) against the peak non-performing loans (NPL) rate (maximum value from t to $t+5$), where the start of a bank equity crisis occurs at time t. Each observation corresponds to a bank equity crisis. The sample of crises consists of all available crises in advanced economies for which the NPL data are available. A line of best fit, estimated using ordinary least squares, is plotted, and the corresponding adjusted R^2 statistics are reported below the plot. Figure A.25 plots analogous results for levered bank and nonfinancial index returns.



Adj. R^2 = 0.233; Adj. R^2 (w/o USA 1990 and SWE 1991) = 0.533

Figure 6: Cumulative abnormal equity returns around liquidity-based interventions

This figure plots the cumulative abnormal log excess total returns of the bank and nonfinancials equity indexes at monthly frequency relative to month $t = 0$, where month $t = 0$ corresponds to the implementation of extraordinary central bank liquidity support or the announcement of blanket guarantees of banking sector liabilities, whichever comes first. 95% confidence intervals (CIs) are computed using Driscoll-Kraay standard errors. Figure A.26 plots the same figure for extraordinary central bank liquidity support or bank liability blanket guarantees separately.

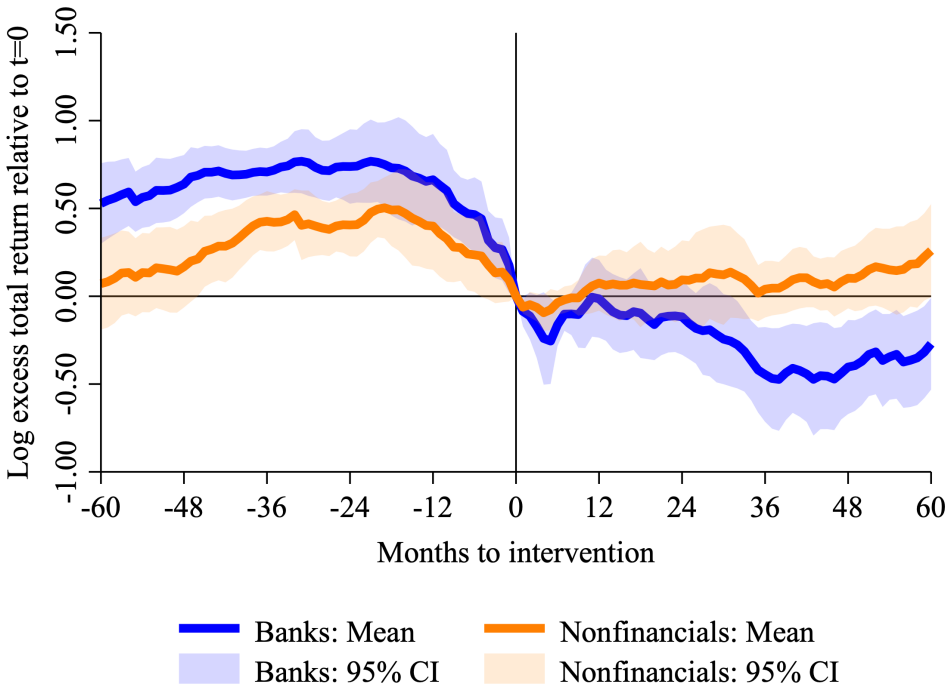
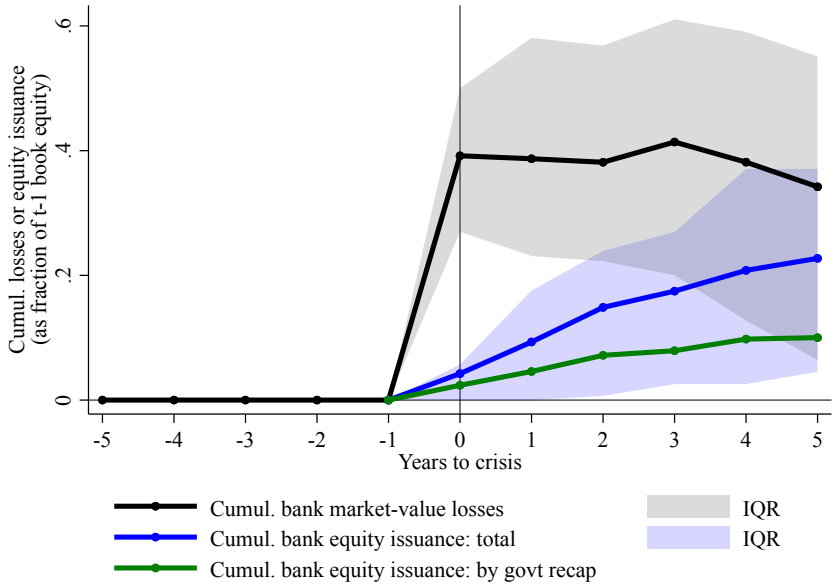


Figure 7: Banks' equity issuance relative to their market-equity losses

Panel A plots cumulative bank equity issuance and banks' market-equity losses, computed for the ten largest banks within each country and averaged across bank equity crises. Bank equity issuance is plotted using two measures: total common equity issued (blue line) and equity issued during a government recapitalization program (green line). Cumulative bank market-equity losses are also plotted (black line). Market-equity losses are computed as the cumulative declines in individual banks' excess total returns relative to the year prior to the bank equity crisis. All three variables are first normalized within each bank equity crisis by banks' book equity in the year before the crisis, then averaged across bank equity crises. The solid lines plot averages across bank equity crises, while the shaded areas depict interquartile ranges (IQR). Panel B plots banks' log real market capitalization in year $t+h$ ($h \in [-5, 5]$) relative to year $t-1$, averaged across bank equity crises, where t is the year of the crisis. Market capitalization is aggregated from the sample of ten largest banks within each country. The dashed lines plot estimated market capitalization assuming equity issuance from t onwards were 0.

(A) Equity issuance relative to market-equity losses



(B) Bank market capitalization is persistently low even after equity issuance

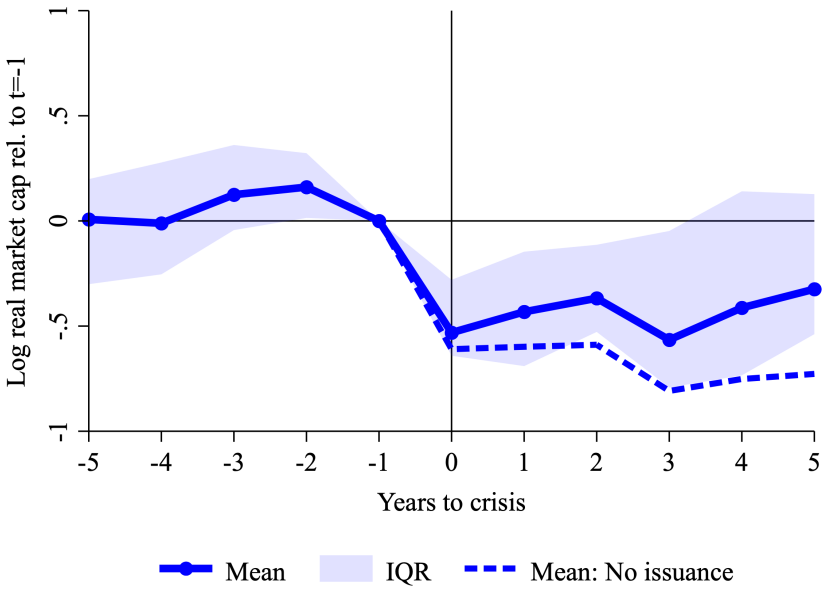


Table 1: Summary statistics

Summary statistics are reported for the country-year data (Panel A) and the individual bank-year data (Panel B). Panel A reports summary statistics for the index returns of bank stocks and nonfinancial stocks, across 46 economies over the period 1870-2019, either as real total returns or excess total returns. Dividend yields and real dividend growth of bank stocks and nonfinancial stocks are also reported. Real earnings growth is only available for bank stocks. Real market capitalization growth and book equity growth of banks is aggregated up from the individual bank data and is thus only available for a smaller sample of 17 economies in ±5-year windows around bank equity crises. Panel B reports bank-level summary statistics for the ten largest banks within each country (determined by asset rank five years before the start of each bank equity crisis) and within ±5-year windows around bank equity crises. All returns and growth rates in both panels are in log units.

Panel A: Country-level data (46 economies, 1870-2019)

	Mean	SD	p5	p25	p50	p75	p95	N
Real total return, banks	0.040	0.318	-0.407	-0.074	0.057	0.175	0.457	3,956
Excess total return, banks	0.022	0.318	-0.430	-0.090	0.037	0.158	0.448	3,956
Real total return, nonfin.	0.040	0.306	-0.430	-0.092	0.043	0.185	0.484	3,876
Excess total return, nonfin.	0.024	0.306	-0.440	-0.105	0.028	0.168	0.461	3,876
Dividend yield, banks	0.048	0.030	0.004	0.030	0.046	0.061	0.100	3,599
Dividend yield, nonfinancials	0.041	0.023	0.011	0.026	0.038	0.052	0.082	2,865
Real dividend growth, banks	-0.013	0.775	-0.761	-0.153	0.007	0.164	0.677	3,430
Real dividend growth, nonfin.	0.019	0.295	-0.461	-0.103	0.020	0.140	0.500	2,697
Real earnings growth, banks	0.044	0.761	-0.699	-0.055	0.053	0.175	0.812	1,893
Real mkt cap growth, banks	0.004	0.408	-0.597	-0.182	0.043	0.211	0.540	496
Real book eq. growth, banks	0.030	0.195	-0.223	-0.033	0.031	0.105	0.285	452

Panel B: Individual bank data
(Ten largest banks within each country, 17 JST economies, 1870-2019)

	Mean	SD	p5	p25	p50	p75	p95	N
Excess total return	-0.084	0.683	-0.822	-0.190	0.020	0.189	0.481	3,287
Dividend yield	0.043	0.036	0.000	0.021	0.041	0.058	0.098	3,456
Dividends/book equity	0.052	0.040	0.000	0.021	0.049	0.074	0.121	3,090
Real market cap growth	-0.012	0.418	-0.697	-0.181	0.014	0.209	0.575	3,159
Real book equity growth	0.030	0.187	-0.251	-0.026	0.027	0.098	0.314	3,673
Market-to-book ratio	1.102	0.581	0.306	0.695	1.009	1.410	2.288	3,165
Real asset growth	0.029	0.142	-0.188	-0.040	0.026	0.102	0.257	3,816
Real loan growth	0.025	0.165	-0.233	-0.049	0.023	0.107	0.276	3,816
Net income/book equity	0.073	0.182	-0.185	0.015	0.074	0.142	0.315	3,049
Equity issuance/book equity	0.059	0.171	-0.013	0.000	0.000	0.026	0.372	3,270

Table 2: Cumulative abnormal equity returns after bank equity crises

This table reports regression coefficients estimated using Equation (1) with $k = 0$, which capture cumulative equity returns after the start of the crisis (i.e., relative to year t). Results corresponding to log excess total returns are reported in Panel A (for bank equity) and Panel B (for nonfinancials equity), while those for log real total returns are reported in Panel C and Panel D. Driscoll-Kraay standard errors are reported in parentheses. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Panel A: Excess returns, banks

	Dependent variable: $r^B_{i,t,t+h}$				
	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$
BankingCrisis$_{i,t}$	-0.009	-0.064	-0.262***	-0.156**	-0.040
	(0.070)	(0.055)	(0.089)	(0.065)	(0.077)
Constant	0.024***	0.050***	0.080***	0.104***	0.125***
	(0.008)	(0.014)	(0.020)	(0.025)	(0.030)
Within-R^2	0.000	0.000	0.004	0.001	0.000
N observations	3,835	3,717	3,600	3,484	3,370
N banking crises	75	75	71	71	71

Panel B: Excess returns, nonfinancials

	Dependent variable: $r^N_{i,t,t+h}$				
	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$
BankingCrisis$_{i,t}$	0.031	0.138**	0.069	0.191***	0.313***
	(0.052)	(0.056)	(0.047)	(0.069)	(0.081)
Constant	0.026***	0.054***	0.088***	0.118***	0.145***
	(0.008)	(0.014)	(0.022)	(0.028)	(0.033)
Within-R^2	0.000	0.002	0.000	0.003	0.007
N observations	3,395	3,301	3,206	3,111	3,017
N banking crises	68	68	68	68	68

Panel C: Real returns, banks

	Dependent variable: $r^B_{i,t,t+h}$				
	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$
BankingCrisis$_{i,t}$	0.014	-0.031	-0.240**	-0.137*	-0.018
	(0.066)	(0.046)	(0.109)	(0.079)	(0.086)
Constant	0.041***	0.086***	0.135***	0.177***	0.217***
	(0.008)	(0.014)	(0.020)	(0.026)	(0.032)
Within-R^2	0.000	0.000	0.003	0.001	0.000
N observations	3,835	3,717	3,600	3,484	3,370
N banking crises	75	75	71	71	71

Panel D: Real returns, nonfinancials

	Dependent variable: $r^N_{i,t,t+h}$				
	$h=1$	$h=2$	$h=3$	$h=4$	$h=5$
$\text{BankingCrisis}_{i,t}$	0.046	0.155***	0.080	0.198***	0.321***
	(0.044)	(0.052)	(0.057)	(0.073)	(0.080)
Constant	0.042***	0.088***	0.139***	0.187***	0.231***
	(0.009)	(0.017)	(0.026)	(0.035)	(0.043)
Within-R^2	0.001	0.003	0.001	0.003	0.007
N observations	3,395	3,301	3,206	3,111	3,017
N banking crises	68	68	68	68	68

Table 3: Initial bank equity declines capture long-run declines in banks' cash flows

Panel A reports coefficients from Equation (2a), estimated at the country-year level, conditional on the start of a bank equity crisis in country i in year t. For Panel A, the independent variable $r_{i,t-1,t}$ is the past one-year log excess total return of the bank index from $t-1$ to t in country i and bank equity crisis in year t. The dependent variable $y_{i,t-1,t+5}$ is the cumulative log-change between $t-1$ and $t+5$ of the aggregate real earnings index or real dividends index of the banking sector in country i. In Panel A, Huber-White standard errors are reported in parentheses. Panel B estimates Equation (2b) at the individual bank level (with each individual bank indexed by b), conditional on the start of a bank equity crisis in country i in year t. The variable $r_{i,b,t-1,t}$ is the past-year bank log excess total return, and outcome variables $y_{i,b,t-1,t+5}$ are defined analogously as in Panel A but at the individual bank level for the ten largest banks within each country around each bank equity crisis. In Panel B, standard errors clustered by crisis episode are reported in parentheses. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Panel A: Cash flows at the country aggregate level

	Dependent variable: Log-change in outcome variable through $t+5$	
	Real earnings per share	Real dividends per share
$r_{i,t-1,t}$	1.704***	2.334***
	(0.417)	(0.549)
Constant	0.033	0.445
	(0.386)	(0.396)
Adjusted R^2	0.186	0.184
N	37	67

Panel B: Cash flows at the bank level

	Dependent variable: Log-change in outcome variable through t+5			
	Real earnings per share		Real dividends per share	
$r_{i,b,t-1,t}$	1.011***	0.825***	1.469***	1.381***
	(0.231)	(0.235)	(0.224)	(0.310)
Constant	-0.068	-0.171	-0.086	-0.135
	(0.231)	(0.131)	(0.198)	(0.170)
Crisis FEs	No	Yes	No	Yes
Adjusted R^2	0.11	0.42	0.29	0.59
N	168	168	204	204

Table 4: Banks' book income decomposed into write-downs and other income categories

This table reports the estimates plotted in Figure 4, documenting banks' cumulative market-equity change (row 1) and cumulative abnormal book income (row 2) in the years following bank equity crises. "Abnormal" is defined for each bank as its yearly net income in year $t+h$ minus its value in year $t-1$. Banks' cumulative abnormal market-equity change and cumulative abnormal book income are then aggregated over the ten largest banks within each country, normalized by these banks' aggregate book equity from the year before the crisis, and then averaged across crises in 17 economies over the period 1870-2019. Panel A decomposes banks' net income into write-downs (row 3) versus all other book income (row 4), while Panel B decomposes banks' net income into write-downs (row 3), net interest income (row 4), trading income (row 5), and all other book income (row 6). These components of net income are all computed as cumulative abnormal values relative to year $t-1$ for each bank. Panel C corresponds to Figure 4 Panels C and D and reports various ratios, splitting banks by whether their securities-to-assets ratios in year $t-1$ are in the bottom or top quartile (among all banks across all crises), with differences between these two groups tested in the row labeled "Difference". Standard errors are reported in parentheses. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Panel A: Net income decomposed into write-downs and all other income

	Years after crisis					
	h = 0	h = 1	h = 2	h = 3	h = 4	h = 5
Cumul. bank market-equity (ME) change	-0.394***	-0.385***	-0.375***	-0.410***	-0.371***	-0.331***
	(0.032)	(0.036)	(0.036)	(0.041)	(0.042)	(0.042)
Cumul. book income	-0.126***	-0.205***	-0.232***	-0.306***	-0.336***	-0.354***
	(0.028)	(0.035)	(0.040)	(0.049)	(0.058)	(0.071)
Cumul. write-downs	-0.106***	-0.221***	-0.289***	-0.364***	-0.394***	-0.420***
	(0.020)	(0.033)	(0.043)	(0.049)	(0.054)	(0.057)
Cumul. all other book income	-0.020	0.016	0.056	0.058	0.058	0.065
	(0.024)	(0.036)	(0.050)	(0.057)	(0.067)	(0.078)
Cumul. book income / cumul. ME change	32.0%	53.2%	61.9%	74.6%	90.6%	106.9%
Cumul. write-downs / cumul. ME change	26.9%	57.4%	77.1%	88.8%	106.2%	126.9%
Cumul. write-downs / cumul. book income	84.1%	107.8%	124.6%	119.0%	117.3%	118.6%

Panel B: Net income decomposed into three categories

	Years after crisis					
	h = 0	h = 1	h = 2	h = 3	h = 4	h = 5
Cumul. bank market-equity (ME) change	-0.457***	-0.416***	-0.394***	-0.453***	-0.424***	-0.377***
	(0.049)	(0.053)	(0.052)	(0.059)	(0.060)	(0.064)
Cumul. book income	-0.145***	-0.210***	-0.251***	-0.340***	-0.369***	-0.387***
	(0.021)	(0.048)	(0.054)	(0.068)	(0.077)	(0.092)
Cumul. write-downs	-0.111***	-0.262***	-0.352***	-0.418***	-0.445***	-0.444***
	(0.023)	(0.050)	(0.067)	(0.074)	(0.080)	(0.088)
Cumul. trading income	-0.062**	-0.029	-0.026	-0.039	-0.035	-0.018
	(0.028)	(0.041)	(0.045)	(0.053)	(0.063)	(0.081)
Cumul. all other book income	0.029	0.082*	0.128**	0.117	0.112	0.076
	(0.035)	(0.049)	(0.060)	(0.092)	(0.097)	(0.099)
Cumul. book income / cumul. ME change	31.7%	50.5%	63.7%	75.1%	87.0%	102.7%
Cumul. write-downs / cumul. ME change	24.3%	63.0%	89.3%	92.3%	105.0%	117.8%
Cumul. write-downs / cumul. book income	76.6%	124.8%	140.2%	122.9%	120.6%	114.7%
Cumul. trading income / cumul. book income	42.8%	13.8%	10.4%	11.5%	9.5%	4.7%

Panel C: Top and bottom quartile banks by (securities/assets)

	Quartile by	Years after crisis					
	(securities/assets)	h = 0	h = 1	h = 2	h = 3	h = 4	h = 5
Cumul. book income / cumul. ME change	Bottom	12.8%	26.6%	36.7%	56.6%	81.1%	97.1%
	Top	28.7%	47.6%	43.6%	52.1%	74.5%	95.4%
	Difference	16.0%***	21.0%**	6.9%	-4.5%	-6.6%	-1.7%
Cumul. write-downs / cumul. book income	Bottom	186.8%	148.4%	165.3%	160.9%	138.0%	125.2%
	Top	78.5%	135.6%	157.5%	138.9%	123.9%	115.7%
	Difference	-108.3%***	-12.8%	-7.9%	-22.0%	-14.1%	-9.5%
Cumul. trading income / cumul. book income	Bottom	23.7%	20.0%	10.5%	3.0%	5.8%	2.0%
	Top	77.7%	41.2%	38.1%	24.2%	15.5%	8.3%
	Difference	54.0%***	21.2%	27.6%**	21.1%	9.7%	6.2%

Table 5: Government recapitalization programs during bank equity crises

The table reports selected characteristics of government recapitalization programs across bank equity crises in 17 economies since 1870. (Blank rows correspond to the bank equity crises without a government recapitalization program). Panel A reports variables related to the size of government recapitalizations. Variables under the header "From other historical sources" are from historical sources beyond the bank-level dataset of the top-10 banks, and they report upon the size of the recapitalization program: the legislative allocation (column 3) and the amount actually used to purchase newly issued common or preferred equity in banks (column 4). Column 6 normalizes the latter by banking sector total equity in year before the bank equity crisis (from column 5). In Panel A, variables under the header "From bank-level data (top-10 banks only)" come from the individual-bank data of the top-10 banks within each country: Column 7 reports total bank equity issuance across all top-10 banks in each country from year 0 to year 5 around the crisis (normalized by book equity in the year before the bank equity crisis) regardless of whether there was a government recapitalization, whereas column 8 only includes the bank equity issuance during years which coincided with government recapitalization programs. Column 10 normalizes the total bank equity issuance by the market-value of bank equity losses (column 9). Panel B reports variables related to the speed of government recapitalizations (Columns 3-6) or the breadth of recapitalizations (Columns 7-10), which are defined in the main text.

Panel A: Size of government recapitalizations

			From other historical sources				From bank-level data (top-10 banks only)			
Crisis	Recap	First recap	Size (legislative allocation)	Size (used)	Bank sector equity$_{t-1}$	Col (4) / Col (5)	Total eq issuance / book eq	Govt recap / book eq	Bank eq decline / book eq	Col (7) / Col (9)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Australia 1893							21%		-65%	
Australia 1990							57%		-14%	
Belgium 1931							1%		-39%	
Belgium 2008	Yes	10/2008	N/A	13.5 B EUR	50.6 B EUR	26.7%	36%	36%	-91%	39%
Denmark 1992							5%		-8%	
Denmark 2008	Yes	1/2009	100 B DKK	46 B DKK	243.4 B DKK	18.9%	26%	24%	-54%	45%
Finland 1921							2%		-27%	
Finland 1991	Yes	3/1992	8 B FIM	7.9 B FIM	33.7 B FIM	23.4%	21%	21%	-50%	42%
France 1882							0%		-38%	
France 1931							7%		-47%	
France 1994	Yes	5/1994	N/A	8.4 B FRF	802.8 B FRF	1.0%	23%	3%	-12%	26%
France 2008	Yes	12/2008	N/A	21 B EUR	271.3 B EUR	7.7%	26%	22%	-61%	36%
Germany 1931	Yes	2/1932	N/A	400 M DEM	4.8 B DEM	8.3%	35%	35%	-59%	59%
Germany 2008	Yes	12/2008	100 B EUR	29.4 B EUR	352.0 B EUR	8.4%	47%	18%	-67%	27%
Italy 1889							13%		-74%	
Italy 1921							39%		-26%	
Italy 2010	Yes	6/2009	20 B EUR	6.2 B EUR	208.5 B EUR	3.0%	24%	0%	-82%	0%
Japan 1907										
Japan 1927							9%		-28%	
Japan 1997	Yes	3/1999	12.4 T JPY	9.3 T JPY	29.0 T JPY	32.1%	54%	43.2%	-62%	70%
Netherlands 1921							0%		-44%	
Netherlands 1931							3%		-36%	
Netherlands 2008	Yes	10/2008	N/A	21 B EUR	110.8 B EUR	19.0%	19%	11%	-78%	15%
Norway 1921							3%		-44%	
Norway 1988	Yes	10/1991	5 B NOK	16.2 B NOK	23.6 B NOK	68.6%	61%	38%	-54%	70%
Portugal 1925							24%		-8%	
Portugal 1931							10%		-16%	
Portugal 2008	Yes	6/2012	12 B EUR	17.7 B EUR	27.3 B EUR	64.8%	54%	21%	-87%	24%
Spain 1977							12%		-41%	
Spain 2009	Yes	3/2010	N/A	54.4 B EUR	180.6 B EUR	30.1%	50%	26%	-58%	46%
Sweden 1922							1%		-42%	
Sweden 1932							0%		-3%	
Sweden 1991	Yes	5/1993	N/A	41.3 B SEK	56.9 B SEK	72.6%	72%	57%	-60%	96%
Sweden 2008							19%		-3%	
Switzerland 1931							0%		-75%	
Switzerland 2008							47%		-66%	
UK 1973							12%		-28%	
UK 2008	Yes	10/2008	N/A	116 B GBP	250.7 B GBP	46.3%	77%	62%	-73%	86%
USA 1931	Yes	6/1934	N/A	897 M USD	7,950 M USD	11.3%	3%	3%	-51%	6%
USA 1990							25%		-6%	
USA 2008	Yes	10/2008	700 B USD	205 B USD	852 B USD	24.1%	28%	22%	-47%	46%
MEAN	43%					27%	24%	26%	-46%	43%
SD	50%					23%	22%	18%	25%	27%
Min	0					1%	0%	0%	-91%	0%
25th	0					8%	4%	18%	-63%	26%
50th	0					23%	21%	22%	-47%	42%
75th	1					32%	37%	36%	-28%	59%
Max	1					73%	77%	62%	-3%	96%
N	40					17	40	17	40	17

Panel B: Speed and breadth of government recapitalizations

			Timing of recapitalization program				Breadth of recapitalization program			
Crisis	Recap	Panic starts	First recap	Additional recaps)	Delay (mos. from panic)	Delay (mos. from bank eq decline)	Only most distressed banks?	Num banks	% of top-10 banks recapped	% of banking system recapped (by assets)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Australia 1893		4/1893								
Australia 1990		3/1990								
Belgium 1931		5/1931								
Belgium 2008	Yes	9/2008	10/2008	12/2012	1	9	Yes	3	30%	77%
Denmark 1992		no panic								
Denmark 2008	Yes	9/2008	1/2009	-	4	12	No	43	100%	>95%
Finland 1921		no panic								
Finland 1991	Yes	9/1991	3/1992	-	6	28	No	83	100%	>95%
France 1882		1/1882								
France 1931		10/1930								
France 1994	Yes	no panic	5/1994	2/1995	2	-8	Yes	2	20%	14%
France 2008	Yes	9/2008	12/2008	-	3	11	No	7	70%	83%
Germany 1931	Yes	4/1931	2/1932	-	10	18	Yes	3	43%	19%
Germany 2008	Yes	9/2008	12/2008	-	3	11	Yes	5	38%	30%
Italy 1889		11/1893								
Italy 1921		11/1921								
Italy 2010	Yes	9/2008	6/2009	12/2012	9	23	Yes	4	13%	6%
Japan 1907		2/1907								
Japan 1927		2/1922								
Japan 1997	Yes	11/1997	3/1999	6/2003	16	108	No	18	78%	56%
Netherlands 1921		no panic								
Netherlands 1931		no panic								
Netherlands 2008	Yes	9/2008	10/2008	1/2013	1	9	Yes	4	40%	76%
Norway 1921		12/1921								
Norway 1988	Yes	10/1991	10/1991	-	0	47	No	20	100%	>95%
Portugal 1925		7/1920								
Portugal 1931		11/1930								
Portugal 2008	Yes	9/2008	6/2012	8/2014, 7/2015, 1/2017	45	53	Yes	5	50%	71%
Spain 1977		no panic								
Spain 2009	Yes	9/2008	3/2010	3/2011, 12/2012	18	22	Yes	41	50%	40%
Sweden 1922		no panic								
Sweden 1932		no panic								
Sweden 1991	Yes	9/1992	5/1993	-	8	40	Yes	4	50%	37%
Sweden 2008		9/2008								
Switzerland 1931		7/1931								
Switzerland 2008		9/2008								
UK 1973		2/1974								
UK 2008	Yes	9/2008	10/2008	-	1	9	Yes	5	44%	43%
USA 1931	Yes	11/1930	6/1934	-	43	55	Yes	5752	10%	18%
USA 1990		no panic								
USA 2008	Yes	9/2008	10/2008	-	1	10	No	707	100%	>95%
MEAN	43%			1.6	10.0	26.9	65%	394	55%	56%
SD	50%			0.9	13.8	27.3	49%	1391	31%	32%
Min	0			1	0	-8	0	2	10%	6%
25th	0			1	1	10	0	4	38%	30%
50th	0			1	4	18	1	5	50%	56%
75th	1			2	9	40	1	41	78%	83%
Max	1			4	45	108	1	5752	100%	95%
N	40			17	17	17	17	17	17	17

Appendix

Table A.1: List of bank equity crises and interventions

Column 1 lists bank equity crises (country and starting year), as defined in the main text. Column 2 reports the year of the 30% or larger annual bank equity decline corresponding to a given crisis. Column 3 reports the first year in which a top-20 bank failed. Column 4 reports the BVX crisis year. Columns 5 and 6 report when a banking panic associated with a given crisis started and ended, respectively. Columns 7-9 show when announcements of bank liability blanket guarantees, extraordinary central bank liquidity support and government recapitalization programs were introduced. Columns 4-9 are blank if there was no BVX crisis, no panic, or no policy intervention of these types, whereas "N/A" means that no information is available for that crisis.

Banking crisis	Year of 30% bank eq. decline	Year top-20 bank failed	BVX crisis year	Start of panic	End of panic	Liability blanket guarantees	Extraord. liquidity support	Government recapital-ization
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Argentina 1931	1931	1931	1930	Apr 1931	May 1931		Dec 1929	May 1935
Argentina 2001	2000	2001	2000	Mar 2001	Dec 2001		Jan 2002	Mar 2002
Australia 1893	1893	1893	1893	Apr 1893	Jun 1893			
Australia 1990	1990	1990	1989	Mar 1990	Oct 1990	Jul 1990		
Austria 1873	1873	1873	1873	May 1873	Nov 1874			
Austria 1931	1931	1931	1931	May 1931	Mar 1932	Jun 1931	May 1931	
Austria 2008	2008	2008	2008	Sep 2008	May 2009	Dec 2008	Oct 2008	Oct 2008
Belgium 1931	1929	1931	1929	May 1931	Mar 1932			
Belgium 2008	2008	2008	2008	Sep 2008	May 2009	Oct 2008	Sep 2008	Oct 2008
Chile 1931	1931	1931	1931	Jul 1931	Jun 1932			
Chile 1981	1981	1981	1982	Sep 1981	Mar 1983	Jan 1983	Mar 1983	Feb 1984
Colombia 1982	1982	1982	1982				Oct 1982	Dec 1985
Colombia 1998	1998	1998	1998	Jun 1998	Jan 2000		May 1999	Jun 1999
Czech 1995	1995	1995	1995	Feb 2000	Jun 2000	Jun 1996		
Denmark 1992	1990	1992	1992					
Denmark 2008	2008	2008	2008	Sep 2008	Feb 2009	Feb 2009	Nov 2008	Jan 2009
Egypt 1931	1931	1931	1931					
Finland 1921	1920	1921	1921					
Finland 1991	1990	1991	1990	Sep 1991	Sep 1992	Aug 1992	Feb 1990	Mar 1992
France 1882	1882	1882	1882	Jan 1882	Feb 1882			
France 1931	1931	1931	1930	Oct 1930	Apr 1932			

Table A.1 – cont.

Bank equity crisis	Year of 30% bank eq. decline	Year top-20 bank failed	BVX crisis year	Start of panic	End of panic	Liability blanket guarantees	Extraord. liquidity support	Government recapital-ization
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
France 1994	1990	1994						May 1994
France 2008	2008	2008	2008	Sep 2008	May 2009	Oct 2008	Oct 2008	Dec 2008
Germany 1931	1931	1931	1930	May 1931	Mar 1932		Jul 1931	Feb 1932
Germany 2008	2008	2008	2008	Sep 2008	May 2009	Oct 2008	Sep 2008	Dec 2008
Greece 1931	1929	1931	1929	Sep 1931	Apr 1932		Nov 1931	
Greece 2008	2008	2008	2008	Sep 2008	May 2009	Oct 2008	Oct 2008	May 2012
Hungary 1873	1873	1873	1873	Jul 1873	Nov 1874			
Hungary 2008	2008	2008	2008	Sep 2008	May 2009	Oct 2008	Apr 2009	
Iceland 2008	2008	2008	2008	Sep 2008	Dec 2008		Sep 2008	Oct 2008
India 1923	1920	1923	1920	N/A	N/A			
India 1993	1993	1993	1993					Feb 1993
Indonesia 1992	1990	1992	1990	Nov 1992	Dec 1992			
Indonesia 1998	1997	1998	1998	Nov 1997	Aug 1998	Jan 1998	Dec 1997	Mar 1999
Ireland 2008	2007	2008	2007	Sep 2008	May 2009	Sep 2008	Sep 2008	Feb 2009
Italy 1889	1889	1889	1889	Aug 1889, Nov 1893	Mar 1894			
Italy 1921	1921	1921	1921	Nov 1921	Dec 1921	Nov 1921	Dec 1921	
Italy 2010	2008	2010	2008	Sep 2008	May 2009	Nov 2008	Sep 2008	Jun 2009
Japan 1907	1907	1907	1907	Feb 1907	Jul 1908			
Japan 1997	1997	1997	1997	Nov 1997	Jan 1999	Nov 1997	Nov 1997	Mar 1999
Korea 1997	1996	1997	1997	Oct 1997	Jan 1998	Nov 1997	Nov 1997	Dec 1997
Mexico 1931	1930	1931	1928	Jul 1931	Jun 1932			
Mexico 1994	1994	1994	1994	Dec 1994	Mar 1995	Dec 1993	Jan 1995	Mar 1995
Netherlands 1921	1921	1921	1921				Apr 1922	
Netherlands 1931	1931	1931	1931					
Netherlands 2008	2008	2008	2008	Sep 2008	May 2009	Oct 2008	Oct 2008	Oct 2008
New Zealand 1989	1987	1989	1987	Aug 1988	Aug 1988			
Norway 1921	1921	1921	1919	Dec 1921	May 1923	May 1923	Dec 1921	

Table A.1 – cont.

