



The Long Shadow of Public Interventions in the Financial Sector

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Abstract

We take stock of the costs of government interventions in the financial sector over the period 2007–2017 and track the assets still under government control. We build a new bank-level dataset on interventions and holding divestitures covering 1114 financial institutions in 37 countries. At end-2017, few countries had fully divested their financial sector holdings. On average, public holdings were divested faster in more capitalized, profitable, and liquid banks. They remained higher in countries where private investment and credit growth grew slower, financial access, depth, efficiency, and competition were worse, and financial stability improved less.

Keywords Financial crisis · Government interventions · Bank resolution

JEL Classification E50 · E60 · G20

1 Introduction

Substantial government interventions in financial institutions were a hallmark of the response to the Global Financial Crisis (GFC). In many countries, governments went beyond liquidity provision and took stakes in individual institutions through capital injections or purchased/guaranteed impaired assets. These interventions were necessary to stabilize markets and repair balance sheets to restart the economy. However, they also led to public frustration against using taxpayers' money to rescue financial institutions that many regarded as the culprits of the crisis. Frustration turned into

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resentment, especially where fiscal austerity followed because the costs of the interventions threatened the financial standing of the sovereign. Taking stock of the fiscal costs of government interventions in support of the financial sector, as well as of the remaining assets in the hands of the public sector, is important to let taxpayers know how their money has been used. The current shock due to COVID-19 also strengthens the case for such a stocktaking exercise: while the pandemic and the GFC are different, both involve a major increase in the role of the state in the economy, and reviewing the experience of the GFC may have useful lessons.

This paper reviews government interventions in, and subsequent divestment from, the financial sector a decade after the GFC. It sheds light on the costs of these interventions on the public purse by focusing on the fiscal implications of direct government interventions.¹ To do so, we compile and present a new bank-level dataset on government interventions. The dataset allows us to track public asset holdings over the period 2007–2017 and estimate intervened financial assets remaining in the hands of the public sector at end-2017. We then compare these data with official aggregate data specifically collected for this exercise and provide an update of the total fiscal impact of interventions, including the value of remaining public assets.

Our dataset improves transparency and hence contributes to accountability. While most countries publish data on their interventions in the financial sector, the presentation of the data is far from uniform and understanding the complex underlying transactions is often cumbersome. In addition, some countries have yet to publish intervention data, a decade after the first intervention in many cases and despite the fact that significant public resources were involved. These issues make cross-country comparisons difficult, hampering analysis aimed at learning lessons. We pursue a uniform approach across countries which allows for such analysis and sheds a light on bank liabilities remaining in public hands.

Transparency is important because interventions may create both direct and indirect economic distortions. Not only can interventions interfere with how markets function, but they can also distort the signaling value of asset prices and financial flows. The resulting resource misallocation could have significant long-term consequences for productivity, competition, and growth (Kane 1990; Peek and Rosengren 2005; Caballero et al. 2008; Richardson and Troost 2009; Calderon and Schaeck 2016; Storz et al. 2017). Such misallocation is potentially important because direct interventions mobilize a sizable volume of public funds, the recovery of which is not only highly uncertain but also takes time (International Monetary Fund 2015; Laeven and Valencia 2018).²

Moreover, prolonged state ownership of banks may not be desirable in its own right. State-owned banks often pursue objectives other than value maximization,

¹ The fiscal implications of direct government interventions in support of the financial sector are only a part of the impact on public finances. We do not consider, for instance, automatic or discretionary fiscal outlays mobilized in response to the macroeconomic recessions associated with the GFC or those triggered by additional shocks.

² This is not to say that all interventions are necessarily harmful. The cost of distortions that may be generated by interventions should be weighed against the potential costs of inaction. Dell'Ariccia et al. (2018) provide an in-depth discussion of the trade-offs entailed in a policymaker's decision to intervene in a distressed financial institution.



sometimes driven by (in)direct political interference or explicit quasi-fiscal mandates. As a result, on average, state-owned banks are less profitable, hold less core capital, and exhibit greater credit risk than privately-owned banks (Cornett et al. 2010).³ These patterns could explain the association between higher government ownership of banks and lower subsequent growth of productivity and per capita income (La Porta et al. 2002). Moreover, lending decisions of state-owned banks may be influenced by political considerations, potentially leading these banks to take excessive and mispriced risks (Sapienza 2004; Claessens et al. 2008), with implications for both financial stability and the real economy (Carvalho 2014; Coleman and Feler 2015). The stylized facts derived from our dataset are consistent with the notion that state-owned banks are less profitable and riskier than their privately-owned counterparts.

Our dataset consists of newly compiled bank-level data, cross-checked with aggregate country-level data. We gather data on the interventions and the remaining public asset holdings in 1114 financial institutions across 37 advanced economies and emerging markets (representing 62% of global GDP) from public records and other publicly available information. We validate these data at the country level with government and central bank sources for a smaller sample of the 28 European Union (EU) countries and the United States. Through the latter sources, we also complement the bank-level data with updated information on government acquisition of impaired assets and the financial costs and benefits stemming from government asset holdings.⁴ Accordingly, we present a dataset with unparalleled granularity on the accumulation and unwinding of financial interventions with the broadest possible coverage of countries, institutions, and types of intervention.

We compile data at the level of specific transactions in individual banks. This allows us to gauge the association between bank characteristics and the amount of and the way in which support was provided, as well as the implications for bank-level outcomes—something that the literature that relies on aggregate country-level data cannot do. Furthermore, our database allows us to track the evolution of the assets acquired during the GFC and in subsequent crises, and to focus on those remaining in public hands today, comparing their value to the cost of intervention. The granularity of our data comes at the cost of a relatively narrow country and time coverage. We focus on 37 countries in the post-GFC period, whereas the Laeven and Valencia (2018) database covers 165 countries from 1970 onwards.

Our country-level dataset complements the existing literature on the costs of banking crises. Our data combines stock and flow data, akin to the approach adopted by EU countries in the Excessive Deficit Procedure (EDP) Supplementary Tables and Financial Assistance Measures Tables (European Commission 2018; European Central Bank 2016). This stock-flow approach differs from cash-flow methods used,

³ Lending by state banks can play a useful role in stabilizing credit over the business cycles and during financial crises (Bertay et al. 2015). Yet, this may come at the expense of poor credit allocation, resulting in low economic growth.

