

BANKING-CRISIS INTERVENTIONS, 1257-2019.

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We present a new database of banking-crisis interventions since the 13th century. The database includes 1886 interventions in 20 categories across 138 countries, covering interventions during all of the crises identified in the main banking-crisis chronologies, while also cataloguing a large number of interventions outside of those crises. The data show a gradual shift over the past centuries from the traditional interventions of a lender-of-last-resort, suspensions of convertibility, and bank holidays, towards a much more prominent role for capital injections and sweeping guarantees of bank liabilities. Furthermore, intervention frequencies and sizes suggest that the crisis problem in the financial sector has indeed reached an apex during the post-Bretton Woods era – but that such trends are part of a more deeply entrenched development that saw global intervention frequencies and sizes gradually rise since at least the late 17th century.

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I. Introduction

Banking crises are pervasive. Even mature economies with stable governments cannot escape them. These crises are costly for economies, for public trust, and for political stability. These social costs motivate government action, but what form should that action take? What kinds of interventions work? How exactly should they be structured and sequenced? To answer these questions we would like to learn from history, and to do this well requires a database of past actions. But no such comprehensive database exists. In this paper, we describe our process to construct this database and analyze the patterns of interventions across time and space.

Since the 1990s, scholars have made considerable progress in building databases and chronologies of banking crises. We build upon this work, starting with a union of such events from four major chronologies, a set that we denote as “canonical crises”.² One goal of our project is to identify all government interventions during these canonical crises, but another goal is to catalogue similar types of interventions done at other times. One reason to extend the scope in this way is that the existence of an intervention may be a sign that there was indeed a banking crisis that was overlooked by the past literature. But perhaps more intriguing is the possibility that such interventions played a role in successfully preventing an incipient crisis, and those would certainly be interventions worthy of further study. Since the time periods around such interventions may signify previously unidentified or incipient crises, we label them as “candidate crises”. Thus, every intervention in the database is associated with either a canonical or a candidate crisis, and we refer to the union of those two groups simply as “crises”.

In crises, governments have used a broad arsenal, acting through monetary, fiscal, and regulatory authorities. Many of these interventions operate by shoring up some component of bank balance sheets. In a crisis, a weakness of bank (or other intermediary) balance sheets carries negative externalities for other parts of the economy or public sector. In the acute, panic, phase of a crisis, concerns about bank solvency can induce short-term creditors to run on the bank, decreasing its ability to sustain its liabilities. The traditional lender-of-last-resort (LOLR) function of central banks is just a direct replacement of such liabilities. If the panic has been driven by some short-term dislocation of markets, then such emergency *lending* may be all that is necessary.

² These four chronologies are Reinhart and Rogoff (2009), Schularick and Taylor (2012), Laeven and Valencia (2020), and Baron, Verner, and Xiong (2021). We discuss our selection of these chronologies later in this introduction, and then provide more details in Section III.

In cases where the government is confident of the ultimate solvency of banks but still concerned about future runs, then a more drastic action would be to extend *guarantees* to liabilities that go beyond any existing deposit insurance. Such guarantees, which work on the same part of the balance sheet as does the LOLR, were widely used during the global financial crisis.

If the bank-solvency concerns are real and lasting, governments may need to take additional actions. Instead of just replacing or guaranteeing liabilities, the government can move down the right-hand-side of the balance sheet and provide equity through *capital injections*, which could reassure depositors of solvency and reduce the incentive to run. Such investments are complex to structure and often lead to political challenges. Nevertheless, their use has increased greatly in the modern era. In some cases, the solvency of the banking system is threatened by the concentration of certain kinds of assets.

The credit booms that precede crises are often focused on specific asset classes and loan types, and banks face a coordination problem in exiting or restructuring them. In those cases, governments often move to the left side of the balance sheet through *asset management* programs, which can solve the coordination problem across many banks or even for a single large one. When banks are clearly insolvent, the government may still have a role to play in the *restructuring* of these failed institutions, effectively reorganizing the full stack of assets, liabilities, and equity. In some cases, that government role is legally prescribed (many countries do not allow banks to go through regular bankruptcy processes), and in other cases the government role is tied up with the provision of deposit insurance.

Each of the categories listed thus far would typically include some outlay or contingent commitment from either the fiscal or monetary authority. But there are other types of interventions that do not have any direct effect on government finance, but instead use government's power to change or suspend *rules* and regulations. Through most of history, bank holidays and more general suspensions of convertibility were a common feature of crisis response. In the modern era, governments often resort to suspensions of regulatory-capital requirements and to market-based changes like short-sale bans in equity markets. Finally, there is a catchall category of *other* interventions that do not fit neatly into the italicized categories above. This group includes, for example, major communications from senior officials, such as President's Roosevelt's first radio address in March 1933, and Mario Draghi's "whatever it takes" speech from 2012.

In total, our seven broad categories of interventions are (1) *lending*, (2) *guarantees*, (3) *capital injections*, (4) *asset management*, (5) *restructuring*, (6) *rules*, and (7) *other*. Note that these categories do not include some of the main macroeconomic policies used in crises, such as fiscal stimulus, currency devaluation, or capital controls. This omission is deliberate and necessary. For our purposes, the defining feature of an intervention is that the government action is taken for the main purpose of stabilizing the financial sector. Importantly, our scope does not include general fiscal- or monetary-policy actions targeted to aid the entire macroeconomy. It is not feasible to catalogue all such actions the same way as we do here for just the financial sector, nor to use any such catalogue to isolate the impact of policy on just that sector.

Several categories of interventions can be structured as open-bank assistance, where the existing financial institution remains in operation following the action. Notwithstanding the labeling of such activities as “assistance”, it would not be accurate to label everything in these categories as a “bailout”. In general, we define a bailout as transferring some expected value from taxpayers to bank stakeholders. Any of these programs can be priced such that they are clearly bailouts, but in many cases the subsidy is unclear and it would not be accurate to use the bailout label. For example, a capital injection where the government receives only a nominal ownership stake, or government purchases of worthless assets from banks would clearly qualify as bailouts. But many cases are less clear: a traditional LOLR that charges a penalty rate, a capital injection in exchange for a significant ownership stake, or a guarantee program that charges high fees – all could have unclear bailout status. Overall, in advanced economies, the public sector will have a comparative advantage at providing financing during a crisis, and that advantage can lead to efficiency gains that can be shared by the private and public sector. Indeed, these possible efficiency gains are the main economic justification for government intervention in a crisis. For this reason, we will avoid the use of the term “bailout” in this paper.

Our paper is most closely related to Laeven and Valencia (2020), one of the four chronologies that constitute the set of canonical crises we use as the starting point for our database construction. Laeven and Valencia cover countries across all income groups and – setting the work apart from similar chronologies – also systematically document crisis interventions associated with a crisis event across seven major intervention categories.³ The differences between our project and theirs

³ Specifically, the authors distinguish between the following interventions categories: (1) deposit freezes; (2) bank holidays; (3) guarantees on bank liabilities; (4) extensive liquidity support; (5) nationalizations; (6) recapitalizations;

is driven mostly by different objectives. The Laeven and Valencia paper fits within a larger project on the patterns of financial crises in the post-Bretton Woods period, of which they study 151 cases in-depth. Our focus in this paper is on the interventions themselves, even when such interventions occur outside of previously identified crisis periods. This approach allows for extensions further back in time and for inclusion of interventions during candidate crises. The current version of our database includes 1886 interventions across 902 crises, of which 494 are canonical crises and 408 are candidate crises.

Other papers to take a comprehensive view of interventions have not attempted to build databases, but rather to survey major events to analyze intervention responses in a more holistic sense. Goodhart and Schoenmaker (1992) is an early example, documenting 104 bank interventions in advanced economies dating from the mid-1970s. Calomiris, Klingebiel, and Laeven (2005) provide a general overview of crisis-resolution strategies with recourse to cross-country empirics, with specific crises-containment patterns also being the focus in De Juan (1999), Honohan and Klingebiel (2001), Detragiache and Ho (2010), and recently Calderon and Schaeck (2016).⁴

While comprehensive treatments of crisis interventions are incomplete, there are many studies of specific subsets of interventions. This literature falls into three groups: (1) studies of multiple types of interventions in a specific single crisis context across different countries;⁵ (2) studies of interventions in a single specific country across different unique banking crises;⁶ and (3) detailed treatments on the effects and empirics of one specific intervention category over space and time (for instance, the effects of bank bailouts).⁷ With the creation of the database described in this

and (7) asset purchases. (1) – (2) are components of our *rules* category, and (5) – (6) components of our *capital injection* category; (3), (4) and (7) have directly corresponding categories in our framework.

⁴ There is also an extensive literature that deals with optimal crises responses from a theoretical perspective – for instance Freixas (1999), Farhi and Tirole (2012) Acharya (2009), or Jeanne and Korinek (2020) – or is primarily concerned with qualitatively ranking optimal crises responses and governance frameworks without recourse to any novel historical datasets – say, as in Beck et al. (2010). Our contribution does not for now seek to directly tie into this strand, or to qualitatively judge the specific historical intervention responses aggregated.

⁵ Bignon, Flandreau, and Ugolini (2011) discuss selected crises responses during the gold-standard period by European fiscal and monetary authorities; Grossman (1994) focuses on cross-country banking sector policies during the Great Depression; Goldstein (1998, chapters 3 and 4) discusses “cures” deployed during the Asian Financial Crisis. More recently, some notable contributions from the extensive GFC literature include Aït-Sahalia et al. (2012), Igan et al. (2019), and Bernanke, Geithner, and Paulson (eds. 2020).

⁶ A large number of historical case studies – far too numerous to credit here extensively – have over time assessed authorities’ banking sector interventions and their role in mitigating or amplifying major national-level bank sector stress episodes.

⁷ Contributions assess the effects and evolution of a specific intervention (sub-) category within our intervention universe, at times with recourse to unique spatial and chronological intervention datasets: for instance,

paper, we hope to greatly reduce the overhead for authors looking to do such investigations in the future.

The rest of the paper proceeds as follows. In Section II, we further divide the seven groups into 20 specific intervention types. In many cases, the subdivision into types is based on whether the intervention was broad-based for a large group of institutions, or narrowly tailored as an *ad hoc* intervention for a single bank. We consider our classification system to be a logical method of organizing and rationalizing interventions as acting on different parts of the balance sheet of the financial system, a method which then allows for an intuitive graphical representation.

In Section III, we discuss the database-construction process. This process has several steps. First, we compile a master list of canonical crises from four major crisis-chronology projects: Reinhart and Rogoff (2009), Schularick and Taylor (2012), Laeven and Valencia (2020), and Baron, Verner, and Xiong (2021).⁸ The union of these four sources includes 494 canonical crises. Next, for each canonical crisis, we consult the sources cited by the original authors, along with an extensive primary and secondary literature. These two steps yield a list of 1187 specific interventions. In some cases, we do not find evidence of any interventions that meet our criteria, or we find evidence that policymakers deliberately abstained from an intervention: such crises are listed as “no intervention” in the database.

The same sources used to identify interventions during canonical crises often have evidence of interventions taken at other times. These additional interventions can show up in the historical records for several possible reasons. In some cases, such interventions may have successfully prevented a major crisis, so that existing crisis chronologies do not have an event at that time. In other cases, such interventions may be trace evidence of a crisis that did occur but was not detected

recapitalizations have received particular attention (Philippon and Schnabl 2013), as have asset-management responses (Klingebiel 2000), blanket guarantees (Laeven and Valencia 2012), or deposit-guarantee policies (Demirguc-Kunt and Detragiache 2002). Similarly, multiple discussions focus more specifically on the binary “bailout or bankruptcy” choice facing policymakers in their crisis response (Rosas 2006; Levitin 2010).