Bank equity crisis	Year of 30% bank eq. decline	Year top-20 bank failed	BVX crisis year	Start of panic	End of panic	Liability blanket guarantees	Extraord. liquidity support	Government recapital-ization
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Norway 1988	1987	1988	1987	Oct 1991	Apr 1993	Oct 1991		Oct 1991
Peru 1877	1877	1877	1876	Aug 1875	Aug 1877	Aug 1877		
Peru 1931	1931	1931	1931	Oct 1930	N/A			
Peru 1982	1981	1982	1981					
Peru 1998	1998	1998	1998				Sep 1998	
Philippines 1981	1981	1981	1981	Jan 1981	Jan 1987		Nov 1983	Nov 1986
Portugal 1925	1920	1925	1923	Jul 1920	Dec 1920			
Portugal 1931	1930	1931	1931	Nov 1930	Jul 1932			
Portugal 2008	2008	2008	2008	Sep 2008	May 2009	Oct 2008	Dec 2009	Jun 2012
Spain 1977	1976	1977	1975					Nov 1982
Spain 2009	2008	2009	2008	Sep 2008	May 2009	Oct 2008	Oct 2008	Mar 2010
Sweden 1922	1921	1922	1919			Mar 1922		
Sweden 1932	1931	1932					Mar 1932	
Sweden 1991	1990	1991	1991	Sep 1992	Jan 1993	Sep 1992	Sep 1992	May 1993
Sweden 2008	2008	2008	2008	Sep 2008	Jan 2009	Oct 2008	Oct 2008	
Switzerland 1931	1931	1931	1931	Jul 1931	May 1934			
Switzerland 2008	2008	2008	2008	Sep 2008	Dec 2009		Sep 2008	
Thailand 1997	1996	1997	1997	May 1996	Jan 1998	Aug 1997	May 1998	Oct 1998
Turkey 1931	1931	1931	1930	Jul 1931	Dec 1931			
Turkey 1983	1980	1983	1980	Jun 1982	Jul 1982		Jul 1982	
Turkey 2001	2001	2001	2001	Nov 2000	Mar 2002	Dec 2000	Dec 2000	Dec 2000
UK 1973	1973	1973	1973	Feb 1974	Jan 1975		Dec 1974	
UK 2008	2008	2008	2008	Sep 2008	Apr 2009	Oct 2008	Oct 2008	Oct 2008
US 1931	1930	1931	1930	Nov 1930	May 1933			
US 1990	1990	1990	1990			Jan 1991		
US 2008	2008	2008	2007	Sep 2008	Apr 2009	Oct 2008	Dec 2008	Oct 2008
Venezuela 1994	1992	1994	1992	Oct 1993	Aug 1995			
Venezuela 2009	2008	2009	2008	Nov 2009	Jun 2010			

Table A.2: Bank equity declines

This table reports the years of all 30% or larger annual bank equity declines at the country index level (computed as log excess total returns). In parentheses, the first year in which a top-20 bank failed (on or after the year of the 30% decline) is reported, where a top-20 bank failure is defined in the main text.

Country	Year of 30% annual bank eq. decline (Year of first top-20 bank failure)
Argentina:	1931 (first failure: 1931), 2000 (first failure: 2001), 2008, 2011
Australia:	1893 (first failure: 1893), 1974, 1990 (first failure: 1990), 2008
Austria:	1873 (first failure: 1873), 1876, 1888, 1920, 1931 (first failure: 1931), 2008 (first failure: 2008), 2011
Belgium:	1929 (first failure: 1931), 1980, 1990, 2008 (first failure: 2008), 2011
Brazil:	1998, 2008
Canada:	2008
Chile:	1931 (first failure: 1931), 1961, 1970, 1972, 1981 (first failure: 1981), 1987, 1998
Colombia:	1931, 1982 (first failure: 1982), 1998 (first failure: 1998), 2008
Czech:	1995 (first failure: 1995), 1997
Denmark:	1990 (first failure: 1992), 2008 (first failure: 2008), 2011
Egypt:	1931 (first failure: 1931), 1956
Finland:	1920 (first failure: 1921), 1974, 1990 (first failure: 1991), 1994, 2008
France:	1882 (first failure: 1882), 1920, 1931 (first failure: 1931), 1974, 1987, 1990 (first failure: 1994), 2008 (first failure: 2008), 2011
Germany:	1920, 1931 (first failure: 1931), 1962, 1970, 1987, 2002, 2008 (first failure: 2008), 2011
Greece:	1920, 1929 (first failure: 1931), 1983, 1988, 2001, 2008 (first failure: 2008), 2010
Hungary:	1873 (first failure: 1873), 1876, 1924, 1995, 2008 (first failure: 2008), 2011
Iceland:	2008 (first failure: 2008)
India:	1920 (first failure: 1923), 1993 (first failure: 1993), 1998, 2011
Indonesia:	1990 (first failure: 1992), 1997 (first failure: 1998), 2000
Ireland:	1974, 1990, 2007 (first failure: 2008), 2010, 2016
Israel:	1973, 1983, 1988, 2002, 2008, 2011
Italy:	1889 (first failure: 1889), 1893, 1921 (first failure: 1921), 1962, 1974, 1982, 1987, 2001, 2008 (first failure: 2010), 2011
Japan:	1907, 1920, 1953, 1990, 1997 (first failure: 1997), 2001, 2008
Korea:	1990, 1996 (first failure: 1997), 2000, 2008
Malaysia:	1973, 1997, 2008

Table A.2 – cont.

Country	Year of 30% annual bank eq. decline (Year of first top-20 bank failure)
Mexico:	1924, 1930 (first failure: 1931), 1994 (first failure: 1994), 1998
Netherlands:	1921 (first failure: 1921), 1931 (first failure: 1931), 1987, 2008 (first failure: 2008)
New Zealand:	1960, 1984, 1987 (first failure: 1989), 1998, 2006, 2008
Norway:	1921 (first failure: 1921), 1987 (first failure: 1988), 1990, 2008
Peru:	1877 (first failure: 1877), 1931 (first failure: 1931), 1981 (first failure: 1982), 1987, 1998 (first failure: 1998), 2000
Philippines:	1971, 1981 (first failure: 1981), 1990, 1997, 2000, 2008
Portugal:	1920 (first failure: 1925), 1930 (first failure: 1931), 2008 (first failure: 2008), 2011, 2014
South Africa:	1969
Spain:	1976 (first failure: 1977), 1982, 2008 (first failure: 2009)
Sweden:	1921 (first failure: 1922), 1931 (first failure: 1932), 1990 (first failure: 1991), 2008 (first failure: 2008)
Switzerland:	1931 (first failure: 1931), 1974, 1987, 1990, 2008 (first failure: 2008)
Taiwan:	1990, 1995, 1998, 2008
Thailand:	1996 (first failure: 1997), 2000, 2008
Turkey:	1875, 1931 (first failure: 1931), 1934, 1974, 1980 (first failure: 1983), 1988, 1991, 1998, 2001 (first failure: 2001), 2008, 2011
UK:	1973 (first failure: 1973), 2008 (first failure: 2008)
US:	1893, 1907, 1930 (first failure: 1931), 1933, 1937, 1974, 1990 (first failure: 1990), 2008 (first failure: 2008)
Venezuela:	1988, 1992 (first failure: 1994), 1998, 2008 (first failure: 2009), 2014

Figure A.1: Government interventions in bank equity crises, 1870-2019

This figure plots the frequency of bank equity crises and the associated government interventions in the sample of 46 economies since 1870. Each crisis is color-coded based on whether the two broad classes of government interventions (liquidity-based interventions and government recapitalizations) occured in a given crisis. Liquidity-based interventions refer to the occurrence of either extraordinary central bank liquidity support or bank liability blanket guarantees (or both). Extraordinary central bank liquidity support, bank liability blanket guarantees, and government recapitalizations are defined in the main text. "No interventions" means that neither of the two types of liquidity-based interventions nor government recapitalizations was implemented in a given bank equity crisis.

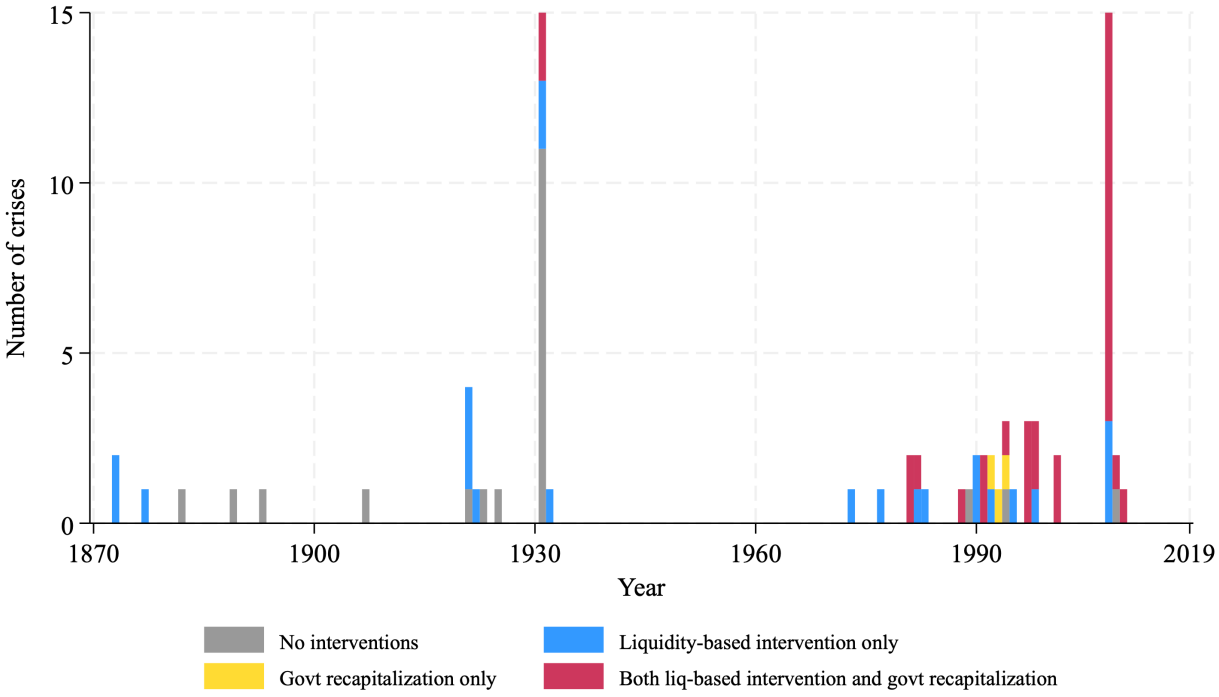


Table A.3: Descriptive statistics about interventions

This table presents descriptive statistics on the frequency of two broad classes of government interventions, liquidity-based interventions and government recapitalizations, for bank equity crises in the sample of 46 economies since 1870. Liquidity-based interventions refer to the first occurrence of either extraordinary central bank liquidity support or bank liability blanket guarantees. Extraordinary central bank liquidity support, bank liability blanket guarantees, and government recapitalizations are defined in the main text. Panel A reports the frequency of these two broad classes of government interventions across bank equity crises. Panel B report the delay (in months) between the bank equity crisis (dated as December of the year) and the intervention (recorded on a monthly level), whereas Panel C reports the delay between the start of the panic phase and the intervention. The table of interventions is listed in Table A.1. "No interventions" means that neither of the two types of liquidity-based interventions nor government recapitalizations was implemented.

Panel A: Frequency of government interventions across crises

N crises	76
of which N panics:	63
Crises with following government interventions:	
No interventions	21
Liquidity-based interventions	52
Government recapitalizations	33
Distribution of interventions:	
Liquidity-based interventions only	22
Government recapitalizations only	3
Liquidity-based interventions & govt recapitalizations	30

Panel B: Months between start of bank equity crisis and intervention

	Mean	Min	25 pct	Median	75 pct	Max	N
Extraordinary CB liquidity support	4.5	-21	-1	4	7	40	47
Bank liability blanket guarantees	4.5	-19	2	4	6	40	33
Government recapitalizations	16.5	-12	4	9	23	65	33

Panel C: Number of months between start of banking panics and interventions

	Mean	Min	25 pct	Median	75 pct	Max	N
Extraordinary CB liquidity support	3.1	-2	0	1	2	34	41
Bank liability blanket guarantees	1.4	-44	1	1	3	24	30
Government recapitalizations	14.6	0	1	7	18	70	30

Figure A.2: Returns after bank equity crises: Bank stocks versus nonfinancial stocks

This figure plots the log excess total return from t to $t+5$ of the nonfinancial stock index against the log excess total return from t to $t+5$ of the bank stock index. t denotes the year of the bank equity crisis. Each observation corresponds to an individual bank equity crisis.

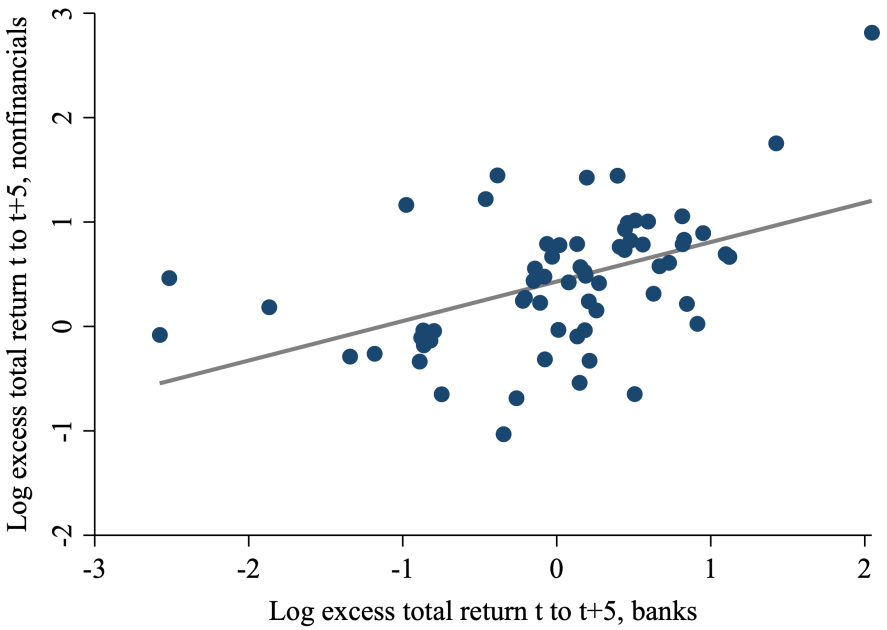


Table A.4: Returns after bank equity crises: Bank stocks versus nonfinancial stocks

This table corresponds to Figure A.2 and reports the results of regressing the log excess total returns of the nonfinancial stock index ($r^N_{i,t-k,t+h}$) on the log excess total returns on the bank stock index ($r^B_{i,t-k,t+h}$, $k =$ 0 or 1), in various windows around bank equity crises, where t denotes the year of the bank equity crisis. In Panel A, we regress log excess total returns from t to $t+h$: $r^N_{i,t,t+h}$ on $r^B_{i,t,t+h}$, where $h = 1, 3, 5$ years. In Panel B, we regress log excess total returns from $t-1$ to $t+h$: $r^N_{i,t-1,t+h}$ on $r^B_{i,t-1,t+h}$, where $h = 1, 3, 5$ years. Huber-White standard errors are reported in parentheses. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Panel A

	Dependent variable: $r^N_{i,t,t+h}$		
	$h = 1$	$h = 3$	$h = 5$
$r^B_{i,t,t+h}$	0.456***	0.298***	0.378***
	(0.101)	(0.110)	(0.116)
Constant	0.060	0.232***	0.430***
	(0.037)	(0.061)	(0.073)
Adjusted R^2	0.274	0.194	0.217
N	67	64	64

Panel B

	Dependent variable: $r^N_{i,t-1,t+h}$		
	$h = 1$	$h = 3$	$h = 5$
$r^B_{i,t-1,t+h}$	0.296***	0.252***	0.340***
	(0.069)	(0.090)	(0.117)
Constant	-0.071	0.053	0.321***
	(0.061)	(0.102)	(0.117)
Adjusted R^2	0.191	0.182	0.223
N	67	64	64

Figure A.3: Using real returns instead of excess returns

This figure is similar to Figure 1 but uses log real total returns instead of log excess total returns.

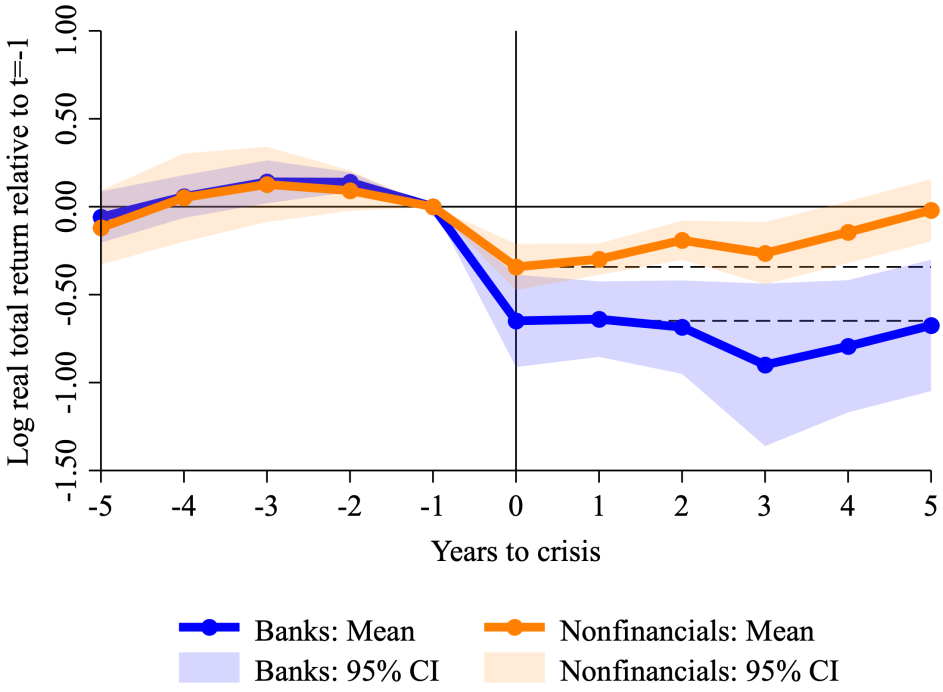


Figure A.4: Broad-market equity returns around bank equity crises

This figure is similar to Figure 1 but also shows the cumulative log excess total returns on the broad-market equity index.

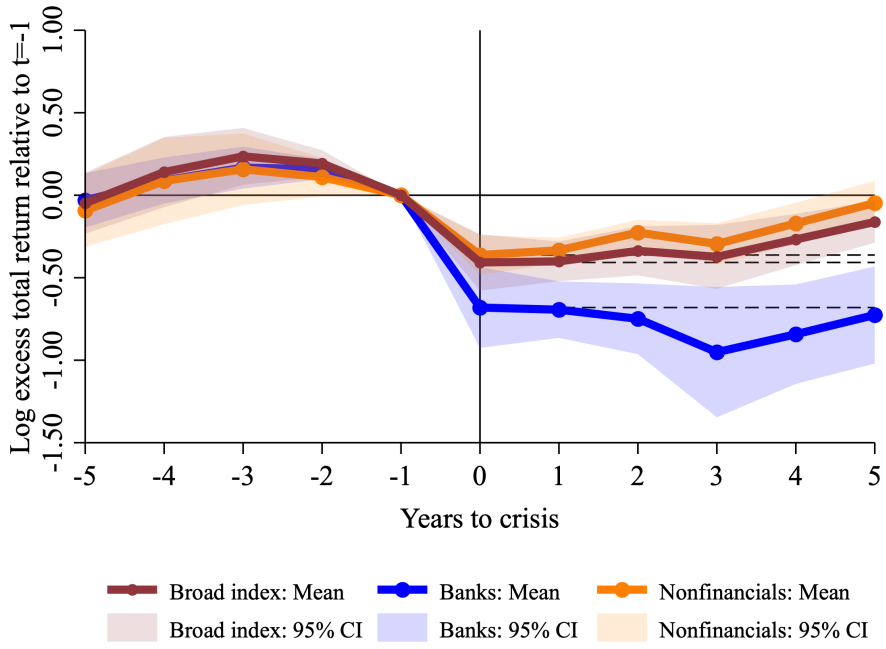


Table A.5: Broad-market equity returns following bank equity crises

This table is similar to Table 2 but uses the cumulative log excess total returns on the broad-market equity index as the dependent variable in the regressions.

	Dependent variable: $r_{i,t,t+h}$				
	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$
BankingCrisis$_{i,t}$	0.010	0.074	0.037	0.142**	0.246***
	(0.050)	(0.057)	(0.059)	(0.069)	(0.077)
Constant	0.024***	0.051***	0.083***	0.112***	0.138***
	(0.009)	(0.016)	(0.022)	(0.028)	(0.032)
Within-R^2	0.000	0.001	0.000	0.002	0.004
N observations	3,383	3,291	3,198	3,105	3,013
N banking crises	68	68	68	68	68

Figure A.5: Subsample analysis

This figure replicates the analysis in Figure 1 on various subsamples: advanced economies (Panel A), emerging economies (Panel B), the 1870-1945 subperiod (Panel C), the 1946-2019 subperiod (Panel D), and the 1870-2006 subperiod that excludes the global financial crisis (GFC, Panel E).

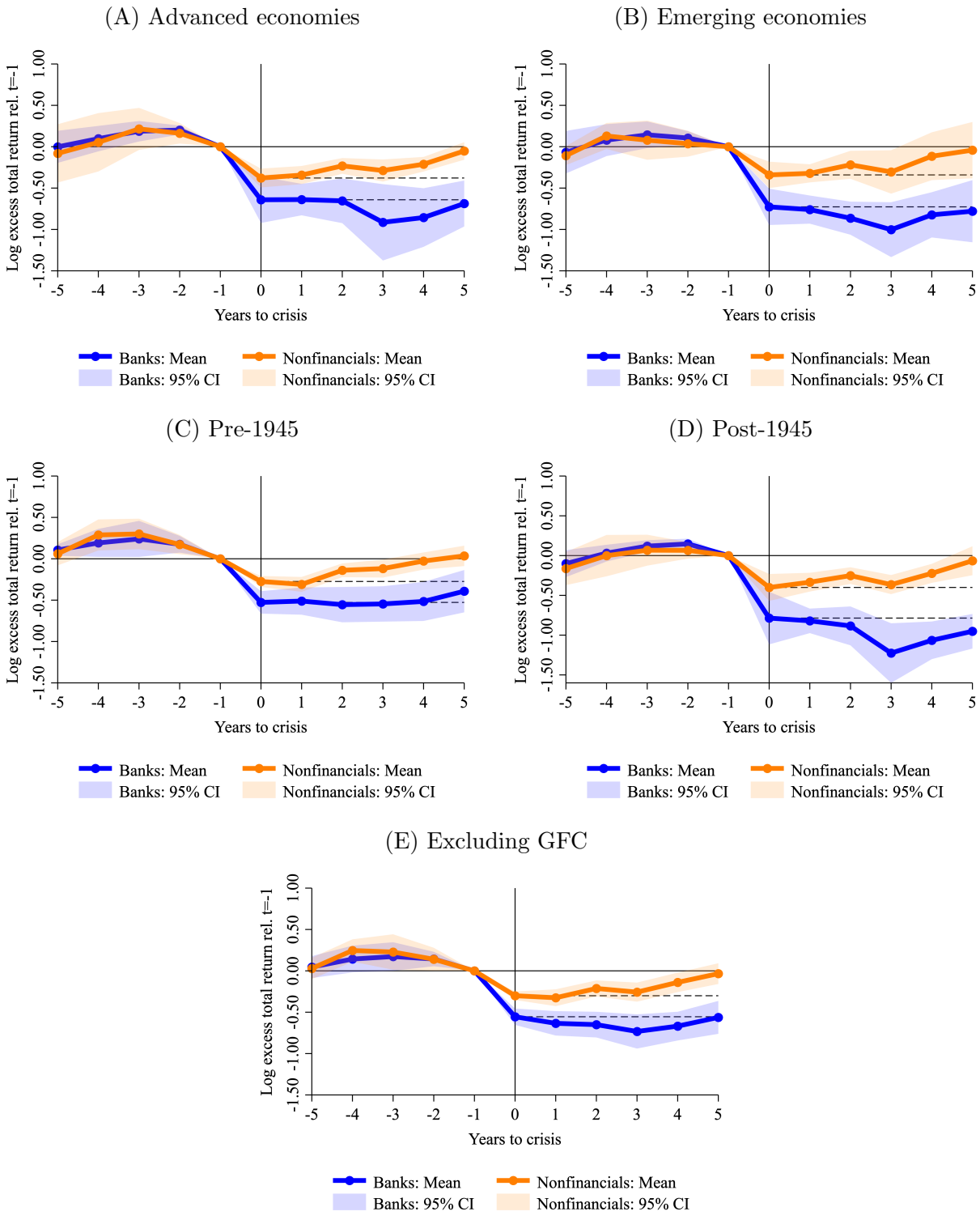
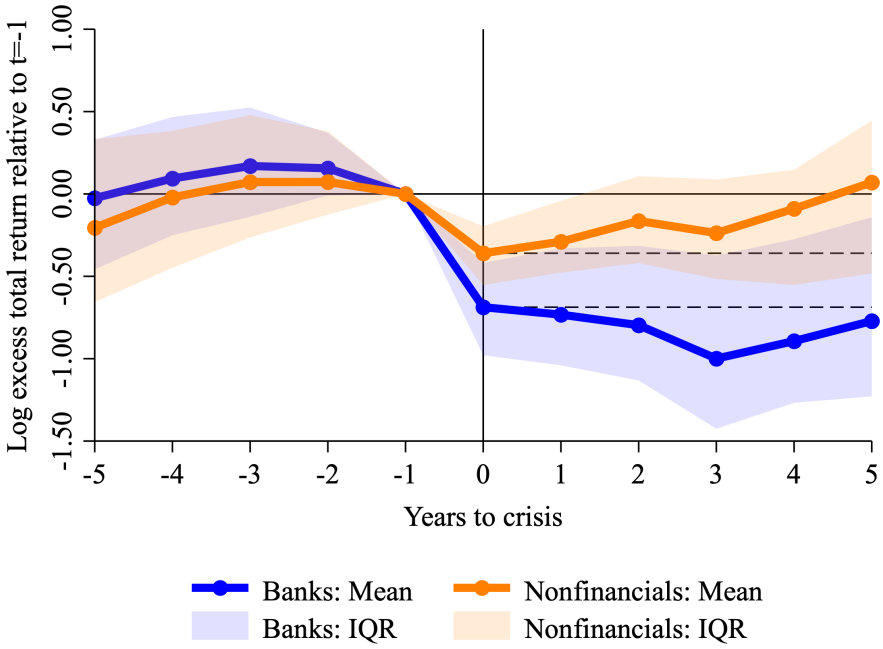


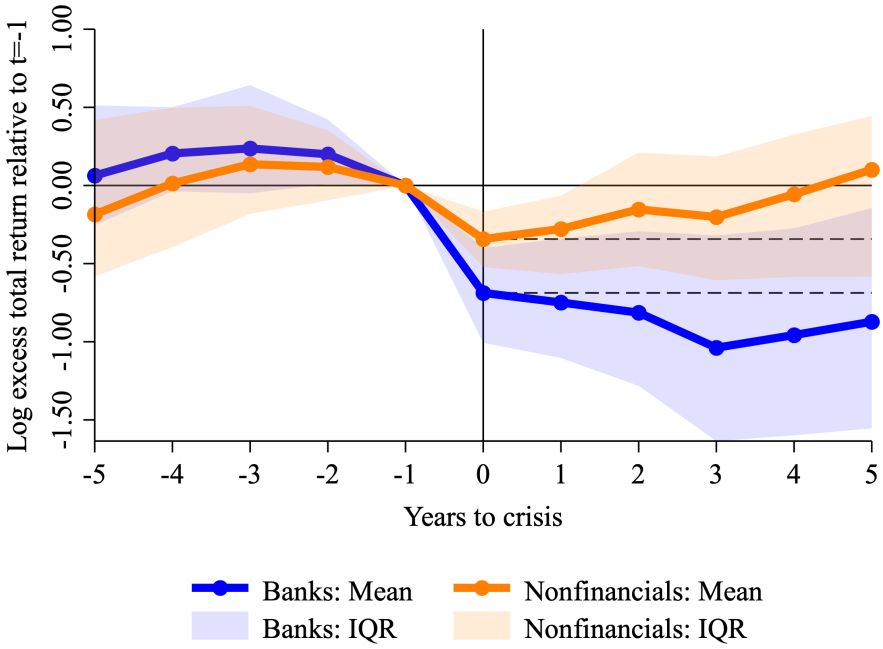
Figure A.6: Alternative methodologies for de-trending cumulative returns

This figure is similar to Figure 1, which plots cumulative abnormal log excess total returns around bank equity crises, normalized to zero in the year prior to the crisis. However, instead of subtracting out the country average of log excess total returns over the full (non-crisis) sample, we subtract out the country-specific rolling average computed from 1870 to year $t-5$ (Panel A), from year $t-15$ to year $t-5$ (Panel B), or we do not subtract anything (Panel C). The year t denotes the start of each bank equity crisis.

(A) Subtracting country-specific average returns from 1870 to year $t-5$



(B) Subtracting country-specific average returns from year $t-15$ to year $t-5$



(C) Not subtracting anything (raw log excess total returns)

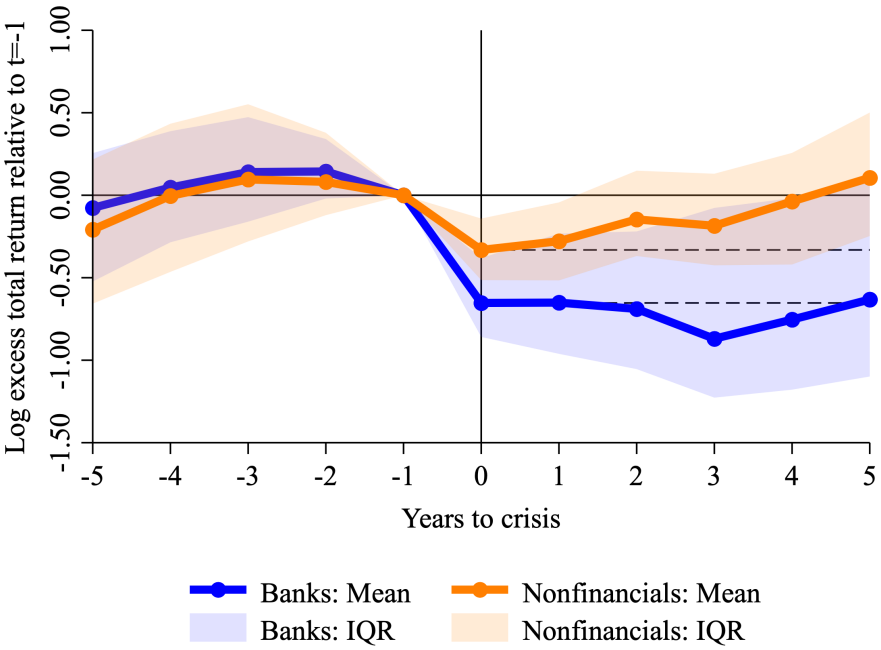
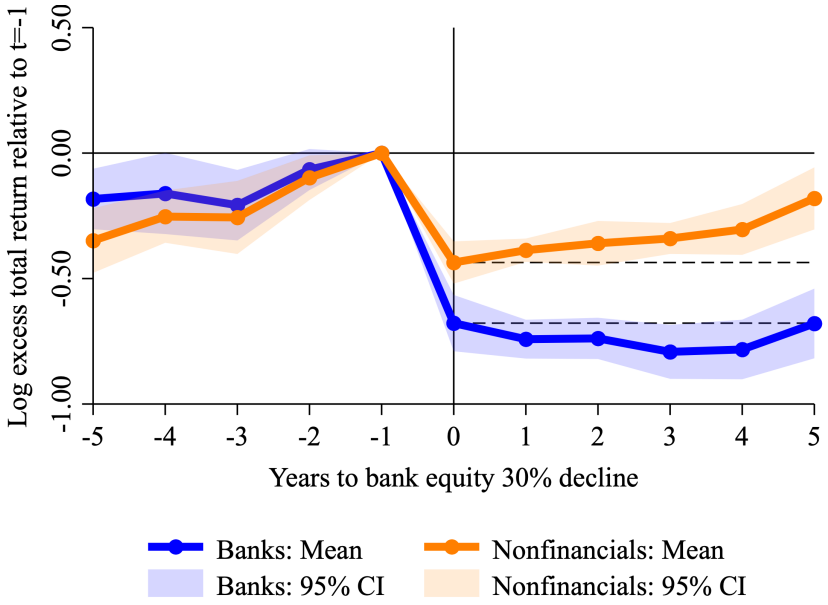


Figure A.7: Cumulative abnormal returns around bank equity 30% declines

This figure replicates the analysis in Figure 1 but around 30% bank equity declines, which are computed at the country level using the yearly excess total returns of the bank equity index. In Panel A, the set of events is defined as all individual years of 30% or larger annual declines (as listed in Table A.2). In Panel B, the set of events is defined as 30% or larger cumulative declines (potentially over multiple years), with the year of the event that in which the cumulative 30% decline threshold is first exceeded. For both of these events, if there is more than one such event within a 5-year window, we keep only the first event.

(A) Year-on-year 30% bank equity declines



(B) Cumulative 30% bank equity declines

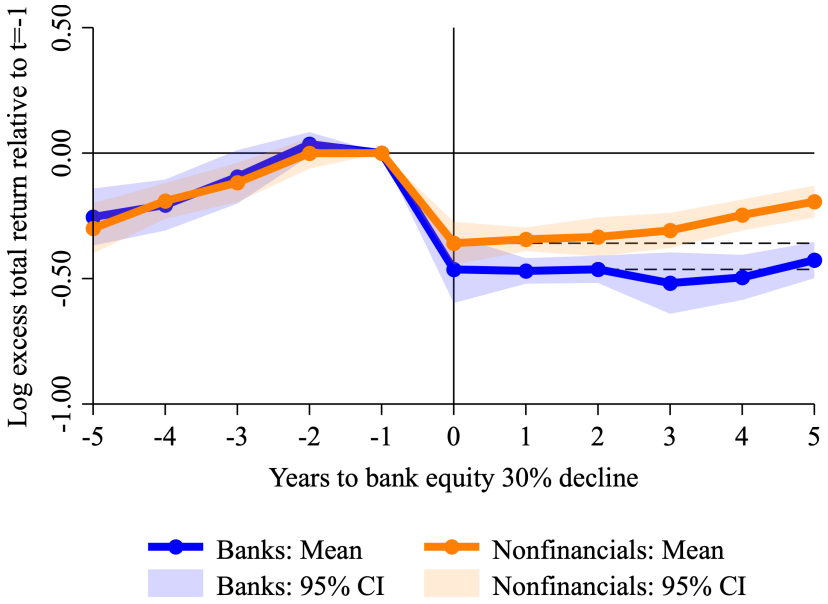
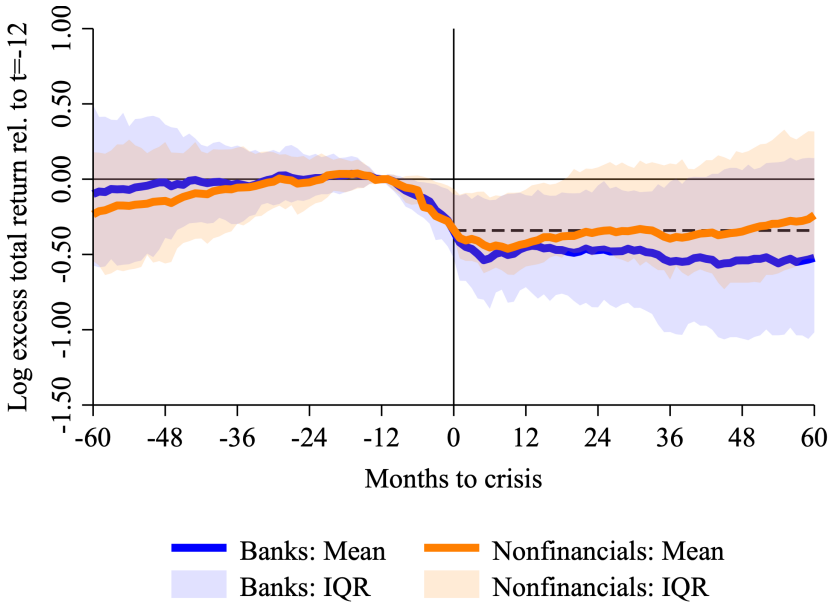


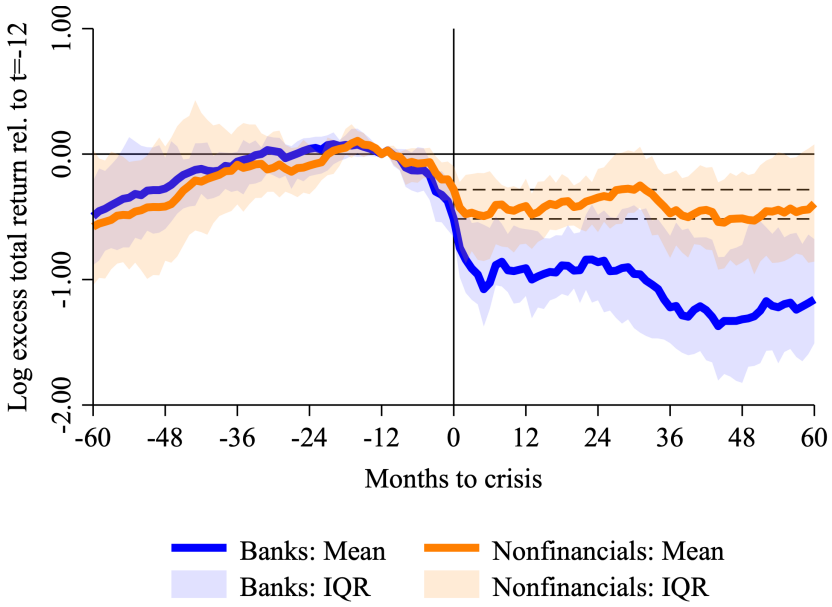
Figure A.8: Alternative definitions of banking crises

This figure plots the cumulative abnormal log excess total returns around banking crises using monthly data, where banking crises are defined using alternative crisis chronologies with monthly start dates. Panel A plots returns around Baron, Verner, Xiong (BVX) crises, defined as the month that they record as the start of a banking panic, and December of the BVX crisis year, if no panic is recorded for that crisis. Panel B plots returns around Laeven and Valencia banking crises and Panel C plots returns around the first month of 30% year-over-year bank equity declines, defined using monthly excess total returns of the bank equity index. (In cases of multiple consecutive 30% bank equity declines, the indicator in Panel C keeps only the first occurrence within a three-year window.)