⁴ Impaired assets can be acquired from financial institutions by the government or by a unit acting on its behalf, such as a defeasance structure—a legal entity specifically set up to take over the assets from the troubled bank.



for instance, by Laeven and Valencia (2008, 2013, 2018) who do not distinguish between acquired assets and capital injections (transfers) provided to financial institutions (Box 2 in the Appendix, available online, provides further details on the differences between the two approaches). Even so, methodological challenges in recording interventions persist. These are mainly due to asset valuation, the classification of financial support, and the use of special purpose vehicles and defeasance structures to provide support.⁵ Encouragingly though, the correspondence between our bank-level data and the country-level data on gross direct interventions is close.⁶

The main insights from our data can be summarized as follows:

- Since 2007, cumulative gross public interventions in financial institutions in the countries in our sample amounted to some US\$1.6 trillion. Equity was the most frequently used instrument, followed by hybrid and debt instruments. In addition, guarantees extended to these institutions amounted to some US\$1.9 trillion, bringing the total amount of support to US\$3.5 trillion.
- On average, governments recorded net cumulative financial benefits from these interventions. That is, they received dividends and fees from asset holdings that exceeded interest payments on debt issued to finance these interventions. Even so, variations across countries are large, with only just over half the countries seeing such benefits.
- The unwinding of direct support has been uneven with only a few countries fully divesting their financial sector holdings. At end-2017, public equity holdings remain above 2% of GDP in Ukraine, Luxembourg, Portugal, Greece, and Belgium. Public holdings of impaired assets are still above 4% of GDP in Austria, Slovenia, and Germany.

We also observe interesting correlations between interventions and both bank-level characteristics and aggregate macro-financial indicators. While not purporting to establish causality, we highlight a few stylized facts that illustrate where and how these interventions have cast a long shadow:

- *Bank-level indicators.* Initial government support was higher in banks that had less capital and were less profitable. Public asset holdings were divested faster over time in better capitalized, more profitable, and more liquid banks.
- *Macro-financial indicators.* Public asset holdings were divested more quickly in countries where the economy recovered faster. Countries where the government stake remains high relative to the initial intervention display lower private investment and credit growth, as well as a deterioration in financial access, depth, efficiency, and competition, and less improvement in financial stability.

⁵ For instance, holdings of financial assets are estimated at nominal value, while ordinary shares are estimated at market value.

⁶ The average (absolute value) difference between the two methodologies is 0.52 percentage point of 2017 GDP (see Appendix III for details).



The remainder of this paper is organized as follows. Section II describes financial sector support since the GFC, focusing on gross direct interventions in individual financial institutions and depicting some stylized facts. Section III details the public asset holdings in these entities and discusses some patterns in the data. Section IV complements bank-level data by providing data on impaired asset holdings that were transferred to the public sector balance sheet and the fiscal impact of direct interventions at end-2017. Section V concludes with directions for potential future and forthcoming work.

2 Gross Direct Interventions

2.1 Conceptual Considerations

There is no comprehensive theoretical framework analyzing the choice of instrument and, arguably, this is another case where, by necessity, “regulatory practice has run somewhat ahead of theory” (Blanchard and Summers 2017). That said, there are some simple economic insights likely to be used by many policymakers in the context of the specific interventions we analyze.⁷ We start with a brief summary of these insights that would then help us interpret what we see in the data.

There is a distinction between a government acquiring an equity or a debt stake in a bank during a crisis. The latter is essentially lending and a government performing such an action could be interpreted as acting in a similar way as a lender of last resort, to the extent that the problem the bank is facing is one of liquidity. The former is a recapitalization of the bank as the equity injection increases the equity-to-asset ratio and reduces the leverage of the bank. Accordingly, the choice of a government between equity and debt could signal its assessment of the nature of the problem. Indeed, in the “panic view” of financial crises (see, for instance, Friedman and Schwartz 2008; Diamond and Dybvig 1983; Schwartz et al. 1986; Gorton 2008), policy intervention should aim to provide liquidity, which would then stop the run on liquid claims. More recent studies instead emphasize the role of bank equity in determining banks’ ability to intermediate funds and argue that financial crises and ensuing deep recessions can be triggered by large bank capital losses even in the absence of panic (e.g., Calomiris and Mason 2003; Admati et al. 2014; Baron et al. 2021; Stein 2021). In this “capital crunch” view of financial crises, faced with an equity shortfall, banks try to reduce leverage and restore their balance sheets. This leads to fire sales and credit rationing, which in turn generate negative feedback loops and amplify the original shock. Then, restoring bank equity should be key.

Marrying the panic and capital crunch views, the common wisdom would be to simply provide loans to banks facing liquidity problems but to inject equity to banks facing solvency problems. In practice, however, it can be difficult to distinguish between illiquid and insolvent banks and what is originally intended to be liquidity support may quickly become solvency support (Dell’Ariccia et al. 2018). Given this

⁷ We are grateful to an anonymous referee for offering directions for this subsection.



challenge and the potentially high cost of failing to recapitalize banks when the need is actually there, policymakers may prefer to err on the safe side and inject equity in addition to or even instead of extending loans to the stressed banks. There may also be legal and practical factors. While riskier and more expensive, equity provides more control over the intervened bank's operations. Such control can be particularly desirable when managerial quality is a concern. It also allows the government to share the upside when the bank returns to profit.

The database we construct in this paper and the exploratory analysis we provide could then shed light on to what extent these views shape government interventions in distressed banks.

2.2 Data Coverage

Our sample covers Australia, Brazil, Canada, Japan, New Zealand, Russia, Switzerland, Ukraine, the United States, and the 28 European Union (EU) countries. We focus on post-GFC interventions that result in an outright government stake in a financial institution.⁸ These primarily involve asset purchases. In order to be able to see whether the type of instrument used in asset purchases has a bearing on the outcomes (e.g., the speed of divestment), we distinguish three broad modes of such support: equity shares, hybrid securities, and debt.⁹ We also gather information on extended guarantees and impaired asset relief.¹⁰

Disclosure and transparency practices differ considerably across countries. The U.S. Department of the Treasury and the Japanese Deposit Insurance Corporation regularly publish their gross financial interventions and remaining stakes in financial institutions. The British, Irish, and Spanish authorities are also comprehensive and transparent in their disclosure efforts. The data in the other countries covered in our sample, however, are not as easily accessible from a single national source. As a result, our data sources are wide and varied, comprising, e.g., reports of legal counsels of national central banks, court rulings, public letters between national agencies,

⁸ We cover any intervention that falls between 2007 and 2017, and do not distinguish the source of distress (except when the source is not related to economic factors and is straightforward to identify, which was some cases in Japan and Russia—see country summaries in Appendix I). In some of the countries we cover, the interventions were not directly related to the GFC but to (additional) shocks that hit the economy or the banking sector later.