⁸ We further considered additional crisis chronologies including Bordo et al.’s (2001) extensive documentation, whose crises dates are covered, and those of Duca et al. (2017), or Romer and Romer’s (2017) methodologies. In particular, we recognize efforts to qualify existing crisis-dating conventions, for instance via establishing quarterly level crisis metrics, but we were not able to identify annual-level crisis events in any of these which are not covered in any of the four existing databases discussed above, or being otherwise outside the scope of our additional intervention events recorded. Schularick and Taylor (2012), and Baron, Verner, and Xiong (2021) both incorporate the Bordo et al. crisis (2001) chronology, while the Duca et al. (2017) and Romer and Romer (2017) crises chronologies are comparatively concise, focusing on 50 systemic events in the EU+Norway from 1970 (in addition to 43 non-systemic episodes), and semi-annual distress events in 24 OECD countries between 1967-2012, respectively.

by the methods of the canonical papers. One advantage of the intervention-prism used in this process is that it allows for the identification of such candidate crises. This is particularly important in the pre-1800 period, when the previous methods of crisis-detection are unlikely to be comprehensive. But we view the main purpose of our database to identify the interventions themselves, and we leave to later work any conclusive statements about the inclusion of our candidate crises in comprehensive crises lists. This additional step adds an additional 699 interventions, which are grouped temporally and geographically into 408 candidate crises. 112 of these candidate crises (associated with 164 specific interventions) occur before 1800.

Taken together, the current database includes 1886 interventions, spread over 902 total crises. For any *ex post* constructed database, researchers will be interested in exact details of sample selection, both to understand the database itself and to be aware of any possible biases induced by that selection. Perhaps most important is the choice of size threshold for an intervention to be included in the database. A tradeoff is unavoidable here: pick a threshold too high, and many interesting examples will be left out; pick a threshold too low and we will be unable to detect many qualifying interventions in the historical record. Furthermore, since data availability varies by country and over time, and since events in larger countries are more likely to register in the historical record, there are unavoidable sources of bias. Section III discusses the thresholds used for the database.

Section IV analyzes the time-series and cross-sectional patterns of these data. Prior to 1914, about one-third of all interventions were in the *lending* category, with a further one-quarter of all interventions classified as *rules*. In contrast, *rules* changes play a very small role in the 21st century (about six percent of interventions) and *lending* is about 23 percent. Instead, the largest category in these recent years is *capital injections*, with about 27 percent of the total. Indeed, this same time-series pattern is echoed in the cross-section, where we find the use of *capital injections* and *guarantees* to be positively correlated to a country's per-capita income level. Overall, the data show that governments have become more aggressive over time, with interventions being increasingly more likely to fall at the bottom of the balance sheet (equity) instead of the top (collateralized lending), and with authorities also increasingly targeting multiple parts of the balance sheet at once, using multiple categories of interventions during the same crisis.

Section V uses the full database of crises (both canonical and candidate) to calculate the share of advanced economy GDP over time experiencing some form of bank stress in any given year.

The historical pattern reveals stark long-run international trends, but also allows more granular secular associations between specific currency and monetary regimes, and respective levels of bank stress. Notably, the series suggests that the four decades since the 1980s represent only the most recent apex in an entrenched trend towards growing absolute intervention frequencies over multiple centuries.

Section VI provides some provocative but still preliminary results for extensions and applications of the database: Section VI.A examines the pattern of intervention sizes over time. For this analysis, we define intervention “size” as the gross total amount that is deployed by (private or public) authorities in the intervention. Our focus on intervention size is conceptually related – but not always identical – to measures of intervention “costs” used in the previous literature. Emergency lending is typically against good collateral; capital injections often receive significant ownership stakes; and debt-guarantee programs usually charge premiums and the full coverage cited by those programs or rarely used. For these reasons, we think it can be misleading to conflate intervention sizes with costs, and we will use the former term throughout. Thus far, building on the work of past scholars, we have been able to reliably estimate size data for the interventions for about half of the crises in the database. The evidence from this subsample suggests substantial increases in average intervention sizes over the past three centuries: from typical sizes in a range of 2-5% of GDP in affected countries under the pre-classical, classical, and gold-exchange standard regimes, intervention sizes more than quadrupled to levels of 10-14% in the post-Bretton Woods decades – across all categories, including *lending*, *capital injections*, and *guarantees*.

Section VI.B examines the timing and ordering of interventions. For a subset of the canonical crises, Baron, Verner, and Xiong (2021) provide data that allows for more precise timing of associated panics and bank-equity crashes. Using their data, we can construct an intervention timeline for a typical crisis, finding that the average lending intervention occurs in the same month as the associated panics, but that the average observation of other interventions occurs several months after the panic. Interestingly, in crises without panics, we often find an intervention *prior* to any equity crash, while in crises that do have panics, the interventions are concentrated in later months. These simple comparisons suffer from a variety of identification and sample-selection issues and are thus far from conclusive, but the raw results are provocative enough to inspire us to deeper (and ongoing) work.

Section VII concludes the paper with a summary of our results and proposals for future applications. Several appendices supplement the text. Appendix A describes the database-construction process in greater detail, thus allowing other scholars to supplement the database without having to repeat our searches. Appendix B shows how the various data elements are represented in the database, and Appendix C is the database itself, which we intend to update regularly. Appendix D lists all of the primary and secondary sources used for the database construction. Appendix E contains specific country notes, including details on the country-level historical (nominal) GDP and FX data used to calculate intervention sizes, geographic coverage notes, and a discussion of particular intervention cases that might be seen as borderline cases, or open to alternative types of intervention classifications.⁹

II. Intervention Categories

Figure 1 shows the seven major categories, with 20 individual elements. The categories are situated on a stylized balance sheet, which can be thought of as representing either a single institution or the entire financial sector. We discuss the elements of the major categories from left to right in Figure 1, beginning with *asset management* (on the asset side), then *guarantees* and *restructuring* (which operate on both sides of the balance sheet), then *lending* and *capital injections* (liabilities and equity side). The final two categories of *rules* and *other* are outside of this balance-sheet framework.

⁹ These appendices are included as text versions to this working paper. They are also available online, along with spreadsheet versions of the database at [Program on Financial Stability | Yale School of Management](#).

Figure 1: overview of major intervention categories and subcategories used (the balance sheet view).

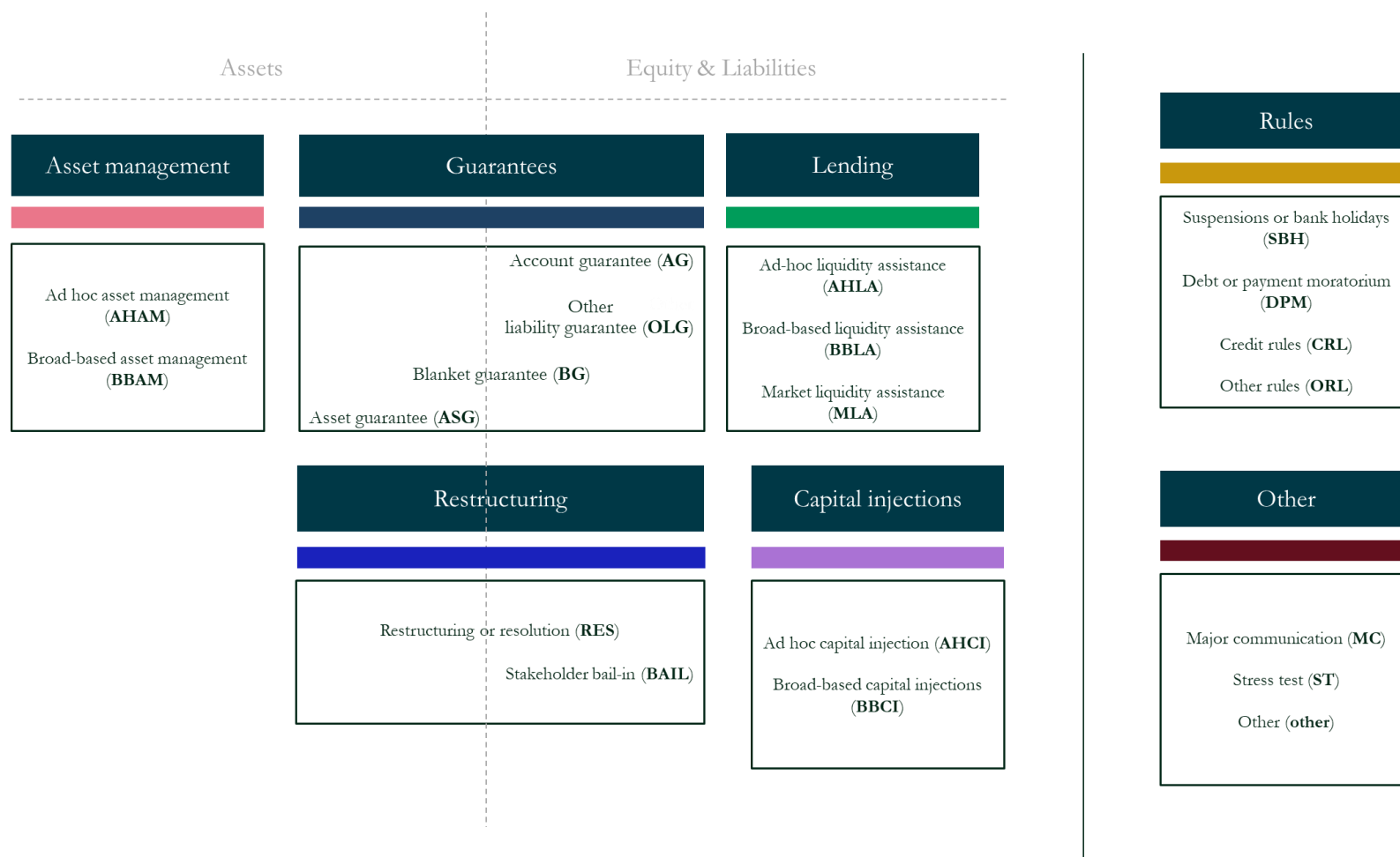


Figure 1 displays the seven major intervention categories (separate boxes) and sub-categories associated with each major category (items within boxes), with items located on a stylized balance sheet for the financial sector. The category and sub-category labeling follow the definitions and descriptions detailed in Section II of the paper.

Asset Management:

- Broad-based asset management program (BBAM): authorities intervene by partially or fully transferring balance-sheet assets of several institutions or of a major share of the entire financial sector, either to a designated asset management vehicle (AMCs), or to another public or private financial institution. Includes the presentation of plans, or statements of intent by authorities, or the mere enabling of such transfers.
- Ad hoc asset management program (AHAM): authorities intervene by partially or fully transferring balance sheet assets at one financial institution or of a minor overall share of the entire financial sector, either to a designated asset management vehicle (AMCs), or to another public or private financial institution. Includes the presentation of plans, or statements of intent by authorities, or the mere enabling of such a transfer.

Guarantees:

- Account guarantees (AG): authorities intervene by adding new deposit insurance or extending an existing deposit insurance program in a material way.
- Other liability guarantees (OLG): authorities intervene to guarantee existing, future or a combination of existing and future bank liabilities of a single or of multiple financial institutions not related to deposit liabilities.
- Asset guarantees (ASG): authorities intervene by guaranteeing certain items on the asset side of the balance sheet.
- Blanket guarantees (BG): authorities intervene by guaranteeing multiple items on the balance sheet of one or multiple financial institutions, spanning asset and liability components.

Restructuring:

- Restructuring or resolution (RES): authorities intervene by mandating a restructuring, resolution or liquidation process of one or more impaired financial institutions. Such a process does not have to be led operationally by any public authority, and can be undertaken on the operational level fully by the private sector, at the instigation of authorities, or merely involving suasion by authorities. Such restructuring often operates on both sides of the balance sheet.

- Stakeholder bail-in (BAIL): authorities intervene by forcing bondholders or other stakeholders to assume expected or already materialized losses, or forego privileges associated with ownership of a particular asset on the balance sheet of one or multiple affected banks. Historically, this category in also regularly involves cases where authorities decide to seize personal assets and property of bank owners to meet existing liabilities. With very few exceptions, the overwhelming majority of cases in this subcategory are also associated with an additional flag to indicate private-sector participation. In their modern form, “bail-in” interventions such as the March 1990 forced deposit conversion in Brazil (“Collor Plan”, see Crabtree 1991, 180), or the Cypriot equivalent in 2013 – when authorities decided to involve uninsured depositors and bondholders at the Bank of Cyprus’ resolution process (IMF 2014) – are typical examples of this type.