(A) BVX crises



(B) Laeven and Valencia crises



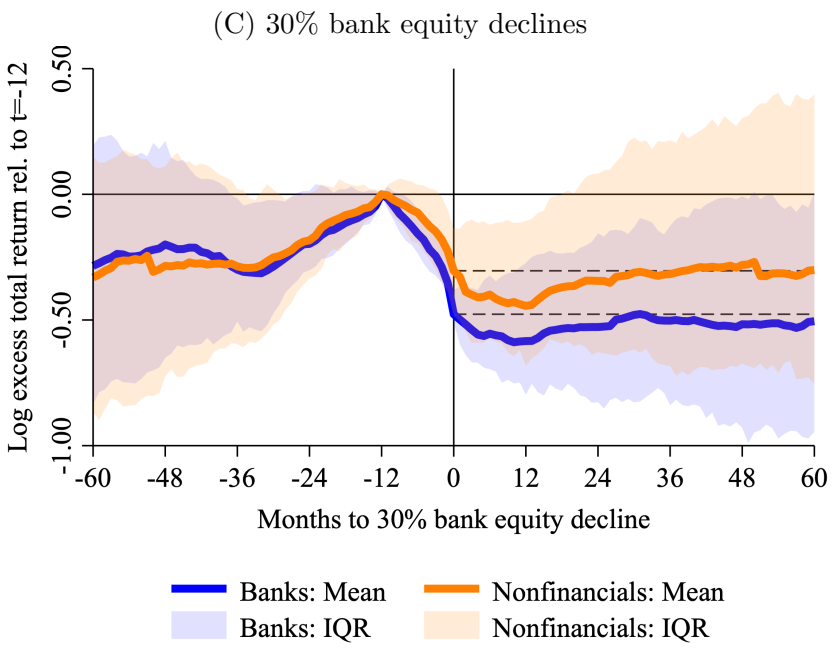

(C) 30% bank equity declines
Log excess total return rel. to t=-12
0.50
0.00
-0.50
-1.00
-60
-48
-36
-24
-12
0
12
24
36
48
60
Months to 30% bank equity decline
Banks: Mean
Banks: IQR
Nonfinancials: Mean
Nonfinancials: IQR

Figure A.9: Extending the horizon to ten years

This figure replicates the analysis in Figure 1 but extends the horizon to ten year before and after each bank equity crisis.

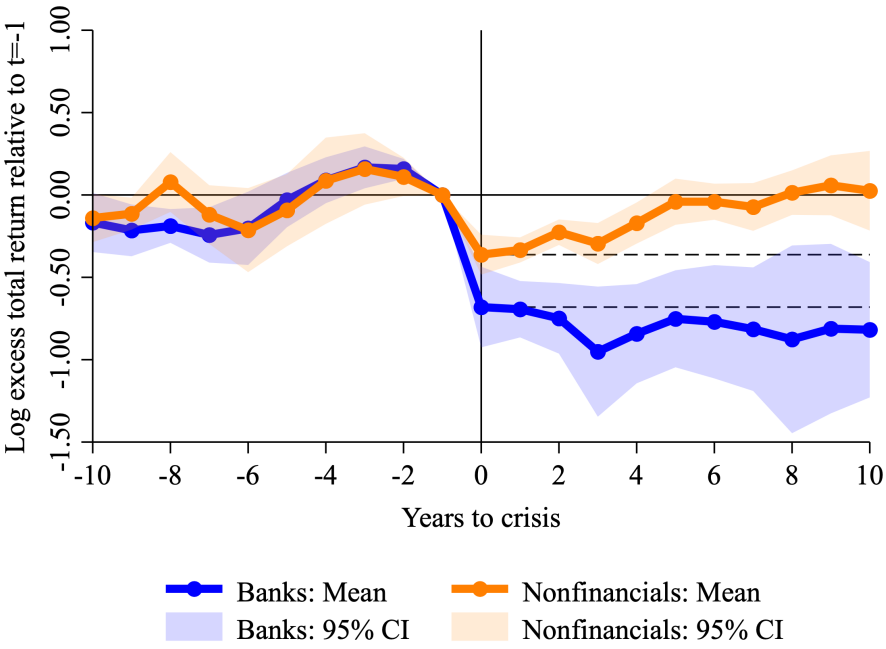


Figure A.10: Constant composition of crises for all horizons

This figure replicates the analysis in Figure 1 but drops any bank equity crises in which either the bank or nonfinancials equity log excess total returns indexes are not available for the full ±5-year window.

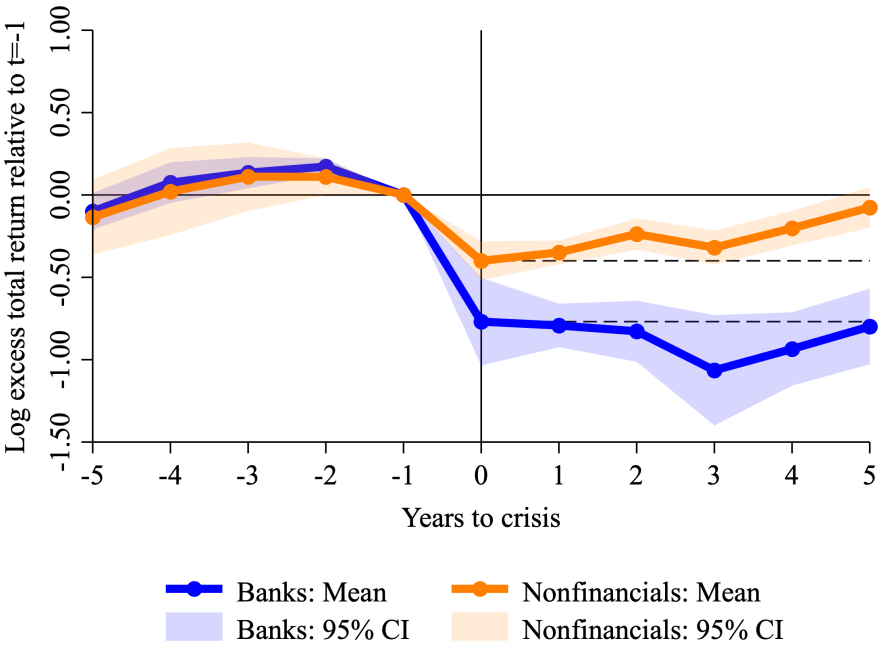


Figure A.11: Excluding banks that fail or exit

This figure replicates the analysis in Figure 1 but with bank total returns index built from banks that do not fail in the ±5-year window around bank equity crises. Specifically, for the bank equity crises in the 17 advanced economies for which we collected individual bank data, we construct market-capitalization-weighted bank equity indexes of the largest ten banks within each country (ranked by assets in year $t-5$ relative to the onset of each bank equity crisis), *excluding banks that fail or otherwise exit* at any point within the ±5-year window of the crisis. We then redo the analysis in Figure 1 on the sample of the 17 advanced economies swapping in the "no-fail" bank equity return indexes. This figure demonstrates that the main results are not simply driven by the banks that fail but also hold for the *surviving* banks.

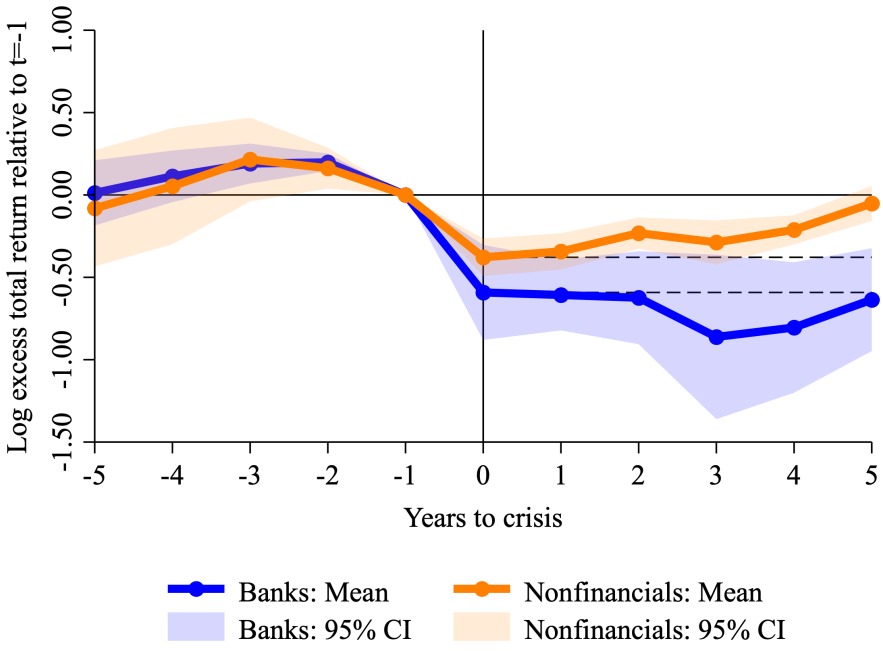
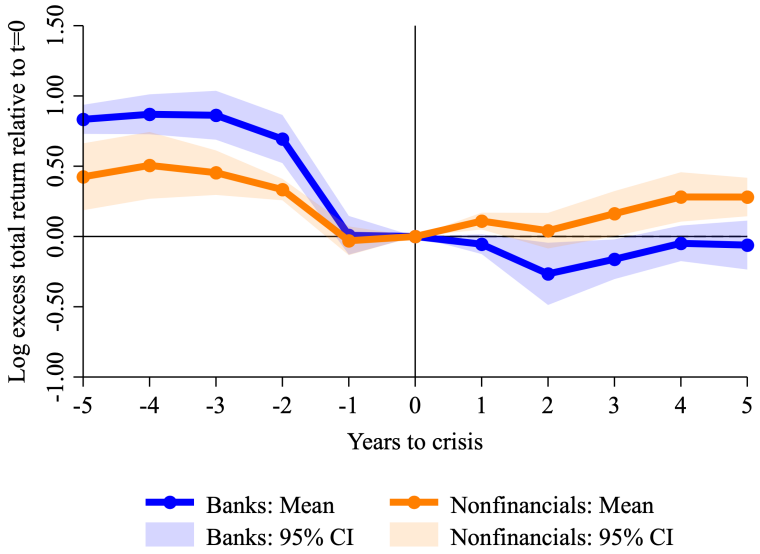


Figure A.12: Timing crises late

This figure is similar to Figure 1 but the crises are deliberately timed late. Specifically, in Panel A, which uses annual data, the crisis onset is timed one year later than in the baseline definition, and in Panel B, which uses monthly data, the crisis onset is timed six months later.

(A) Timing crises one year later



(B) Timing crises six months later

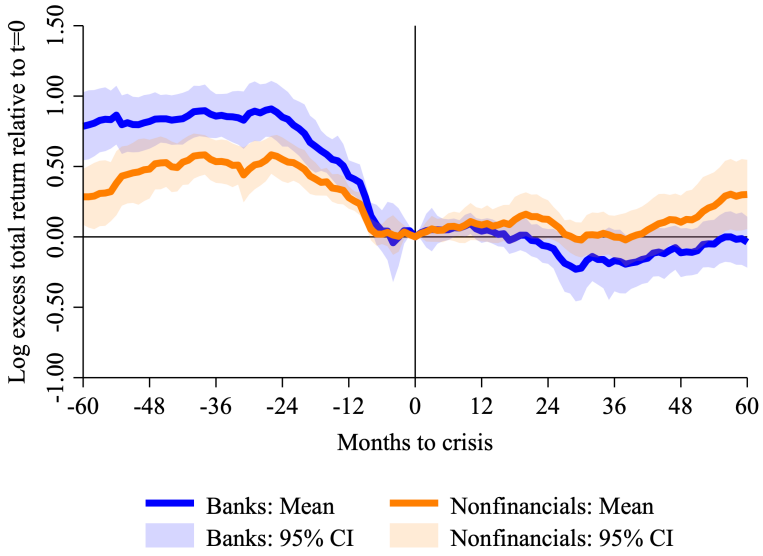
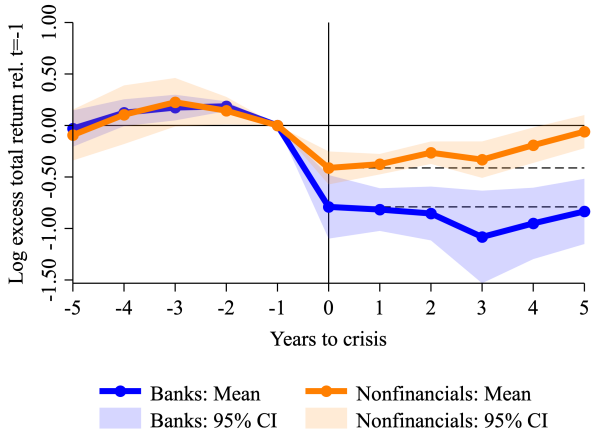


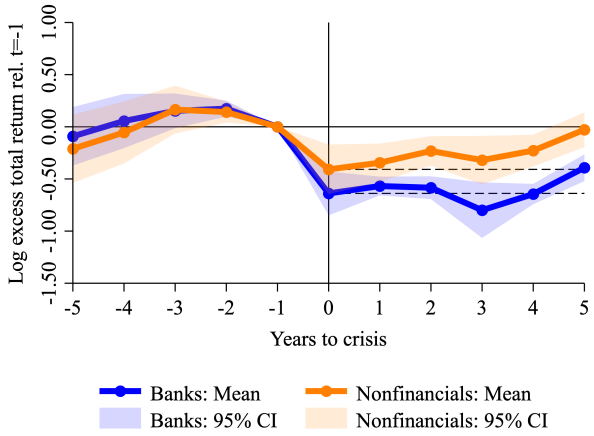
Figure A.13: Controlling for factor returns

This figure is similar to Figure 1 but controls for equity factor returns. Specifically, we compute $\hat{\alpha}_i + MKT_{i,t} + \hat{\varepsilon}_{i,t}$, where MKT_t is the market factor (defined as the excess total return of the broad equity market index of each country), $\hat{\alpha}_i$ is the estimated alpha from regressing country i's bank or nonfinancial equity excess total returns on various sets of factor returns, and $\hat{\varepsilon}_{it}$ is the residual of these regressions. We then construct plots similar to Figure 1 using these adjusted returns. In Panel A, we control for only $MKT_{i,t}$. In Panel B, we also control for the country-specific value factor taken from Kenneth French's website. In Panel C, we control for region-specific market, value, size and momentum factors, also taken from Kenneth French's website. In Panel D, we control for the global equity market factors of Karolyi and Wu (2021). Since the factor returns used in Panels C and D are only reported as US dollar returns, all returns in these panels are first converted to US-dollar returns, and we also control for the carry trade and dollar risk factors of Lustig, Russanov and Verdelhan (2011). Because of factor data availability, the sample is limited to 1975-2019 for advanced economies in Panel B, to 1990-2019 for advanced and select developing economies in Panel C, and 1984-2019 for all countries in our sample in Panel D.

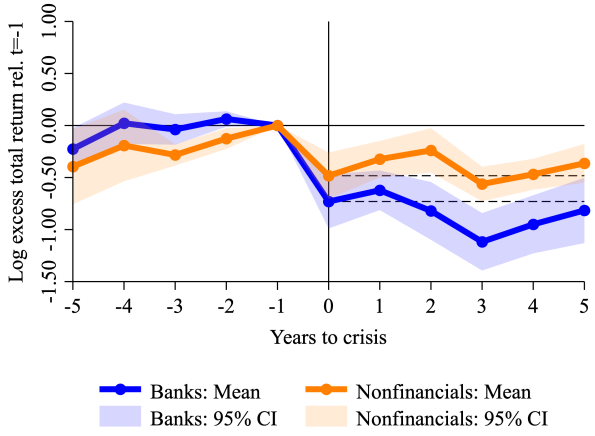
(A) Controlling for the market factor



(B) Controlling for the market and value factors



(C) Controlling for the market, value, size, and momentum factors



(D) Controlling for the global equity market factors of Karolyi and Wu (2021)

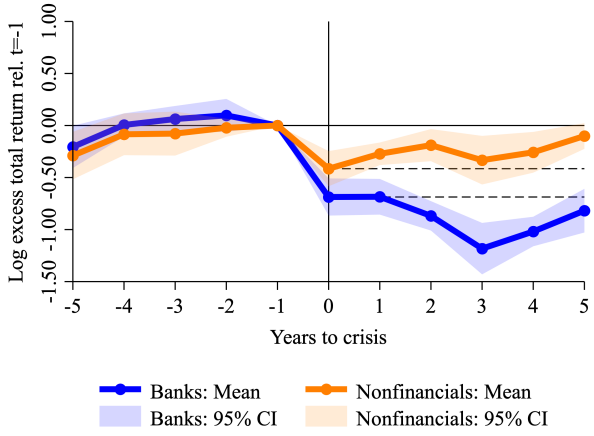


Table A.6: Cumulative abnormal equity returns after bank equity crises: Controlling for time-series momentum

This table is similar to Table 2 but controls for past index returns and past aggregate bank earnings growth. Panel A reports the results for bank equity and Panel B for nonfinancial equity. The regression is estimated at the country-year level. The dependent variable in all regressions is $r^B_{i,t,t+h}$ in Panel A and $r^N_{i,t,t+h}$ in Panel B, where $h = 1, 3, 5$ is the future cumulative return horizon in years. The sample size in columns (4), (8), (12) in Panel A is substantially lower than in other specifications because bank earnings data are available only for the 17 JST economies. The corresponding columns are not present in Panel B because historical earnings data for most of the 17 advanced economies are not available for nonfinancials. Driscoll-Kraay standard errors are reported in parentheses. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Panel A: Bank equity

	$h=1$				$h=3$				$h=5$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$\text{BankingCrisis}_{i,t}$	-0.009	0.072	0.047	0.028	-0.262***	-0.250**	-0.259***	-0.354***	-0.040	-0.167	-0.190**	-0.203**
	(0.070)	(0.066)	(0.065)	(0.093)	(0.089)	(0.100)	(0.090)	(0.101)	(0.077)	(0.103)	(0.080)	(0.085)
$r^B_{i,t-1,t}$		0.117**	0.106**	0.035		0.018	0.006	-0.205***		-0.185***	-0.188***	-0.356***
		(0.049)	(0.050)	(0.037)		(0.045)	(0.049)	(0.060)		(0.058)	(0.060)	(0.089)
$r^B_{i,t-2,t-1}$			-0.074***	-0.169***			-0.121**	-0.202***			-0.229***	-0.331***
			(0.022)	(0.030)			(0.056)	(0.048)			(0.050)	(0.060)
$r^B_{i,t-3,t-2}$			0.022	0.033			-0.174***	-0.183***			-0.174***	-0.201***
			(0.051)	(0.042)			(0.053)	(0.061)			(0.047)	(0.076)
$\Delta \log \text{Earnings}_{i,t}$				0.014				0.038				0.034
				(0.022)				(0.023)				(0.029)
$\Delta \log \text{Earnings}_{i,t-1}$				0.018*				0.061***				0.040
				(0.010)				(0.022)				(0.024)
$\Delta \log \text{Earnings}_{i,t-2}$				0.032***				0.042**				0.020
				(0.012)				(0.018)				(0.023)
Constant	0.024***	0.020**	0.023***	0.025**	0.080***	0.079***	0.089***	0.092***	0.125***	0.132***	0.141***	0.141***
	(0.008)	(0.008)	(0.008)	(0.010)	(0.020)	(0.020)	(0.020)	(0.025)	(0.030)	(0.030)	(0.030)	(0.039)
Within-R^2	0.000	0.013	0.015	0.035	0.004	0.004	0.020	0.040	0.000	0.006	0.024	0.048
N observations	3,835	3,835	3,600	1,618	3,600	3,600	3,369	1,524	3,370	3,370	3,145	1,433
N banking crises	75	75	74	30	71	71	70	30	71	71	70	30

Panel B: Nonfinancial equity

	$h = 1$			$h = 3$			$h = 5$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\text{BankingCrisis}_{i,t}$	0.031	0.019	0.003	0.069	0.015	-0.068	0.313***	0.197**	0.121
	(0.052)	(0.045)	(0.049)	(0.047)	(0.060)	(0.052)	(0.081)	(0.086)	(0.088)
$r^N_{i,t-1,t}$		-0.028	-0.029		-0.145**	-0.216***		-0.319***	-0.369***
		(0.031)	(0.041)		(0.062)	(0.054)		(0.065)	(0.078)
$r^N_{i,t-2,t-1}$			-0.087***			-0.228***			-0.302***
			(0.015)			(0.036)			(0.036)
$r^N_{i,t-3,t-2}$			-0.032			-0.200***			-0.232***
			(0.045)			(0.056)			(0.035)
Constant	0.026***	0.028***	0.036***	0.088***	0.094***	0.117***	0.145***	0.156***	0.178***
	(0.008)	(0.008)	(0.010)	(0.022)	(0.023)	(0.028)	(0.033)	(0.036)	(0.041)
Within-R^2	0.000	0.001	0.010	0.000	0.008	0.049	0.007	0.034	0.072
N observations	3,395	3,369	3,208	3,206	3,181	3,022	3,017	2,992	2,841
N banking crises	68	68	66	68	68	66	68	68	66

Table A.7: Controlling for time-series momentum, advanced economies only

This table is similar to Table A.6, but the sample is limited to the 17 advanced economies in our sample.

Panel A: Bank equity

	$h=1$				$h=3$				$h=5$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$\text{BankingCrisis}_{i,t}$	0.004	0.028	-0.003	0.028	-0.271**	-0.338***	-0.383***	-0.354***	-0.049	-0.210**	-0.280***	-0.203**
	(0.080)	(0.088)	(0.089)	(0.093)	(0.105)	(0.126)	(0.121)	(0.101)	(0.081)	(0.083)	(0.073)	(0.085)
$r^B_{i,t-1,t}$		0.037	0.034	0.035		-0.105**	-0.132***	-0.205***		-0.252***	-0.270***	-0.356***
		(0.031)	(0.033)	(0.037)		(0.046)	(0.047)	(0.060)		(0.073)	(0.081)	(0.089)
$r^B_{i,t-2,t-1}$			-0.110***	-0.169***			-0.107**	-0.202***			-0.258***	-0.331***
			(0.036)	(0.030)			(0.052)	(0.048)			(0.060)	(0.060)
$r^B_{i,t-3,t-2}$			0.043	0.033			-0.127**	-0.183***			-0.180**	-0.201***
			(0.065)	(0.042)			(0.058)	(0.061)			(0.069)	(0.076)
$\Delta \log \text{Earnings}_{i,t}$				0.014				0.038				0.034
				(0.022)				(0.023)				(0.029)
$\Delta \log \text{Earnings}_{i,t-1}$				0.018*				0.061***				0.040
				(0.010)				(0.022)				(0.024)
$\Delta \log \text{Earnings}_{i,t-2}$				0.032***				0.042**				0.020
				(0.012)				(0.018)				(0.023)
Constant	0.019*	0.018*	0.025**	0.025**	0.074***	0.077***	0.089***	0.092***	0.114***	0.121***	0.138***	0.141***
	(0.011)	(0.011)	(0.012)	(0.010)	(0.026)	(0.027)	(0.028)	(0.025)	(0.043)	(0.044)	(0.044)	(0.039)
Within-R^2	0.000	0.001	0.016	0.035	0.007	0.011	0.022	0.040	0.000	0.013	0.034	0.048
N observations	2,121	2,121	2,005	1,618	2,005	2,005	1,892	1,524	1,892	1,892	1,783	1,433
N banking crises	41	41	41	30	41	41	41	30	41	41	41	30

Panel B: Nonfinancial equity

	$h=1$			$h=3$			$h=5$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\text{BankingCrisis}_{i,t}$	0.037	0.055	0.024	0.093**	0.058	-0.061	0.324***	0.207***	0.098
	(0.058)	(0.060)	(0.059)	(0.037)	(0.049)	(0.050)	(0.075)	(0.057)	(0.079)
$r^N_{i,t-1,t}$		0.047	0.031		-0.090	-0.215***		-0.312***	-0.373***
		(0.051)	(0.057)		(0.091)	(0.066)		(0.087)	(0.098)
$r^N_{i,t-2,t-1}$			-0.121***			-0.266***			-0.361***
			(0.031)			(0.053)			(0.053)
$r^N_{i,t-3,t-2}$			-0.002			-0.216**			-0.273***
			(0.067)			(0.087)			(0.048)
Constant	0.030***	0.029***	0.040***	0.104***	0.108***	0.139***	0.172***	0.184***	0.210***
	(0.010)	(0.010)	(0.012)	(0.026)	(0.028)	(0.033)	(0.039)	(0.041)	(0.045)
Within-R^2	0.000	0.002	0.016	0.001	0.004	0.057	0.010	0.033	0.088
N observations	2,027	2,017	1,920	1,920	1,910	1,814	1,812	1,802	1,713
N banking crises	39	39	38	39	39	38	39	39	38

Table A.8: Equity index trading strategies around banking crises

This table reports statistics on the excess US dollar (USD) returns earned from various trading strategies in which an USD-based equity investor invests in either bank or nonfinancial equity indexes in a given country at the start of the month following the onset of a bank equity crisis in that country. The first row corresponds to the baseline non-crisis buy-and-hold (b&h) strategy, in which an investor invests unconditionally across all countries (equal-weighted) and stays invested in all years without regard to banking crises. The following rows correspond to trading strategies around various definitions of banking crises. "Bank equity crises" refers to the bank equity crisis chronology as defined in the main text (using December of the crisis year). "BVX crises" is defined as the month in which Baron, Verner and Xiong (2021) record the start of a banking panic, and December of the BVX crisis year, if no panic is recorded for that crisis. "LV crises" refers to the monthly banking crises start dates defined by Laeven and Valencia (2013). "30% bank equity declines" refers to bank equity excess total return index drops of 30% or more year-over-year (based on monthly data, first occurrence in a three-year window). The traded assets are either the bank or nonfinancial equity total return indexes, converted to USD excess returns. The strategies are constructed based on a USD investor who invests 100% of his or her wealth over the specified horizon (either 1-60 months or 7-60 months relative to the onset of the banking crisis) in countries with a banking crisis (dividing the wealth equally, if more than one country is in crisis at a given time) and in US T-bills otherwise. The following annualized quantities are reported based on the monthly time-series of this investor's performance: mean, volatility, Sharpe ratio, and factor alphas. "Intl. 3-factor" alpha refers to the alpha after controlling for global equity market, size and value factors. "Intl. 3-factor + LRV" alpha additionally controls for currency risk factors – the carry trade, dollar and the dollar carry trade factors of Lustig, Roussanov, Verdelhan (2011, 2014). *Diff. w/ b&h* is the difference between the trading strategy and the baseline buy-and-hold strategy from the first row. t-statistics are reported in brackets. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Panel A: Bank equity

Crisis	Holding period	Mean	Volatility	Sharpe ratio	Intl. 3-factor α	Intl. 3-factor + LRV α
N/A	Buy and hold	0.112	0.199	0.561	-0.006 [-0.309]	-0.009 [-0.494]
Bank equity crises	0-60 months	0.088	0.257	0.343	-0.022 [-0.482]	-0.034 [-0.735]
	Diff. w/ b&h	-0.023 [-0.596]	0.058** [1.985]	-0.217 [-0.941]	-0.016 [-0.383]	-0.025 [-0.591]
	6-60 months	0.086	0.244	0.351	-0.005 [-0.117]	-0.016 [-0.358]
	Diff. w/ b&h	-0.026 [-0.575]	0.045 [1.582]	-0.210 [-0.868]	0.000 [0.009]	-0.008 [-0.188]
BVX panics	0-60 months	0.069	0.272	0.255	-0.070* [-1.837]	-0.081** [-2.098]
	Diff. w/ b&h	-0.042 [-1.070]	0.073*** [4.437]	-0.306 [-1.257]	-0.065* [-1.907]	-0.072** [-2.187]
	6-60 months	0.094	0.261	0.359	-0.023 [-0.483]	-0.031 [-0.651]
	Diff. w/ b&h	-0.018 [-0.424]	0.062*** [3.674]	-0.202 [-0.759]	-0.018 [-0.405]	-0.023 [-0.524]
LV crises	0-60 months	0.072	0.300	0.242	-0.068 [-1.410]	-0.083 [-1.649]
	Diff. w/ b&h	-0.039 [-0.911]	0.101*** [2.699]	-0.319 [-1.193]	-0.062 [-1.572]	-0.074* [-1.785]
	6-60 months	0.098	0.291	0.336	-0.033 [-0.695]	-0.051 [-1.006]
	Diff. w/ b&h	-0.014 [-0.313]	0.092** [2.029]	-0.225 [-0.932]	-0.028 [-0.655]	-0.043 [-0.946]
30% bank equity declines	0-60 months	0.109	0.213	0.513	-0.010 [-0.450]	-0.013 [-0.577]
	Diff. w/ b&h	-0.002 [-0.083]	0.015 [1.185]	-0.048 [-0.192]	-0.005 [-0.281]	-0.004 [-0.240]
	6-60 months	0.110	0.218	0.506	-0.010 [-0.397]	-0.013 [-0.518]
	Diff. w/ b&h	-0.001 [-0.043]	0.019 [1.470]	-0.054 [-0.201]	-0.004 [-0.229]	-0.004 [-0.214]

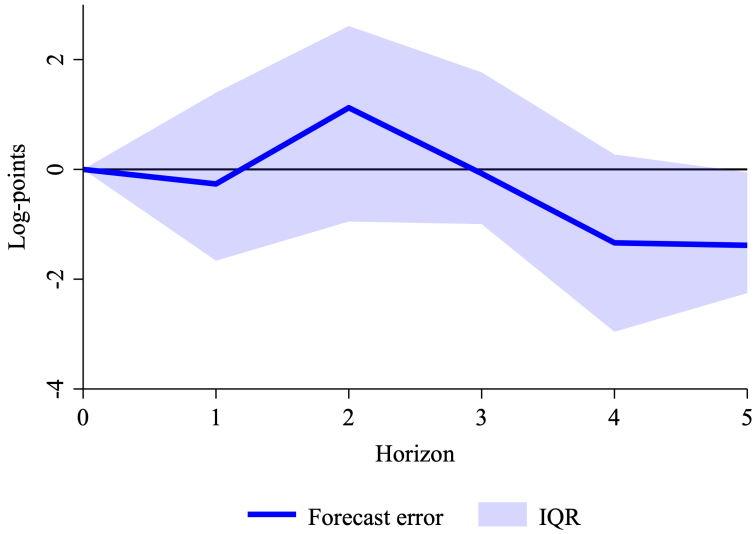
Panel B: Nonfinancial equity

Crisis	Holding period	Mean	Volatility	Sharpe ratio	Intl. 3-factor α	Intl. 3-factor + LRV α
N/A	Buy and hold	0.103	0.169	0.607	0.008 [0.585]	0.008 [0.620]
Bank equity crises	0-60 months	0.081	0.183	0.443	0.007 [0.230]	0.005 [0.158]
	Diff. w/ b&h	-0.022 [-0.705]	0.013 [0.335]	-0.165 [-0.708]	-0.001 [-0.024]	-0.003 [-0.094]
	6-60 months	0.075	0.182	0.414	0.009 [0.299]	0.008 [0.252]
	Diff. w/ b&h	-0.028 [-0.862]	0.013 [0.410]	-0.193 [-0.703]	0.002 [0.061]	0.000 [0.012]
BVX panics	0-60 months	0.092	0.193	0.479	-0.006 [-0.230]	-0.010 [-0.401]
	Diff. w/ b&h	-0.010 [-0.366]	0.024* [1.947]	-0.128 [-0.457]	-0.013 [-0.568]	-0.017 [-0.766]
	6-60 months	0.105	0.193	0.546	0.018 [0.517]	0.012 [0.356]
	Diff. w/ b&h	0.002 [0.080]	0.024 [1.537]	-0.062 [-0.238]	0.011 [0.334]	0.005 [0.149]
LV crises	0-60 months	0.059	0.201	0.293	-0.029 [-0.999]	-0.034 [-1.144]
	Diff. w/ b&h	-0.044 [-1.478]	0.032 [0.132]	-0.315 [-1.211]	-0.037 [-1.446]	-0.041 [-1.588]
	6-60 months	0.075	0.195	0.384	-0.009 [-0.315]	-0.016 [-0.554]
	Diff. w/ b&h	-0.028 [-0.949]	0.026 [0.613]	-0.223 [-0.847]	-0.017 [-0.675]	-0.023 [-0.935]
30% bank equity declines	0-60 months	0.112	0.175	0.642	0.016 [1.043]	0.017 [1.132]
	Diff. w/ b&h	0.009 [0.462]	0.006 [0.614]	0.034 [0.125]	0.009 [0.831]	0.009 [0.921]
	6-60 months	0.118	0.175	0.677	0.024 [1.478]	0.025 [1.534]
	Diff. w/ b&h	0.015 [0.737]	0.005 [0.661]	0.069 [0.257]	0.016 [1.435]	0.017 [1.493]

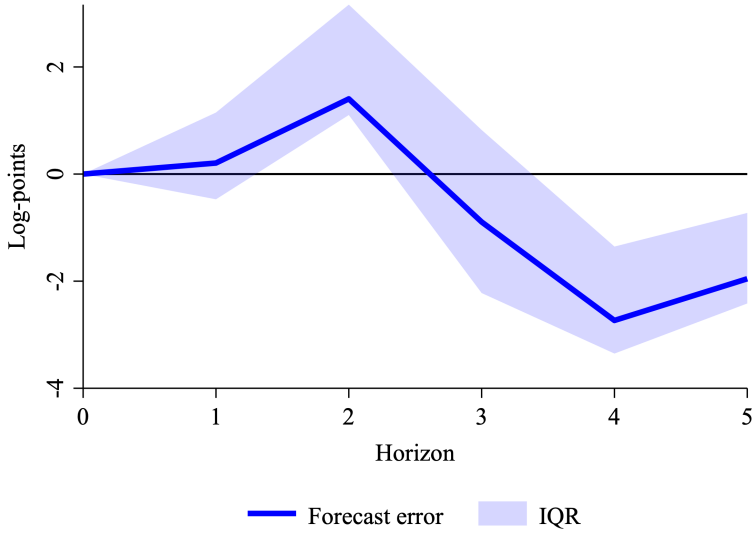
Figure A.14: IMF GDP forecasts errors after bank equity crises

This figure plots the average forecast error (realized minus forecasted) of log real GDP growth at horizons $t+h, h=1,...,5$ made by the IMF in the spring of year $t+1$, where t is the year of the bank equity crisis. Panel A plots the average errors across all crises for which the IMF data are available. Panel B restricts the sample to 2008-2010 crises only. Panel C splits the data into crises that were preceded by a credit boom vs. those that were not. We define a bank equity crisis as preceded by a credit boom if the trough-to-peak change in credit-to-GDP ratio within the five years leading up to the crisis exceeds the median value observed across all crises.