⁹ Equity includes ordinary shares and preference shares, as well as the Austrian Partizipationskapital, the German silent partnerships, and the Spanish cuotas participativas. Hybrid securities include contingent convertible bonds, mandatory convertible securities, and convertible core securities, as well as the Irish promissory notes and the Italian Tremonti bonds. Debt includes commercial paper, bonds, loan provisions, non-collateralized claims, state deposits, subordinated debt, and debt assumptions.

¹⁰ Asset purchases cover the acquisition of financial assets and, in the EU cases, any capital injections that are not recognized by the European Commission as impaired asset relief. We do not include blanket guarantees and deposit insurance coverage. We record impaired asset relief whenever the transfer value of impaired assets onto governments' balance sheets exceeds their market value. Data on individual bank interventions do not allow us to track impaired assets once they are transferred onto the general government balance sheet and/or to asset management vehicles. We fill in this gap using information at the aggregate level in Section IV.



and numerous additional official sources. Throughout, a key source consists of the European Commission's state aid reports and annual bank reports.¹¹ We supplement this information with data from S&P Market Intelligence, which includes financial institution annual reports. A full list of data sources is in Appendix I.

Compiling our data required overcoming several challenges. First, numerous banks that existed in 2007 ceased operations during the crisis or were acquired by other (often public) entities. This made tracking divestment and hence estimating the remaining public stake difficult. Second, gauging the specific nature of some interventions required detailed analysis of the notes to banks' annual statements. Third, the way in which governments intervened in the financial sector often involved complex transactions among several parties, complicating the ownership structure of the public stake in intervened banks. In some cases, the state became a direct stakeholder, whereas in other cases one or more state-controlled entities were used.¹² Detailed descriptions of these methodological challenges and how we addressed them in the construction of the database are in Appendix I.

2.3 A First Glance at the Data: Recipients, Types, and Determinants of Interventions

We document public support totaling some \$3.5 trillion, spread out broadly across the banking system and aiding more than a thousand banks (Table 1). Such support consisted of \$1.6 trillion in gross direct interventions and \$1.9 trillion in guarantees.

2.3.1 Recipients

The support is driven neither by specific countries nor by specific big banks (defined as those with over \$50 billion in total assets). This speaks to the global nature of both the crisis and our dataset. While US institutions comprise a majority of the banks in our sample (63%, or 707 out of 1114 entities), they received less than 10% of the total support we document.¹³ Big banks received two thirds of the

¹¹ Even within the EU, common reporting standards have room for improvement, particularly given the varied nature of interventions and complicated cases that we document. For instance, the tracking of government aid transfer across entities, e.g., after the failure of an intervened bank or the carving of bank assets into good and bad banks, is not systematically recorded, so this requires a lot of judgment calls on our end. Another issue is the recording of which entities received bail-outs that didn't need repayment, and which did. The only source available at the EU-level and which we make extensive use of is the EU Commission reports. However, even those are frequently revised in light of new agreements and arrangements. Gaps would be reduced by first establishing reporting requirements on all relevant transactions and then harmonizing the frequency of and level of detail in reporting.

¹² We focus on the financial support provided to the banking sector starting in 2007. The sample includes both private banks and banks that were (partially) state-owned bank at the time of first intervention. To account for the role of state ownership on bank recapitalization, we include bank fixed effects when we conduct regression analysis and control for state ownership in robustness checks. Results remain unchanged.

¹³ Total support received by US institutions amounts to 7.1% of the total assistance extended to financial institutions, while asset purchases in US institutions come to 21.3% of total asset purchases in our sample. US government-sponsored enterprises (GSEs) are not covered in our sample. Specifically, Fannie Mae and Freddie Mac were placed under conservatorship on September 6, 2008 at a cost of nearly



documented support over the whole 2007–2017 period, even though they represent the vast majority of bank assets in our sample. The share of support going to big banks fluctuates between a high of 86% in 2008 and a low of 37% in 2011. This might be attributed to the systemic nature of these banks: being more closely inter-linked and, hence, more exposed to global shocks, they received the lion's share of public support early in the crisis. After the initial shock, however, the macro-financial outlook progressively worsened in the years after 2008. As a result, the initial shock propagated to small and medium-sized banks that subsequently also faced liquidity and solvency issues. This transmission mechanism may have led to a more balanced allocation of gross direct interventions across banks of different size in the following years.

Table 1 further shows that both the number of banks receiving aid and the total extended aid peaked in 2009. While the former is driven by the Troubled Asset Relief Program (TARP) in the United States, the latter is not, reflecting that the crisis and the corresponding intervention wave quickly propagated across the globe. At the peak (end-2008), 20% of the total financial assets in the countries covered in our sample belonged to banks that received government support.¹⁴

Country-level magnitudes vary widely (Fig. 1). Greece (45.6% of GDP), Ireland (23.5% of GDP), and Cyprus (18% of GDP) provided the largest support to their banks. At the opposite end of the spectrum, public support was lowest in Lithuania, Japan, and Sweden (all below 0.2% of GDP). These patterns are consistent with findings by previous studies, such as Laeven and Valencia (2018), on the relative magnitude of gross direct interventions.

2.3.2 Types

We focus our attention on asset purchases given that these arguably represent the most direct way we can capture the stake a government takes in a bank.¹⁵ Equity was the most frequently used instrument for bank recapitalization (Table 2). Next came hybrid instruments, while debt instruments were used least frequently. Only eight countries in our sample used all three instruments and the choice of the primary instrument is far from uniform (see Fig. 9 in Section III.B, where we discuss these patterns further). For instance, Belgium and Ireland acquired equity shares and

Footnote 13 (continued)

\$200 billion and they remain in this status as of the time of writing, although their financial position has thrived.

¹⁴ Overall the intervened banks in our sample account for 40% of system assets in the covered countries. This ratio varies from less than 1% in Russia to 96% in Greece.

¹⁵ Guarantees, by contrast, are extended but not always incurred, while impaired asset relief is counted only when the transfer value exceeds the market value. Also worth noting is the fact that we do not include deferred tax assets. While sizeable at times, these assets primarily function through an accounting, rather than economic, channel. Some deferred tax assets have been converted to irrevocable claims on the governments upon a bank's loss, liquidation, or insolvency—called deferred tax credits (DTCs). Although not included in our dataset, such DTCs could in principle be considered public support and recorded as contingent liabilities of the government.