Lending:

- Broad-based liquidity assistance (BBLA): authorities intervene to provide liquidity to the affected institution(s), via the use of fiscal or monetary channels, providing such assistance either to the entire or a major section of the banking sector. We exclude actions that merely ease financial conditions in the most general sense – such as monetary policy rate reductions – but do include instances where monetary authorities consciously meet a sharp rise in private-sector liquidity demand, for instance by fully discounting eligible paper in the context of a rise in market uncertainty. Historically, on the monetary side these actions are often officially phrased as “discounting freely” or “lending freely” in times of stress, with little or no discretion towards the borrower. We also include changes in the accepted collateral at the discount window of central banks in this category, to the extent that these changes are enacted against the backdrop of financial-sector instabilities. Note, however, that this category does not include changes to reserve requirements – such actions fall into the *rules* group, as described below.
- Ad hoc liquidity assistance (AHLA): authorities intervene to provide liquidity to the affected institution(s), via the use of fiscal or monetary channels, but without providing such assistance indiscriminately to the entire or major portions of the banking sector.
- Market liquidity assistance (MLA): authorities intervene with a key motivation to stabilize liquidity in a specific wholesale-funding market that is under stress. MLAs focus on

markets that a central bank believes are critical to financial stability. In common with traditional interventions, MLAs may rely on individual institutions as intermediaries or market-makers to pass on liquidity.

Capital Injections:

- Broad-based capital injections (BBCI): authorities intervene by directly assuming ownership interest in multiple institutions, either via equity or debt purchases of affected institutional assets. Includes the presentation of plans, or statements of intent by authorities to undertake such purchases or assumptions of ownership interests – and includes policy actions that would enable an eventual assumption of such interests, even if actual purchases do not eventually take place.
- Ad hoc capital injections (AHCI): authorities intervene by directly assuming ownership interest in a single institution, or in a clear minority group of total institutions comprising a subset of the banking or wider financial system.

Rules:

- Stock market closures, bank holidays, or suspensions of convertibility (SBH): authorities intervene by announcing a stock market closure (either temporary or open-ended), authorizing a suspension of payment convertibility at individual institutions or the entire banking sector; or proceed to implement a general suspension of convertibility on the level of the central bank, if undertaken against the backdrop of banking sector volatility. We do not include general suspensions that occur primarily to safeguard against capital flight or a currency attack, to the extent that these motivations are clearly identifiable.
- Debt or other payment moratoria (DPM): authorities intervene by implementing either a partial or general moratorium on debt-service obligations at least partly involving creditors in the banking sector, against the backdrop of distinct banking-sector volatility. Moratoria that are primarily associated with broader political or macroeconomic problems, and not distinctly justified by banking sector volatility are not covered in this category.
- Relaxation of capital rules (CRL): authorities intervene by relaxing existing capital requirement or accounting rules, or other rules that would improve the outlook of the future capital adequacy of institutions in the banking sector, and are not covered in the other *rules*

sub-categories. Changes in accepted collateral at the discount windows of central banks are not captured in this category – they are to be found under broad-based lending (BBLA), above.

- Other rules (ORL): authorities intervene by amending legal arrangements affecting the banking or financial industry that do not fall into one of the other “rules” sub-categories specified above.

Other:

- Stress testing (ST): authorities intervene by mandating a detailed investigation of the sustainability or robustness of one or multiple banking institutions. We record the date that the results of such an exercise are publicly made known, if such information is available.
- Major communication event (MC): we use this category to denote instances where authorities have made a significant public announcement with regards to the banking or wider financial sector which induced significant changes in market expectations or the de facto assessment of the health or profitability of the banking or financial sector. Famous examples here are FDR’s “fireside chat” on the banking crisis in March 1933, and the July 2012 speech by ECB President Mario Draghi to do “whatever it takes” to save the Eurozone.
- Other intervention type (Other): authorities intervene to alleviate an existing or an anticipated stress event in the banking or wider financial system with a policy tool that does not fall under any of the aforementioned categories. We include instances in this category where authorities set up central banks, either by founding an entirely new monetary institution, or by assuming ownership of a formerly private institution with no such previous public mandate – examples are the establishments of the Danish Rigsbank in 1813, or the Turkish Central Bank in 1930 amid respective banking crises (Suvla 1933; Maercher 2010).

Finally, there are crises in the combined database that do not appear to have any associated interventions. When that occurs, we designate the intervention as a **NOI** (“no intervention”) in the single row representing that crisis in the database. This notation appears when either we cannot find any relevant intervention measure for a confirmed canonical crisis instance, or in all cases

where our minimum event criteria for a candidate crisis are matched with regards to an institutions' total liabilities – but where we do find evidence of a deliberate abstention by policymakers from an intervention.

We record interventions according to the above classifications even if authorities undertake actions that merely *enable* a particular type of intervention – even if de facto such a policy action does not eventually materialize. For instance, if political authorities approve the establishment of an asset management company (AMC) to purchase impaired banking assets – but subsequently this AMC does not actually proceed to transfer meaningful amounts of banking system assets, we would still designate the policy action as a “BBAM”.

III. Database Construction

This section describes the construction of the database. We begin with a core set of canonical crises, built from the union of the databases constructed by Reinhart and Rogoff (2009) (R/R), Schularick and Taylor (2012) (S/T), Laeven and Valencia (2020) (L/V), and Baron, Verner, and Xiong (2021) (B/V/X). Section A discusses the crisis definitions used in those papers and illustrates their various unions and intersections. Section B describes the rules and thresholds we use to go from the list of canonical crises to our database of interventions related to those crises. That data gathering process also yields a set of interventions that are not associated with an existing canonical crisis; that set is used to build a supplementary list of candidate crises.

A. Canonical Crises

We combine four of the most widely used chronologies to construct our sample of canonical crises. We are aware of the multiple subsequent database updates that individual authors provided in non-published form, but limit our following data and discussion strictly to the published lists:¹⁰

¹⁰ Such subsequent updates concern recurrent online updates of the “JST” database in S/T’s case, and in R/R’s case updates recorded via the BFFS database, see <https://www.hbs.edu/behavioral-finance-and-financial-stability/data/Pages/global.aspx>. For a general discussion on trends and findings associated with banking crises chronologies over the past years, see Bordo and Meissner (2016).

(1) L/V: Laeven and Valencia (2020) cover a total of 165 countries over the period of 1976-2016, identifying a total of 151 systemic banking crises, for which the crisis start year is provided. The authors define a systemic banking crisis if one of two conditions hold:

- (i) “Significant signs of financial distress in the banking system (as indicated by significant bank runs, losses in the banking system, and/or bank liquidations).”
- (ii) “Significant banking policy intervention measures in response to significant losses in the banking system.”

As per the second crisis definition, the authors are unique across the included chronologies in investigating systematically the policy responses associated with bank stress events since 1976, and rely on a mixture of qualitative and quantitative measures to define a “significant” policy intervention: to measure intervention sizes, the authors calculate direct intervention “costs” associated with each crisis across fiscal and liquidity measures, though technically a policy intervention can be deemed “significant” on purely qualitative grounds in the framework.¹¹ General intervention patterns are then studied in more detail, across seven intervention groups. We discuss the authors’ specific approach to cost calculations in more detail in Section VI.A.

(2) R/R: Reinhart and Rogoff (2009) cover a total of 70 countries over the period of 1800-2008, identifying a total of 332 systemic banking crises (start years). A systemic banking crisis is identified if one of two conditions are given:

- (i) “bank runs that lead to the closure, merging, or takeover by the public sector of one or more financial institutions or
- (ii) if there are no runs, the closure, merging, takeover, or large-scale government assistance of an important financial institution (or group of institutions), that marks the start of a string of similar outcomes for other financial institutions.”

¹¹ The authors do not strictly quantify a “significant” bank nationalization, define any minimum levels for “bank holidays” or “deposit freezes”, or “significant” guarantees that can be deployed: if a bank stress event is associated with policy responses across these three sub-dimensions, it can be deemed “systemic” (c.f. *ibid.*, 310).

R/R are unique for their extensive temporal sample, beginning observations in the early 19th century. They were also the first across our four chronologies to provide a long-run banking-crisis exercise. Against this backdrop, we use R/R as our default chronology wherever databases differ in their exact dating of a shared banking crisis: our crisis designation in such cases always follows the R/R start year, and additional crises start years in other databases that fall within a crisis *period* in R/R are discarded to avoid double-counting

(3) S/T: Schularick and Taylor (2012) cover a total of 14 countries over the period of 1870-2016. As in previous approaches, the authors narratively identify banking crises, focusing on advanced economies. A total of 67 crises are identified – with no specific focus on their resolution or policy responses – and the authors provide the following crisis definition:

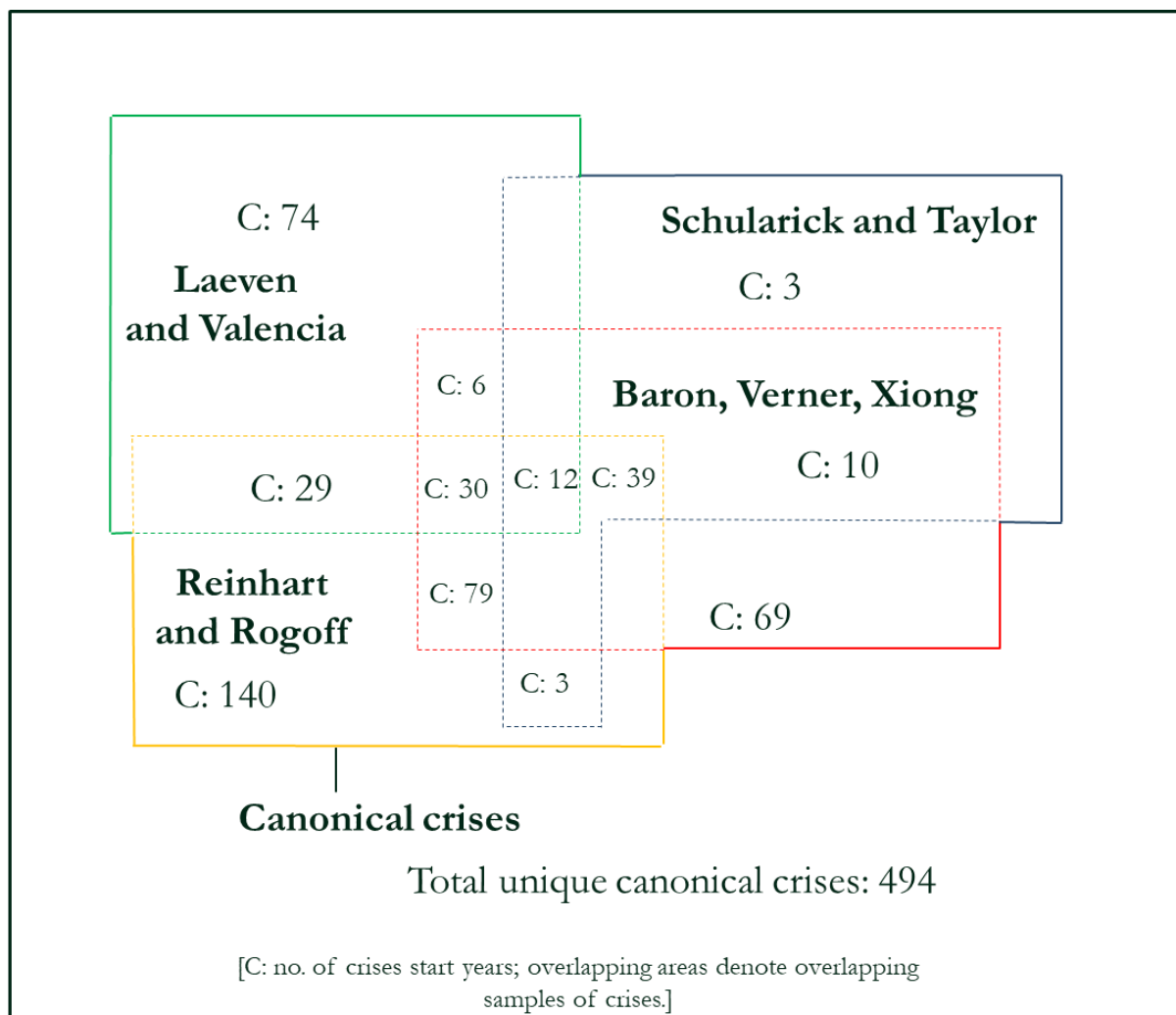
“In line with the previous studies, we define financial crises as events during which a country’s banking sector experiences bank runs, sharp increases in default rates accompanied by large losses of capital that result in public intervention, bankruptcy, or forced merger of financial institutions. We have corroborated the crisis histories from Bordo et al. (2001) and Reinhart and Rogoff (2009) with alternative codings found in the databases compiled by Laeven and Valencia (2008), as well the evidence described in Cecchetti, Kohler, and Upper (2009).”