(A) Full sample



(B) 2008-2010 crises



(C) Full sample

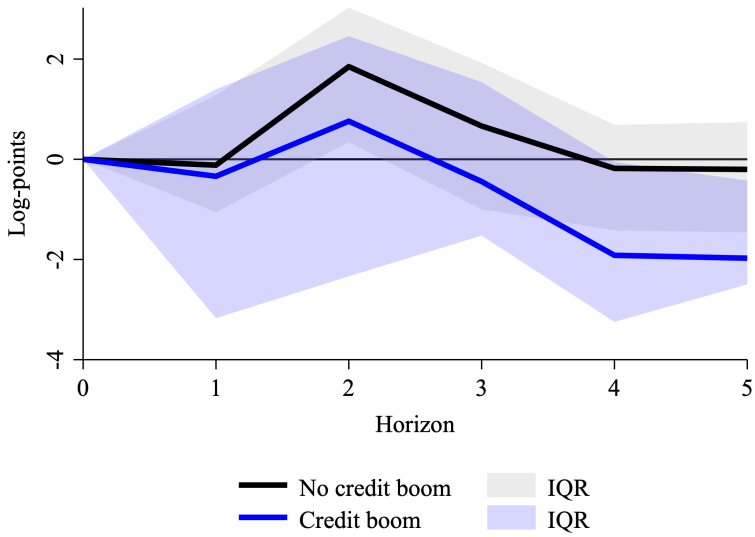


Table A.9: IMF GDP forecasts after bank equity crises

This table reports real GDP growth forecasts at various horizons made by the IMF in the spring of year $t+1$, where t is the year of the bank equity crisis as defined in the paper. For clarity of presentation, we list only bank equity crises starting in 2008-2010. Following Mian, Sufi and Verner (2017), we report real GDP growth rates as log-rates ($\times 100$). Panel A reports cumulated growth rates from year t to year $t+h$ for $h = 1, ..., 5$ (where t is the crisis year). Panel B reports real GDP growth rates in each individual year $t+h$.

Panel A

	$h=1$			$h=2$			$h=3$			$h=4$			$h=5$		
	Forecast	Realized	Error	Forecast	Realized	Error	Forecast	Realized	Error	Forecast	Realized	Error	Forecast	Realized	Error
Austria 2008	-3.03	-3.84	-0.80	-2.85	-2.02	0.84	-1.45	0.86	2.32	0.52	1.54	1.02	2.57	1.57	-1.01
Belgium 2008	-3.91	-2.28	1.63	-3.62	0.43	4.05	-1.84	2.21	4.05	0.14	2.45	2.30	2.46	2.65	0.19
Denmark 2008	-4.11	-5.03	-0.92	-3.72	-3.18	0.54	-2.24	-1.85	0.39	0.21	-1.62	-1.83	2.73	-0.69	-3.42
France 2008	-3.00	-2.92	0.08	-2.59	-0.98	1.60	-0.92	1.18	2.11	1.01	1.50	0.49	3.21	2.07	-1.14
Germany 2008	-5.78	-5.86	-0.08	-6.78	-1.76	5.02	-5.32	2.08	7.39	-3.50	2.50	6.01	-1.56	2.93	4.49
Greece 2008	-0.20	-4.40	-4.20	-0.80	-10.03	-9.23	0.29	-19.61	-19.90	1.88	-27.19	-29.07	3.86	-30.48	-34.34
Hungary 2008	-3.40	-6.83	-3.43	-3.85	-6.18	-2.32	-1.38	-4.53	-3.15	2.35	-6.18	-8.52	6.75	-4.10	-10.85
Iceland 2008	-11.23	-7.02	4.21	-11.43	-10.51	0.91	-7.34	-8.65	-1.31	-2.93	-7.36	-4.43	1.51	-3.31	-4.82
Ireland 2008	-8.34	-5.24	3.10	-11.38	-3.49	7.89	-10.39	-3.16	7.23	-8.09	-2.93	5.16	-5.54	-1.59	3.95
Italy 2010	1.05	0.58	-0.47	2.34	-2.28	-4.63	3.70	-4.03	-7.72	5.07	-3.91	-8.98	6.46	-2.99	-9.45
Netherlands 2008	-4.88	-3.74	1.15	-5.55	-2.40	3.14	-3.86	-0.87	3.00	-1.76	-1.90	-0.14	0.69	-2.03	-2.72
Portugal 2008	-4.19	-3.17	1.01	-4.69	-1.45	3.24	-3.69	-3.16	0.53	-2.20	-7.30	-5.10	-0.71	-8.23	-7.51
Spain 2009	-0.41	0.01	0.43	0.49	-0.99	-1.47	1.94	-3.96	-5.90	3.57	-5.68	-9.25	5.40	-4.31	-9.71
Sweden 2008	-4.36	-4.33	0.04	-4.19	1.68	5.87	-2.21	4.68	6.90	1.71	4.05	2.34	6.11	5.13	-0.98
Switzerland 2008	-3.00	-2.25	0.75	-3.34	0.58	3.91	-2.34	2.40	4.74	-1.10	3.40	4.50	0.39	5.26	4.87
UK 2008	-4.17	-4.34	-0.17	-4.57	-2.64	1.93	-2.47	-1.01	1.46	0.43	0.42	-0.01	3.18	2.45	-0.73
US 2008	-2.79	-2.57	0.22	-2.84	-0.04	2.80	0.63	1.50	0.87	4.21	3.73	-0.48	7.44	5.55	-1.89
Venezuela 2009	-2.67	-1.50	1.17	-2.31	2.59	4.90	-1.84	8.06	9.91	-0.29	9.40	9.69	1.85	5.43	3.58

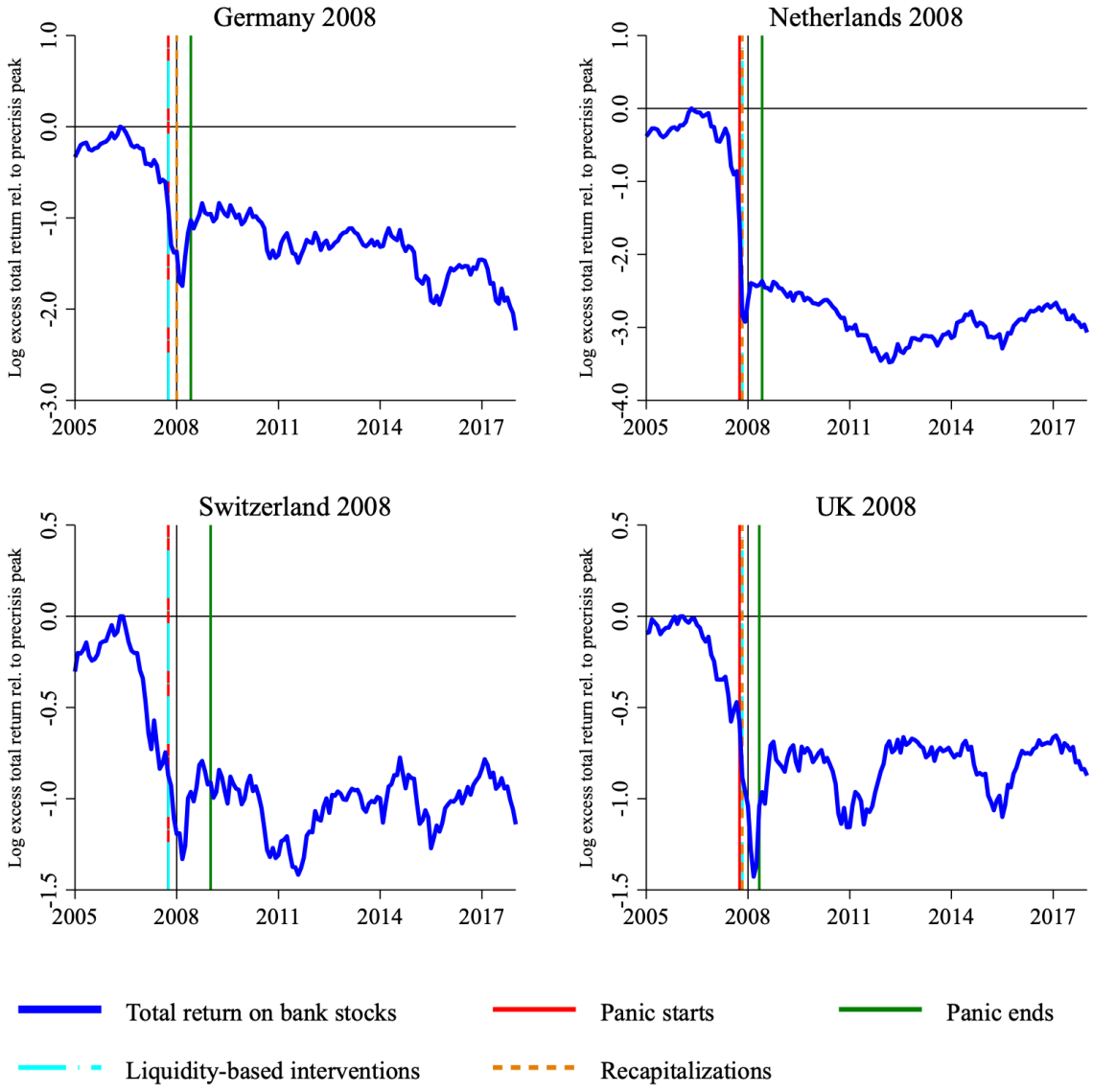
Panel B

	$h=1$			$h=2$			$h=3$			$h=4$			$h=5$		
	Forecast	Realized	Error	Forecast	Realized	Error	Forecast	Realized	Error	Forecast	Realized	Error	Forecast	Realized	Error
Austria 2008	-3.03	-3.84	-0.80	0.18	1.82	1.64	1.40	2.88	1.48	1.97	0.68	-1.30	2.05	0.03	-2.02
Belgium 2008	-3.91	-2.28	1.63	0.29	2.71	2.42	1.78	1.78	-0.00	1.98	0.23	-1.75	2.31	0.20	-2.11
Denmark 2008	-4.11	-5.03	-0.92	0.39	1.85	1.46	1.48	1.33	-0.15	2.44	0.23	-2.22	2.52	0.93	-1.59
France 2008	-3.00	-2.92	0.08	0.41	1.93	1.52	1.66	2.17	0.51	1.93	0.31	-1.62	2.20	0.57	-1.63
Germany 2008	-5.78	-5.86	-0.08	-1.00	4.10	5.10	1.47	3.84	2.37	1.81	0.43	-1.39	1.95	0.43	-1.52
Greece 2008	-0.20	-4.40	-4.20	-0.60	-5.63	-5.03	1.09	-9.58	-10.67	1.59	-7.58	-9.17	1.98	-3.30	-5.28
Hungary 2008	-3.40	-6.83	-3.43	-0.45	0.65	1.10	2.47	1.64	-0.82	3.73	-1.64	-5.37	4.40	2.07	-2.33
Iceland 2008	-11.23	-7.02	4.21	-0.20	-3.50	-3.30	4.09	1.86	-2.22	4.41	1.29	-3.12	4.44	4.05	-0.39
Ireland 2008	-8.34	-5.24	3.10	-3.05	1.75	4.79	1.00	0.33	-0.66	2.30	0.23	-2.07	2.55	1.34	-1.20
Italy 2010	1.05	0.58	-0.47	1.30	-2.86	-4.16	1.36	-1.74	-3.10	1.37	0.11	-1.26	1.39	0.92	-0.47
Netherlands 2008	-4.88	-3.74	1.15	-0.66	1.33	1.99	1.69	1.54	-0.15	2.10	-1.04	-3.14	2.45	-0.13	-2.58
Portugal 2008	-4.19	-3.17	1.01	-0.50	1.72	2.22	1.00	-1.71	-2.71	1.49	-4.14	-5.63	1.49	-0.93	-2.42
Spain 2009	-0.41	0.01	0.43	0.90	-1.00	-1.90	1.45	-2.97	-4.43	1.63	-1.72	-3.35	1.83	1.37	-0.46
Sweden 2008	-4.36	-4.33	0.04	0.17	6.01	5.84	1.98	3.01	1.03	3.92	-0.63	-4.56	4.40	1.08	-3.32
Switzerland 2008	-3.00	-2.25	0.75	-0.33	2.83	3.16	1.00	1.82	0.82	1.24	1.00	-0.24	1.49	1.86	0.37
UK 2008	-4.17	-4.34	-0.17	-0.40	1.70	2.09	2.10	1.63	-0.47	2.90	1.44	-1.46	2.75	2.03	-0.73
US 2008	-2.79	-2.57	0.22	-0.05	2.53	2.58	3.47	1.54	-1.93	3.58	2.22	-1.35	3.23	1.83	-1.40
Venezuela 2009	-2.67	-1.50	1.17	0.36	4.09	3.73	0.47	5.47	5.01	1.55	1.33	-0.22	2.14	-3.97	-6.12

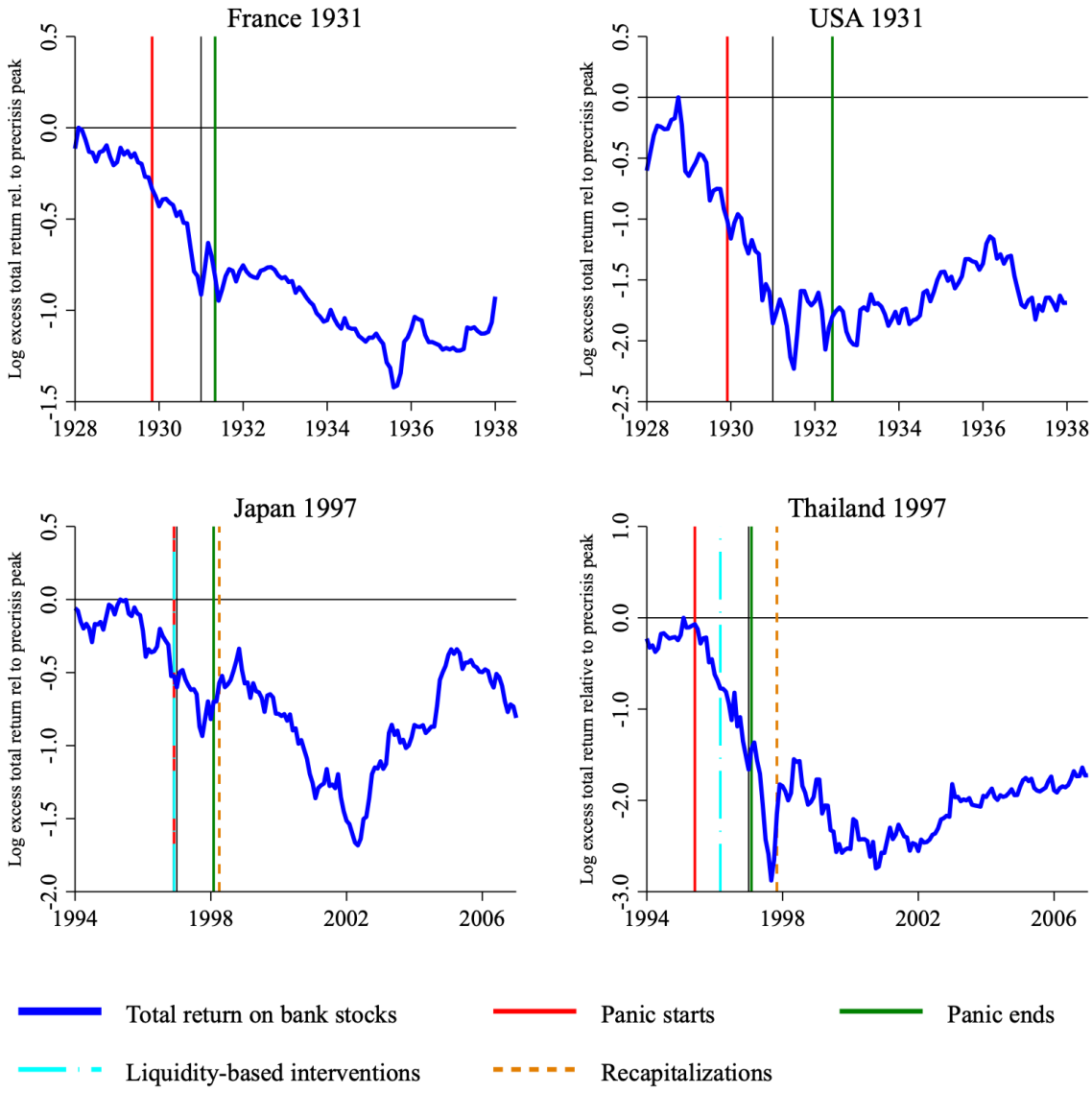
Figure A.15: Cumulative bank equity returns around selected bank equity crises

This figure plots bank equity index returns around twelve selected bank equity crises. Each plot shows the cumulative log excess total returns at monthly frequency around the start of a bank equity crisis (defined as December 31 of the bank equity crisis year) and normalized to 0 at the pre-crisis peak. Unlike in Figure 1, these are not *abnormal* returns but cumulative *raw* log excess total returns of the bank equity index. Vertical lines denote the month of the panic start (red solid line), the panic end (green solid line), liquidity-based interventions (light blue dashed line), and government recapitalizations (orange dashed line).

(A) Select countries around the Great Financial Crisis



(B) Select historical bank equity crises



(C) Select crises with large bouncebacks in bank equity

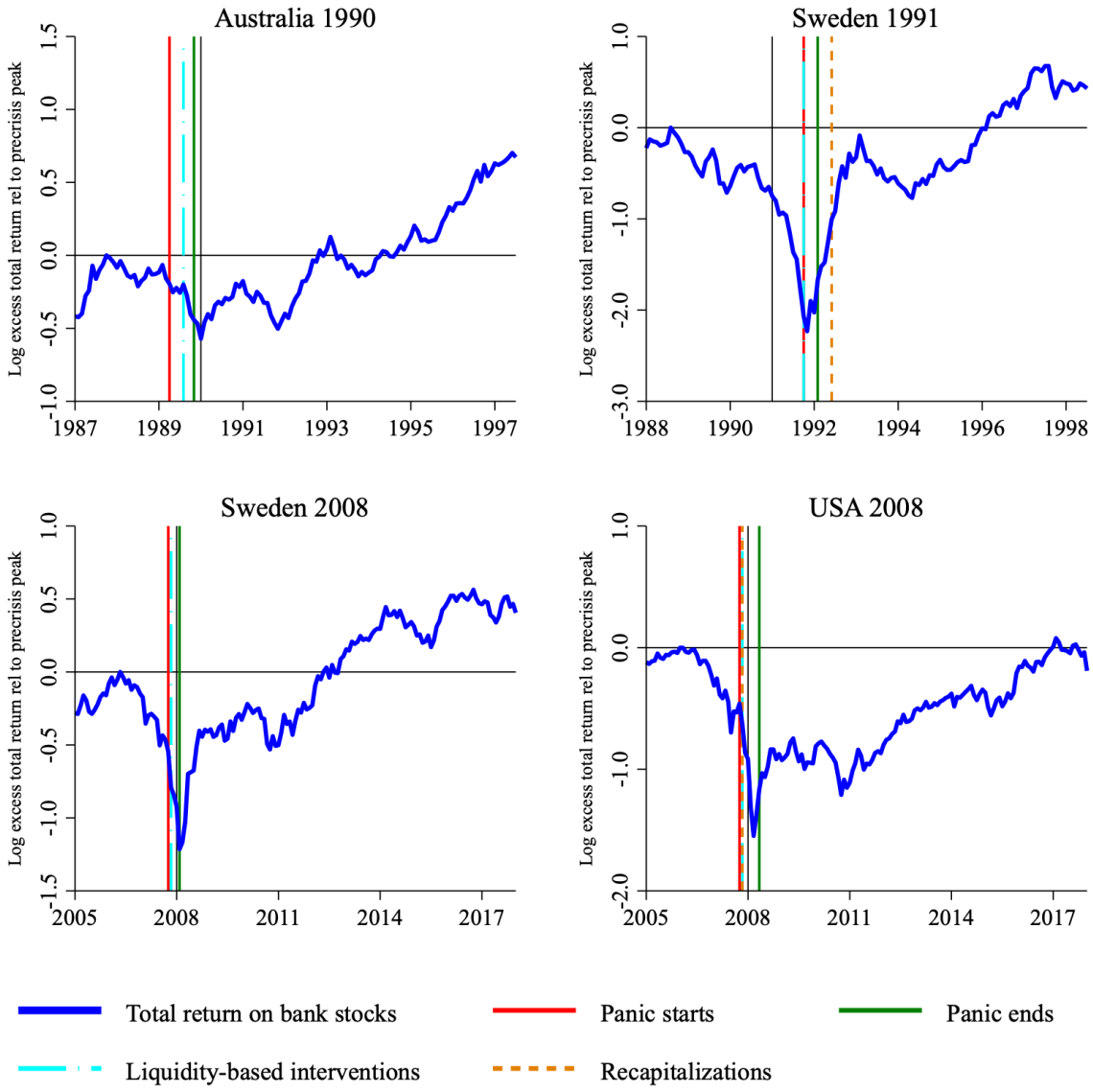
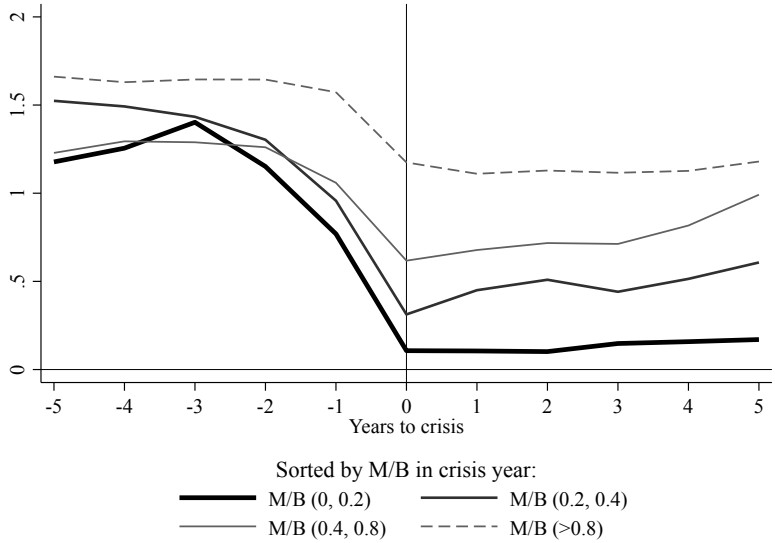


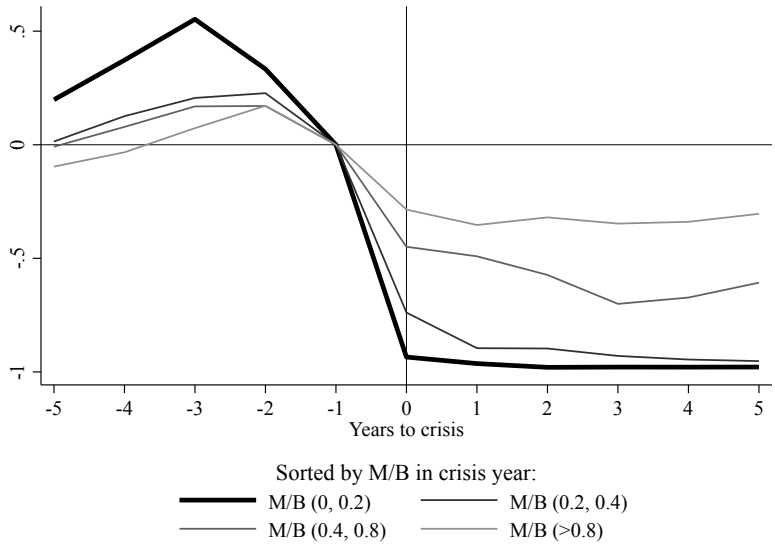
Figure A.16: Evolution of banks' market-to-book ratios during crises

This figure plots the evolution of banks' market-to-book (M/B) ratios and selected other variables around bank equity crises, sorting banks by M/B ratios at t (the year of bank equity crisis onset). The plot is constructed using bank level data of the ten largest banks by country around bank equity crises in 17 economies since 1870. Banks in the sample are first sorted by their M/B ratios in year t into four bins, as follows: 0 to 0.2, 0.2 to 0.4, 0.4 to 0.8, and greater than 0.8. Then, average M/B ratio (Panel A), bank equity excess total return (cumulative return, relative to $t-1$, Panel B), real credit growth (cumulative, relative to $t=-1$, Panel C), and bank income-to-book equity (Panel D) are plotted for each sort.

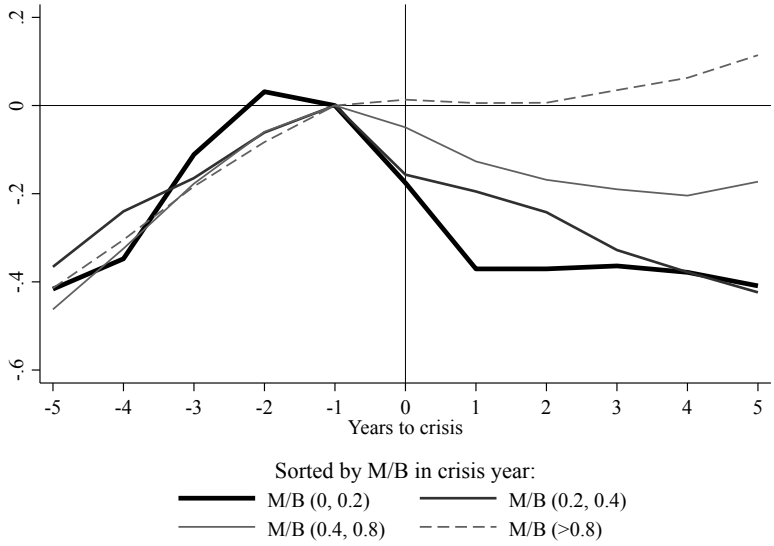
(A) Evolution of bank M/B ratios, sorted by M/B ratio in crisis year



(B) Evolution of bank equity excess total returns, sorted by M/B ratios in crisis year



(C) Evolution of bank real credit growth, sorted by M/B ratios in crisis year



(D) Evolution of bank income-to-book equity, sorted by M/B ratios in crisis year

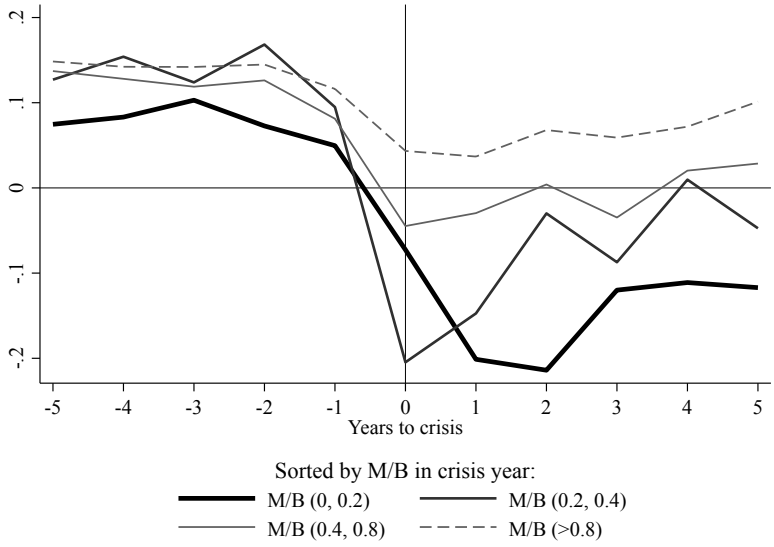
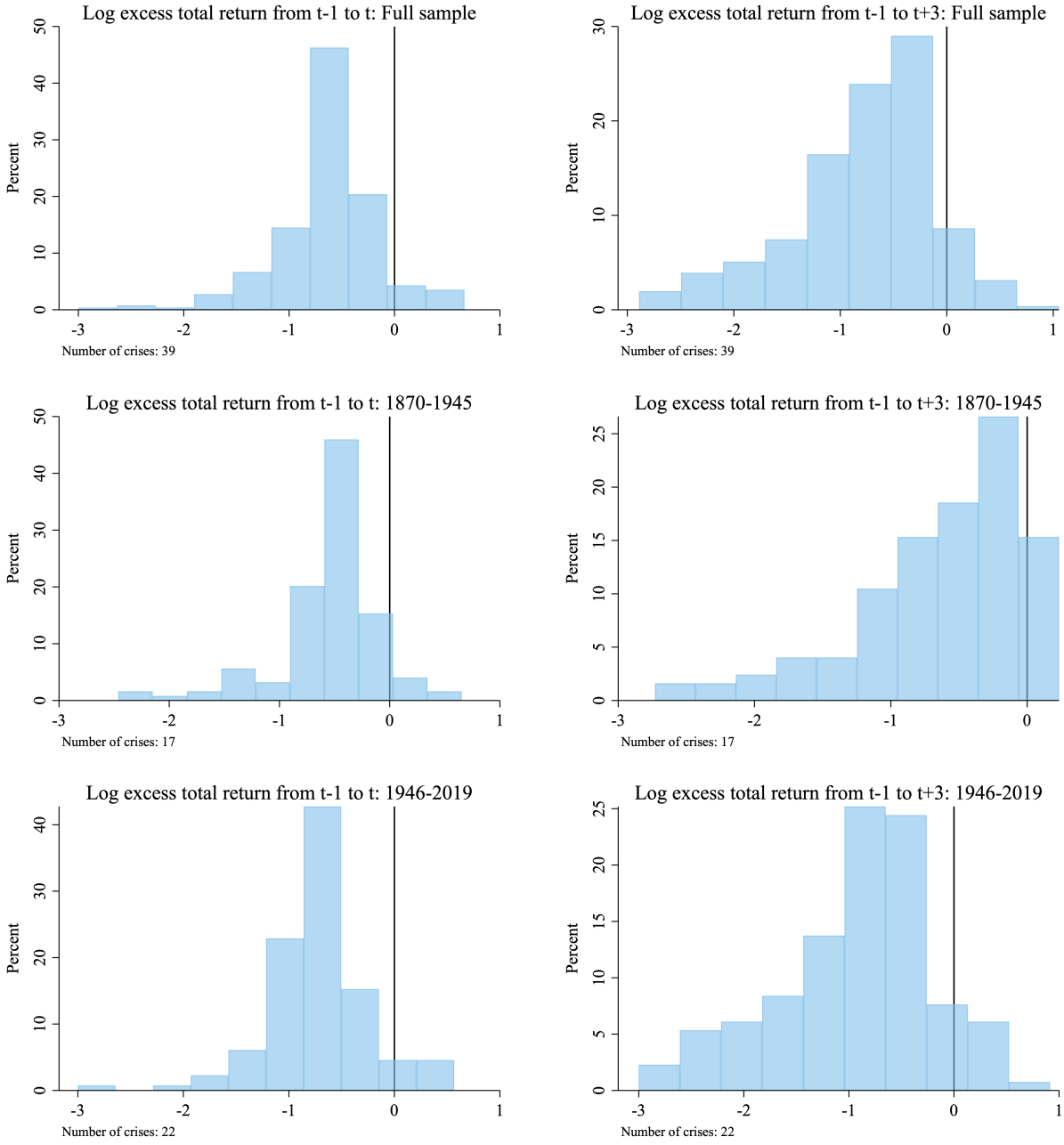


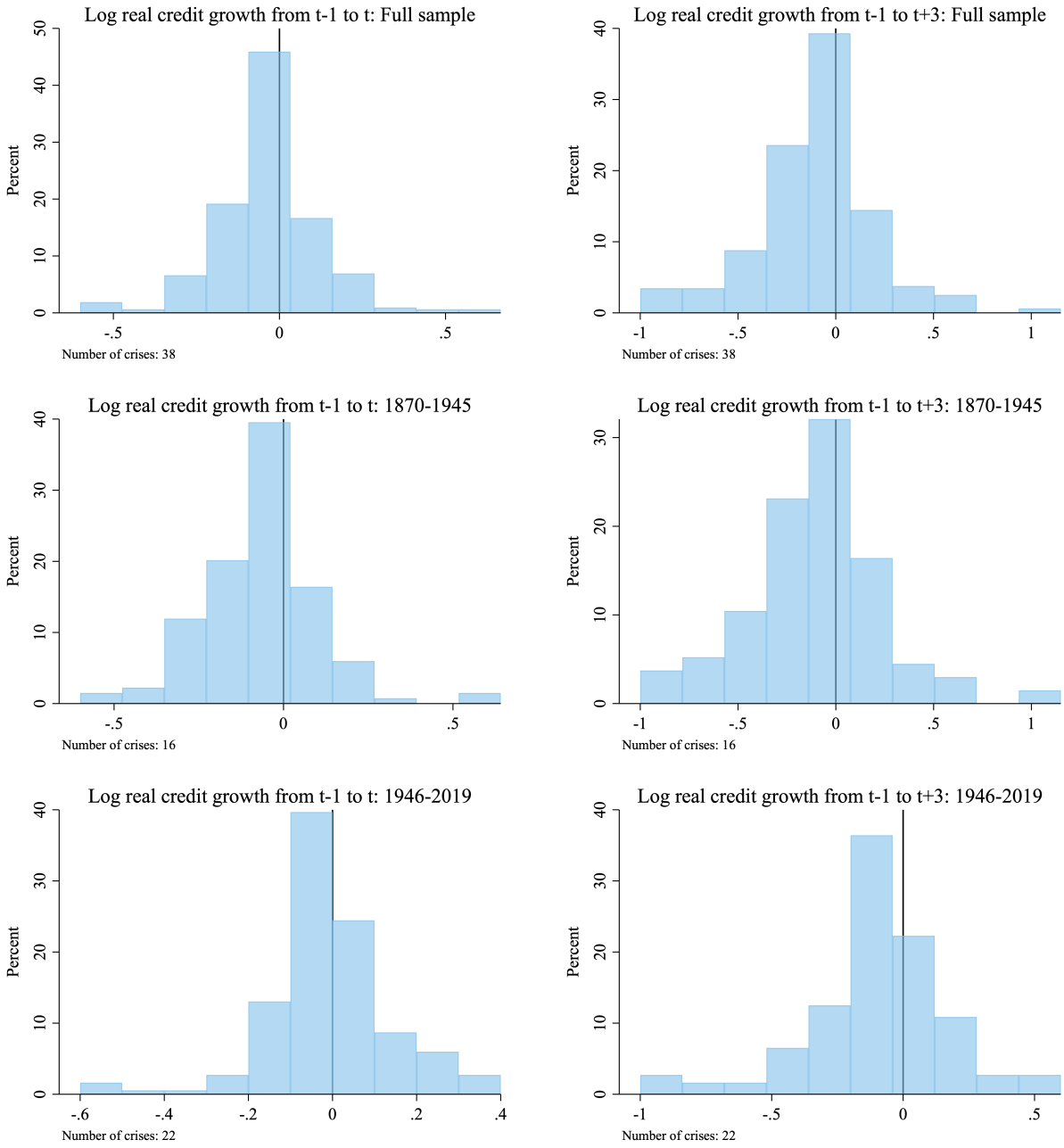
Figure A.17: Heterogeneity in bank-level outcomes after bank equity crises

This figure plots the distribution of bank-level log excess total returns (Panel A), log real credit growth (Panel B), and market-to-book ratios (Panel C) around bank equity crises. The sample of banks consists of the ten largest banks by assets within each country; see Section II of the main text for details. t denotes the year of the bank equity crisis.