Table 1 Gross Direct Interventions by Year. *Sources* National authorities; European Commission; bank reports; IMF staff estimates.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Number of banks	7	260	692	58	67	66	50	94	19	4	16	–
o/w US banks	0	214	497	0	0	0	0	0	0	0	0	–
o/w big banks	4	39	35	11	7	12	7	3	2	0	5	–
Percent of system assets	1.7	20.2	18.4	1.7	0.9	1.6	0.8	0.2	0.2	0	1.0	–
o/w US banks	0	7.7	3.7	0	0	0	0	0	0	0	0	–
o/w big banks	1.7	19.7	18.0	1.6	0.8	1.5	0.7	0.2	0.2	0	1.0	–
Total extended aid (billion USD)	\$166	\$827	\$1215	\$516	\$116	\$300	\$247	\$38	\$16	\$5	\$54	\$3,499
o/w US banks	\$0	\$198	\$52	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$250
o/w big banks	\$76	\$710	\$679	\$400	\$42	\$202	\$119	\$14	\$6	\$0	\$38	\$2,287
o/w direct support	\$73	\$486	\$336	\$395	\$62	\$126	\$58	\$24	\$14	\$5	\$21	\$1599

This table shows the banks that received aid in a given year both in absolute numbers (“number of banks”) and in terms of their assets as a percent of total system assets (“percent of system assets”), as well as the total extended aid documented in the dataset in billion USD. The rows for the first two indicators cannot be summed over time as a bank would appear in more than one column if it was intervened multiple times (therefore, summing would lead to double-counting). Interventions include asset acquisitions, extended guarantees, and impaired asset relief. Big banks are those with over \$50 billion in total assets. System assets are the total assets of the financial sector in the sample. Exchange rates are expressed at year end. Numbers may not add up due to rounding. Data reflect the available information as of April 2018 for EU countries and as of end-2018 for the United States



hybrid securities with little use of debt. In contrast, Bulgaria, Denmark, Hungary, and the Netherlands heavily relied on debt instruments (see Figures A3–A5 in the Appendix for the full picture).

The patterns in our data suggest that many governments opted for intervening in banks via acquisition of equity. The dominance of equity interventions hint that the capital crunch view shaped these interventions and is also in line with a preference for control over the intervened bank's operations and for allowing the government to capture some of the potential upside. Notably, however, even though 86% of asset purchases over the sample period used equity (831 out of 966 banks in Table 2), the two earliest intervention cases in the midst of the GFC came in the form of debt: in 2007 to the German lender Sachsen LB and the British bank Northern Rock. This could be an indication that, when problems first appeared, they were considered to be related to illiquidity or their severity was not truly understood. Accordingly, liquidity provision and support in a form that provided limited control over bank operations appear to have been deemed sufficient.

Although most equity interventions recorded in our database occurred in the first five years after the GFC, some took place as late as 2017 reflecting structural problems in the banking sector and/or new, country-specific shocks. These late cases were often related to the euro area crisis and involved Italian Monte dei Paschi di Siena, Banca Marche, and Banca Etruria, the Lithuanian Central Credit Union, and the Portuguese state-owned bank Caixa Geral de Depósitos. The assistance the Portuguese government provided to Caixa Geral de Depósitos included hybrid instruments in addition to equity. The late case of the Ukrainian PrivatBank was attributable to a country-specific idiosyncratic shock.¹⁶

Recourse to direct equity injections tended to coincide with a high level of systemic risk, as captured by the financial stress index at the country level. The share of equity in the total government support was 97% when the financial stress index was in the top quartile of its distribution across countries and time, while this share was 80% when the financial stress index was in the bottom quartile. Conditional on a bank being intervened, equity was more likely to be used when the capital and liquidity ratios were lower (other bank soundness and performance indicators do not consistently display statistically significant differences). While in line with an interpretation that governments are more likely to take an equity stake in banks that are facing more severe solvency problems when systemic risk (and, hence, the risk of cascading spillovers) is elevated, the simple comparisons should be taken with a grain of salt given the fact that transactions involving equity as an instrument represent an overwhelming portion of the sample.

In most of our analysis, we use a combined measure of asset purchases, defined as the sum of equity, hybrid securities, and debt instruments. Different types of instruments may, however, have different economic, prudential, and legal implications for the intervened bank's health (depending on their loss-absorbing capacity). Or, they may display differences in recovery patterns (sale of equity stakes to third parties, for example, would inherently prove more difficult than repayment of debt). While

¹⁶ Detailed information on all individual interventions can be found in Appendix I.



we briefly explore differences in prevailing conditions by intervention type here and document the different recovery patterns by the type of instrument in Section III.B, we leave a more in-depth analysis of different instruments for future research.

2.3.3 Determinants

Bank-level characteristics may have determined the decision to intervene and the size of interventions, providing lessons for future bank resolutions. We see some patterns between individual bank characteristics and the government stakes taken in these banks. First, we look at the key bank soundness indicators such as capital adequacy, liquidity, profitability, and asset quality in banks that were intervened and in those that were not in Table 3. Intervened banks are larger in size and have less capital, less liquidity, and less earnings, but they also have higher net interest margins and lower non-performing loan ratios. If we focus on the countries where the overall interventions were large relative to the size of the economy or the size of the banking system (the top six countries in Fig. 1, with interventions exceeding 10% of GDP), the differences in terms of capitalization, liquidity, and earnings continue to hold but the net interest margin is virtually the same across the two sets of banks and it is the intervened banks that have more problem loans. Second, splitting the sample of intervened banks by these characteristics, we examine the resulting summary statistics in Fig. 2. The patterns, in line with the comparison of intervened and non-intervened banks, reveal that the initial government stake tends to be higher in banks with weaker soundness indicators. Those differences, however, are not statistically significant at conventional levels—a result that speaks to the wide variation across these banks.¹⁷

We look at these patterns more in depth through simple regressions, considering both bank characteristics and countries' macro-financial conditions. This analysis is to explore whether the stylized facts hold beyond bivariate relationships (while not claiming causal interpretation). The specification we use is:

$$Stake_{bct} = \alpha + \beta X_{bc,t-1} + \gamma Y_{ct} + \delta_t + \varepsilon_{bct} \quad (1)$$

where the left-hand side variable is the government's stake in bank b in country c at time t . Here, X is a vector of lagged bank characteristics (capitalization, liquidity, profitability, and asset quality in the period before the intervention, as well as lagged total assets), Y is a vector of macro-financial conditions (real GDP growth, credit growth, inflation, unemployment, public debt-to-GDP ratio, monetary policy rate, and the financial stress index), and δ_t are year fixed effects (which allows us to focus on comparison of banks within a country by stripping out the global conditions at

¹⁷ A possible explanation for the lack of a statistically significant difference at this level is that, when systemic risk is high, governments may (preemptively) intervene in banks that may look fine based on the commonly used financial soundness indicators but could be fragile nonetheless. In addition, policymakers may employ moral suasion to get good banks (i.e., banks not prima facie in need of support) to accept support, in order to avoid stigma on bad banks (see, e.g., (Johnson and Kwak 2011) for further on such incentives on the policymakers' end).