(4) B/V/X: Baron, Verner, and Xiong (2021) cover a total of 46 countries over the period of 1870-2016. The authors differ from earlier chronologies by systematically using bank-equity return data to identify crises, with quantitative thresholds in a bank-equity return variable as the key criterion. We include all events the authors here identify as crises. Their methodology yields a sample of 215 bank “equity crashes” (start years), 69 of which represent crises that do not appear in the other canonical papers. The authors are not systematically collecting crises resolution and define a banking sector “crash” as follows (ibid., 55):

“We define a “bank equity crash” as an annual bank equity decline of over 30%. We separate these bank equity crashes into panic versus non-panic episodes based on a systematic reading of the

narrative evidence for each of these episodes. We define panics as episodes of severe and sudden withdrawals of funding by bank creditors from a significant part of the banking system, which could include withdrawals of funding from insolvent banks or illiquid but fundamentally solvent banks.”

Figure 2: Existing “canonical” crises chronologies and crises distribution.



“C”: number of individual crisis start years; overlapping areas (dashed borders) denote crises and associated interventions identical in the respective canonical chronology covered by the particular area. Figures outside dashed areas represent crises unique to a particular chronology. “Baron, Verner, Xiong” denotes Baron, Verner, and Xiong (2021), “L/V” denotes Laeven and Valencia (2020), “Reinhart and Rogoff” denotes Reinhart and Rogoff (2009), and “Schularick and Taylor” denotes Schularick and Taylor (2012).

Figure 2 displays the universe of the 494 canonical crises, built from the union of these four crises chronologies. We observe that despite the methodological differences in the identification processes, a non-trivial overlap of banking crises exists across all chronologies.

B. Cataloguing Interventions and Candidate Crises

We begin the search for interventions with the bibliography in R/R. Often, the same references that previously served as evidence for R/R to identify a banking crisis also elaborate on the wider circumstances of the event, and detail particular policy responses. Through this channel, we were able to utilize works such as Symes Scutt's (1904) *The History of the Bank of Bengal*, Charles Conant's (1915) *A History of Modern Banks of Issue*, or Caprio and Klingebiel's (2002) well-known compilations.

In many instances, however, the existing banking-crises references are silent on the exact policy response: it is evident that some intervention took place, but we do not have the necessary details for our database. In these cases, we turn next to IMF or World Bank country reports, which are helpful for the post-1970 intervention documentation. For some crises, particularly those before 1970, it is necessary to consult primary sources, often in the language of the crisis country. Appendix A describes our systematic search of those sources, and Appendix D provides a full bibliography.

A plethora of potential interventions emerges from a comprehensive historical search. Yet, a significant share of these interventions may not be of sufficient size when measured in terms of fiscal or monetary outlays or balance sheet size involved; and for obvious reasons, the further one attempts to go back in time, the harder it would be to aim for a certain degree of comprehensiveness if only the loosest selection criteria apply.

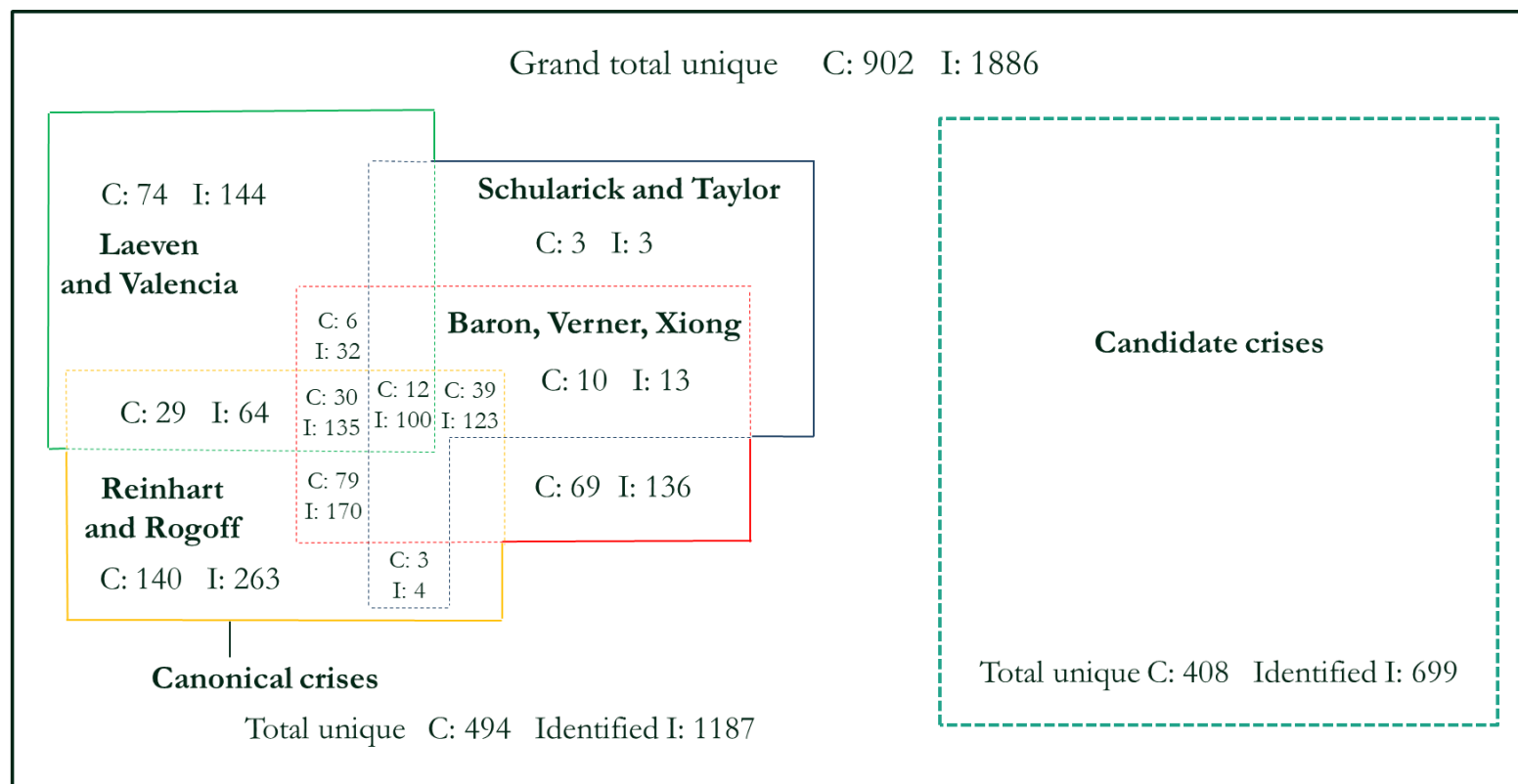
While we do not restrict our analysis just to interventions during the canonical crises, we do have time-varying size thresholds for inclusion outside of such crises. These thresholds are necessarily arbitrary and are driven mostly by our judgement about the size of intervention likely to appear in our sources, thus giving us the best chance at comprehensiveness above those thresholds.

Specifically, we include an intervention outside of canonical crises if we have reason to believe that the gross fiscal or monetary volume, or the total liability volume, associated with the intervention is

- At least 5,000 Florentine florins in the case of all pre-1800 events, or at least 1,000 British Pounds deployed, or respective exchange rate equivalents;¹²
- From 1800-1914, at least either 50,000 British Pounds, or 50,000 U.S. Dollars (using the foreign exchange equivalent based on current exchange values);
- During 1915-1945, for advanced economies at least either 5M British Pounds, or 5M U.S. Dollars in total bank liabilities involved or in gross fiscal or monetary outlays deployed; and for emerging economies at least either 1M British Pounds or 1M U.S. Dollars for the respective intervention or total liability volumes involved.
- And from 1946-, for advanced economies at least either 50M British Pounds, or 50M U.S. Dollars in total bank liabilities involved, or in (gross) fiscal or monetary outlays deployed; and for emerging economies at least either 30M British Pounds or 30M U.S. Dollars for the respective intervention or total liability volumes involved.

¹² One of our main long-run FX (and respective gold content) sources are Karaman, Pamuk, and Yildirim-Karaman (2020). For full details on FX bases, see the country notes in Appendix E below.

Figure 3: composition of full intervention database, and breakdown of “canonical” and “candidate” crises.



C=No. of crisis country years (start year); I=No. of interventions identified for respective crises years. Canonical crises only record “unique” crises, excluding all double-counting.

“C”: number of individual crisis start years; “I”: number of interventions associated with all crises; overlapping areas (dashed borders) denote crises and associated interventions identical in the respective canonical chronology covered by the particular area. Figures outside dashed areas represent crises and interventions unique to a particular chronology. “Baron, Verner, Xiong” denotes Baron, Verner, and Xiong (2021), “L/V” denotes Laeven and Valencia (2020), “Reinhart and Rogoff” denotes Reinhart and Rogoff (2009), and “Schularick and Taylor” denotes Schularick and Taylor (2012).

Figure 3 illustrates the final composition of the database, which includes a total of 1886 interventions. The left side of Figure 3 shows the distribution of 1187 total interventions for the 494 canonical crises. As in Figure 2, the data is displayed in a Venn diagram showing the interventions corresponding to crises from each of the component databases. The right side of Figure 3 represents the interventions identified outside of the canonical-crisis periods. These 699 interventions are spread over 408 candidate crises. As we stated earlier, we are *not* claiming that these candidate crises should necessarily be classified as “banking crises” under the definitions used by earlier studies. Rather, we claim only that these candidates are worthy of further investigation, most importantly because they may represent periods of bank stress where interventions played a role in preventing a crisis. Furthermore, we do not claim to have uncovered all interventions or candidate crises; hence, the largest rectangle in the figure also includes open space to be filled by future discoveries.

IV. Summary Statistics

In this section, we discuss aggregate intervention statistics and long-run crises intervention and size trends derived from the full database. Table 1 displays the distribution of the 1886 interventions. The table shows that *lending* interventions – in the form of ad hoc, broad-based, or market-based liquidity assistance – have been the most common group, with 540 cases accounting for 28.6% of the total. In order, the remaining groups are *guarantees* (311 for 16.5%), *capital injections* (285 for 15.0%), *rules* (267 for 14.2%), *restructuring* (236 for 12.5%), *asset management* (81 for 4.3%), and *other* (48 for 2.6%).

Table 1: Intervention types: absolute number of occurrences, 1257-2019, and distribution.