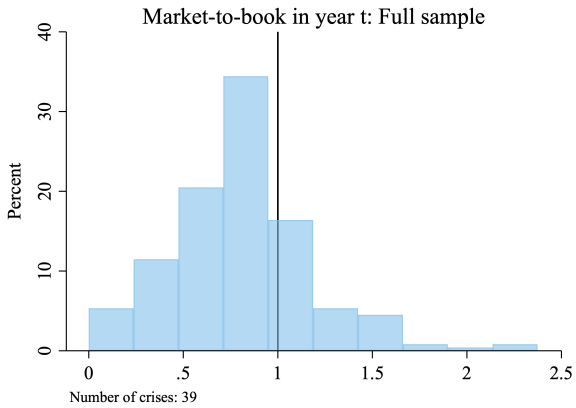
(A) Bank equity returns

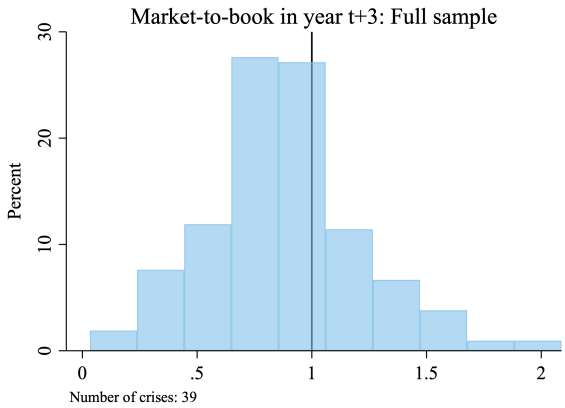


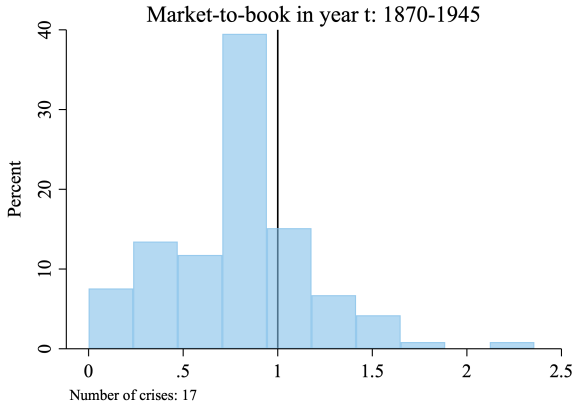
(B) Real credit growth

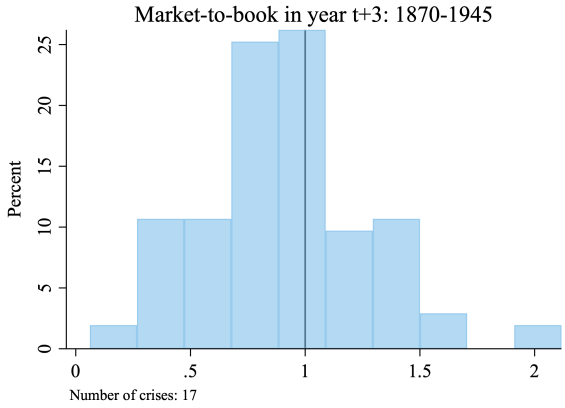


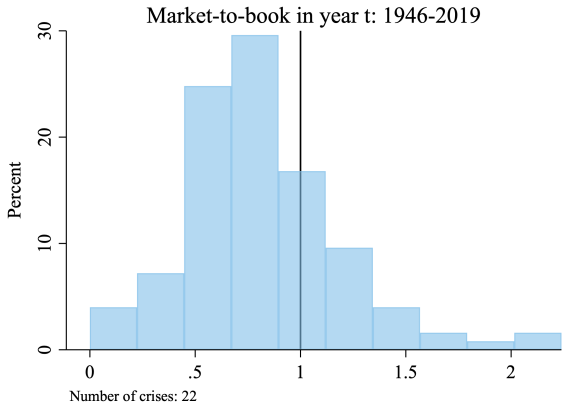
(C) Market-to-book ratios











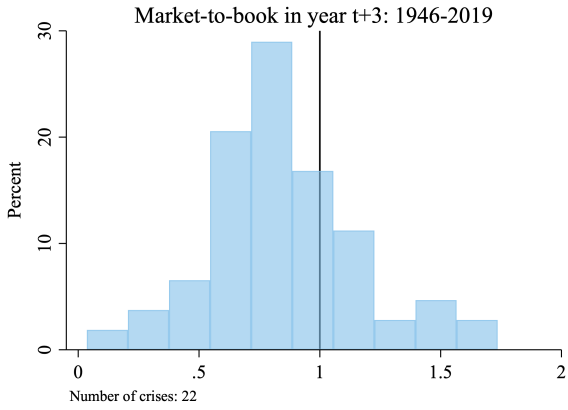


Table A.10: Low bank market-to-book ratios predict future equity write-downs, not future high market returns

This table estimates the following regression at the individual-bank level conditional on bank equity crises, using data on the ten largest banks within each country, across 17 economies since 1870.

$$\Delta y_{i,b,t,t+5} = \alpha_i + \sum_k \beta_k \text{ M/B } (lower_k, upper_k)_{i,b,t} + \varepsilon_{i,b,t}$$

The equation is estimated on bank-year observations corresponding to the start of bank equity crises (denoted year t) for the ten largest banks by assets within each country, with individual banks indexed by b. The indicator variable, M/B ($lower$,$upper$)$_{i,b,t}$, takes the value of one if bank b in country i and year t has a market-to-book ratio in that year between $lower$ and $upper$. The bank-level dependent variable, $\Delta y_{i,b,t,t+5}$, is the future five-year cumulative value of: the bank stock excess total return (column 1), real credit growth (column 2), real book equity growth (column 3), net income (normalized by book equity in year t, column 4), losses due to write-downs (normalized by book equity in year t, column 5), and net income other than losses due to write-downs (normalized by book equity in year t, column 6). *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

	Stock Excess Total Return$_{t,t+5}$ (1)	Real Credit Growth$_{t,t+5}$ (2)	Real Book Eq. Growth$_{t,t+5}$ (3)	Income to Book Eq$_{t,t+5}$ (4)	Write-downs to Book Eq$_{t,t+5}$ (5)	Other Income to Book Eq$_{t,t+5}$ (6)
M/B (0,0.2)$_{i,b,t}$	-0.952***	-0.260*	-0.319**	-0.867***	-0.387**	-0.342*
	(0.351)	(0.136)	(0.148)	(0.186)	(0.171)	(0.193)
M/B (0.2,0.4)$_{i,b,t}$	-0.884***	-0.311***	-0.463***	-0.727***	-0.281*	-0.333*
	(0.246)	(0.103)	(0.114)	(0.172)	(0.157)	(0.178)
M/B (0.4,0.6)$_{i,b,t}$	-0.093	-0.162**	-0.269***	-0.363***	-0.157	-0.206
	(0.198)	(0.079)	(0.091)	(0.134)	(0.123)	(0.139)
M/B (0.6,0.8)$_{i,b,t}$	0.000	-0.110*	-0.131*	-0.268**	-0.155	-0.066
	(0.167)	(0.065)	(0.075)	(0.111)	(0.102)	(0.115)
M/B (0.8,inf)$_{i,b,t}$						
Constant	0.011	-0.013	0.128***	0.367***	-0.474***	0.831***
	(0.095)	(0.037)	(0.043)	(0.064)	(0.059)	(0.067)
Crisis FEs	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.31	0.14	0.21	0.47	0.41	0.55
N	239	230	235	241	241	241

Table A.11: Bank equity issuance predicts higher credit growth and market capitalization for healthy banks, lower credit growth and market capitalization for distressed banks

This table is similar to Table A.10 but interacts the market-to-book (M/B) ratio of banks with the banks' equity issuance (Eq_iss). Specifically, this table estimates the following regression at the individual-bank level using data on the ten largest banks by country, conditional on bank equity crises across 17 economies over the period 1870-2019.

$$\Delta y_{i,b,t,t+5} = \alpha_i + \beta Eq_iss_{i,b,t+5} + \sum_k \beta_{k,1} \text{ M/B } (lower_k, upper_k)_{i,b,t}$$

$$+ \sum_k \beta_{k,2} \text{ M/B } (lower_k, upper_k)_{i,b,t} \times Eq_iss_{i,b,t+5} + \varepsilon_{i,b,t}$$

The equation is estimated on bank-year observations icorresponding to the start of bank equity crises (denoted year t) for the ten largest banks by country, with individual banks indexed by b. The indicator variable, M/B $(lower,upper)_{i,b,t}$, takes the value of one if bank b in country i and year t has a market-to-book ratio in that year between $lower$ and $upper$. The variable, Eq_iss$_{i,b,t+5}$, is the bank-level equity issuance between t and $t+5$ (normalized by book equity in year $t-1$). The bank-level dependent variable, $\Delta y_{i,b,t,t+5}$, is the future five-year cumulative real credit growth (columns 1-3) or change in market capitalization (normalized by book equity in year $t-1$, columns 4-6). *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

	Real Credit Growth$_{i,b,t,t+5}$			Market Cap Change$_{i,b,t,t+5}$		
	(1)	(2)	(3)	(4)	(5)	(6)
Eq_iss$_{i,b,t+5}$	-0.002			0.735***		
	(0.093)			(0.280)		
M/B (0,0.4)$_{i,b,t}$		-0.253***	-0.155		0.014	-0.126
		(0.087)	(0.108)		(0.236)	(0.278)
M/B (0.4,0.8)$_{i,b,t}$		-0.125***	-0.114		0.228	-0.004
		(0.047)	(0.071)		(0.147)	(0.206)
M/B (0.8,inf)$_{i,b,t}$		-0.047			0.214*	
		(0.040)			(0.127)	
M/B (0,0.4)$_{i,b,t}$ x Eq_iss$_{i,b,t+5}$		-0.365*	-0.395*		0.048	-0.507
		(0.212)	(0.238)		(0.639)	(0.658)
M/B (0.4,0.8)$_{i,b,t}$ x Eq_iss$_{i,b,t+5}$		-0.054	0.035		0.872	-0.196
		(0.172)	(0.214)		(0.545)	(0.632)
M/B (0.8,inf)$_{i,b,t}$ x Eq_iss$_{i,b,t+5}$		0.211*	0.136		0.978**	0.614
		(0.119)	(0.145)		(0.380)	(0.434)
Constant	-0.102***		-0.038	0.196**		0.330**
	(0.030)		(0.044)	(0.089)		(0.131)
Crisis FEs	Yes	No	Yes	Yes	No	Yes
Adjusted R^2	-0.00	0.16	0.16	0.02	0.10	0.19
N	230	230	230	243	243	243

Table A.12: Heterogeneity in bank equity crises across subsamples

This table reports means of various bank crisis metrics, comparing bank equity crises in the pre-1945 versus post-1945 subsamples (Panel A), in advanced versus developing economies (Panel B), and both splits together (Panel C). Differences are tested using a standard t-test. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively. *Bounce back* is defined as max(bank equity index excess return$_{i,t,t+5}$, 0). *Fraction in which bounce back* $\geq 50\%$ is an indicator variable of the previous variable exceeding 50%. *Dividend reduction* is defined as min(real bank dividend index$_{i,t,t+5}$, 0), and *Earnings reduction* is defined similarly for the real bank earnings index. *Write-downs to total book losses* is defined as book equity losses due to write-downs divided by total book equity losses (cumulative from t to $t+5$) for the aggregate ten largest banks within each crisis. *Immediate book losses to total book losses* is defined as total book equity losses from t to $t+2$ divided by total book equity losses from t to $t+5$. *Credit boom* is an indicator variable of a pre-crisis credit boom defined in Figure A.20. *Bank equity decline precedes panic* is an indicator variable of whether the 30% bank equity decline strictly precedes the year of the start of the panic (using annual data). *Monetary policy change* is the change in policy interest rates from year -1 to year +1 around the crisis, and *Primary deficit change* is defined analogously using the primary government deficit-to-GDP ratio. The next three variables are indicator variables of the use of three types of government interventions defined in Section II. The last seven variables (only available for the 17 advanced economies) relate to government recapitalization programs and are defined in Section V of the main text.

Panel A: Pre- vs. post-1945 bank equity crises

	Pre-1945	Post-1945	Difference
Bounce back	0.362	0.411	0.049
Fraction in which bounce back $\geq 50\%$	0.310	0.239	-0.071
Dividend reduction	-0.536	-0.568	-0.032
Earnings reduction	-0.411	-0.424	-0.013
Write-downs to total book losses	0.371	0.442	0.071
Immediate book losses to total book losses	0.433	0.501	0.068
Credit boom	0.333	0.581	0.248*
Bank equity decline precedes panic	0.367	0.500	0.133
Monetary policy change	-0.004	0.003	0.007
Primary deficit change	-0.004	-0.038	-0.034***
Bank liabilities blanket guarantee	0.167	0.609	0.442***
Extraordinary liquidity support	0.267	0.739	0.472***
Banking sector recapitalization	0.033	0.500	0.467***
Size of recap program to bank equity$_{t-1}$	0.007	0.128	0.121***
Govt.-recap. eq. issuance to bank equity$_{t-1}$	0.013	0.115	0.103***
Govt.-recap. eq. issuance to market-value losses	0.020	0.136	0.117**
Delay (mo.) between panic start and recap.	11.833	7.409	-4.424***
Recap. only for most distressed banks	1.000	0.600	-0.400
Fraction of top-10 banks recapitalized	0.018	0.252	0.235***
Fraction of banking system recapitalized	0.006	0.219	0.213***

Panel B: JST vs. non-JST countries

	JST	Non-JST	Difference
Bounce back	0.383	0.407	0.024
Fraction in which bounce back $\geq 50\%$	0.267	0.267	0.000
Dividend reduction	-0.569	-0.533	0.036
Earnings reduction	-0.419		
Write-downs to total book losses	0.412		
Immediate book losses to total book losses	0.471		
Credit boom	0.500	0.522	0.022
Bank equity decline precedes panic	0.400	0.516	0.116
Monetary policy change	-0.011	0.021	0.032**
Primary deficit change	-0.033	-0.018	0.016
Bank liabilities blanket guarantee	0.511	0.323	-0.189
Extraordinary liquidity support	0.578	0.516	-0.062
Banking sector recapitalization	0.333	0.290	-0.043
Size of recap program to bank equity$_{t-1}$	0.108		
Govt.-recap. eq. issuance to bank equity$_{t-1}$	0.103		
Govt.-recap. eq. issuance to market-value (MV) losses	0.125		
Delay (mo.) between panic start and recap.	9.4		
Recap. only for most distressed banks	0.647		
Fraction of top-10 banks recapitalized	0.218		
Fraction of banking system recapitalized	0.183		

Panel C: Pre- vs. post-1945 bank equity crises within JST vs. non-JST countries

	JST			Non-JST		
	Pre-1945	Post-1945	Diff.	Pre-1945	Post-1945	Diff.
Bounce back	0.225	0.509	0.285	0.668	0.295	-0.373
Fraction in which bounce back $\geq 50\%$	0.250	0.280	0.030	0.444	0.190	-0.254
Dividend reduction	-0.546	-0.588	-0.041	-0.514	-0.543	-0.028
Earnings reduction	-0.411	-0.424	-0.013			
Write-downs to total book losses	0.371	0.442	0.071			
Immediate book losses to total book losses	0.433	0.501	0.068			
Credit boom	0.308	0.600	0.292*	0.400	0.556	0.156
Bank equity decline precedes panic	0.350	0.440	0.090	0.400	0.571	0.171
Monetary policy change	-0.003	-0.016	-0.013	-0.005	0.028	0.032
Primary deficit change	-0.006	-0.051	-0.045***	0.004	-0.022	-0.026
Bank liabilities blanket guarantee	0.200	0.760	0.560***	0.100	0.429	0.329*
Extraordinary liquidity support	0.300	0.800	0.500***	0.200	0.667	0.467**
Banking sector recapitalization	0.050	0.560	0.510***	0.000	0.429	0.429**
Size of recap program to bank equity$_{t-1}$	0.010	0.194	0.184***			
Govt.-recap. eq. issuance to bank equity$_{t-1}$	0.019	0.176	0.157***			
Govt.-recap. eq. issuance to MV losses	0.029	0.207	0.178***			
Delay (mo.) between panic start and recap.	11.833	7.409	-4.424***			
Recap. only for most distressed banks	1.000	0.600	-0.400			
Fraction of top-10 banks recapitalized	0.026	0.384	0.357***			
Fraction of banking system recapitalized	0.009	0.333	0.324***			

Figure A.18: Median and interquartile range across bank equity crises

This figure is similar to Figure 1 except that it plots the median and interquartile range (IQR) across bank equity crises, instead of the mean and 95% confidence intervals.

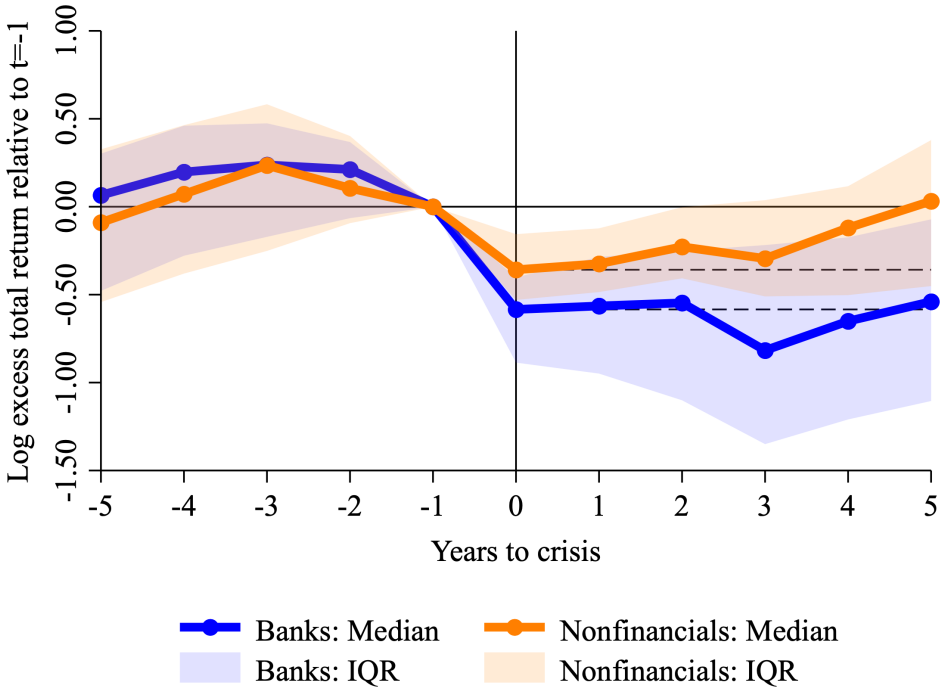


Table A.13: Explaining heterogeneity in outcomes across bank equity crises

This table reports estimates from a regression across bank equity crises, in which the dependent variable is the log excess total returns of the bank equity index (Panel A) or cumulative real GDP growth (Panel B) from year $t+1$ to $t+5$ (relative to the start of the bank equity crisis in year t). The regressor variables are defined in Table A.12, but are modified here to reflect only information known by the end of year $t+1$, so as to avoid any look-ahead bias in predicting returns from $t+1$ to $t+5$. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Panel A: Bank returns (from $t+1$ to $t+5$)

	(1)	(2)	(3)	(4)	(5)
Monetary policy change$_{t-1,t+1}$	-0.140**				-0.082
	(0.061)				(0.064)
Primary deficit change$_{t-1,t+1}$		-0.187**			-0.134*
		(0.075)			(0.077)
(Realized losses to market-value losses)$_{t+1}$			0.502**		0.341
			(0.241)		(0.235)
Credit boom$_t$			-0.246**		-0.336***
			(0.112)		(0.116)
Extraordinary liquidity support$_{t+1}$				-0.090	-0.015
				(0.126)	(0.122)
Banking sector recapitalization$_{t+1}$				0.237*	0.231*
				(0.135)	(0.130)
Constant	0.158**	0.132**	-0.064	0.047	0.077
	(0.067)	(0.060)	(0.130)	(0.086)	(0.137)
Adjusted R^2	0.05	0.07	0.08	0.01	0.18
N	75	75	75	75	75

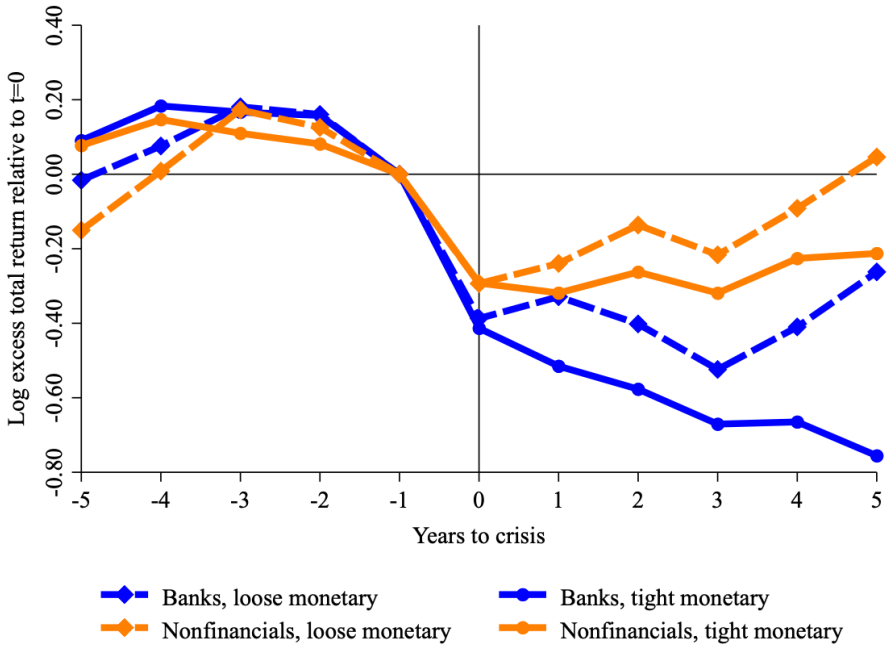
Panel B: Real GDP growth (from $t+1$ to $t+5$)

	(1)	(2)	(3)	(4)	(5)
Monetary policy change$_{t-1,t+1}$	0.005				0.006
	(0.013)				(0.014)
Primary deficit change$_{t-1,t+1}$		0.008			0.008
		(0.016)			(0.017)
(Realized losses to market-value losses)$_{t+1}$			0.072		0.064
			(0.051)		(0.053)
Credit boom$_t$			-0.043*		-0.050*
			(0.024)		(0.026)
Extraordinary liquidity support$_{t+1}$				-0.023	-0.014
				(0.026)	(0.027)
Banking sector recapitalization$_{t+1}$				0.033	0.044
				(0.028)	(0.029)
Constant	0.109***	0.109***	0.096***	0.115***	0.090***
	(0.014)	(0.013)	(0.027)	(0.018)	(0.031)
Adjusted R^2	-0.01	-0.01	0.04	-0.01	0.02
N	75	75	75	75	75

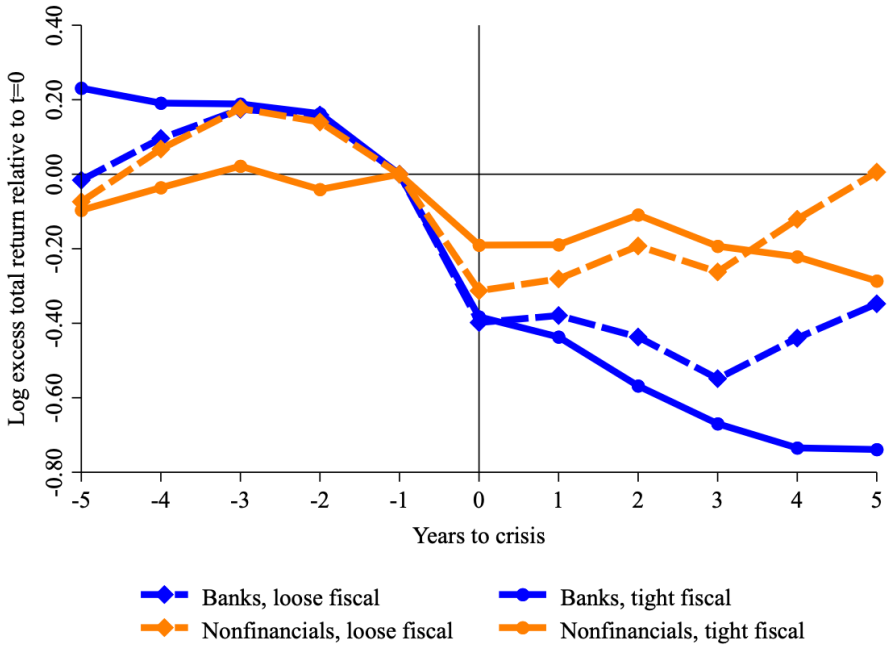
Figure A.19: Explaining heterogeneity in outcomes across bank equity crises

This figure replicates the analysis in Figure 1 but splits the sample of bank equity crises into those that feature: monetary tightening versus loosening (Panel A, defined based on whether *Monetary policy change* is positive or negative), fiscal tightening versus expansion (Panel B, defined based on whether *Primary deficit change* is positive or negative), whether the ratio of cumulative realized book losses to market-equity losses for the banking sector in year $t+1$ is above or below the median across all crises (Panel C), and whether the 30% bank equity decline strictly precedes the year of the start of the banking panic (using annual data, Panel D). Variables are defined in Table A.12.

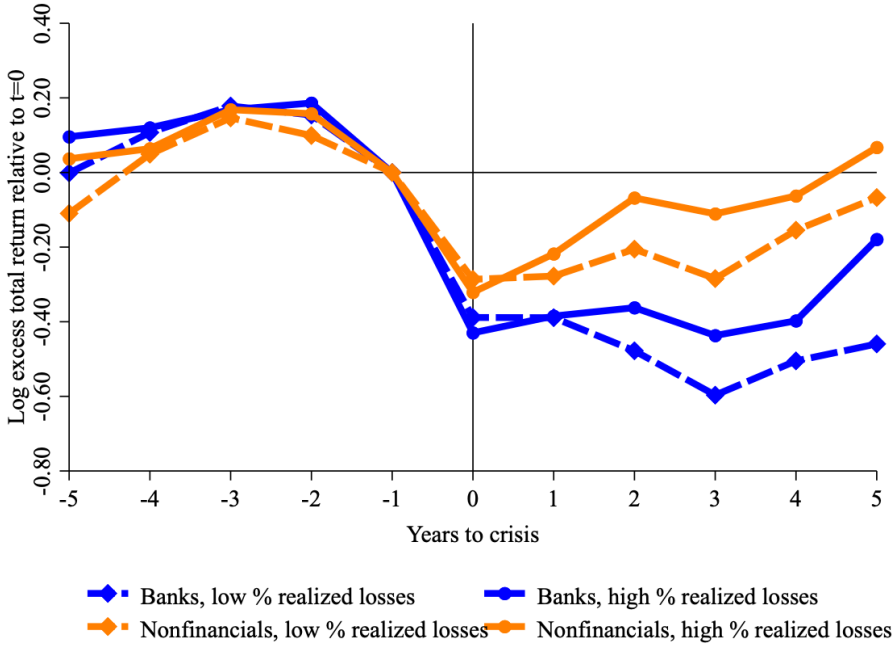
(A) Monetary tightening vs. loosening



(B) Fiscal tightening vs. expansion



(C) Realized book losses to market-equity losses at $t+1$



(D) Bank equity decline preceding the banking panic

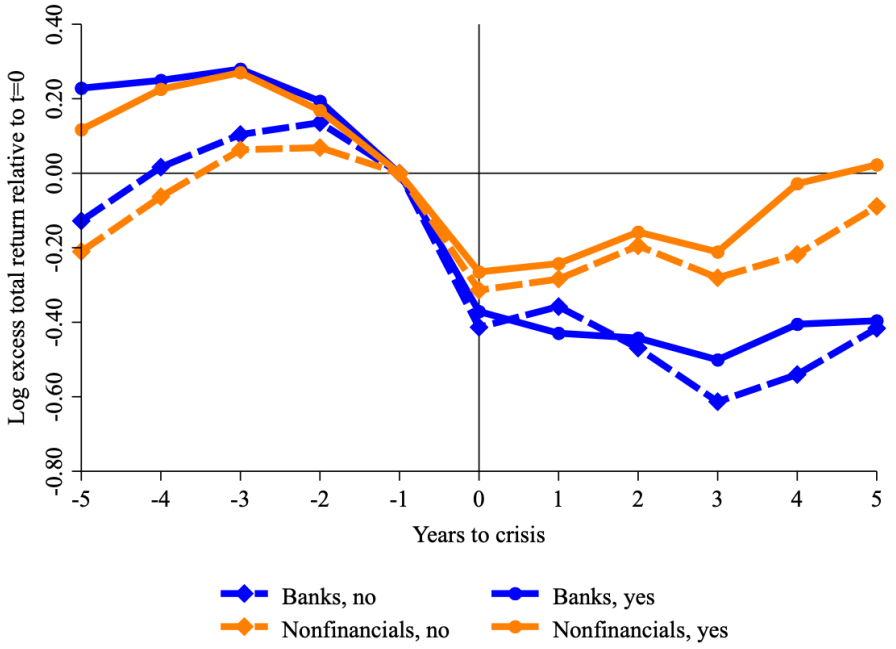
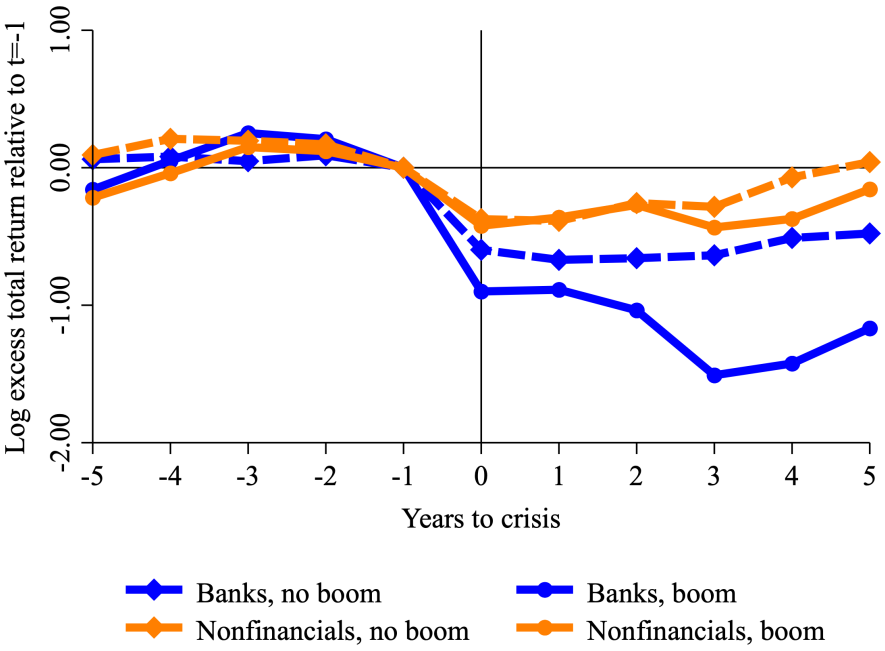


Figure A.20: Sample split by pre-crisis credit boom

This figure replicates the analysis in Figure 1 but splits the sample of bank equity crises into those that are preceded by a credit boom (solid lines) and those that are not (dashed lines). A pre-crisis credit boom is defined to occur if the the trough-to-peak change in credit-to-GDP ratio within the five years leading up to the crisis exceeds the median value observed across all crises.