Table 2 Asset Purchases by Instrument. *Sources* National authorities; European Commission; bank reports

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
<i>Equity</i>											
Number of banks	0	231	500	20	21	23	17	6	9	2	8
o/w US banks	0	211	446	0	0	0	0	0	0	0	0
Percent of system assets	0.0	17.2	13.7	1.2	0.8	1.3	0.5	0.1	0.2	0.0	0.2
o/w US banks	0.0	7.7	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Hybrid securities</i>											
Number of banks	0	8	63	5	4	8	2	0	2	0	1
o/w US banks	0	3	51	0	0	0	0	0	0	0	0
Percent of system assets	0.0	2.1	0.8	0.4	0.1	0.5	0.0	0.0	0.2	0.0	0.1
o/w US banks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>Debt</i>											
Number of banks	2	11	12	4	5	3	2	1	1	0	0
o/w US banks	0	0	0	0	0	0	0	0	0	0	0
Percent of system assets	0.1	0.3	0.1	0.0	0.2	0.3	0.5	0.0	0.0	0.0	0.0
o/w US banks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

This table shows the banks that were subject to asset purchases by year in absolute numbers ("number of banks") and in terms of their assets as a percent of total system assets ("percent of system assets") by type of instrument (equity, hybrid instruments, and debt). System assets are the total assets of the financial sector in the sample. Data reflect the available information as of April 2018 for EU countries and as of end-2018 for the United States. The sample is smaller than that in Table 1, owing to data constraints and to the fact that not all interventions involved asset purchases

the time of an intervention). Bank characteristics are lagged by one year to reduce potential endogeneity. Country-level macro-financial conditions are not lagged because it is less likely that a stake in a specific single bank would affect the overall conditions in the country. Also, it is arguably more relevant to explore the contemporaneous relationship between government interventions and macro-financial conditions given the feedback loops between the banking system and macroeconomic outcomes. We interpret the results as correlations rather than causal links.

We focus on the initial stake, as measured by the first intervention a bank receives from a government in the form of asset purchase divided by the bank's total equity at the time.¹⁸ We run cross-sectional regressions using ordinary least squares to understand if and how the size of the initial stake relates to the bank and country conditions prevailing around that time. Note that t varies by bank and refers to the year in which a given bank was intervened for the first time.¹⁹

The size of the government's first intervention is negatively correlated with lagged capitalization (total equity divided by total assets) and profitability (net interest margin), albeit the latter association is statistically significant at a marginal level

¹⁸ We turn to the dynamics of the government stake in Section III.A.

¹⁹ The variables are winsorized. Winsorization reduces the influence of outliers by bunching all data points below the 1st (above the 99th) percentile at the 1st (99th) percentile value.



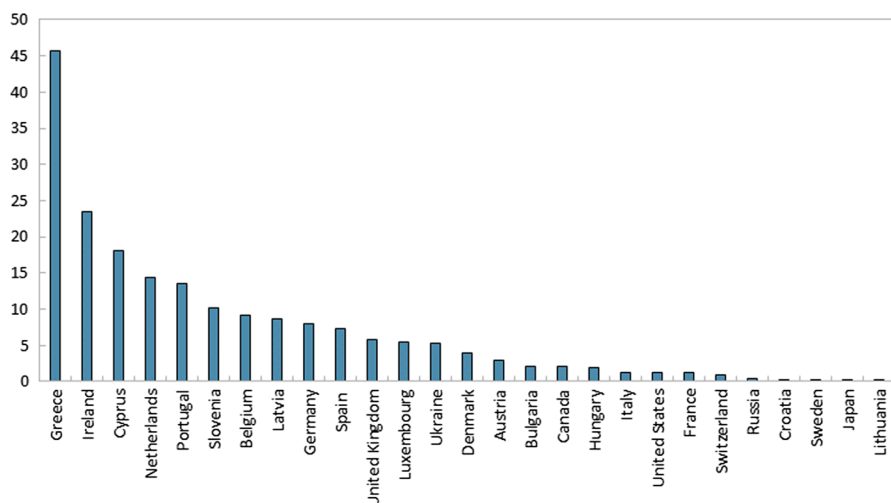


Fig. 1 Cumulative Direct Interventions by Country (2007–2017; in percent of 2017 GDP). This figure shows the cumulative direct public interventions in banks from 2007 to 2017, expressed as a percent of 2017 GDP. Data reflect the available information as of April 2018 for EU countries and as of end-2018 for the United States. *Sources* National authorities; European Commission; bank reports; IMF staff estimates

(Table 4). When we include all bank characteristics in the same regression, however, capitalization, liquidity, and profitability (return on average assets) all have negative and statistically significant coefficients.^{20,21}

These findings suggest that, broadly speaking, banks with initial weaker fundamentals needed and were allocated larger public resources. Notably, the stronger relationship of interventions with capitalization compared to the relationship with liquidity is in line with interventions being motivated by a desire to restore equity in stressed banks. By highlighting the potential cost differential (as indicated by the size of the intervention) between intervening in weaker and stronger banks, these patterns can also help inform future bank resolutions and provide an additional argument in favor of strong prudential regulation to reduce the need for government support.

²⁰ We choose between two measures of capitalization and two measures of profitability in the horse-race specification, given the potential collinearity when we include both. Our choice between the different proxies is informed by the number of observations: we choose equity-to-asset ratio over Tier 1 ratio for capitalization and return on average assets over net interest margin for profitability because they have better coverage.

²¹ Given that the sample in this instance is only a cross-section of banks, we cannot include bank fixed effects. We do observe the banks in different countries in different time periods, however, so we can add country-year fixed effects. This would allow us to contrast banks within a country and in a given year, at the cost of dropping country-level macro-financial variables. Here we keep the results with the latter but confirm their robustness to including country-year fixed effects (results available upon request).