<i>Intervention distribution by period</i>								
<i>share of all interventions (n)</i>	Pre-1800	1800-1869	1870-1913	1914-1945	1946-1971	1972-1999	2000-2019	<i>Total</i>
<u>LENDING</u>	<u>2.6 (49)</u>	<u>4.3 (81)</u>	<u>4.5 (81)</u>	<u>6.4 (120)</u>	<u>0.1 (12)</u>	<u>6.1 (115)</u>	<u>4.6 (82)</u>	<u>28.6 (540)</u>
AHLA	1.8 (34)	2.7 (49)	1.9 (36)	3.4 (62)	0.0 (2)	2.6 (50)	1.5 (27)	13.8 (260)
BBLA	0.7 (14)	1.4 (25)	2.0 (38)	2.8 (55)	0.1 (10)	3.3 (62)	2.3 (41)	13.0 (245)
MLA	0.1 (1)	0.3 (7)	0.4 (7)	0.2 (3)	0.0 (0)	0.1 (3)	0.8 (14)	1.9 (35)
<u>CAPITAL INJECTIONS</u>	<u>0.3 (6)</u>	<u>0.3 (5)</u>	<u>0.5 (9)</u>	<u>2.2 (36)</u>	<u>0.1 (9)</u>	<u>6.2 (119)</u>	<u>5.4 (101)</u>	<u>15.0 (285)</u>
AHCI	0.3 (6)	0.3 (5)	0.4 (7)	1.6 (28)	0.0 (2)	3.4 (67)	3.4 (64)	9.4 (179)
BBCI	0.0 (0)	0.0 (0)	0.1 (2)	0.5 (8)	0.1 (7)	2.8 (52)	2.0 (37)	5.6 (106)
<u>GUARANTEES</u>	<u>1.4 (27)</u>	<u>1.0 (16)</u>	<u>1.7 (30)</u>	<u>2.9 (51)</u>	<u>0.0 (2)</u>	<u>3.7 (88)</u>	<u>5.1 (97)</u>	<u>16.5 (311)</u>
AG	1.0 (17)	0.2 (4)	0.7 (13)	1.0 (18)	0.0 (2)	2.2 (46)	1.6 (30)	6.9 (130)
ASG	0.1 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	1.0 (12)	0.8 (16)	1.5 (29)
BG	0.1 (1)	0.1 (2)	0.2 (4)	0.3 (5)	0.0 (0)	1.0 (12)	0.2 (4)	1.5 (28)
OLG	0.5 (8)	0.6 (10)	0.7 (13)	1.6 (28)	0.0 (0)	1.0 (18)	2.4 (47)	6.9 (124)
<u>RULES</u>	<u>2.7 (49)</u>	<u>2.8 (49)</u>	<u>2.0 (38)</u>	<u>3.3 (59)</u>	<u>0.1 (8)</u>	<u>2.2 (41)</u>	<u>1.1 (23)</u>	<u>14.2 (267)</u>
DPM	1.0 (18)	0.2 (4)	0.3 (5)	0.8 (15)	0.0 (1)	0.3 (6)	0.0 (0)	2.6 (49)
SBH	1.2 (22)	1.5 (28)	0.8 (16)	1.7 (33)	0.1 (5)	0.8 (14)	0.3 (5)	6.5 (123)
CRL	0.1 (1)	0.2 (3)	0.0 (1)	0.0 (1)	0.0 (0)	0.1 (4)	0.6 (10)	1.1 (20)
ORL	0.5 (8)	0.7 (14)	0.8 (16)	0.6 (10)	0.0 (2)	1.0 (17)	0.3 (8)	4.0 (75)
<u>RESTRUCTURING</u>	<u>1.1 (21)</u>	<u>1.3 (25)</u>	<u>0.7 (12)</u>	<u>1.5 (30)</u>	<u>0.1 (6)</u>	<u>5.3 (106)</u>	<u>1.7 (36)</u>	<u>12.5 (236)</u>
RES	0.6 (12)	0.8 (16)	0.6 (11)	1.5 (29)	0.1 (6)	4.9 (97)	1.0 (18)	10.0 (189)
BAIL	0.5 (9)	0.5 (9)	0.0 (1)	0.0 (1)	0.0 (0)	0.5 (9)	1.0 (18)	2.5 (47)
<u>ASSET MANAGEMENT</u>	<u>0.0 (2)</u>	<u>0.0 (0)</u>	<u>0.2 (3)</u>	<u>0.2 (13)</u>	<u>0.0 (0)</u>	<u>2.2 (39)</u>	<u>1.3 (24)</u>	<u>4.3 (81)</u>
AHAM	0.0 (0)	0.0 (0)	0.0 (0)	0.1 (2)	0.0 (0)	0.2 (5)	0.5 (8)	0.8 (15)
BBAM	0.0 (2)	0.0 (0)	0.2 (3)	0.1 (11)	0.0 (0)	2.0 (34)	0.9 (16)	3.5 (66)
<u>OTHER</u>	<u>0.6 (10)</u>	<u>0.1 (4)</u>	<u>0.5 (9)</u>	<u>0.3 (7)</u>	<u>0.0 (2)</u>	<u>0.5 (9)</u>	<u>0.2 (7)</u>	<u>2.6 (48)</u>
MC	0.0 (1)	0.0 (0)	0.0 (0)	0.0 (1)	0.0 (1)	0.0 (0)	0.1 (2)	0.2 (5)
ST	0.0 (0)	0.1 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (2)	0.0 (1)	0.2 (4)
OTHER	0.5 (9)	0.1 (3)	0.5 (9)	0.3 (6)	0.0 (1)	0.4 (7)	0.1 (4)	2.1 (39)
<u>NO/I</u>	<u>0.2 (3)</u>	<u>0.7 (13)</u>	<u>1.9 (28)</u>	<u>1.4 (21)</u>	<u>0.0 (0)</u>	<u>2.2 (46)</u>	<u>0.1 (7)</u>	<u>6.3 (118)</u>
<i>total</i>	8.9 (167)	10.2 (193)	11.3 (210)	18.0 (337)	2.1 (39)	29.7 (563)	19.8 (377)	100.0 (1886)

Figures in brackets measure absolute number of interventions, outside of brackets share as percentage of all-time total interventions. Intervention tags correspond to subgroups (see Figure 1 and discussion in Section II): AHLA – ad hoc liquidity assistance; BBLA – broad-based liquidity assistance; MLA – market liquidity assistance; BBCI – broad-based capital injection; AHCI – ad hoc capital injection; AG – account guarantee; ASG – asset guarantee; BG – blanket guarantee; OLG – other liability guarantee; DPM – debt or payments moratorium; SBH – bank suspension or bank holiday; CRL – credit rules; ORL – other rules; RES – restructuring or resolution; BAIL – stakeholder bail-in; BBAM – broad-based asset management; AHAM – ad hoc asset management; ST – stress test; MC – major communication; OTHER – other intervention; NO/I – no intervention (not included in total).

The table shows a clear shift in the pattern of interventions over time. Prior to 1945, the two largest categories were *rules* and *lending*, which combined for more than 50% of all interventions in every subperiod. Since 1945, both of these categories have had lower shares of the total, and in the last 50 years they comprise less than 30% of all interventions. During this same period, there has been a marked shift towards *capital injections*, which has been the largest category since 1972 and comprises 26.8% of all interventions since 2000. This occurred amid a parallel recovery of *guarantees* intervention measures, which over the past two decades have once more become more important than *lending* or *other* categories (re-claiming a prominence last recorded only in the pre-1750 era).

We next turn to a crisis-level prism on the database. Table 2 summarizes the long-term trends in the number of interventions per crisis, and how various types of combinations have been combined to fight individual crises.

Table 2: Intervention combinations, and total interventions per crisis, 1257-2019.

<i>Intervention combinations by crises and period</i>							
<i>Share of crises responses (no. of crises)</i>	Pre-1800	1800-1869	1870-1913	1914-1945	1946-1971	1972-1999	2000-2019
<i>LENDING + CAPITAL INJ.</i>	0 (0)	1.9 (3)	3.3 (4)	12.9 (21)	2.6 (7)	15.4 (37)	18.5 (24)
<i>LENDING+ CAPITAL INJ. + GUARANTEES</i>	0 (0)	3.0 (3)	0.8 (1)	4.9 (8)	3.9 (1)	6.9 (17)	12.3 (16)
<i>RULES + RESTRUCTURING</i>	4.6 (4)	6.9 (7)	1.6 (2)	2.5 (4)	3.9 (1)	2.9 (7)	2.3 (3)
Single item responses	37.3 (41)	56.4 (57)	47.5 (58)	42.9 (70)	3.1 (12)	40.7 (100)	50.8 (66)
Avg. interventions per crisis	1.27	1.83	1.70	1.94	1.52	2.05	2.60

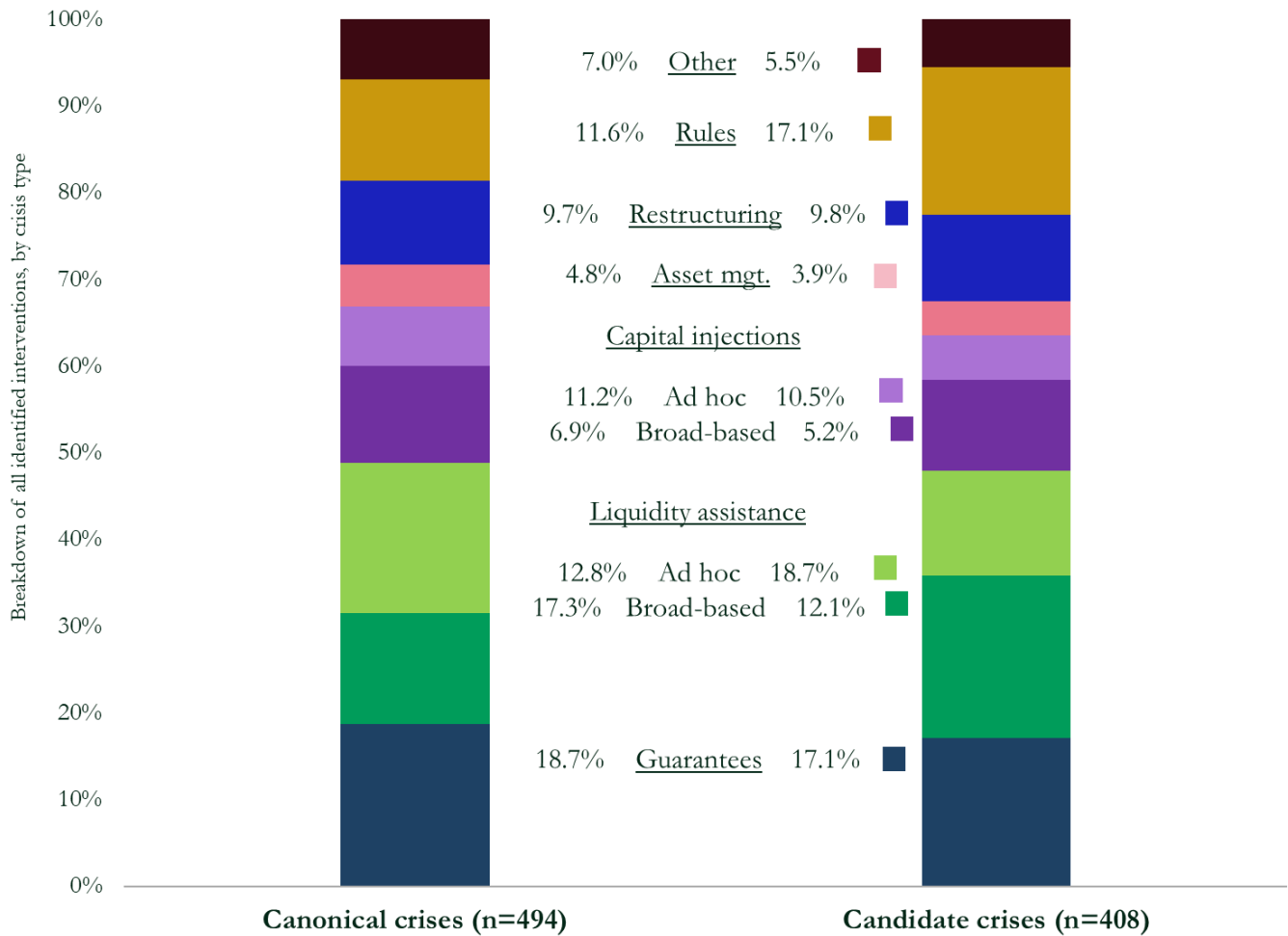
Table 2 displays the share of respective intervention combinations experienced in crises as percentage of total number of identified crises during historical period. Combinations can involve all items from subcategory. Figures in brackets record absolute numbers. Bottom row figures in absolute numbers of interventions per crisis.