(A) Cumulative abnormal equity returns



(B) Real dividends

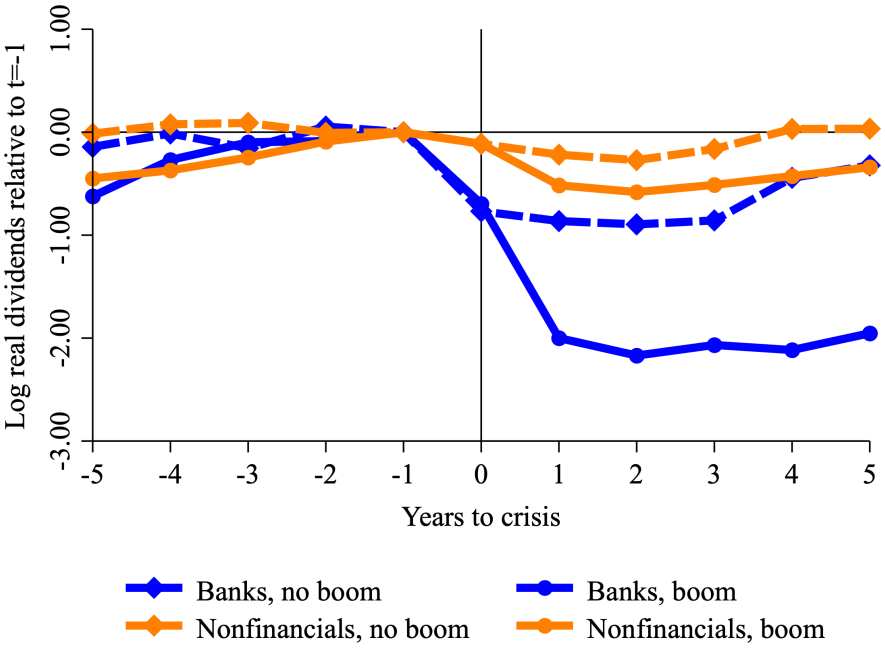


Table A.14: Sample split by pre-crisis credit boom

This table, which reports coefficient estimates corresponding to Figure A.20, estimates a variation of Equation (1) but splits the sample of bank equity crises into those that are preceded by a pre-crisis credit boom and those that are not. The difference in coefficient estimates (boom minus no boom) is also reported. Driscoll-Kraay standard errors are given in parentheses. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Panel A: Cumulative abnormal equity returns, banks

	Dependent variable: $r^B_{i,t,t+h}$				
	$h=1$	$h=2$	$h=3$	$h=4$	$h=5$
BankingCrisis$_{i,t}$ × No boom$_{i,t}$	-0.064	-0.052	-0.017	0.106	0.137
	(0.089)	(0.110)	(0.103)	(0.093)	(0.130)
BankingCrisis$_{i,t}$ × Boom$_{i,t}$	0.013	-0.135	-0.599***	-0.517***	-0.259**
	(0.121)	(0.104)	(0.083)	(0.116)	(0.105)
Constant	0.022**	0.044***	0.067***	0.081***	0.089**
	(0.009)	(0.016)	(0.023)	(0.029)	(0.035)
Difference: boom minus no boom	0.076	-0.083	-0.582***	-0.623***	-0.396***
	(0.122)	(0.144)	(0.096)	(0.151)	(0.145)
Within-R^2	0.000	0.001	0.010	0.006	0.002
N observations	2,741	2,647	2,553	2,461	2,369

Panel B: Cumulative abnormal equity returns, nonfinancials

	Dependent variable: $r^N_{i,t,t+h}$				
	$h=1$	$h=2$	$h=3$	$h=4$	$h=5$
BankingCrisis$_{i,t}$ × No boom$_{i,t}$	-0.012	0.120	0.091*	0.304***	0.413***
	(0.072)	(0.076)	(0.048)	(0.061)	(0.081)
BankingCrisis$_{i,t}$ × Boom$_{i,t}$	0.061	0.153**	-0.011	0.051	0.264***
	(0.064)	(0.061)	(0.050)	(0.085)	(0.087)
Constant	0.030***	0.058***	0.091***	0.114***	0.134***
	(0.008)	(0.016)	(0.025)	(0.033)	(0.040)
Difference: boom minus no boom	0.073	0.033	-0.102**	-0.253**	-0.148
	(0.065)	(0.043)	(0.040)	(0.107)	(0.110)
Within-R^2	0.001	0.003	0.000	0.004	0.009
N observations	2,655	2,572	2,488	2,405	2,322

Panel C: Real dividends

	Dependent variable: $\log(\text{Dividends}_{i,t+h}/\text{Dividends}_{i,t-1})$					
	Banks			Nonfinancials		
	$h=1$	$h=3$	$h=5$	$h=1$	$h=3$	$h=5$
$\text{BankingCrisis}_{i,t} \times \text{No boom}_{i,t}$	-0.863***	-0.857***	-0.323*	-0.218***	-0.163**	0.034
	(0.147)	(0.157)	(0.188)	(0.048)	(0.080)	(0.075)
$\text{BankingCrisis}_{i,t} \times \text{Boom}_{i,t}$	-1.999***	-2.067***	-1.953***	-0.516***	-0.512***	-0.340***
	(0.458)	(0.170)	(0.357)	(0.067)	(0.065)	(0.131)
Constant	-0.001	-0.028	-0.079	0.043*	0.071	0.083
	(0.040)	(0.069)	(0.102)	(0.025)	(0.049)	(0.074)
Boom minus no boom	-1.136***	-1.210***	-1.631***	-0.298***	-0.348***	-0.374***
	(0.398)	(0.150)	(0.274)	(0.058)	(0.093)	(0.110)
Within-R^2	0.052	0.036	0.024	0.027	0.016	0.006
N observations	2,436	2,246	2,069	2,094	1,955	1,820

Figure A.21: Housing prices around bank equity crises

This figure does the same analysis as in Figure 1 for real housing price index. Data are at the country-year level and come from the JST macrohistory database.

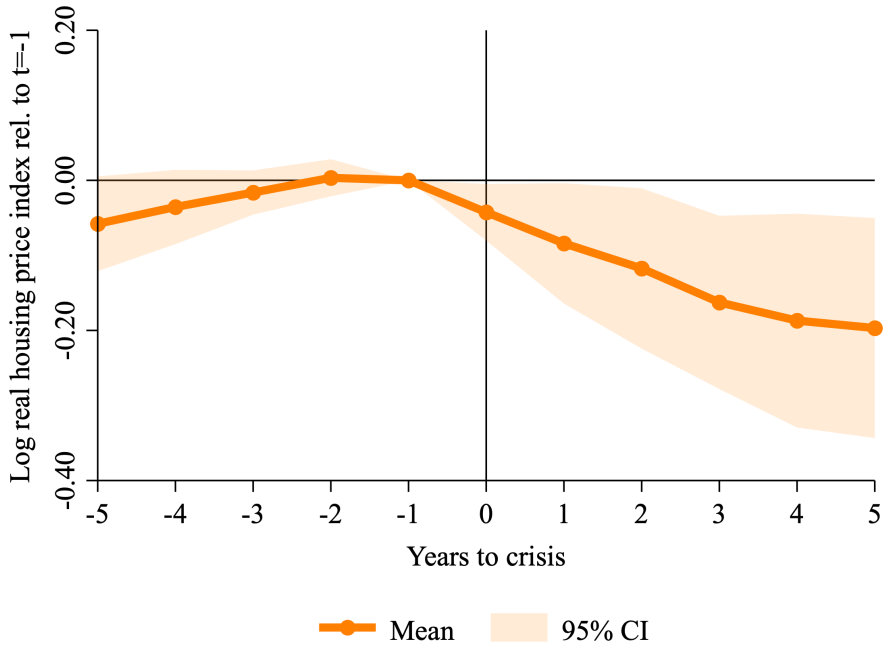
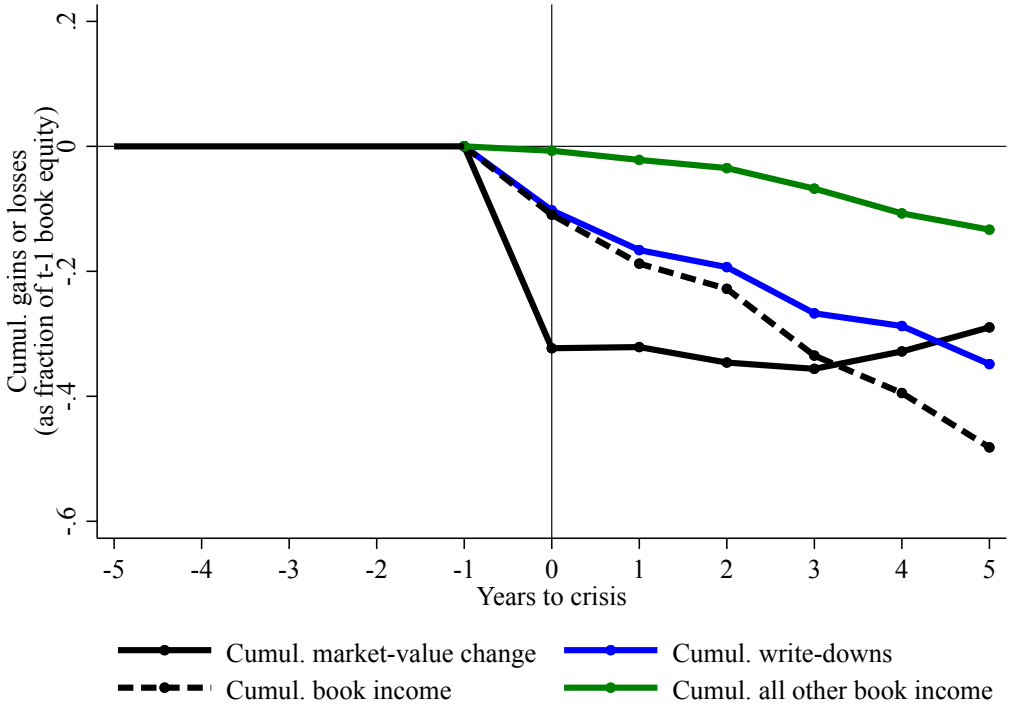
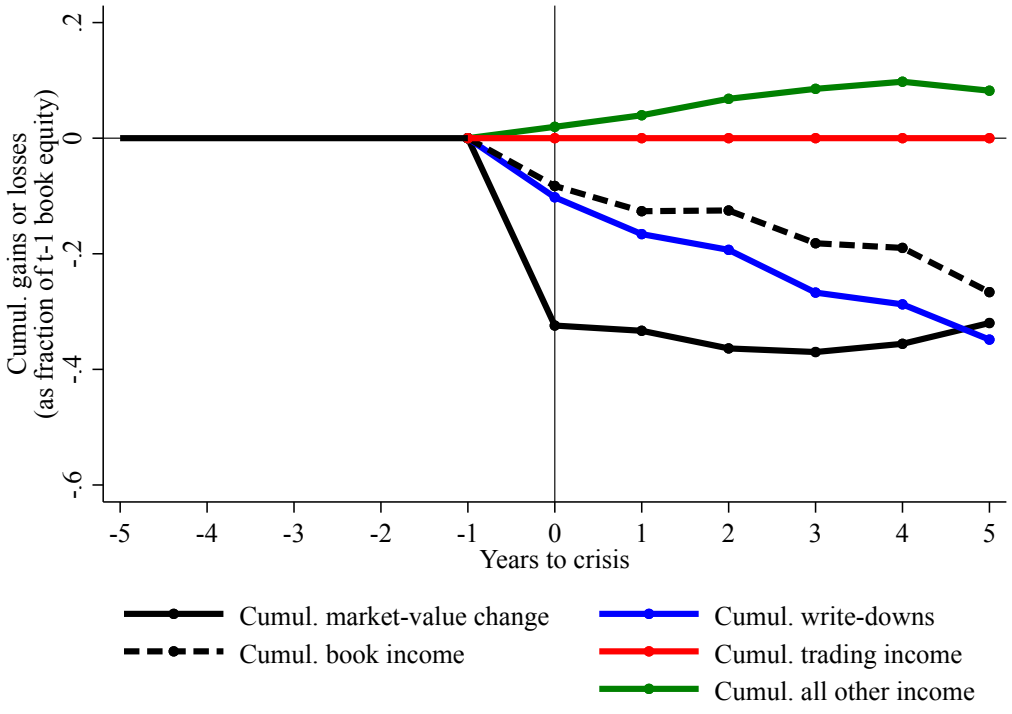


Figure A.22: Book losses relative to market-equity losses: Subsample analysis

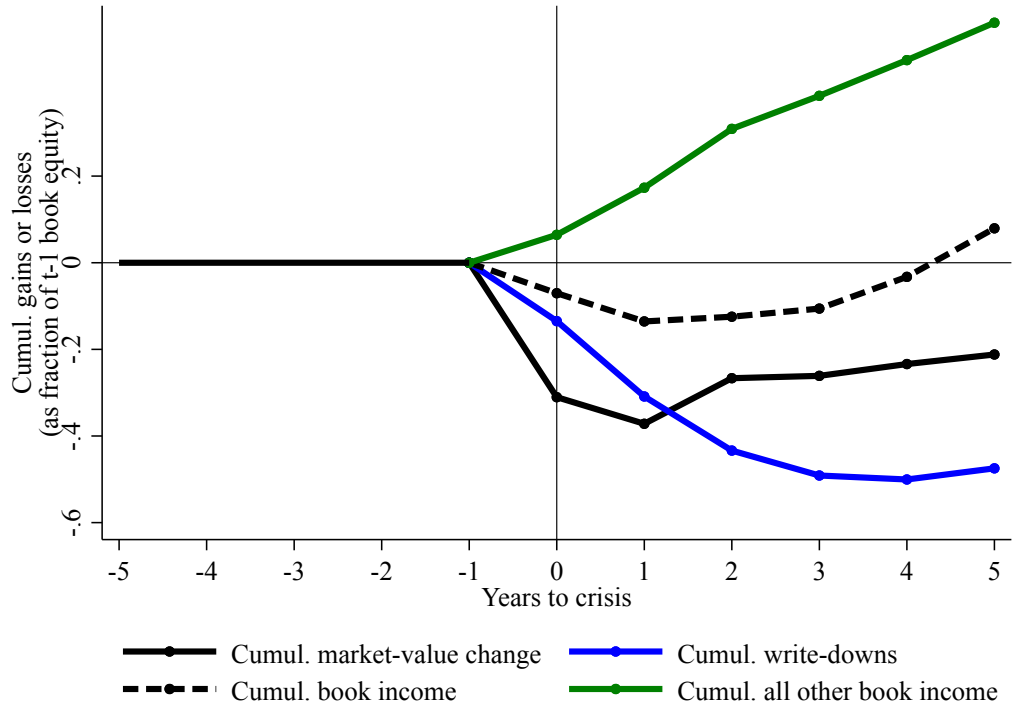
This figure replicates the analysis in Figure 4 but on subsamples: the 1870-1945 subperiod (Panel A), the 1946-2005 subperiod (Panel B), and the 2006-2019 subperiod that includes the Great Financial Crisis (Panel C). The two-way splits (top plots in each panel) are based on 15, 10 and 12 crisis episodes for the three respective subsamples. The three-way splits (bottom plots in each panel) are based on 1, 8, and 12 crisis episodes for the three respective subsamples.

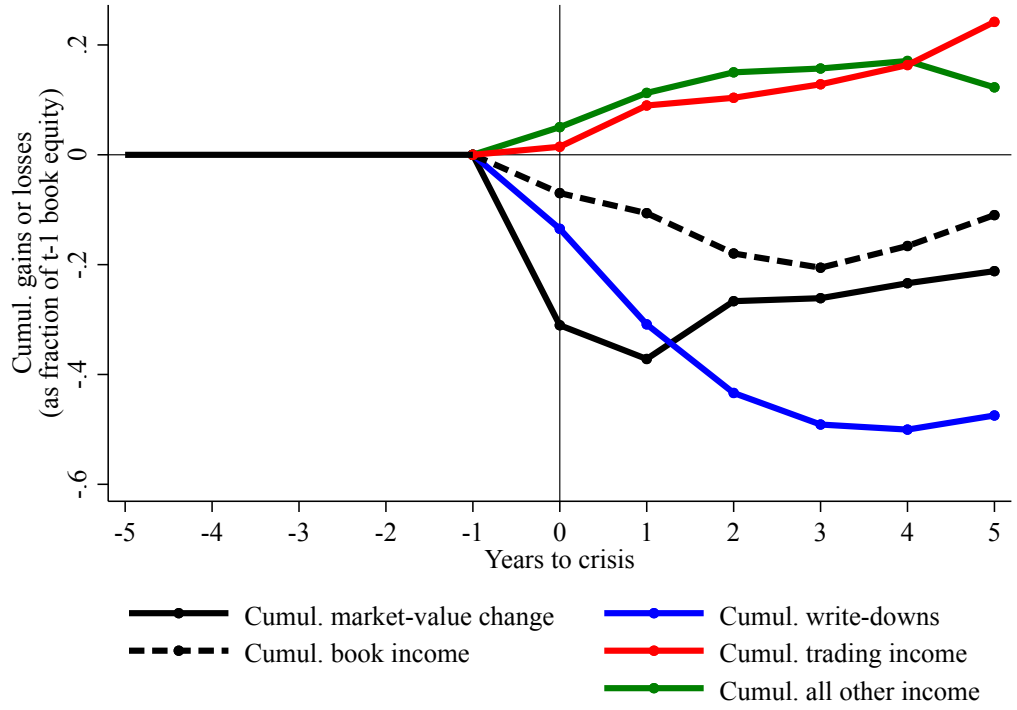
(A) 1870-1945 subsample



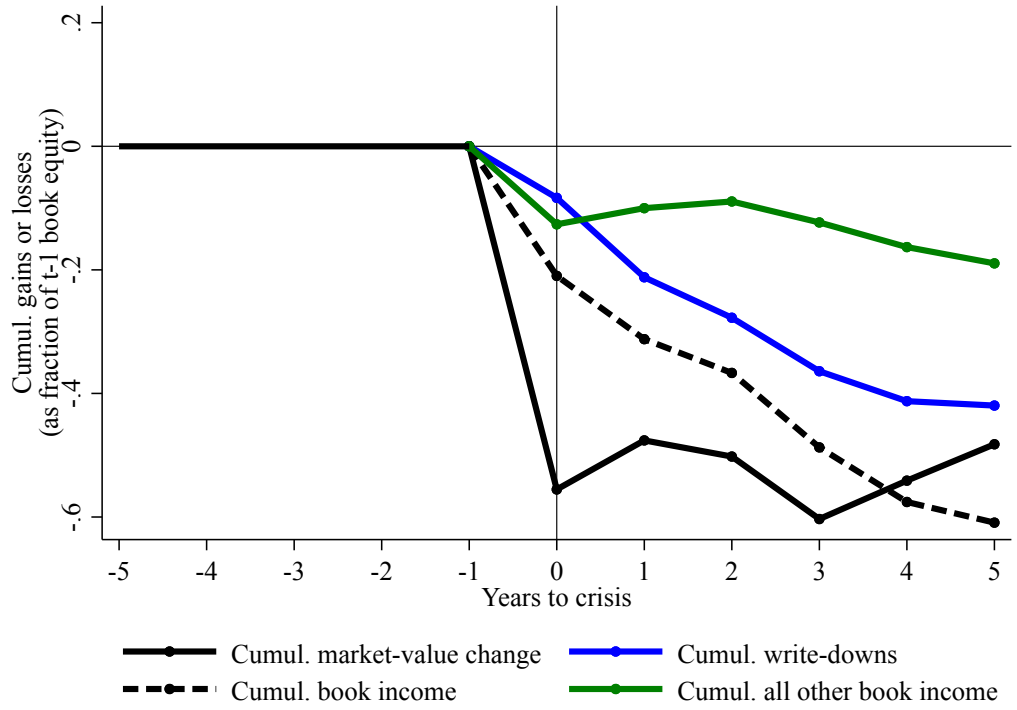


(B) 1946-2005 subsample





(C) 2006-2019 subsample



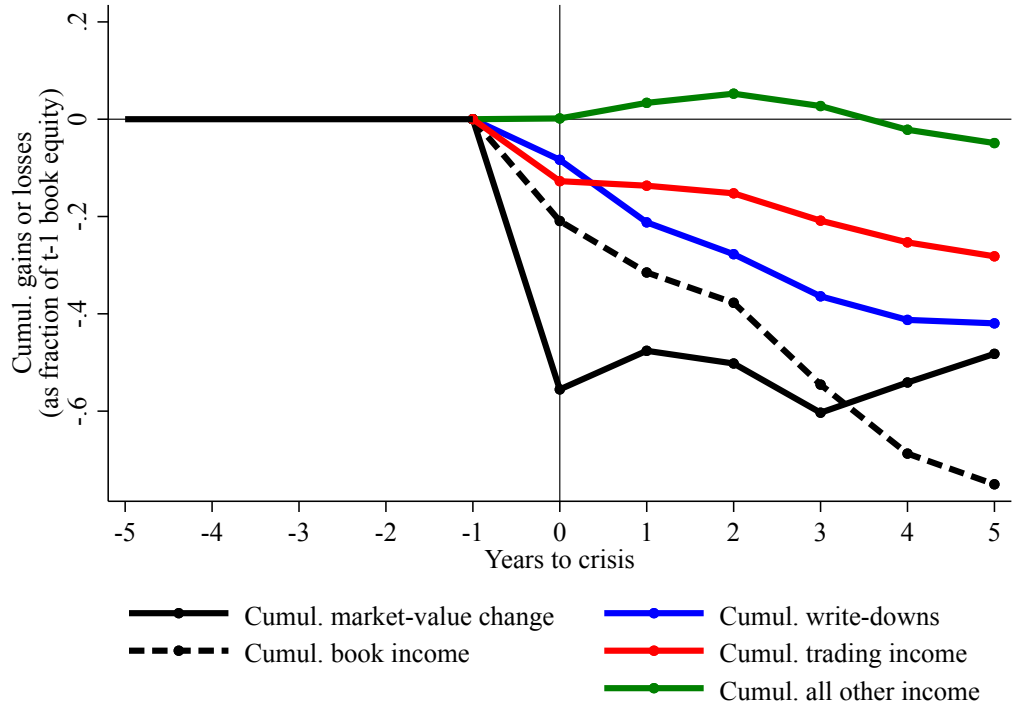
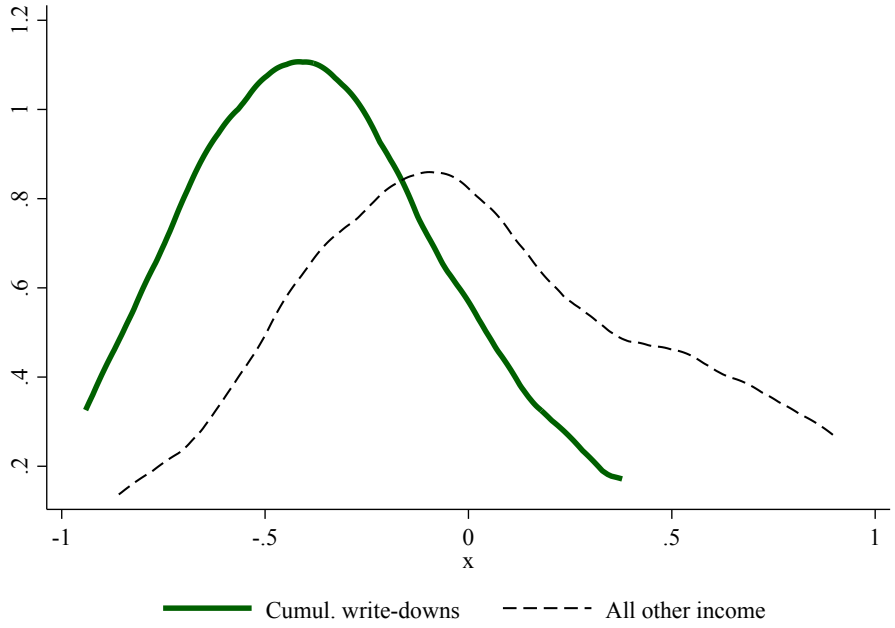
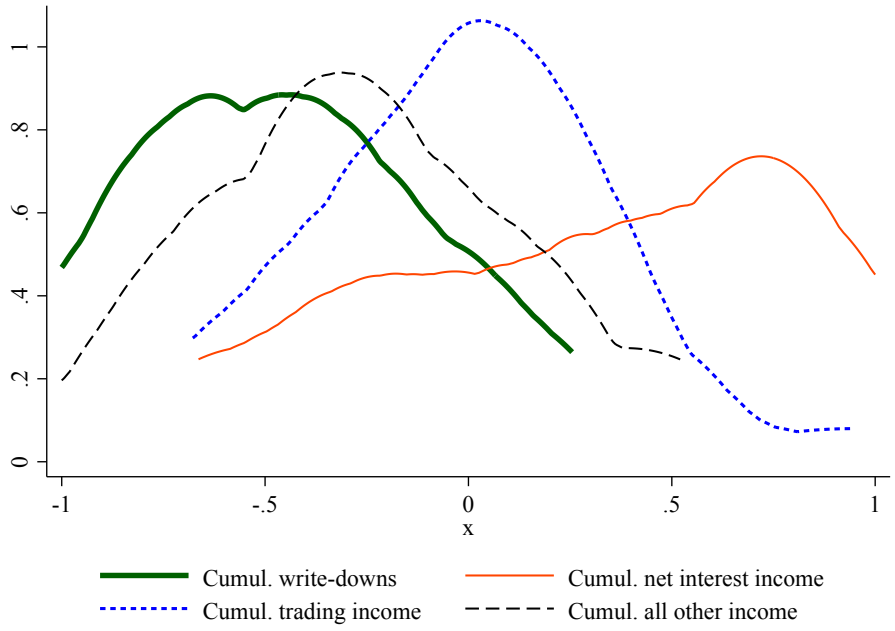


Figure A.23: Distributions of banks' cumulative net income after bank equity crises

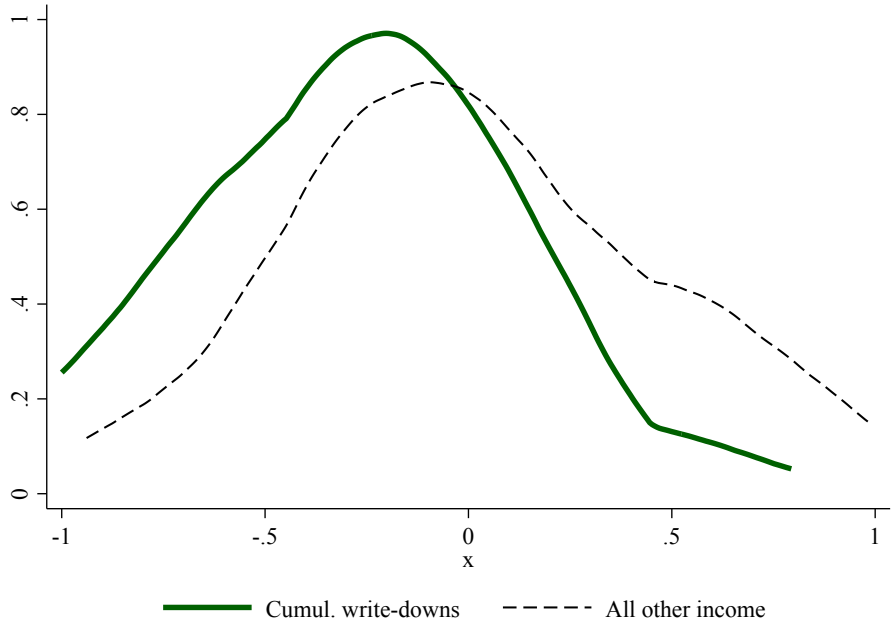
This figure plots distributions of various components of banks' book income. As described in Figure 4, book income of the ten largest banks in each country is decomposed into income categories, which are computed as cumulative *abnormal* values from year t to year $t+5$, where "abnormal" refers to the difference of a variable relative to its value in year $t-1$ before the crisis, normalized by book equity in year $t-1$ for each bank. Panel A aggregates the net income of the ten largest banks up to the crisis level and plots the distribution across crises, whereas Panel B plots the distribution at the individual bank level (pooled across all crises). In each panel, the top plot decomposes banks' net income into write-downs versus all other book income, while the bottom plot decomposes banks' net income into write-downs, net interest income, trading income, and all other book income. These components of book income are all defined in the main text.

(A) Distributions at the crisis level





(B) Distributions at the bank level



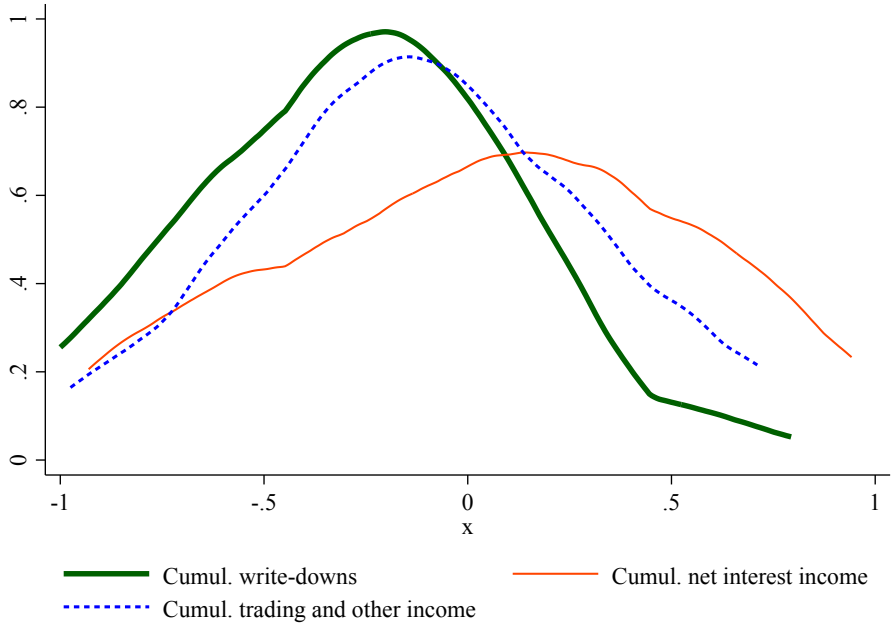


Table A.15: Distributions of banks' cumulative net income after bank equity crises

This table reports summary statistics of various components of banks' book income. As described in Figure 4, book income of the ten largest banks in each country is decomposed into income categories, which are computed as cumulative *abnormal* values from year t to year $t+h$ ($h = 1, 3, 5$), where "abnormal" refers to the difference of a variable relative to its value in year $t-1$ before the crisis, normalized by book equity in year $t-1$ for each bank. These quantities are then aggregated up across the ten largest banks within each crisis, and summary statistics representing the distribution across crises are reported. In Panel A, banks' net income is decomposed into write-downs versus all other book income, while in Panel B, banks' net income is decomposed into write-downs, net interest income, trading income, and all other book income. These components of book income are all defined in the main text. The table also compares banks' cumulative abnormal book income to their cumulative market-equity gains and losses, also calculated relative to year $t-1$ and aggregated in the way described above. Each panel is split into three subpanels, corresponding to $h = 1, 3, 5$.

Panel A: Net income decomposed into write-downs and all other income

	Mean	SD	p5	p25	p50	p75	p95
Cumul. market-equity change$_{i,t-1,t+1}$	-0.385	0.223	-0.763	-0.581	-0.357	-0.231	-0.067
Cumul. book income$_{i,t-1,t+1}$	-0.206	0.215	-0.687	-0.302	-0.191	-0.076	0.089
Cumul. write-downs$_{i,t-1,t+1}$	-0.222	0.202	-0.666	-0.279	-0.157	-0.081	0.021
Cumul. all other book income$_{i,t-1,t+1}$	0.016	0.222	-0.494	-0.076	-0.004	0.139	0.435
Cumul. market-equity change$_{i,t-1,t+3}$	-0.411	0.255	-0.891	-0.611	-0.426	-0.200	-0.031
Cumul. book income$_{i,t-1,t+3}$	-0.306	0.300	-0.862	-0.417	-0.345	-0.097	0.244
Cumul. write-downs$_{i,t-1,t+3}$	-0.365	0.301	-1.000	-0.576	-0.301	-0.165	0.093
Cumul. all other book income$_{i,t-1,t+3}$	0.058	0.352	-0.604	-0.136	0.016	0.298	0.816
Cumul. market-equity change$_{i,t-1,t+5}$	-0.331	0.257	-0.847	-0.525	-0.286	-0.064	0.000
Cumul. book income$_{i,t-1,t+5}$	-0.355	0.436	-0.955	-0.628	-0.496	-0.042	0.623
Cumul. write-downs$_{i,t-1,t+5}$	-0.420	0.351	-1.000	-0.575	-0.422	-0.243	0.255
Cumul. all other book income$_{i,t-1,t+5}$	0.065	0.475	-0.725	-0.243	-0.055	0.367	0.905

Panel B: Net income decomposed into four categories

	Mean	SD	p5	p25	p50	p75	p95
Cumul. market-equity change$_{i,t-1,t+1}$	-0.397	0.227	-0.748	-0.590	-0.357	-0.242	-0.068
Cumul. book income$_{i,t-1,t+1}$	-0.210	0.251	-0.614	-0.326	-0.176	-0.076	0.170
Cumul. write-downs$_{i,t-1,t+1}$	-0.257	0.220	-0.666	-0.445	-0.193	-0.120	0.011
Cumul. net interest income$_{i,t-1,t+1}$	0.164	0.260	-0.111	-0.021	0.119	0.261	0.899
Cumul. trading income$_{i,t-1,t+1}$	-0.030	0.190	-0.197	-0.098	-0.028	0.024	0.072
Cumul. all other book income$_{i,t-1,t+1}$	-0.091	0.211	-0.605	-0.156	-0.044	0.056	0.114
Cumul. market-equity change$_{i,t-1,t+3}$	-0.429	0.261	-0.891	-0.633	-0.426	-0.200	-0.050
Cumul. book income$_{i,t-1,t+3}$	-0.340	0.422	-0.918	-0.421	-0.267	-0.097	0.320
Cumul. write-downs$_{i,t-1,t+3}$	-0.411	0.313	-1.000	-0.652	-0.380	-0.117	0.042
Cumul. net interest income$_{i,t-1,t+3}$	0.269	0.404	-0.385	-0.070	0.245	0.600	1.000
Cumul. trading income$_{i,t-1,t+3}$	-0.039	0.245	-0.428	-0.125	0.000	0.055	0.227
Cumul. all other book income$_{i,t-1,t+3}$	-0.175	0.340	-0.995	-0.329	-0.089	0.042	0.275
Cumul. market-equity change$_{i,t-1,t+5}$	-0.355	0.275	-0.847	-0.583	-0.337	-0.058	0.000
Cumul. book income$_{i,t-1,t+5}$	-0.387	0.604	-1.125	-0.637	-0.411	-0.042	0.560
Cumul. write-downs$_{i,t-1,t+5}$	-0.463	0.371	-1.000	-0.759	-0.504	-0.119	0.230
Cumul. net interest income$_{i,t-1,t+5}$	0.303	0.535	-0.600	-0.103	0.464	0.750	1.000
Cumul. trading income$_{i,t-1,t+5}$	-0.019	0.373	-0.605	-0.225	0.012	0.189	0.360
Cumul. all other book income$_{i,t-1,t+5}$	-0.251	0.412	-1.000	-0.549	-0.279	-0.067	0.491

Figure A.24: Historical examples of banks' income statements

This figure shows two examples of historical balance sheets and income statements during the Great Depression, those of Continental Illinois (Panel A), a U.S. bank over the period 1934-36, and of Deutsche Bank (Panel B), a German bank over the period 1932-34, showing the prominence of write-downs. Write-down items are boxed in red, while trading income items are boxed in blue. For more general corroboration of the presence of write-downs in historical crises, the complete transcribed income data of all of the largest ten banks in each country around each bank equity crisis can be downloaded here.

Panel A:

CONTINENTAL ILLINOIS NATIONAL BANK & TRUST CO. OF CHICAGO (Chicago, Ill.): Chartered

COMPARATIVE INCOME ACCOUNT, YEARS ENDED DEC. 31

	1936	1935	1934
Gross earnings	$25,446,988	$25,371,018	$24,061,332
Operating expenses, etc.	13,338,318	*12,565,463	*13,036,799
Net from current operation	12,108,670	12,805,555	11,024,533
Earned per share, common	$11.70	$14.73	$11.85
Net profit on securities	9,386,439	7,121,504	3,915,316
Total	21,495,109	19,927,059	14,939,849
Losses and depreciation	.....	†9,249,931	†10,986,776
Balance	21,495,109	10,677,128	3,953,073
Earned per share, common	$22.13	$11.89	$2.43

* Includes losses on assets acquired since recapitalization.
† After deducting recoveries on assets acquired prior to recapitalization.

RECONCILEMENT OF UNDIVIDED PROFITS, YEARS ENDED DEC. 31

	1936	1935	1934
Balance forward	$3,512,508	$3,606,218	$2,850,636
Bal., income acct. (above)	21,495,109	10,677,128	3,953,073
Total	25,007,617	14,283,346	6,803,709
Preferred dividend	1,605,538	1,770,838	2,197,491
Common dividend	1,500,000	.....	.....
Common stock dividend	5,000,000	.....	.....
Transfers to surplus	2,500,000	1,500,000	1,000,000
Transf. to res. for conting.	.....	7,500,000	.....
Undiv. profits, Dec. 31	14,402,079	3,512,508	3,606,218

Panel B:

DEUTSCHE BANK UND DISCONTO-GESELLSCHAFT (Berlin, Germany) (German Bank & Discount Co.)