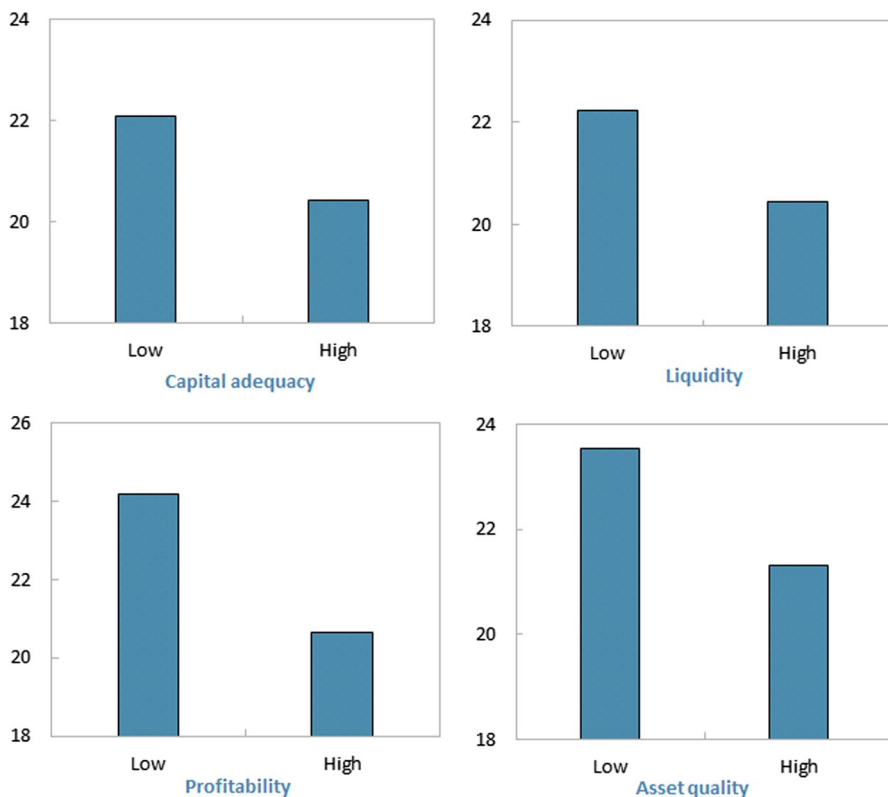


Fig. 2 Initial Public Holdings in a Bank by Certain Lagged Characteristics (in percent of total bank equity). This figure shows the average initial public holdings in a bank as a percent of the bank's total equity on the vertical axes by various levels of capital adequacy, liquidity, profitability, and asset quality on the horizontal axes. Public holdings are calculated as the winsorized total public holdings of equity, hybrid instruments, and debt divided by the bank's total equity. The initial stake is the first intervention the bank received. Bank variables (capital adequacy, liquidity, profitability, and asset quality) are measured during the year preceding the first intervention and are labeled high (low) relative to the sample mean. High (low) capital adequacy indicates above-(below-) average Tier 1 capital ratio. Liquidity is measured by the ratio of liquid assets to total assets. High (low) liquidity indicates above-(below-) average liquid assets to total assets. Profitability is measured by the return on assets. High (low) profitability indicates above-(below-) average return on assets. Asset quality is measured by the ratio of problem loans to gross customer loans. High (low) asset quality indicates below-(above-) average problem loans to gross customer loans. Data reflect the available information as of April 2018 for EU countries and as of end-2018 for the United States. *Sources* National authorities; European Commission; bank reports; S&P Market Intelligence, IMF staff estimates

Among the variables capturing the macro-financial conditions in the country around the time of initial intervention, we note a negative relationship with GDP growth, credit growth, and public debt. In countries where GDP growth, credit growth, and public debt were lower, the average intervention was higher. This is consistent with more severe macro-financial downturns being associated with larger interventions and governments with more ample fiscal room being able to provide more support to their financial institutions. A related possible interpretation of these



results taken together with those on the bank-level conditions is that supportive macroeconomic policies that rein in the decline in economic activity might limit the need to provide direct support to individual financial institutions.

These findings suggest that the interventions in our sample were primarily driven by capital shortages in individual institutions, while deteriorating macro-financial conditions also played a role. Additional statistics confirm that restoring capital was a key objective of interventions: in a typical intervened bank, interventions in the form of equity as a share of assets amounted to 2.2%, compared to the pre-intervention equity-to-asset ratio of 8.6%. Another way to see that is to look at the distribution of equity ratios with and without interventions (with the latter defined as equity ratio calculated after subtracting the government equity stake from bank equity). Figure 3 shows that the counterfactual distribution of equity ratios if there were no interventions would be skewed to the left, confirming that preserving equity was a major motivation. A natural question that comes to mind is to what extent other policies such as a complete suspension of dividend payments could have helped since recapitalization needs would be smaller if dividends were suspended by banks that receive support. To answer this question, we conduct a simple back-of-the-envelope calculation where we assume that the intervened banks retained the funds they would otherwise redistribute to their shareholders. In this counterfactual scenario, the equity ratio of intervened banks would have been 0.4 percentage point higher on average with a total of \$380 billion added to bank capital, or about a quarter of the cumulative direct support provided by governments in 2007–2017.²²

One may also wonder what happened to intervened banks' performance following the intervention. While an exercise that would aim to establish causal relationships is beyond the scope of the current paper, we run a simple regression where the dependent variable is the three-year ahead level of the bank indicator of interest and initial intervention is an explanatory variable. Specifically:

$$Indicator_{bc,t+3} = \alpha + \beta Stake_{bct} + \theta X_{bc,t-1} + \delta_{ct} + \varepsilon_{bct} \quad (2)$$

where *Indicator* is a measure of performance or soundness (liquidity, return on assets, non-performing loans, lending) for bank *b* in country *c* at time *t*+3 and the main variable of interest *Stake* is the initial stake government has taken at time *t*. *X* is a vector of pre-intervention bank characteristics, including the lagged value of *Indicator*, and δ_{ct} are country-year fixed effects.

The results show that, for a typical intervened bank, liquidity improved but capital ratios remained lower than banks without a stake (so far) or relative to banks with smaller stakes (Table 5). Return on assets declined while non-performing loans increased. Lending did not change significantly while total assets shrunk. These seem consistent with a recognition of losses following intervention by the government ((Tan et al. 2020) present similar evidence) and deleveraging.

²² In an exercise similar in spirit, (Gambacorta et al. 2020) estimate that a complete suspension of bank dividends in 2020 during the COVID-19 pandemic would have added \$ 0.8–1.1 trillion of bank lending capacity in a sample of 30 countries, equivalent to 1.1–1.6% of total GDP.