We note first the increase in the number of interventions per crisis: after 2000 the average number of separate policy interventions per banking crisis stands at 2.6 – a figure that more than doubled over levels measured in the 18th and 19th centuries. This increased response is not just driven by multiple interventions of the same type, but rather by a combination of interventions from different categories. The first row tabulates intervention combinations that feature both *lending* and *capital injections* at the same time. The next row shows combinations that feature all three categories of *lending*, *capital injections* and *guarantees* interventions during the same crisis. These combinations of open-bank assistance programs rise in frequency over time, and most recently account for almost one-fifth of all crisis-level policy responses. Conversely, we observe that intervention combinations of *restructuring* with *rules*, more likely a reactive or stalling tactic, are receding secularly in importance, with their share peaking in the 19th century. Taken together, this evidence shows that governments have grown more pro-active over time, with more interventions, often in combination and lower on the balance sheet.

Continuing with the crisis-level prism, Figure 4 compares intervention patterns between canonical and candidate crises.

At a high level, the response patterns look similar across these two types of crises. The big picture here is that government policy during candidate crisis appears to be *economically* similar to policies during canonical crises. There are some statistical differences that appear in the regression results, shown in Table 3 and discussed below. But these differences remain economically small.

Figure 4: Intervention policy mix, by crisis type, 1257 – 2019.



“Canonical” and “candidate” crises sample as defined above (Section III.A), with only unique “canonical” crises counted. All income levels and intervention sizes included. Intervention categories defined as per Section II. Interventions unweighted by intervention size.

Figure 5 compares the pattern of responses as a function of per-capita GDP for the crisis country, displaying a comparison between countries with a per capital real GDP of <8,000 USD (2011 GKD basis), and those >30,000 USD.¹³ Since the crises cover many centuries of history,

¹³ Real p.c. GDP series are mainly sourced from Bolt and van Zanden (2020), and authors therein. We thank Ulrich Pfister for sharing his latest German GDP compilations, on which we rely via Pfister (2021), and thank Leonardo Ridolfi for providing context to his most recent French data (Nuvolari and Ridolfi 2020). Note that the source basis

the split by income combines cross-sectional and time-series variation, allowing us to illustrate the key relationship in just the two dimensions of the figure.

Figure 5: Intervention policy mix by per real capita GDP level, 1257 – 2019.



Number in brackets (n) denotes total number of interventions associated with particular real GDP per capita group. For full notes on historical real GDP data used, refer to text above and country notes in Appendix E. Overwhelmingly, real per capita series on the basis of the latest Maddison Project estimates are used, and all underlying authors therein: real per capita levels are benchmarked to 2011 USD levels; readers should consult the full documentation and notes in Bolt and van Zanden (2020), and associated online spreadsheets via: [Maddison Project 2020 release](#). We use Pfister's (2021) data for Germany, which is benchmarked to 1990 USD levels. Note that real p.c. sample has different source basis from our GDP sample detailed in Appendix E. Further details on historical GDP bases and calculations there.

for this exercise differs in multiple ways from the calculation of intervention size / GDP figures further below, for which we utilize aggregate NGDP series.

Here, a visual inspection shows clear differences. Across all major intervention groups, a country's policy mix is linked to its income level. First, lower-income countries have a higher probability of “no intervention” (7.9% vs. 1.4%). Furthermore, lower-income countries have a higher fraction of *lending* (by a factor of 1.5) and *rules* interventions (by a factor of 4). In contrast, higher-income countries favor *guarantees* and *capital injections*.

We confirm these visual impressions with logit regressions of (the presence of an) intervention type on per-capita income and a dummy variable for candidate-crisis status. Since the data series for canonical crises begins in 1800, we also use that cutoff for all data in the regressions. Each row gives the results for a different dependent variable. In each specification, the dependent variable is set equal to one if the specific intervention type was used in a crisis, and zero otherwise.

Table 3 summarizes the results and (mostly) confirms the visual impressions from the preceding figures; as countries get richer, there is a stronger likelihood that any given crisis will have interventions in *capital injections*, *guarantees*, and *asset management*, and a lower likelihood of “no intervention” at all. The coefficients on the candidate-crisis dummy suggest a lower likelihood of *capital injections* and *asset management* – relationships that were not apparent in the intervention-level bivariate data of Figure 4.

At first glance, the most surprising result appears to be the significant negative coefficient on the candidate-crisis dummy in the “no intervention” (NO/I) regression. This result would seem to suggest that governments are more likely to intervene in candidate crises, and that perhaps such interventions are the reason why such crises do not progress to canonical status. Alas, this result is not an endorsement for activist policy, but rather an artifact of our database-creation methods. Since we use the existence of interventions in the historical record as the defining feature of a candidate crisis, we have very few “no intervention” examples for that group. (There are a small number of examples where the historical record shows evidence that an intervention was seriously considered but rejected. We include those as candidate crises with a “NO/I” label. But this is rare.) We highlight this potentially misleading result as a reminder of the challenge of drawing any strong conclusions from such an ex-post constructed sample. Ideally, we would study the efficacy of activist policy using the full universe of scenarios, or at least a random sample. But we don't have that here. What we do have – new for this literature – is at least *some* of the cases that did not progress to a canonical crisis. We think the best way to proceed from here is to study these examples very carefully, and to search for more of them.

Table 3: Regression results for Figures 4 and 5.

<i>Regression results</i>			
<i>Intervention type</i>	Intercept	Income (in \$ 10,000)	candidate
<i>NO/I</i>	-1.03 *** (0.16)	-5.31 ** (1.65)	-2.34 *** (0.43)
<i>GUARANTEES</i>	-1.46 *** (0.13)	5.32 *** (0.75)	-0.35 (0.19)
<i>LENDING</i>	0.06 (0.11)	-0.12 (0.63)	-0.01 (0.15)
<i>CAPITAL INJECTIONS</i>	-1.40 *** (0.13)	5.42 *** (0.76)	-0.44 * (0.19)
<i>RESTRUCTURING</i>	-1.26 *** (0.16)	1.16 (0.69)	-0.13 (0.18)
<i>ASSET MANAGEMENT</i>	-2.50 *** 0.19	3.86 *** 0.82	-0.70 * 0.30
<i>RULES</i>	-0.84 *** (0.14)	-4.28 *** (1.15)	-0.20 (0.19)
<i>Ad hoc liquidity assistance</i>	-1.04 *** (0.13)	-0.87 (0.77)	0.21 (0.17)
<i>Broad-based liquidity assistance</i>	-0.90 *** (0.12)	1.13 (0.66)	-0.47 ** (0.18)

Table 3 displays logistic regressions, coefficient estimates (with standard errors) post-1800 data. ***p<0.001; **p<0.01; *p<0.05. Each row represents a single regression, with the dependent variable given in the first column. The intervention categories in the first column follow our definitions introduced in Section II above, with “ad hoc liquidity assistance” and “broad-based liquidity assistance” representing sub-categories from the *lending* major category. “Income” and “Candidate” columns column gives the coefficients and standard errors for real GDP per capita and the candidate dummy, respectively.

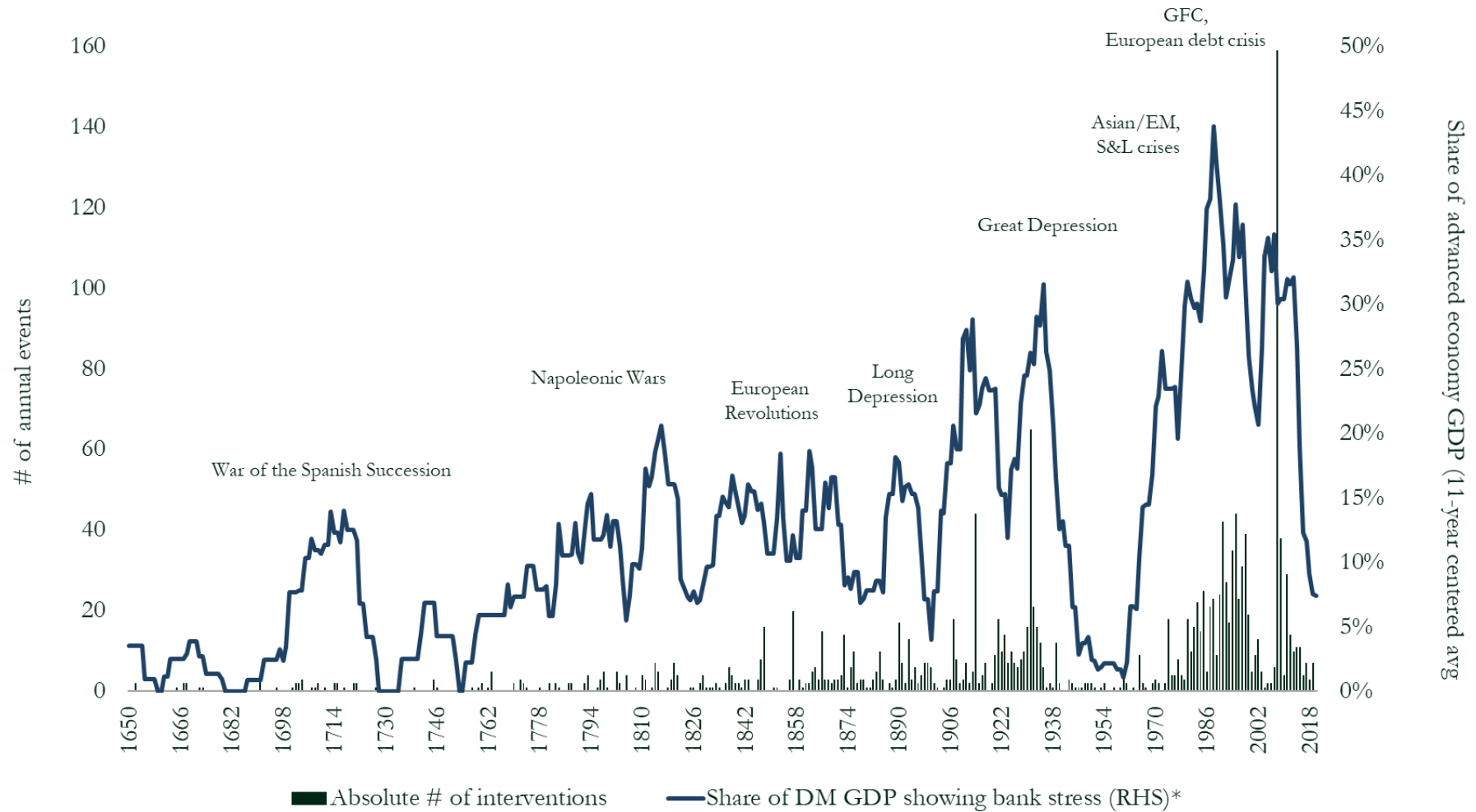
V. Bank Stress over the Very Long Run

One application of the database is a new investigation into the question whether “the crisis problem is growing more severe”, in the spirit of earlier overviews (Bordo et al. 2001; Reinhart and Rogoff 2013; Bordo and Meissner 2016). Consistent with the rest of this paper, our crisis definition subsumes those in the canonical papers, and also adds the candidate crises identified by the existence of intervention decisions. In this respect, our crisis definition is broader than that considered by the previous literature. Since we view our work as a complement and not a replacement for that literature, we will use the broader term of “bank-stress period” instead of “crisis” for the long-run macro perspective discussed in this section.

Figure 6 displays the share of advanced economy GDP displaying bank stress – combining all canonical and candidate crises since the mid-17th century. We display the full annual distribution of interventions across both crises groups over time, for all countries, by major intervention group, and record separately the associated share of advanced economy GDP that is experiencing an intervention event of any form during the respective year. The GDP shares used here follow the shares constructed and discussed further in Schmelzing (2020), which builds on Maddison (2008), covering eight leading advanced economies over the past five centuries.¹⁴

¹⁴ The weighting is generally robust to alternative approaches, such as population figures, or expanded GDP country samples.