COMPARATIVE INCOME ACCOUNT, YEARS ENDED DEC. 31
(In Reichsmark)

	1934	1933	1932
Interest and bills of exch.	62,654,451	65,932,712	76,124,643
Commissions	67,268,208	67,761,708	65,699,326
Notes and coupons	642,909	986,654	1,025,887
Permanent participations	1,435,230	1,482,562	1,389,148
Total income	132,010,798	136,163,936	144,239,004
General expenses	87,582,798	87,522,135	92,741,771
Taxes and dues	7,732,816	7,621,543	10,894,409
Contributions	15,989,055	15,736,993	14,956,518
Written off real estate	529,690	255,266	170,073
Depreciation and reserves	20,153,239	25,046,929	26,382,916
Balance for year	23,200	(d)48,930	(d)906,673
Brought forward	885,026	933,956	1,840,630
Carried forward	908,226	885,026	933,957

Table A.16: To what extent can NPL rates account for banks' market-equity losses?

This table reports estimates, related to Figure 5, from the following equation:

$$r^B_{i,t-1,t+h} = \alpha + \beta^h \text{ NPLpeak}_{i,t} + \varepsilon_{i,t}$$

The dependent variable $r^B_{i,t-1,t+h}$ is the cumulative *unlevered* log excess total return of the bank equity index in country i from year $t-1$ to year $t+h$ (with the start of a bank equity crisis being in year t). $\text{NPLpeak}_{i,t}$ is the nonperforming loan rate for each country i (maximum value from t to $t+5$ around each bank equity crisis). The regression is estimated only on country-year observations (i,t) that correspond to the start of a bank equity crisis. Huber-White standard errors are reported in parentheses. Panel A corresponds to bank equity crises in advanced economies starting in 2008-2010, whereas Panel B corresponds to all bank equity crises in advanced economies for which the NPL data are available. The third column in Panel B corresponds to the line of best fit in Figure 5. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Panel A: Advanced economies, 2008-2010 crises

	Dependent variable:		
	$r^B_{i,t-1,t+1}$	$r^B_{i,t-1,t+3}$	$r^B_{i,t-1,t+5}$
NPL peak$_{i,t}$	-0.134***	-0.132***	-0.166***
	(0.030)	(0.022)	(0.031)
Constant	-0.014***	-0.020***	-0.008
	(0.004)	(0.004)	(0.005)
Adjusted R^2	0.528	0.555	0.606
N	13	13	13

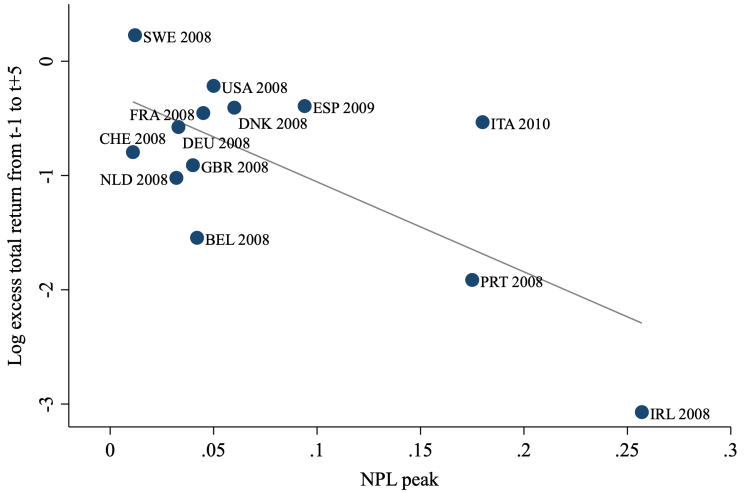
Panel B: Advanced economies, all available crises

	Dependent variable:		
	$r^B_{i,t-1,t+1}$	$r^B_{i,t-1,t+3}$	$r^B_{i,t-1,t+5}$
NPL peak$_{i,t}$	-0.154***	-0.164***	-0.199***
	(0.033)	(0.036)	(0.048)
Constant	-0.011***	-0.011*	0.001
	(0.004)	(0.006)	(0.007)
Adjusted R^2	0.365	0.290	0.233
N	19	19	19

Figure A.25: To what extent can NPL rates account for banks' market-equity losses?
Comparison with nonfinancials' equity returns

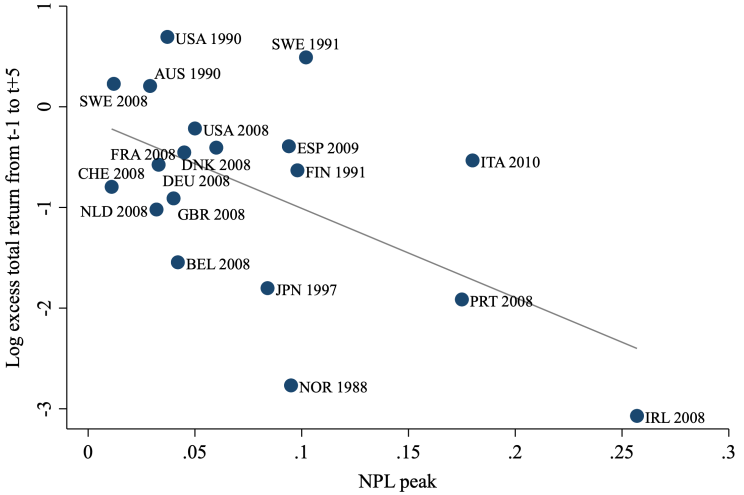
This figure is similar to Figure 5 but with *levered* index returns reported on the y-axis. Panels A and B correspond to bank equity index returns, Panels C and D correspond to nonfinancial equity index returns. Note that it is not possible to plot unlevered returns for the nonfinancial equity index, since we do not have data on the aggregate book leverage of the nonfinancial sector for the countries in the sample. A line of best fit, estimated using ordinary least squares, is plotted in each panel, and the corresponding adjusted R^2 statistic is reported below each panel.

(A) Bank returns, JST countries, 2008-2010 crises



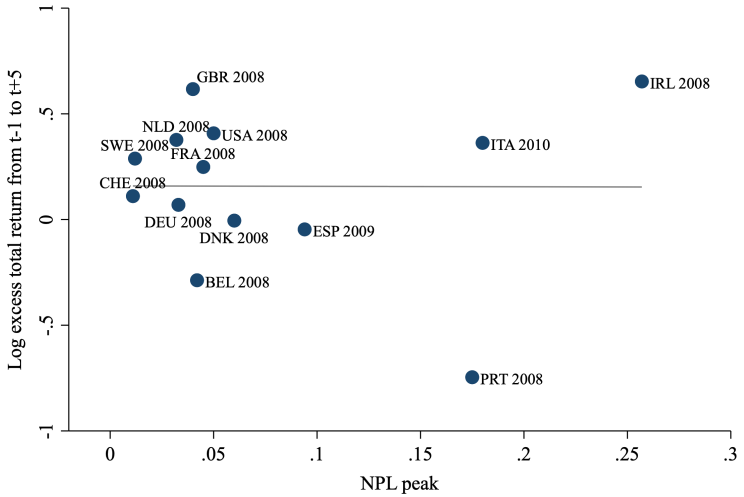
Adj. R^2 = 0.443

(B) Bank returns, JST countries, all available crises



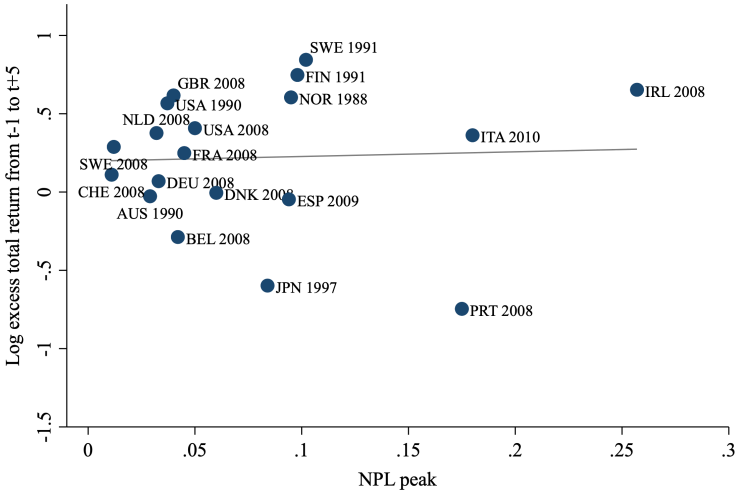
Adj. R^2 = 0.275

(C) Nonfin. returns, JST countries, 2008-2010 crises



Adj. R^2 = -0.091

(D) Nonfin. returns, JST countries, all available crises

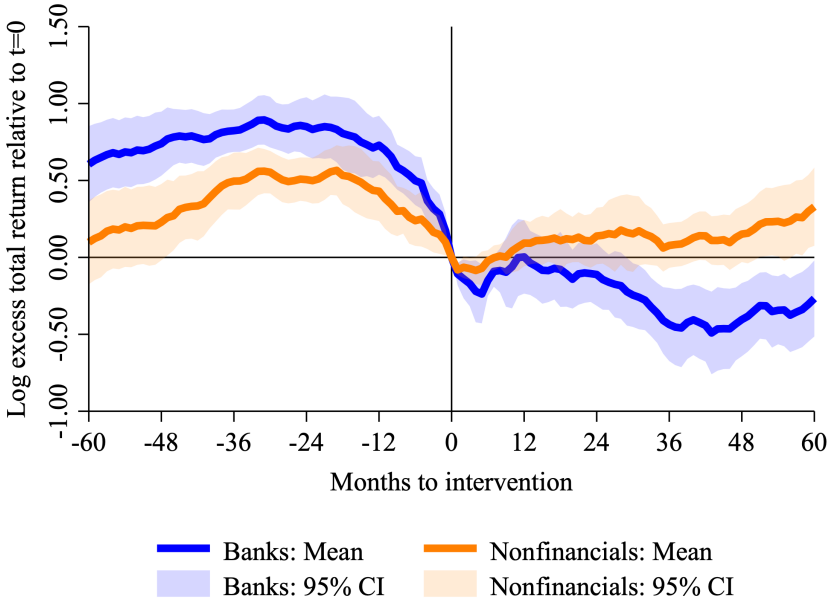


Adj. R^2 = -0.057

Figure A.26: Cumulative abnormal equity returns around liquidity-based interventions: Two types of liquidity-based interventions separated

This figure is similar to Figure 6 but plots the results for extraordinary central bank liquidity support (Panel A) and bank liability blanket guarantees (Panel B) separately.

(A) Extraordinary central bank liquidity support



(B) Bank liability blanket guarantees

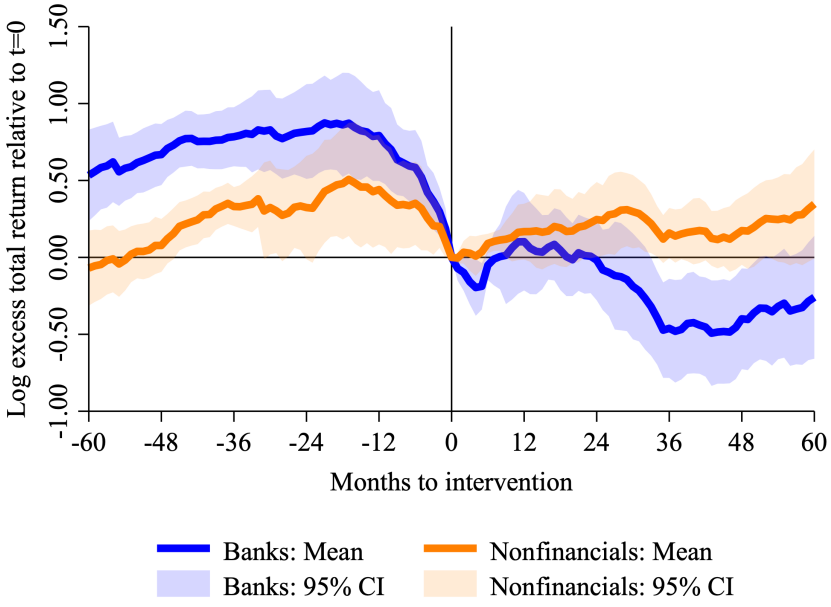
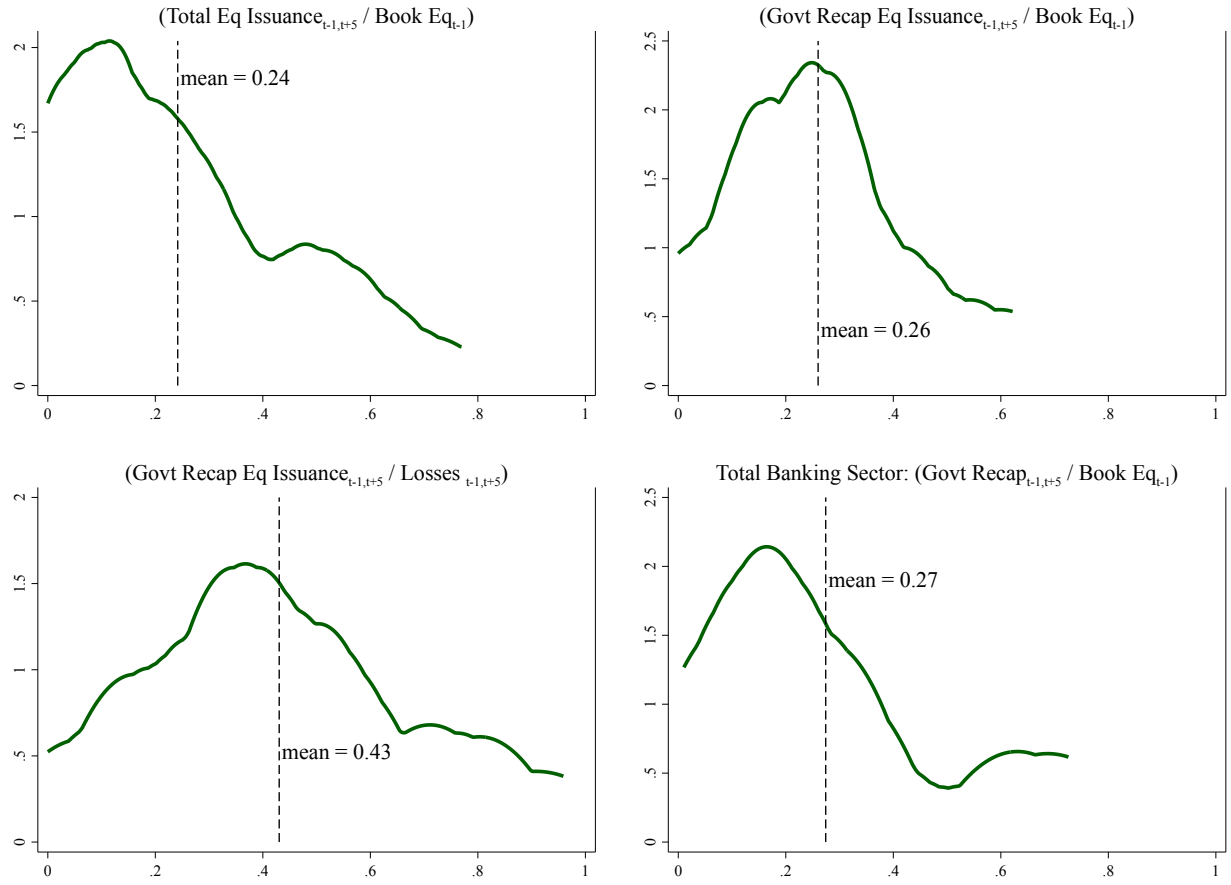


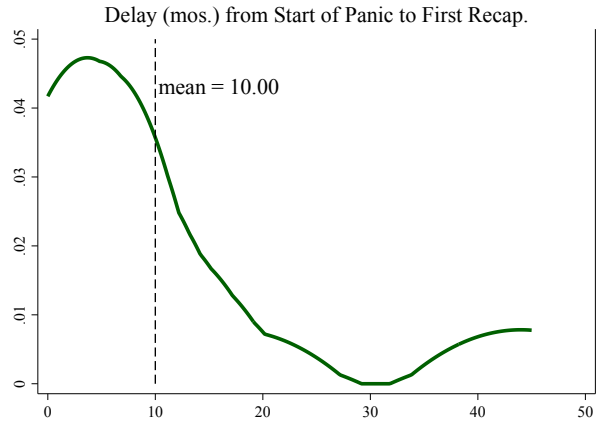
Figure A.27: Government recapitalizations: size, speed, and breadth

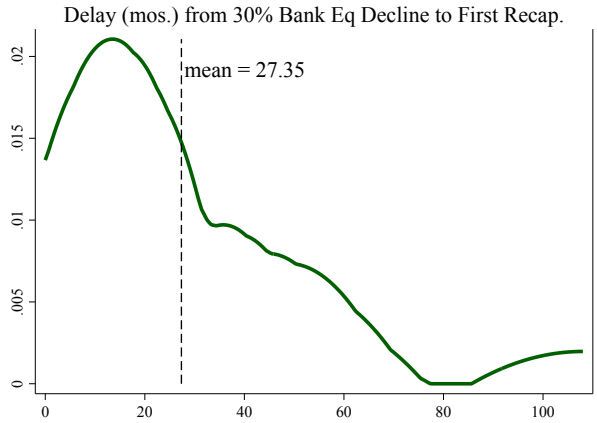
This figure presents histograms that plot the distribution of selected variables across bank equity crises across 17 economies since 1870, conditional on a government recapitalization program. The selected variables are various characteristics of government recapitalization programs, drawn from the data in Table 5. Panel A plots the distribution of variables related to the size of government recapitalizations, Panel B variables related to the speed of government recapitalizations, and Panel C variables related to the breadth of recapitalizations. The dashed vertical line in each plot represents the mean value across all bank equity crises with recapitalizations.

(A) Size of government recapitalizations

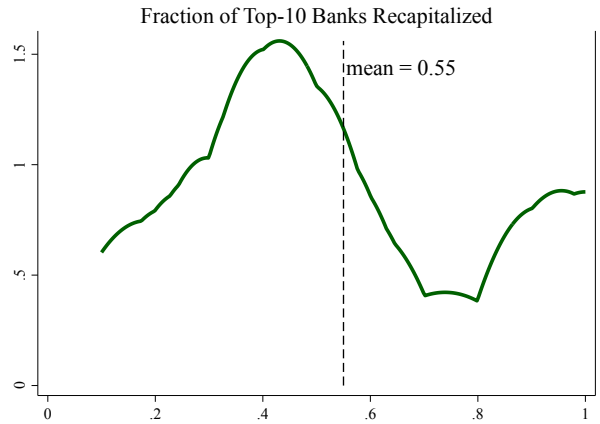


(B) Speed of government recapitalizations





(C) Breadth of government recapitalizations



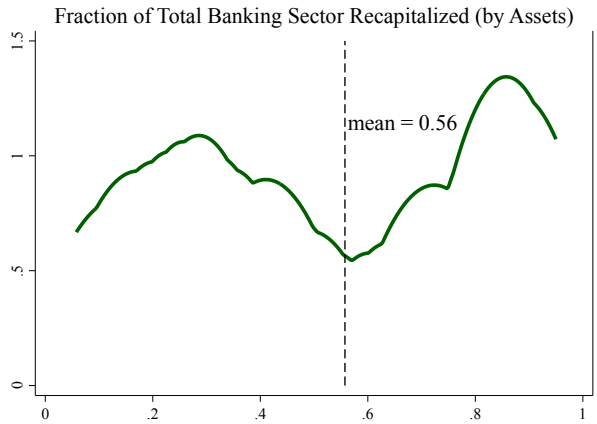


Table A.17: List of sustained banking panics and averted crises

This table reports all types of events used in our analysis, including averted crises (column 3, month reported in column 2), sustained panics (column 5, month reported in column 2), bank equity crises (column 6), and quiet banking crises (column 7). See the main text for definitions. An asterisk indicates that the month of the banking panic is unknown. See the supplemental online spreadsheet for complete historical documentation on the occurrence of sustained panics, averted crises, and quiet banking crises, and for historical documentation of their corresponding monthly dates.

Country	Month (sustained panic or averted crisis)	Averted crisis	Early liq. interv. or liab. guar.	Sustained panic	Bank equity crisis	Quiet banking crisis
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Argentina	May 1876	0	0	1		
Argentina	Mar 1890	0	0	1		
Argentina	Jul 1914	0	1	1		
Argentina	Apr 1931	0	1	1	1931	
Argentina	Mar 1980	0	0	1		
Argentina	May 1985	0	0	1		
Argentina	Apr 1989	0	0	1		
Argentina	Jan 1995	0	0	1		
Argentina	Mar 2001	0	0	1	2001	
Argentina	Sep 2008	1	1	0		
Australia	May 1879	1	1	0		
Australia	Apr 1893	0	0	1	1893	
Australia	Nov 1897	1	1	0		
Australia	Oct 1924	1	1	0		
Australia	Apr 1931	0	0	1		
Australia	Oct 1974	1	1	0		
Australia	Sep 1977	1	1	0		
Australia	Mar 1990	0	0	1	1990	
Australia	Sep 2008	1	1	0		
Austria	May 1873	0	1	1	1873	
Austria	Dec 1884	1	1	0		
Austria	Nov 1912	1	1	0		
Austria	Jul 1914	1	1	0		
Austria	May 1924	1	1	0		
Austria	Nov 1926	1	1	0		
Austria	May 1931	0	1	1	1931	
Austria	Sep 2008	0	1	1	2008	
Belgium	Jul 1870	1	1	0		
Belgium	Dec 1872	1	1	0		
Belgium	Mar 1876	0	0	1		
Belgium	Nov 1885	0	0	1		
Belgium	Sep 1901	0	0	1		
Belgium	Jul 1914	1	1	0		
Belgium	May 1931	0	0	1	1931	
Belgium	Nov 1939	0	0	1		
Belgium	Sep 2008	0	1	1	2008	
Brazil	May 1875	1	1	0		
Brazil	Dec 1890	0	0	1		
Brazil	Sep 1900	0	0	1		
Brazil	Aug 1914	0	1	1		
Brazil	Oct 1930	1	1	0		
Brazil	May 1955	1	1	0		
Brazil	Sep 1985	0	0	1		
Brazil	Feb 1990	1	1	0		

Table A.17 – cont.

Country	Month (sustained panic or averted crisis)	Averted crisis	Early liq. interv. or liab. guar.	Sustained panic	Bank equity crisis	Quiet banking crisis
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Brazil	Dec 1994	0	0	0		
Brazil	Jan 1999	1	1	0		
Brazil	Sep 2008	1	1	0		
Canada	May 1879	0	0	1		
Canada	Apr 1883	1	1	0		
Canada	Jan 1888	1	1	0		
Canada	Dec 1894	0	0	1		
Canada	Oct 1906	1	1	0		
Canada	Oct 1907	1	1	0		
Canada	Aug 1914	1	1	0		
Canada	Dec 1921	0	1	1		
Canada	[no panic]	0	1	0		1931
Canada	Jul 1982	0	0	1		
Canada	Sep 2008	1	1	0		
Chile	Dec 1877	0	0	1		
Chile	Jan 1891	1	1	0		
Chile	Feb 1895	1	1	0		
Chile	Jul 1898	0	1	1		
Chile	Oct 1907	0	1	1		
Chile	Jul 1914	1	1	0		
Chile	Dec 1925	1	1	0		
Chile	Jun 1932	0	0	1	1931	
Chile	Jun 1975	0	0	1		
Chile	Nov 1981	0	1	1	1981	
Chile	Sep 2008	1	1	0		
Colombia	Jul 1923	0	1	1		
Colombia	Sep 1931	0	1	1		
Colombia	Jul 1982	0	1	1	1982	
Colombia	Jun 1998	0	0	1	1998	
Colombia	Sep 2008	1	1	0		
Czech	May 1873	0	0	1		
Czech	Oct 1912	1	1	0		
Czech	May 1923	0	0	1		
Czech	May 1931	1	1	0		
Czech	Mar 1939	1	1	0		
Czech	Apr 1994	0	1	1	1995	
Czech	Jun 2000	0	1	1		
Czech	Sep 2008	1	1	0		
Denmark	Jan 1877	0	0	1		
Denmark	Sep 1885	0	0	1		
Denmark	Feb 1908	0	1	1		
Denmark	Jul 1914	1	1	0		
Denmark	Sep 1922	0	1	1		
Denmark	Sep 1931	1	1	0		
Denmark	Dec 1984	1	1	0		
Denmark	[no panic]	0	1	0	1992	1992
Denmark	Sep 2008	0	1	1	2008	
Egypt	May 1907	0	0	1		
Egypt	Sep 1911	1	1	0		
Egypt	Jul 1914	1	1	0		
Egypt	Jul 1931	0	0	1	1931	
Egypt	1980*	1	1	0		

Table A.17 – cont.

Country	Month (sustained panic or averted crisis)	Averted crisis	Early liq. interv. or liab. guar.	Sustained panic	Bank equity crisis	Quiet banking crisis
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Finland	Feb 1878	1	1	0		
Finland	Nov 1890	1	1	0		
Finland	Nov 1900	0	1	1		
Finland	[no panic]	0	0	0	1921	1921
Finland	Oct 1931	0	1	1		
Finland	Nov 1939	1	1	0		
Finland	Sep 1991	0	1	1	1991	
Finland	Sep 2008	1	1	0		
France	Oct 1870	1	1	0		
France	Jan 1882	0	0	1	1882	
France	Mar 1889	1	1	0		
France	Jul 1914	1	1	0		
France	Oct 1930	0	0	1	1931	
France	Sep 1938	1	1	0		
France	Sep 1943	1	1	0		
France	[no panic]	0	1	0	1994	1994
France	Sep 2008	0	1	1	2008	
Germany	Oct 1873	0	0	1		
Germany	Sep 1891	0	0	1		
Germany	Jun 1901	0	1	1		
Germany	Oct 1907	0	0	1		
Germany	Sep 1911	1	1	0		
Germany	Jul 1914	1	1	0		
Germany	Apr 1931	0	0	1	1931	
Germany	Jun 1974	1	1	0		
Germany	[no panic]	0	1	0		2002
Germany	Sep 2008	0	1	1	2008	
Greece	Aug 1914	1	1	0		
Greece	Jun 1923	1	1	0		
Greece	Sep 1931	0	1	1	1931	
Greece	Sep 2008	0	1	1	2008	
Hungary	Jul 1873	0	1	1	1873	
Hungary	Oct 1912	1	1	0		
Hungary	Jul 1931	0	0	1		
Hungary	[no panic]	0	1	0		1991
Hungary	[no panic]	0	1	0	2008	2008
Iceland	May 1920	0	0	1		
Iceland	Feb 1930	0	0	1		
Iceland	[no panic]	0	1	0		1985
Iceland	[no panic]	0	1	0		1993
Iceland	Sep 2008	0	1	1	2008	
India	May 1884	1	1	0		
India	Oct 1913	0	0	1		
India	1923*	0	0	1		1923
India	Apr 1938	1	1	0		
India	[no panic]	0	1	0	1993	1993
India	Jan 1998	1	0	0		
India	Sep 2008	1	1	0		
India	[no panic]	0	1	0		2011
Indonesia	Nov 1992	0	0	1	1992	
Indonesia	Nov 1997	0	1	1	1998	
Indonesia	Sep 2008	1	1	0		

Table A.17 – cont.

Country	Month (sustained panic or averted crisis)	Averted crisis	Early liq. interv. or liab. guar.	Sustained panic	Bank equity crisis	Quiet banking crisis
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ireland	Jul 1885	1	1	0		
Ireland	Sep 2008	0	1	1	2008	
Israel	Sep 1935	0	0	1		
Israel	Aug 2002	0	1	1		
Israel	Sep 2008	1	1	0		
Italy	Nov 1893	0	0	1	1889	
Italy	Sep 1907	0	1	1		
Italy	Jul 1914	0	1	1		
Italy	Nov 1921	0	0	1	1921	
Italy	Apr 1931	0	1	1		
Italy	Aug 1943	1	1	0		
Italy	Sep 2008	0	1	1	2010	
Japan	Aug 1871	0	0	1		
Japan	May 1890	0	1	1		
Japan	Apr 1901	0	0	1		
Japan	Feb 1907	0	0	1	1907	
Japan	Apr 1920	0	0	1		
Japan	Feb 1922	0	0	1		
Japan	Sep 1923	0	1	1		
Japan	Mar 1927	0	1	1		
Japan	May 1965	1	1	0		
Japan	Nov 1997	0	1	1	1997	
Japan	Sep 2008	1	1	0		
Korea	Jun 1950	1	1	0		
Korea	May 1961	1	1	0		
Korea	Oct 1997	0	1	1	1997	
Korea	Sep 2008	1	1	0		
Malaysia	Dec 1985	0	0	1		
Malaysia	Sep 1997	0	0	1		
Malaysia	Sep 2008	1	1	0		
Mexico	Mar 1883	0	0	1		
Mexico	Apr 1893	0	0	1		
Mexico	Jun 1908	0	0	1		
Mexico	Sep 1913	0	0	1		
Mexico	Dec 1920	0	0	1		
Mexico	Jul 1931	0	0	1	1931	
Mexico	Sep 1982	0	0	1		
Mexico	Dec 1994	0	1	1	1994	
Mexico	Sep 2008	1	1	0		
Netherlands	Nov 1907	0	1	1		
Netherlands	Jul 1914	1	1	0		
Netherlands	[no panic]	0	1	0	1921	1921
Netherlands	[no panic]	0	1	0	1931	1931
Netherlands	Sep 1944	1	1	0		
Netherlands	Sep 2008	0	1	1	2008	
New Zealand	Jan 1893	0	0	1		
New Zealand	Aug 1988	0	0	1	1989	
New Zealand	Sep 2008	1	1	0		
Norway	Oct 1886	1	1	0		
Norway	Jun 1899	0	1	1		
Norway	Aug 1905	1	1	0		
Norway	Jul 1914	1	1	0		

Table A.17 – cont.

Country	Month (sustained panic or averted crisis)	Averted crisis	Early liq. interv. or liab. guar.	Sustained panic	Bank equity crisis	Quiet banking crisis
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Norway	Dec 1921	0	1	1	1921	
Norway	Dec 1931	1	1	0		
Norway	Oct 1991	0	1	1	1988	
Norway	Sep 2008	0	1	1		
Peru	Aug 1875	0	0	1	1877	
Peru	Jul 1914	1	1	0		
Peru	Oct 1930	0	0	1	1931	
Peru	[no panic]	0	1	0	1982	1981
Peru	[no panic]	0	1	0		1992
Peru	Sep 1998	0	0	1	1998	
Peru	Sep 2008	1	1	0		
Philippines	Aug 1968	0	0	1		
Philippines	Jun 1974	1	1	0		
Philippines	Mar 1977	1	1	0		
Philippines	Jan 1981	0	1	1	1981	
Philippines	Jun 1997	1	1	0		
Philippines	Apr 2000	1	1	0		
Philippines	Sep 2008	1	1	0		
Portugal	Aug 1876	0	0	1		
Portugal	May 1891	0	0	1		
Portugal	Jul 1920	0	0	1		
Portugal	1923*	0	0	1		
Portugal	Jul 1920	0	0	1	1925	
Portugal	Nov 1930	0	0	1	1931	
Portugal	Sep 2008	0	1	1	2008	
South Africa	1881*	0	0	1		
South Africa	Sep 1890	0	0	1		
South Africa	Aug 1977	1	1	0		
South Africa	Feb 2002	1	1	0		
Spain	Feb 1882	0	0	1		
Spain	Nov 1890	0	0	1		
Spain	Dec 1913	1	1	0		
Spain	Sep 1914	1	1	0		
Spain	Dec 1920	0	0	1		
Spain	Sep 1924	0	0	1		
Spain	Apr 1931	0	1	1		
Spain	[no panic]	0	1	0	1977	1977
Spain	Dec 1993	1	1	0		
Spain	Sep 2008	0	1	1	2009	
Sweden	Dec 1878	0	1	1		
Sweden	Nov 1890	1	1	0		
Sweden	Oct 1907	0	1	1		
Sweden	[no panic]	0	1	0	1922	1922
Sweden	[no panic]	0	1	0	1932	1932
Sweden	Sep 1939	1	1	0		
Sweden	Sep 1992	0	1	1	1991	
Sweden	Sep 2008	0	1	1	2008	
Switzerland	Jul 1870	1	0	0		
Switzerland	Jul 1912	0	1	1		
Switzerland	Jul 1914	1	1	0		
Switzerland	Nov 1920	1	1	0		
Switzerland	Jul 1931	0	0	1	1931	

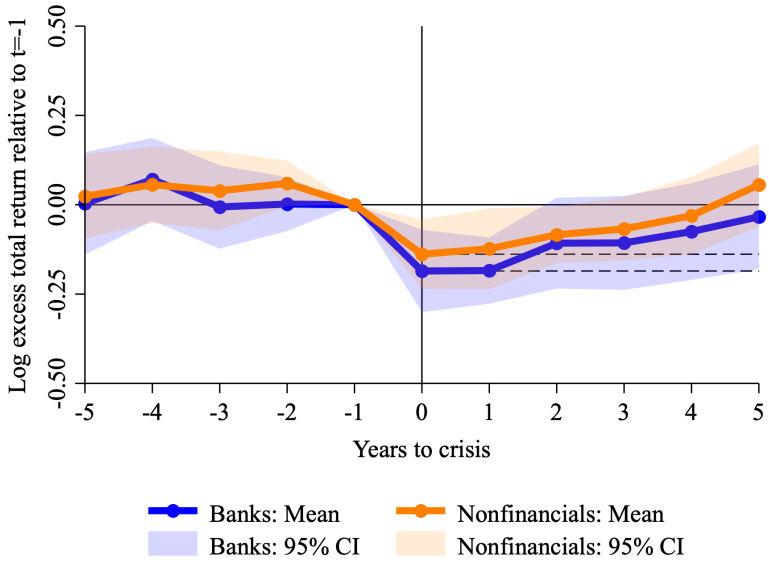
Table A.17 – cont.