Recall that the sample used in the regression analysis includes only those banks that experienced a government intervention. Therefore, the regression results should be interpreted as relationships observed *conditional* on a bank being intervened. A related concern is that the intervened banks may have different characteristics than a typical bank in a given country, considering that the government's decision to intervene is not random. To address this sample selection bias, we run Heckman regressions using a larger sample including banks that were not intervened but were located in the countries covered in our sample. The results remain broadly the same.^{23,24}

3 The Evolution of Public Asset Holdings

In some cases, there were interventions that followed the first one as the bank in question remained distressed, increasing the government stake. In many countries, public asset holdings in individual intervened banks remain significant even a decade after the original intervention. This section studies the dynamics of the government stake, with a focus on the financial asset holdings remaining in public hands and the patterns of their divestment.

The speed and extent of the unwinding of public asset holdings varied widely across countries. Some countries, like the United States, recovered the funds provided for recapitalization and other support programs within a few years. Others, like Cyprus, liquidated insolvent banks only after the end-2017 cutoff date of our dataset. This reflects in part the different ways in which the crisis started and developed in different countries, the different ways in which it affected their macroeconomic circumstances, and the happenstance of new shocks (e.g., the euro area debt crisis), as well as the different crisis management and resolution frameworks. It may also reflect the different characteristics of the banks that were intervened.

To better understand these patterns, we construct current stocks of public holdings in individual banks by tracking the flows of asset purchases and sales in each bank by instrument from the time of the first intervention until end-2017. Because of data availability constraints, we are not able to examine public holdings of special purpose vehicles, impaired assets, or bad banks using our bank-level data (this is done at the country level in Section IV). We also cannot track impaired asset relief and the triggering of guarantees through time, because these data are not available at the bank level.

²³ These regressions are not presented for the sake of brevity but are available upon request.

²⁴ Concern about selection bias could also arise given that almost two-third of the interventions in our sample involve US institutions. To alleviate this concern, we repeat our analysis dropping interventions that happened under the TARP to confirm the robustness of the main findings, which remain broadly the same except for the coefficient on liquidity being not significant. Results are not displayed for the sake of brevity but are available upon request.



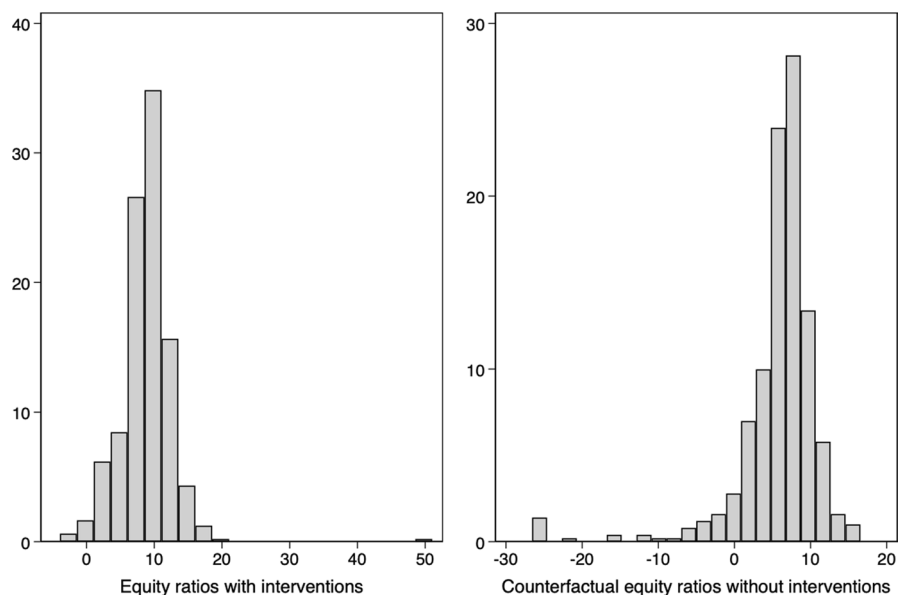


Fig. 3 Bank Capitalization and Equity Interventions. This figure shows the distribution of bank equity-to-asset ratios with and without government interventions in the form of equity. In the counterfactual, equity of a bank is calculated as its equity value minus the equity injected by the government. *Sources* National authorities; European Commission; bank reports; S&P Market Intelligence, IMF staff estimates

3.1 Remaining Asset Holdings in 2017

Public asset holdings in individual banks at end-2017 amounted to US\$ 135.3 billion, or 1.15% of GDP on average in the countries in our sample (Fig. 4). This average, however, masks considerable variation across countries.

The largest asset holdings relative to GDP can be found in Ukraine, where the government holdings amount to 7% of GDP following the nationalization of PrivatBank in December 2016; Luxembourg, with its holding of 34% of ordinary stock in BGL BNP Paribas (unchanged since 2009); Portugal given its ownership of Novo Banco—the good bank that emerged from the resolution of Banco Espírito Santo—and its capital injections in 2017 in Caixa Geral de Depósitos; and Greece, with its remaining stakes in the four large Greek banks (Piraeus, National Bank of Greece, Eurobank, and Alpha Bank). Germany and the Netherlands display a large outstanding asset holding of debt securities due to the novation of Sachsen LB's commercial paper facilities of €17.1 billion and of Fortis Bank Nederland's loan obligations of €16.1 billion.²⁵

²⁵ Novation is the act of replacing one contractual obligation with another, with the consent of all parties involved. Given the characteristics of the novations and the lack of further disclosed information, we treat these as outstanding.



Table 3 Bank Characteristics by Intervention Status. *Sources* National authorities; European Commission; bank reports; S&P Market Intelligence, FitchConnect, IMF staff estimates

	Tier 1	Equity	Liquidity	ROAA	NIM	NPL	Size
<i>All countries</i>							
<i>Intervened banks</i>							
Obs.	3966	4455	4325	4527	4352	4172	4696
Mean	12.9	9.1	23.4	− 0.3	3.3	5.0	11.4
Std. dev.	8.6	4.0	12.0	22.2	1.1	8.3	12.7
<i>Non-intervened banks</i>							
Obs.	31,879	75,818	28,647	68,719	33,862	31,303	97,904
Mean	18.4	41.8	32.7	2.7	2.6	6.3	9.5
Std. dev.	29.5	35.4	21.1	71.5	2.5	11.4	11.6
<i>Countries with large interventions</i>							
<i>Intervened banks</i>							
Obs.	255	239	244	281	252	244	292
Mean	11.5	6.9	22.5	− 7.6	2.0	19.4	11.7
Std. dev.	4.9	3.7	10.4	88.4	0.8	19.8	12.4
<i>Non-intervened banks</i>							
Obs.	1143	1124	1182	1296	1127	1020	1812
Mean	22.5	12.1	36.6	0.1	2.1	11.3	10.5
Std. dev.	36.3	12.8	22.9	4.9	3.0	15.2	12.0