Figure 6: distribution of total interventions, by year, and share of advanced economy GDP exhibiting “bank stress”, 1665-2019.



“Bank stress frequency”: combining four canonical crisis chronologies and full set of candidate crises for eight-country DM sample. Frequency defined as No. of country-years with stress event in any database)/(total no. of country-years). GDP weights based on Schmelzing (2020). Absolute # of intervention series includes all countries in combined database and all intervention types (including “NO/T”).

With this analysis, we can place 20th and 21st century bank-stress events into a very long historical context. We observe that, indeed, advanced-economy bank distress appears to be becoming gradually more and more frequent, from an initial basis in the second half of the 17th century that saw on average 1.6% of DM GDP experiencing bank stress in any given year prior to the outbreak of the War of the Spanish Succession. This figure almost quadruples to 5.9% of DM GDP during the first half of the 18th century, with notable peaks being closely linked to geopolitical tail events: generally, it becomes clear that even prior to the classical gold-standard arrangements, both bank stress episodes and authorities' recourse to a wide menu of policy responses was clearly a regular feature of the international financial system.

In the early industrial era, the two great escalations in bank stress occur during the late phase of the Napoleonic Wars – we count 36 interventions spread across 19 separate bank-stress periods between 1810-1821, many related to public banks in need of recapitalizations, restructurings, or suspensions in the wake of invasions or (post-war) escalating debt monetization – as well as the years 1847-1848 – this latter date marking the high tide of domestic revolutions across Europe, a two-year period that had 25 interventions, but one that has received comparatively little attention thus far relative to its financial importance.¹⁵

By this count, the years 1907, 1914, and 1931 mark years of intervention clusters, with 1914 experiencing 47 interventions, clustered in July and August after the declaration of War (1914 thus marking the third largest intervention year on record), and 1907 witnessing a notable number (18) of bank assistances and liquidity programs in- and outside the U.S. The year 1931, meanwhile, with 69 recorded interventions, experiences the largest number of interventions in the entire sample outside of 2008 (when we record 167 individual interventions), and contributes to a total of 136 interventions during the main Great Depression years of 1929 through 1933.

Subsequently, while the immediate post-war decades are notable for a relatively muted stress incidence, the post-Bretton Woods period is unique over the four-century period observed here, with a record 20.2% of GDP being under bank stress in an average advanced economy year. Indeed, between 1980 and 1999, we record an average of 24 relevant interventions per annum across the globe.

¹⁵ Osterhammel (2014, esp. chapter 10) offers a comprehensive account of international political events for these years. Dedicated economic and financial work is rarer given the scale of volatility, but Berger and Spoerer (2001) provide economic context, and Ferguson (2006, 77-79) documents the pan-European bond market sell-off in 1848.

By this evidence, it appears that the post-Bretton Woods banking crisis frequency is higher than that experienced under the classical gold standard (Bordo et al. 2001; Bordo and Meissner 2016): even prior to the 2008 GFC, the international financial system was prone to a gradually but consistently rising intervention frequency persisting across historical regimes, and meaningfully intensifying in the second half of the 20th century.¹⁶ On average, the percentage of DM GDP under bank stress over the 1665-2019 period displayed below shows an increase of 3.4 basis points per year, with the uptick from the virtually intervention-free Bretton Woods period to the floating era resembling the reversals of fortune during the quiet 1870s and the immediate pre-WWI years.

VI. Extensions: Intervention Size and Timing

This section summarizes preliminary evidence for two extensions of the database. Section VI.A. estimates intervention sizes and shows how these sizes have been rising over time, in parallel with the intensive intervention frequency discussed above. Section VI.B analyzes the sequencing of interventions across categories and relative to panic dates and bank-equity crashes.

A. Intervention size

This section describes our preliminary results for the estimation of sizes for *capital injection*, *lending*, and *guarantee* interventions. In this exercise, we are explicitly limiting our size calculations presented here to direct intervention and do not include any associated costs of banking crises on output, wider financial sector real measures (such as private lending), or knock-on effects on financial markets (Hoggarth, Reis, and Saporta 2002; Cecchetti, Kohler, and Upper 2009; Detragiache and Ho 2010; Adler and Boissay 2020).

For this analysis, we incorporate all previously reported direct intervention sizes – we are not attempting our own calculations in such cases. In particular, previous surveys of direct intervention sizes have been provided by Caprio and Klingebiel (2003) and Laeven and Valencia (2020), with Frydl (1999) and Reinhart and Rogoff (2013, 4568) providing further summaries on the size side. For the >300 new datapoints that we calculated ourselves, we screened historical sources from all episodes across our intervention universe: a non-negligible amount of literature in the intervention

¹⁶ Note that this trend is not explained by a higher responsiveness of authorities to an otherwise static level of bank stress, since we control for “NO/I” responses.

realm also reports associated intervention sizes. We generally note that the intervention size coverage by historical period and country type is broadly representative of the underlying intervention sample itself (8.3% of intervention size datapoints are obtained for pre-1800, versus 8.9% of all intervention datapoints).

Table 4 summarizes the results.

Table 4: 533 intervention “sizes” across *lending*, *capital injections*, and *guarantees*, 1257-2020.

% of NGDP	<i>Intervention sizes by period</i>							<i>all</i>
	Pre-1800	1800-1869	1870-1913	1914-1945	1946-1971	1972-1999	2000-2019	
<i>LENDING</i>	6.4 (24)	1.9 (27)	4.7 (35)	4.5 (45)	2.6 (7)	11.2 (110)	17.5 (41)	8.7 (289)
<i>CAPITAL INJECTIONS</i>	3.7 (15)	1.0 (17)	1.1 (7)	1.6 (22)	3.5 (5)	11.6 (68)	9.1 (37)	7.5 (171)
<i>GUARANTEES</i>	4.0 (5)	6.7 (4)	1.2 (9)	8.1 (17)	- (0)	5.2 (14)	14.6 (24)	8.5 (73)
weighted average	5.2 (44)	2.0 (48)	3.6 (51)	4.5 (84)	3.1 (12)	10.9 (192)	13.8 (102)	8.3 (533)

Figures record average intervention size as percentage of nominal GDP for intervening country, for all cases where presently intervention sizes have been calculated. Nominal GDP for most recent pre-crisis year is taken (t-1) for denominator. All figures refer to gross sizes. For full details on historical GDP sources used and intervention size calculations, see Appendix E.

We define “**lending intervention size as a % of GDP**” as all measures either being partially or fully led by the respective domestic central bank, other domestic monetary authorities, or the fiscal authorities that involve policy measures from our *lending* category (AHLA, BBLA, MLA) for which precise size figures can be obtained. We include cases where such lending measures are being enacted partially or fully by private actors. Typically, such *lending* volumes are reported in the historical literature on a gross total “peak basis” over normal (pre-crisis) discounting/lending

volumes – such a basis should be assumed to be the default concept whenever we report lending sizes. Table 4 reports 289 *lending* size datapoints and associated trends.

We define “**capital injection size as a % of GDP**” as all measures being partially or fully led by the respective domestic Treasury or other government agencies that involve policy measures including “AHCI”, “BBCI”, but not direct *lending* instances (“AHLA” and “BBLA”) by the Treasury. Consistent with our *lending* size approach, we do not attempt to estimate net capital injections at present, given that the historical crises sizes are overwhelmingly reported on the gross basis. Table 4 reports 171 *capital injection* intervention size datapoints and associated historical trends.

We define “**guarantee intervention size as a share of GDP**” as capturing all measures designed to maintain a fixed ex-ante value to particular asset(s) on any part of the bank balance sheet. We disregard increases in deposit insurance schemes for these calculations. Table 4 reports 73 *guarantee* size datapoints and associated historical trends.

For all three categories, we consolidate all sizes under the initial crisis start year – consistent with our crisis code labelling (which follows the format “geography-initial crisis start year”), and consistent with previous methodologies in the literature. We do not spread intervention size datapoints over multiple years in the case of extended crises. Furthermore, in all cases where both fiscal and monetary authorities are participating in a mix of policy actions that involve *both lending* and *capital injection* components, and where the exact breakdown the intervention size is not precisely known, we allocate such shares in equal weights (i.e. assigning 50% of the overall size to the monetary authority as lending, and 50% of the size to the fiscal authority as capital injections).

In total, Table 4 shows 533 size datapoints across the three major intervention category. There is a sharp increase in *capital injection* sizes subsequent to the collapse of the Bretton Woods System: since 1972 they average 10.7% of GDP, versus just 1.9% of GDP for all crises associated with calculated *capital injection* sizes prior to 1972 (n=66). Not least, we observe a sharp contrast between the 1929-1933 Great Depression period (average *capital injection* size: 2.3% of GDP across all countries), and the 2007-2012 period (average *capital injection* size: 10.2% of current GDP across all countries).

The largest (measurable) early modern *capital injection* response to a bank crisis in our sample is the Venetian recapitalization of Bancogiro in 1739 with 250,000 Venetian ducats, associated

with fiscal outlays of 26.9% of GDP. When considering such a datapoint, of course it needs to be taken into account that Northern Italian real per capita GDP at this point had been in terminal decline and recorded 13% below mid-15th century levels, with Venice in particular more than two centuries past its economic peak.¹⁷ Nevertheless, such a real mobilization of funds could point towards substantial remaining (or recovering) financial-sector activities in parts of early modern Europe, trumping any datapoint we observe until the mid-1980s, including the Great Depression period.

On the *lending* size side, the size of interventions is even more tilted towards the second half of the 20th century, with few pre-1945 interventions coming close to post-Bretton Woods mobilizations of funds. In earlier days, the Bank of Finland's Markka 1.5M loss incurred from its failed rescue attempt of the Bank of Agriculture and Industry in 1900 (the largest bank default in Finnish history) stands out, with a total intervention size of 15.6% of Finnish GDP.

Finally, our *guarantee* size sample is comparatively limited, but also confirms the sharp dichotomy between pre- and post-Bretton Woods intervention sizes. Pre-1972 events typically do not record more than a 2% of GDP intervention size, while several recent cases (including Cyprus' state guarantees to CCB in 2018, at 18.2% of Cypriot GDP) represent sizable relative amounts.

In size-terms, indeed, it can thus be observed that the crisis problem is growing more severe – in particularly pronounced terms since the end Bretton Woods: intervention sizes have grown at least five-fold in *capital injection*, *lending* and *guarantee* terms over the span of just half a century.

B. The timing and sequencing of interventions

In this section, we investigate the distribution and sequencing of interventions in relation to canonical crisis start dates and bank-equity crashes. Given that the historical record provides the exact month of individual intervention decisions for most cases, the database allows insights into both the holistic trends in intervention timing, the sequencing across intervention categories, and the secular trends across these two dimensions.

¹⁷ As for other examples discussed, refer to the same country notes in Appendix E below for full details and GDP bases.

Figure 7 displays the equal-weighted absolute occurrence of the seven respective intervention categories. A total of 599 interventions are linked to crisis across the three canonical chronologies with monthly information on panic dates (n=191, from B/V/X, L/V, R/R).¹⁸

Figure 7: absolute weighted occurrence of intervention categories, relative to “panic month”.