Country	Month (sustained panic or averted crisis)	Averted crisis	Early liq. interv. or liab. guar.	Sustained panic	Bank equity crisis	Quiet banking crisis
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Switzerland	Oct 1991	0	0	1		
Switzerland	Sep 2008	0	1	1	2008	
Taiwan	Aug 1985	1	1	0		
Taiwan	Jul 1995	1	1	0		
Taiwan	Nov 1998	1	1	0		
Taiwan	Jan 2000	1	1	0		
Taiwan	Sep 2008	1	1	0		
Thailand	Dec 1913	1	1	0		
Thailand	May 1979	1	1	0		
Thailand	Oct 1983	0	1	1		
Thailand	May 1996	0	1	1	1997	
Thailand	Sep 2008	1	1	0		
Turkey	Aug 1914	0	0	1		
Turkey	Jul 1931	0	0	1	1931	
Turkey	Jun 1982	0	1	1	1983	
Turkey	Jan 1991	1	1	0		
Turkey	May 1994	0	1	1		
Turkey	Nov 2000	0	1	1	2001	
Turkey	Sep 2008	1	1	0		
UK	Oct 1878	1	1	0		
UK	Nov 1890	1	1	0		
UK	Aug 1911	1	1	0		
UK	Jul 1914	1	1	0		
UK	Jul 1931	1	1	0		
UK	Feb 1974	0	1	1	1973	
UK	Jul 1991	0	1	1		
UK	Sep 2008	0	1	1	2008	
US	Sep 1873	0	0	1		
US	May 1884	0	0	1		
US	Nov 1890	0	0	1		
US	May 1893	0	0	1		
US	Oct 1907	0	0	1		
US	Jul 1914	1	1	0		
US	Sep 1920	1	1	0		
US	Nov 1930	0	0	1	1931	
US	Jun 1970	1	1	0		
US	May 1984	0	1	1		
US	[no panic]	0	1	0	1990	1990
US	Sep 1998	1	1	0		
US	Sep 2008	0	1	1	2008	
Venezuela	Jul 1931	0	0	1		
Venezuela	Aug 1961	0	1	1		
Venezuela	Dec 1978	0	1	1		
Venezuela	Oct 1993	0	0	1	1994	
Venezuela	Nov 2009	0	0	1	2009	

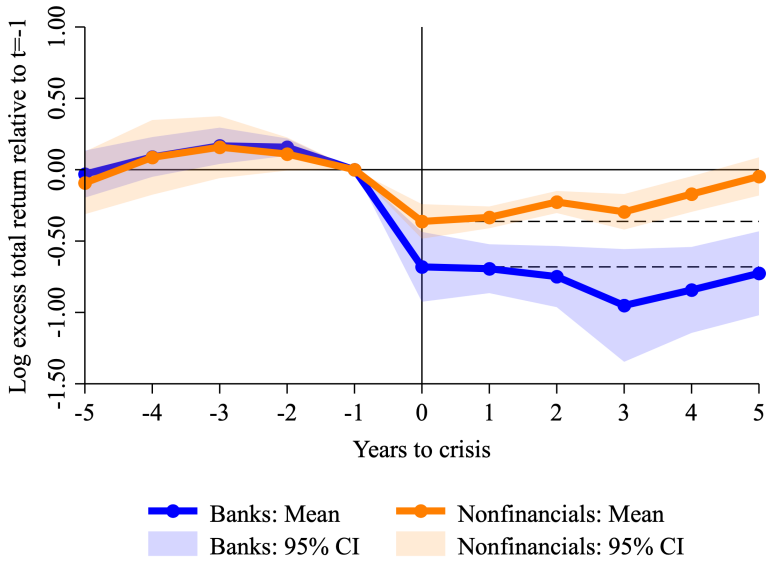
Figure A.28: Comparing bank equity crises with "panic-only" events: Cumulative abnormal equity returns and real dividends

This figure is similar to Figure 1 and Figure 3 but plots cumulative abnormal equity index returns and real dividends around panic-only events (Panels A and C) and bank equity crises (Panels B and D). Panic-only event are defined as banking panics (as listed in Table A.17) that are not also bank equity crises.

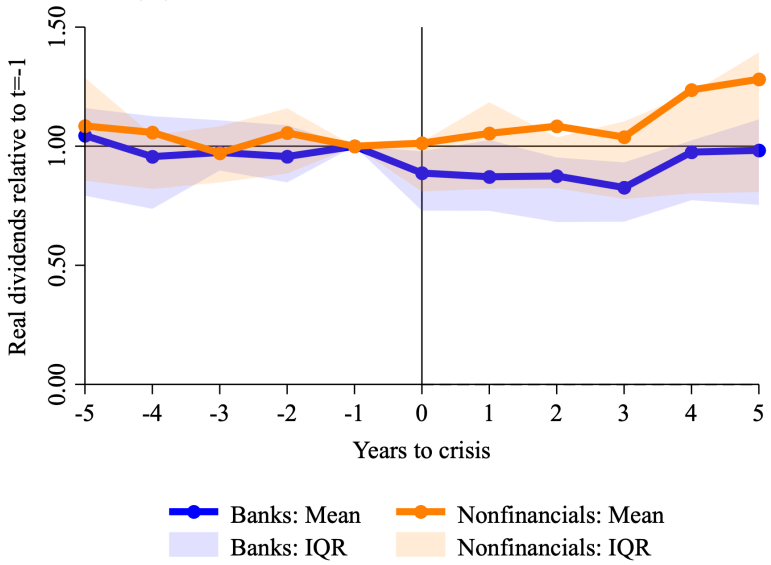
(A) Panic-only events: Cumulative abnormal equity returns



(B) Bank equity crises: Cumulative abnormal equity returns



(C) Panic-only events: Real dividends



(D) Bank equity crises: Real dividends

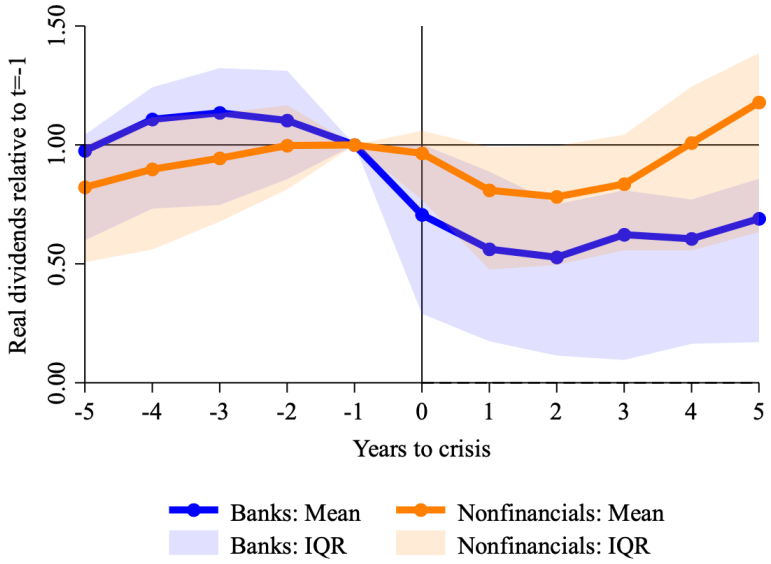
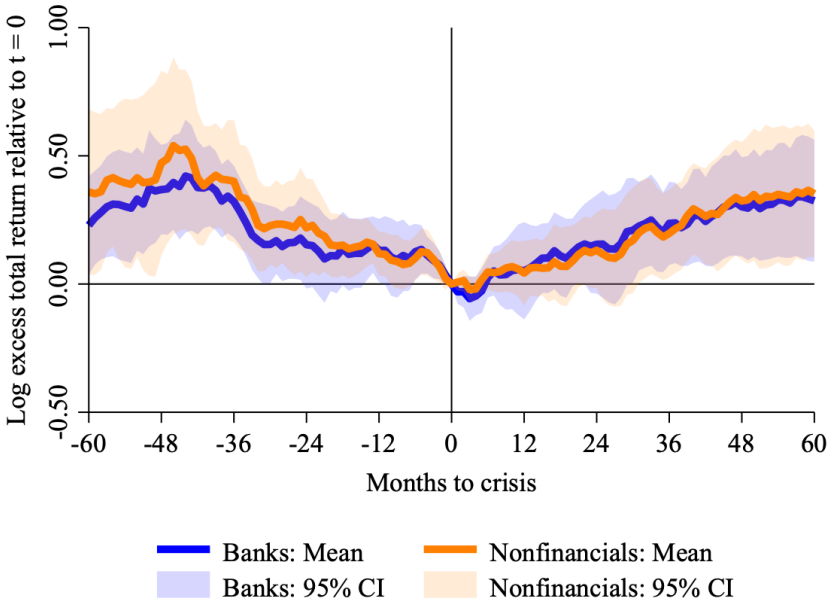


Figure A.29: Comparing bank equity crises with "panic-only" events: Response to liquidity interventions

This figure is similar to Figure 6 but plots cumulative abnormal equity index returns around panic-only events (Panels A and C) and bank equity crises (Panels B and D). Panic-only event are defined as banking panics (as listed in Table A.17) that are not also bank equity crises. As in Figure 6, the cumulative abnormal returns are relative to month t corresponding to the implementation of extraordinary central bank liquidity support or bank liability blanket guarantees, whichever comes first.

(A) Panic-only events



(B) Bank equity crises

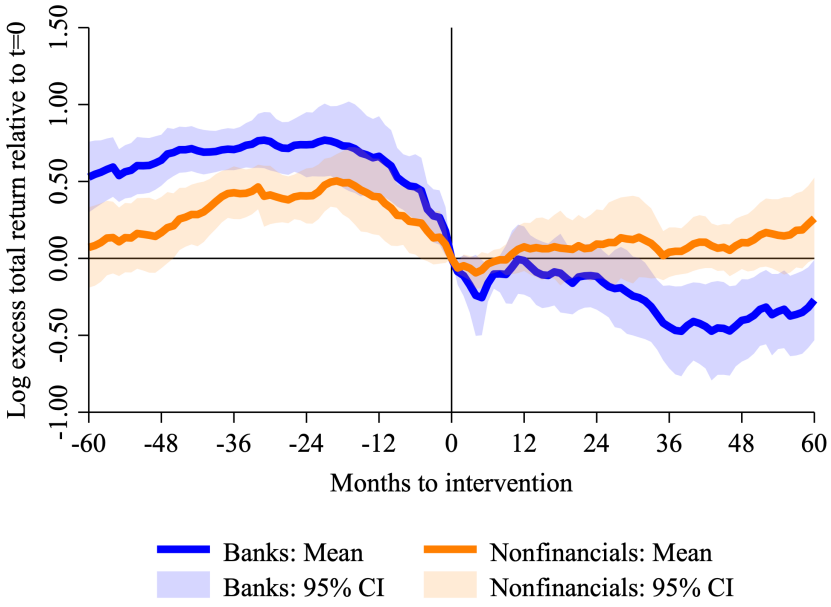
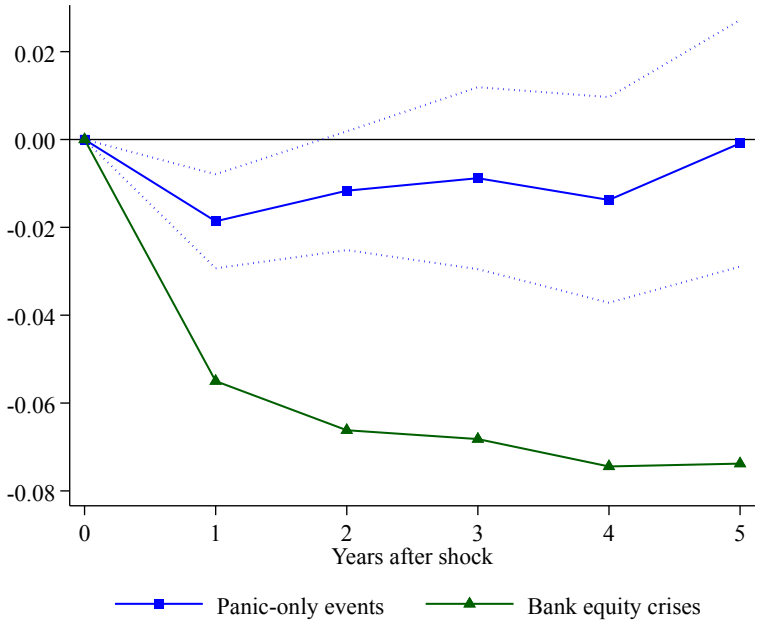


Figure A.30: Comparing bank equity crises with "panic-only" events: Macroeconomic outcomes

This figure estimates the real GDP response (left panel) and the aggregate bank credit-to-GDP response (right panel) following panic-only events (blue line) and bank equity crises (green line). Panic-only event are defined as banking panics (as listed in Table A.17) that are not also bank equity crises. The real GDP response and credit-to-GDP response are estimated using local projections using the same methodology as in Baron, Verner, and Xiong (2021). The blue dashed lines represent 95% confidence intervals corresponding to panic-only events.

(A) Real GDP Response



(B) Credit-to-GDP Response

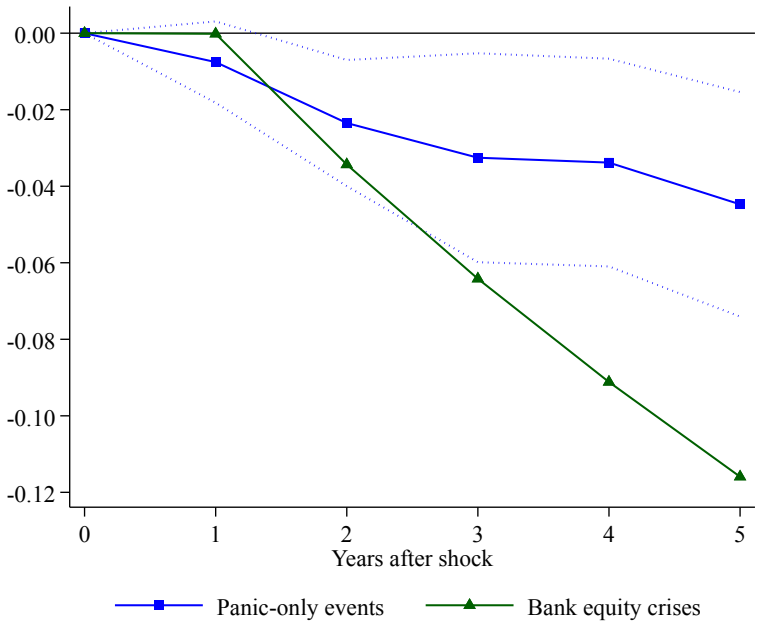
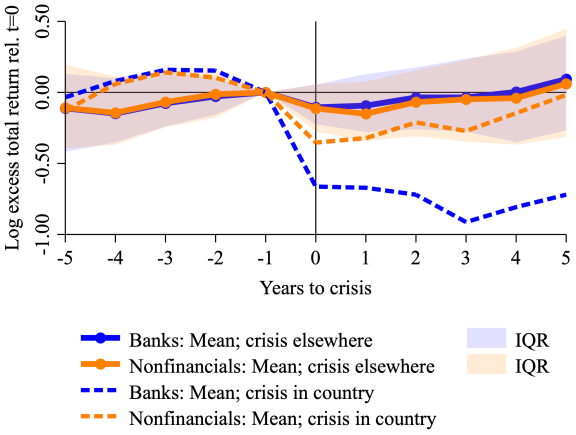


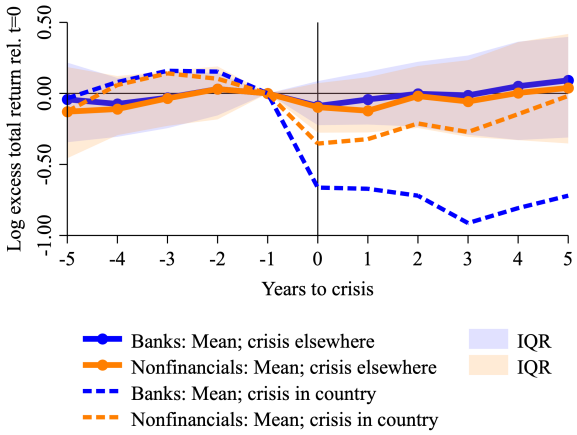
Figure A.31: Cross-predictability of bank equity returns around bank equity crises

This figure is similar to Figure 1, but the events in this figure are the occurrence of bank equity crises in other countries. Specifically, in Panel A, the event indicator CrisisElsewhere$_{i,t}$ equals 1 if a bank equity crisis occurs in any other country $j \neq i$ in the sample in year t but not in country i in years $t-3, ..., t+3$. In cases of more than one such event in a given country in any five-year window, we keep only the first event. In Panel B, we follow the same algorithm but consider bank equity crises only in advanced (emerging) economies and their cross-predictability only in other advanced (emerging) economy. (In other words, we omit the cross-predictability of crises in emerging economies on advanced economies, and vice versa.) In Panel C, we limit the analysis to the set of bank equity crises starting in 2008-2010. In all panels, we also plot same-country returns around bank equity crises (the baseline result from Figure 1) as dashed lines for comparison.

(A) Main result



(B) Precluding advanced-emerging cross-predictability



(C) 2008-2010 bank equity crises subsample

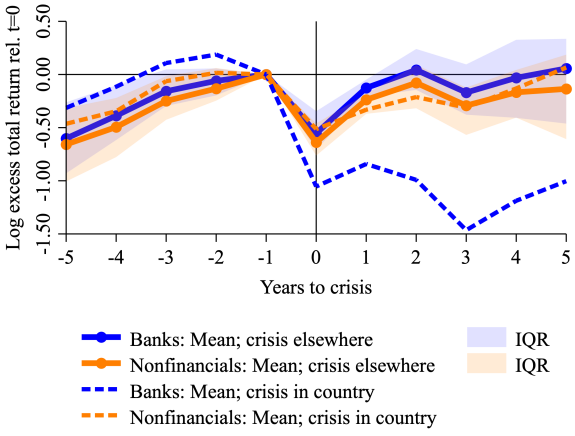


Figure A.32: Other types of crises

This figure is similar to Figure 1 but plots results around other types of crises. For reference, Panel A reproduces the results from Figure 1 around bank equity crises, and Panel B reproduces the results from Figure A.7, with interquartile ranges as the measure of uncertainty. Panel C plots returns around annual nonfinancial equity excess total returns of $< -30\%$. Panel D plots returns around currency crises defined following Frankel and Rose (1996, i.e., annual currency depreciations of $< -30\%$). Panel E plots returns around real consumption declines (country-year observations with negative real consumption growth). Panel F plots returns around real GDP declines (country-year observations with negative real GDP growth). For all of the other crises (Panels C-F), we consider only the episodes which are *not* overlapping with $\pm$5-year windows of bank equity crises.

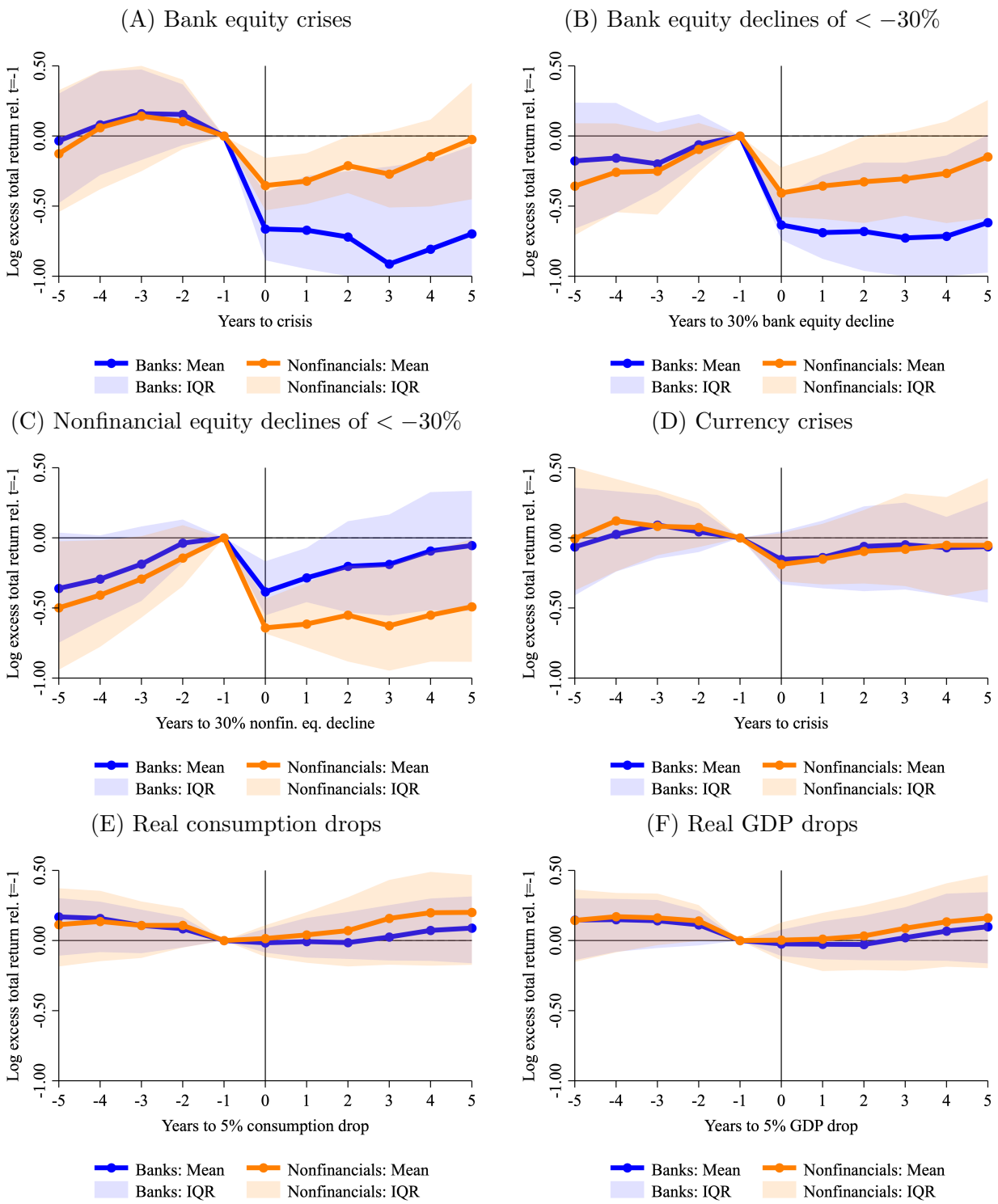
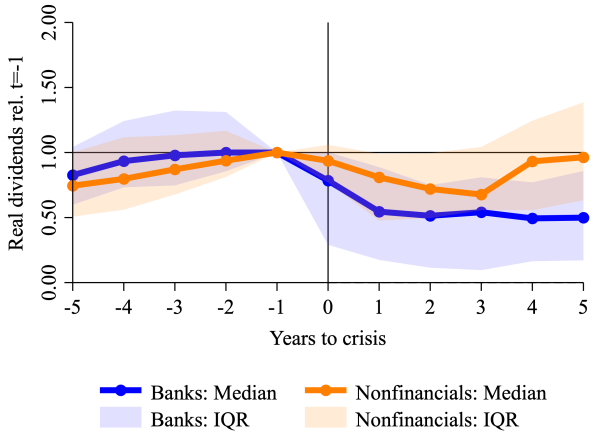
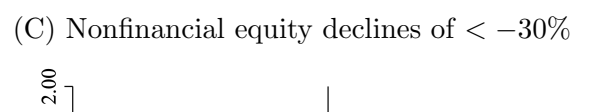


Figure A.33: Dividends around other types of crises

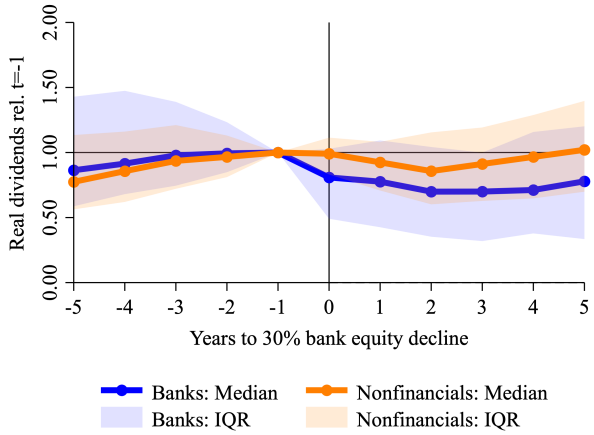
This figure is similar to Figure 3 Panel A, but repeats the analysis for other types of crises. See Figure A.32 for crisis definitions. We plot the median, rather than the mean, of the real dividend index across crises, to avoid the influence of outlier real dividend growth observations (which occur due to high inflation in several emerging market cases, which likely introduces high measurement error into the real dividends index).

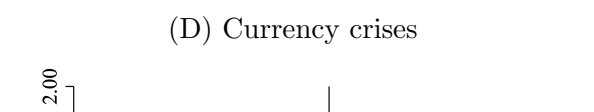
(A) Bank equity crises



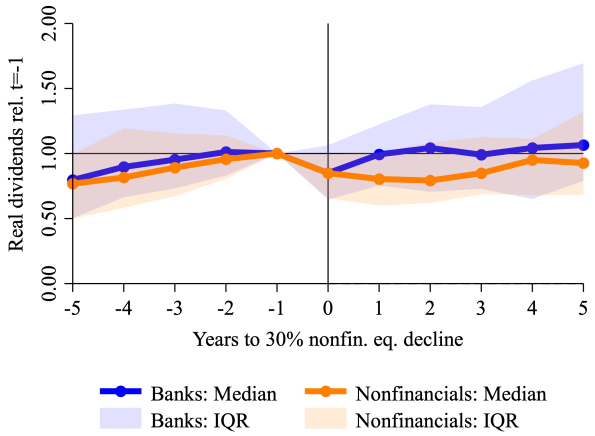


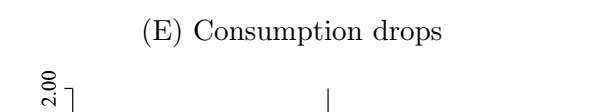
(B) Bank equity declines of $< -30\%$



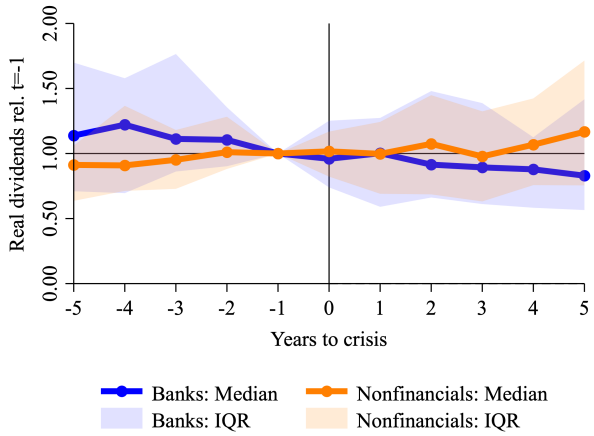


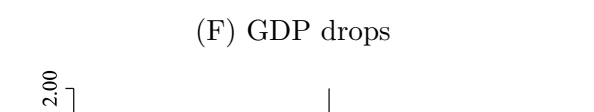
(C) Nonfinancial equity declines of $< -30\%$



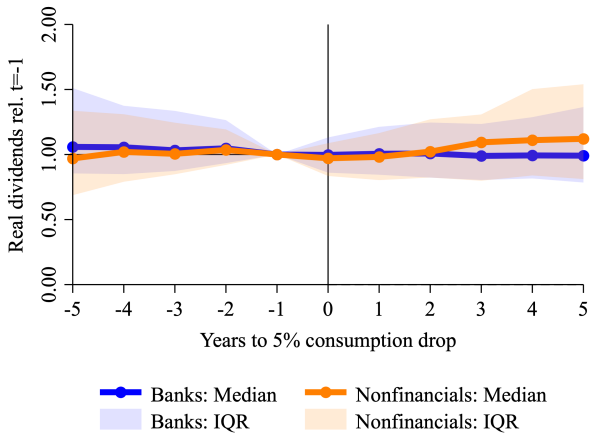


(D) Currency crises





(E) Consumption drops



(F) GDP drops

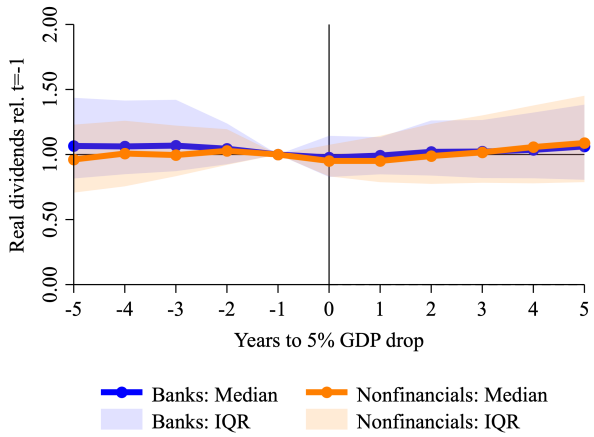


Figure A.34: Tree diagram of types of banking crises

This figure categorizes all the types of events (bank equity crises, banking panics, and averted crises) from Table A.17. The eventual outcomes, which are all defined in the main text, are: averted crises (row 1, $n = 92$), bank equity (BE) crises with sustained panics (rows 2 and 5, $n = 64$), panic-only events (sustained panics without BE crises, row 3, $n = 72$), and quiet banking crises (BE crises without banking panics, row 4, $n = 12$). The tree then diagrams the paths through which eventual outcomes are reached.

The upper tree captures episodes in which the panic happens strictly before the bank equity decline or within three months of it ($n = 183$). In this case, early decisive liquidity interventions (as defined in the main text, $n = 126$) can often avert the crisis ($n = 92$). However, sometimes these liquidity interventions fail and the crisis ends up becoming a sustained banking panic anyway ($n = 34$). When there is no early decisive liquidity intervention ($n = 57$), these cases also all become sustained banking panics. Banking panics ($n = 91$) can then either turn into a BE crisis ($n = 19$) or not ($n = 72$).

The bottom tree captures episodes in which the bank equity decline happens strictly before the banking panic by at least three months. In these cases, the bank equity losses are recognized by the market in advance, so any resulting panic cannot be the cause of these initial large bank losses. The tree diagram shows that two possibilities emerge: cases followed by early decisive liquidity interventions ($n = 40$) and without ($n = 17$), the latter always leading to banking panic that accompany the BE crisis. In the cases with early decisive liquidity interventions, a banking panic often still erupts ($n = 28$), since insolvencies in the banking sector are severe enough to lead to widespread runs on the banking system despite the overwhelming government liquidity interventions. However, in the remaining cases ($n = 12$), the episode turns into a BE crisis without banking panic (what BVX dub "quiet banking crises").

Note that there are other theoretical possible paths and outcomes (e.g., an event featuring a BE decline first that is quickly averted after early decisive liquidity intervention), but there are no historical cases of these other possibilities in our sample of 46 countries since 1870. Thus, this diagram represents a complete categorization of all types of episodes from Table A.17.

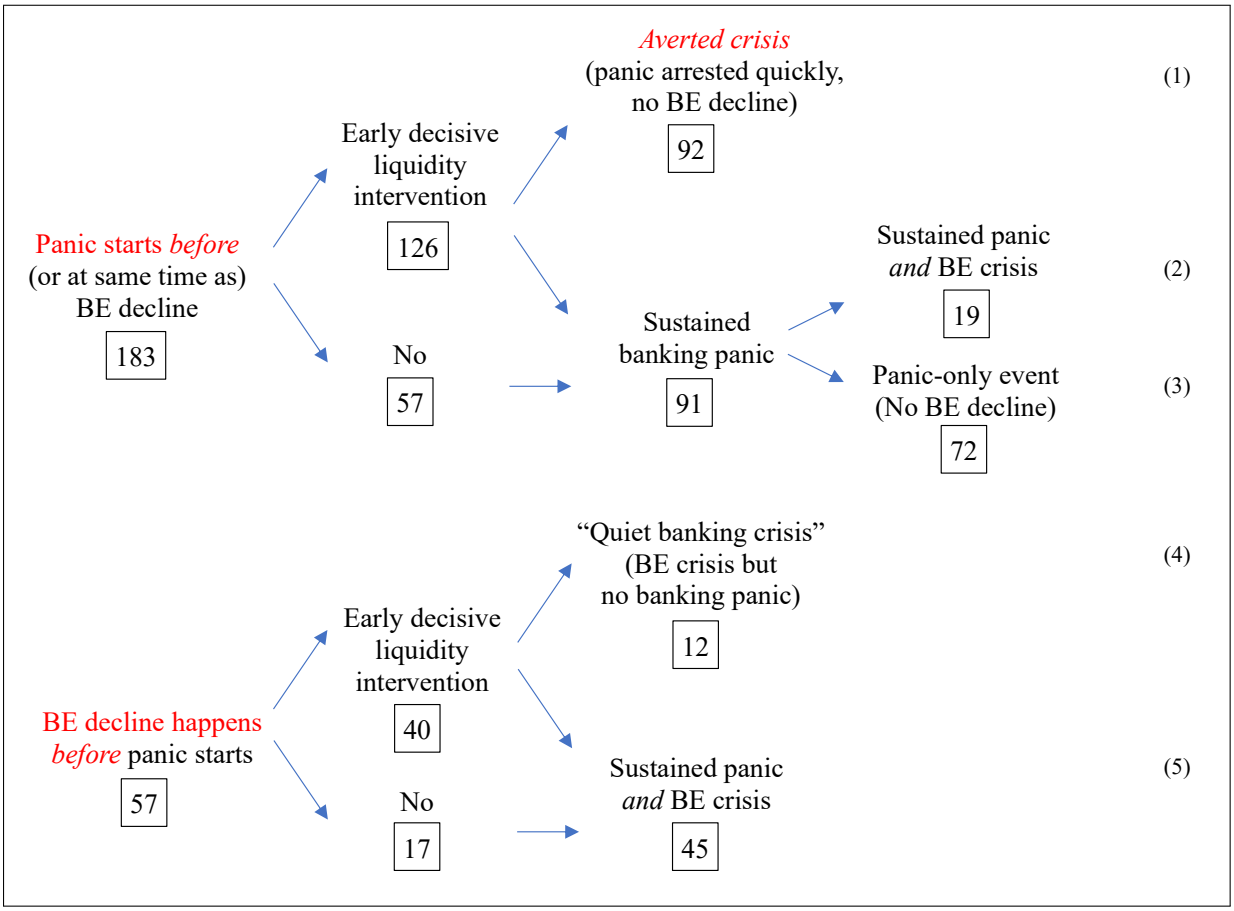


Table A.18: Which crises can be averted through early decisive liquidity interventions?

Panel A reports the marginal effects from a probit regression estimated on the sample of episodes listed in Table A.17. Using the framework from the tree diagram in Figure A.34, this probit analyzes why some events are successfully averted through early decisive liquidity interventions, while other events turn into bank equity crises or sustained banking panics despite early liquidity interventions. The dependent variable in the probit is an indicator variable of the event being an "averted crisis". The predictor variables are as follows: *Small BE Decline* is an indicator variable of whether the event was preceded by a bank equity decline of less than 30%; *Early Liq. Interv.* is an indicator variable of whether there was an early liquidity intervention; *War* is an indicator variable of whether the event was the result of the outbreak of a war; and *Single Bank* is an indicator variable of whether the event was the result of distress at only a single institution. *, **, *** indicate significance at the 0.1, 0.05, and 0.01 levels, respectively.

Panels B and C discard the functional form imposed by the probit regression and make predictions based on simple rules using the same four predictor variables. The results are assembled into a classification matrix that compares the predicted outcome ("averted crisis" or not) to the actual outcome. In Panel B, an averted crisis is predicted when *Small BE Decline* and *Early Liq. Interv.* are both equal to one. In Panel C, an averted crisis is predicted when *Small BE Decline* and *Early Liq. Interv.* are both equal to one and either *War* or *Single Bank* equals one.

Panel A: Probit estimation

	Full sample of events				Conditional on panic starting before BE decline	Conditional on (panic starting before BE decline) *and* (early decisive liq. intervention)
	(1)	(2)	(3)	(4)	(5)	(6)
Small BE decline	0.736***		0.632***	0.610***		
	(8.66)		(6.35)	(6.15)		
Early Liq. Interv.		0.778***	0.688***	0.681***	0.998***	
		(7.97)	(7.01)	(6.76)	(6.77)	
War				0.263**	0.336**	0.292***
				(2.44)	(2.49)	(2.62)
Single Bank				0.276**	0.406***	0.372***
				(2.54)	(2.93)	(3.13)
Pseudo R^2	0.270	0.251	0.533	0.578	0.429	0.104
N	240	240	240	240	183	126

Panel B: Prediction table

Predict "averted crisis" using the following criteria:
a) *Small BE decline* equals one, and
b) *Early Liq. Interv.* equals one.

		Prediction:		
		Not averted	Averted	Total
Actual:	Not averted	113	35	148
	Averted	1	91	92
	Total	114	126	240

Panel C: Alternative prediction table

Predict "averted crisis" using the following criteria:
a) *Small BE decline* equals one, and
b) *Early Liq. Interv.* equals one, and
c) Either *War* or *Single Bank* equals one.

		Prediction:		
		Not averted	Averted	Total
Actual:	Not averted	143	5	148
	Averted	46	46	92
	Total	189	51	240