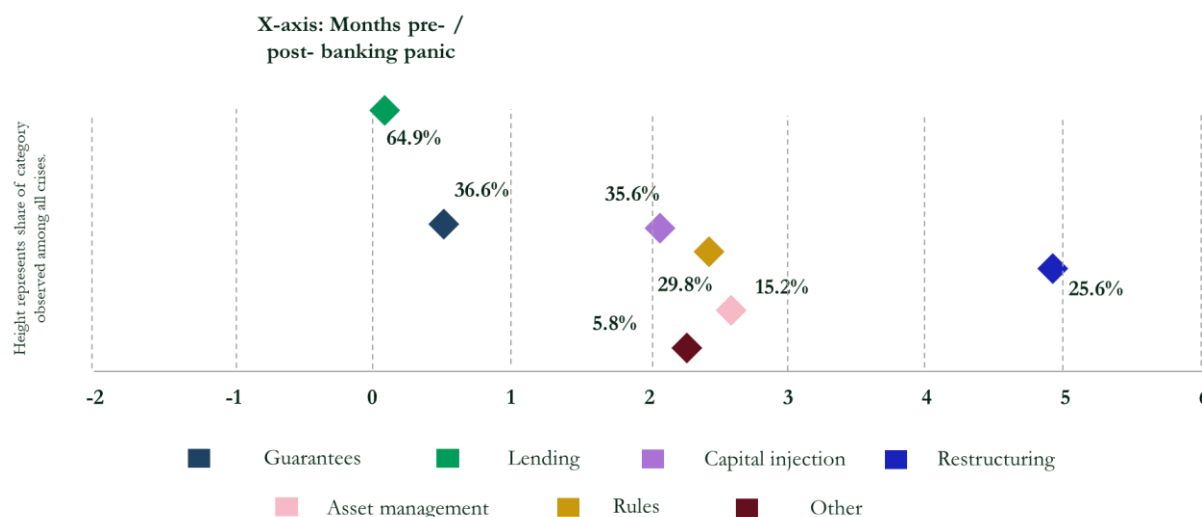


Figure displays the weighted occurrence of respective intervention categories across the entire banking crises sample, featuring all canonical banking crises for which a monthly “panic” date has been provided by previous authors (crises n=191; total intervention n=599). The data label calls out the percentage share of all crises that exhibit an intervention from the respective category, a figure reflected in the category datapoint’s position on the Y-axis. Crises without any identified interventions (“NO/I”) are included in the calculation of the total shares of interventions occurring (in the denominator), but no interventions are counted in the timeline for these events. Point “0” represents the respective monthly panic benchmark.

We observe that *lending* interventions are both the most frequent overall (occurring in almost 65% of all canonical crises), and are deployed at the earliest stage of all interventions – on average just 0.1 months after the panic start. Following such rapid-lending deployment, *guarantee* measures occur on average 0.5 months after the panic start, and are recorded in close to 37% of all crises in this sample. With a lag of just over two months, we see in close succession the average deployment of *capital injections* (2.1 months), *other* (2.3 months), *rules* (2.4 months), and *asset management* (2.5 months) interventions – with these four categories being observed in 6-36% of

¹⁸ Note that BVX provide monthly “panic dates” for both existing canonical crises chronologies (L/V and R/R), and their own monthly panic dates for selected new events. Wherever we detected discrepancies between the existing canonical monthly panic dates and B/V/X, we choose to operate with the monthly dates in L/V and R/R.

all crises. Lagging behind this group, observed at the 4.9 month mark, are *restructurings* – which we observe in about 26% of all crises.

Overall, we thus note that the bulk of interventions are concentrated in a 0-5 month window around panic dates. Of course, just looking at averages does not show the significant variability around these intervention sequences – it is particularly of note that a meaningful share of canonical crises exhibits interventions *prior* to the panic month, a phenomenon we analyze further below.

One drawback of using panic dates is that the crisis-chronology literature regards “significant policy interventions” themselves as a variable to determine such events (see discussion in Section III.A), but the documentation in these chronologies does not specify when such events were used to determine crisis inclusion. To avoid this potential confound, we use bank-equity crash dates as an alternative benchmark, based on the work done by B/V/X for their chronology. The identification of bank-equity crashes is fully independent from intervention dates from other crises chronologies, and thus there is no bias induced by the sample selection. Of course, equity crashes are not independent of government actions or their expectations, so the perfect experimental design still does not exist.

B/V/X assemble long-run bank equity return data for a majority of countries in their 46-country chronology. In their paper, they provide bank-equity-crash years but do not identify a specific month. Using the data provided in their replication kit (sourced via [Dataverse](#)), we select the month within the B/V/X crash year that experiences the largest percentage decline, to mark the “equity crash month”.¹⁹ Figure 8 displays the sequencing of interventions across two banking crisis categories: “crises with panics” (Panel A: 109 crises) and “crises without panics” (Panel B: 28 crises), following the identification method in the B/V/X crises samples. As in the other timing exercises, we exclude crises for which we record no interventions (“NO/I”) or lack exact intervention months.

¹⁹ An alternative identification would associate the “equity crash month” with the first month of equity declines in the equity crash year, however small the decline. However, such an identification for multiple reasons appears more spurious: small bank equity declines by themselves occur frequently outside of banking crises episodes and in practice do not necessarily signal any problematic developments to policymakers. Secondly, the first month of bank equity declines may be interrupted by months of equity return gains – which create benign signals to policymakers and market participants, which once more ease pressures to deploy intervention measures in practice.

Figure 8: Sequencing of interventions, relative to equity market crashes, banking crises “with panics” and crises “without panics”.

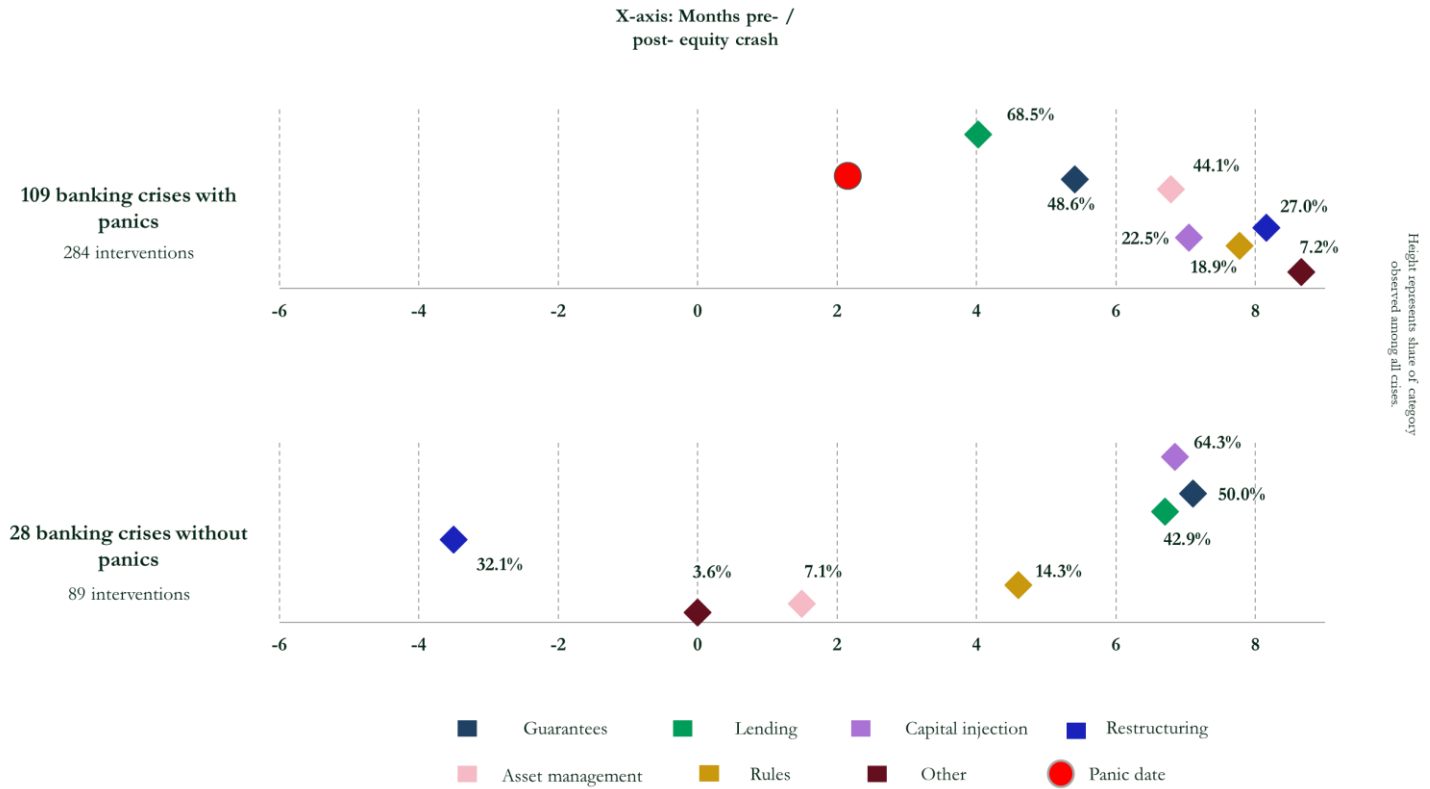


Figure displays weighted monthly occurrences of interventions in each of the seven intervention categories during two crisis samples that feature exact monthly dating of “equity market crashes” based on the monthly equity return indices in Baron, Verner, and Xiong (2021, replication data via Harvard Dataverse). We choose the month of the largest absolute monthly decline in the bank equity index within the year that B/V/X have identified as the “equity crash / crisis start year” as the “equity crash month”. Panic months featured in the first panel are identified on the same basis as those in Figure 7 above. The data label calls out the percentage share of all crises that exhibit an intervention from the respective category, a figure reflected in the category datapoint’s position on the Y-axis. We omit all crises for which B/V/X report no equity data on the monthly level. Crises without any identified interventions (“NO/I”) are included in the calculation of the total shares of interventions occurring (in the denominator), but no interventions are counted in the timeline for these events.

On this basis, we observe that on average, policy interventions historically occur within a nine-month window in both directions around bank equity crashes, considering both crises “with” or “without panics”. For the sample with panics in Panel A, the panic months are about halfway between the bank-equity crash and the initiation of intervention measures. Once again, lending interventions are on average observed first in our sample of crises with panics, where they are also once more the most frequently observed intervention category overall (featuring in 69% of all

crises). Various other features of the typical intervention sequencing resemble the sequencing illustrated for all panics in Figure 7.

Of particular interest is the sequencing for crises without panics (Panel B), since there are plausible causal channels whereby the particular intervention deployment and timing is in fact responsible for the fact that a panic was avoided (indeed B/V/X speculate that this particular sample may have seen successful policy interventions): for the 28 crises here, we observe *restructuring* interventions on average 3.5 months *prior* to the identified equity-market crash, and overall *restructurings* are found in about one-third of these crises. *Capital injections* are also common in Panel B, found in almost two-thirds of the sample. In contrast, *lending* interventions are observed later stage and less frequently than in the panic sample. We caution, however, that these statements are about averages, and there is both a relatively small sample and significant variation within it that prevents any statistically significant conclusions.

VII. Conclusion

In the historical record, crises are like fires and the government interventions in those crises are firefighting. The way history is written, it is often easier to observe trace evidence of firefighting than to get other indicia of the fire itself. The existing crisis chronologies are built from looking for direct evidence of the fire. This has been an important exercise for the macroeconomics and finance because the historical record is clear about the existence of the most severe crises, and these examples are the most quantitatively important for welfare. But if we are interested in the efficacy of interventions, we also need to study the cases where we observe the firefighting, but no long-term damage apparent from the fire. The main goal of our project is to build a database that includes as many interventions as possible, both with and without other indicia of a crisis.

To accomplish this goal, we introduce a classification system for banking-crisis interventions, describe the construction of a database based on that system, and then provide statistics about cross-sectional and time-series patterns from this database. The classification system is mapped onto the financial-sector balance sheet and includes 20 types of interventions in seven major categories. The current version of the database includes 1886 interventions since the 13th century. One contribution of our intervention-based prism is that it allows for the identification of 408 “candidate crises”, where we find evidence of an intervention in the historical record, but no crisis

event is found in the canonical chronologies. These candidate crises may have been missed by earlier filters or may instead be examples of successful interventions worthy of further study.

The data show that governments have become more aggressive over time, which can be observed along several dimensions: by number of interventions per crisis, by interventions “moving down the balance sheet” from liabilities to equity, and by a higher likelihood of interventions hitting multiple parts of the balance sheet during the same crisis. We observe the same differences in the cross-section, with wealthier countries more likely to intervene, particularly lower down on the balance sheet. Furthermore, the intervention-prism allows for a longer historical view about the “crisis problem”; intervention frequencies and sizes suggest that the crisis problem in the financial sector has indeed reached an apex during the post-Bretton Woods era, part of a more deeply entrenched development that saw global intervention frequencies and sizes gradually rise since at least the late 17th century.

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