This table shows the summary statistics for bank characteristics across banks that were intervened by the government and across banks located in the same set of countries but were not intervened. Capitalization is measured by Tier 1 ratio or by total equity divided by total assets. Liquidity is measured by the ratio of liquid assets to total assets. Profitability is measured by return on average assets (ROAA) or, alternatively, by net interest margin (NIM). Asset quality is measured by the ratio of problem loans to gross customer loans (NPL). Size is the log of total assets. Countries with large interventions are those where the size of total interventions exceeded 10% of GDP: Cyprus, Greece, Ireland, Netherlands, Portugal, Slovenia. Data reflect the available information as of April 2018 for EU countries and as of end-2018 for the United States

Overall, of the governments that intervened in their financial sectors, less than a third fully unwound their public stake positions by end-2017. Those are Austria, Bulgaria, Denmark, France, Latvia, Sweden, and Switzerland. Some of these public stakes were transferred to special purpose vehicles inside the general government, which we cannot track due to data availability. As such, our bank-level data may underestimate the actual remaining asset holdings on sovereign balance sheets.²⁶

Of course, the timing of the GFC and its aftershocks as well as the pattern of separate shocks hitting the economy and the financial sector have not been uniform across countries and, consequently, neither has been the timing of the interventions. Therefore, comparisons of remaining assets in public hands at a given point in

²⁶ In the United States, Fannie Mae and Freddie Mac, two government-sponsored enterprises, remain in government conservatorship—see Section IV. In addition, the United States—where the macro-financial recovery has been stronger and unwinding of investments rather methodical—still holds a minor \$47 million in outstanding TARP investments at end-2017.



Table 4 Initial Government Stake and Bank/Country Conditions. *Sources* National authorities; European Commission; bank reports; S&P Market Intelligence, IMF staff estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Bank variables</i>							
<i>Capitalization</i>							
Tier 1	-0.12 [0.24]						
Equity/assets		-0.60*** [0.06]					-1.02*** [0.13]
<i>Liquidity</i>							
Liquid/total assets			-0.01 [0.10]				-0.13*** [0.02]
<i>Profitability</i>							
ROAA				-0.53 [0.33]			-4.97*** [1.12]
NIM					-1.80* [0.88]		
<i>Asset quality</i>							
NPL						0.32 [0.52]	-0.04 [0.36]
<i>Size</i>							
Total assets, log	-1.18*** [0.22]	-1.28*** [0.33]	-1.09** [0.44]	-0.94*** [0.28]	-1.10** [0.38]	-0.61*** [0.17]	-0.03 [0.09]
<i>Country variables</i>							
GDP growth	-3.27** [1.36]	-2.88** [1.27]	-3.29** [1.35]	-2.78** [1.22]	-2.29* [1.25]	-0.65 [1.81]	-1.57 [1.36]
Credit growth	-1.35** [0.46]	-1.11** [0.42]	-1.33** [0.46]	-1.22** [0.42]	-0.99** [0.41]	-0.81 [0.64]	-0.26 [0.50]
Inflation	0.48 [0.96]	0.68 [0.86]	0.63 [0.96]	0.52 [0.94]	0.71 [0.86]	0.43 [1.18]	0.03 [0.68]
Unemployment	-0.63 [0.63]	-0.03 [0.52]	-0.47 [0.60]	-0.33 [0.57]	0.20 [0.53]	0.30 [1.08]	1.00 [0.70]
Public debt	-0.30*** [0.08]	-0.27*** [0.07]	-0.29*** [0.09]	-0.28*** [0.08]	-0.28*** [0.07]	-0.22** [0.09]	-0.16* [0.08]
Policy rate	0.01 [1.27]	0.13 [1.19]	-0.11 [1.34]	0.14 [1.26]	0.31 [1.25]	1.03 [1.64]	-0.36 [0.97]
Financial stress index	0.75* [0.39]	0.85** [0.36]	0.61 [0.43]	0.84** [0.32]	1.13*** [0.35]	1.06** [0.48]	1.89*** [0.52]
Observations	368	400	390	407	401	367	349
R2	0.14	0.20	0.13	0.14	0.14	0.12	0.34

This table shows the results of regressing the initial stake that a government holds in a bank on bank characteristics and country conditions. The initial stake is computed as the winsorized total public holdings of equity, hybrid instruments, and debt divided by the bank's total equity. Capitalization is measured by Tier 1 ratio or, alternatively, by total capital ratio. Liquidity is measured by the ratio of liquid assets to total assets. Profitability is measured by return on average assets or, alternatively, by net interest margin. Asset quality is measured by the ratio of problem loans to gross customer loans. All variables are expressed in percent except for the financial stress index, which is designed to be zero on average with negative (positive) values indicating below (above)-average financial market stress. All bank-level variables are lagged by one year. Year fixed effects are included. Robust standard errors are clustered at the country level



Table 5 Bank Performance and Initial Government Stake. *Sources* National authorities; European Commission; bank reports; S&P Market Intelligence, IMF staff estimates

Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)
	Capital	Liquidity	Profitability	Asset quality	Size	Lending
<i>Intervention</i>						
Initial stake	−0.16*** [0.01]	0.10*** [0.01]	−0.02*** [0.00]	0.17*** [0.01]	−0.01*** [0.00]	−0.02 [0.02]
<i>Capitalization</i>						
Equity/assets	0.27*** [0.00]	0.48*** [0.01]	−0.04*** [0.00]	−0.01 [0.01]	0.02*** [0.00]	−0.22*** [0.01]
<i>Liquidity</i>						
Liquid/total assets	−0.02*** [0.00]	0.71*** [0.01]	0.01*** [0.00]	−0.03** [0.01]	0.00*** [0.00]	0.20*** [0.01]
<i>Profitability</i>						
ROAA	0.12*** [0.02]	1.21*** [0.06]	0.12*** [0.01]	0.14* [0.06]	0.01* [0.00]	−1.10*** [0.10]
<i>Asset quality</i>						
NPL	0.03 [0.05]	0.65** [0.18]	−0.06** [0.01]	0.48* [0.16]	−0.02* [0.01]	−0.71** [0.24]
<i>Size</i>						
Total assets, log	0.25*** [0.01]	−0.02 [0.01]	0.10*** [0.00]	−0.15*** [0.02]	0.97*** [0.00]	0.08*** [0.02]
<i>Lending</i>						
Loans/assets						0.90*** [0.01]
Observations	300	294	299	283	303	300
R2	0.47	0.45	0.16	0.46	0.97	0.49

This table shows the results of regressing bank performance and soundness indicators on the initial stake that a government holds. The initial stake is computed as the winsorized total public holdings of equity, hybrid instruments, and debt divided by the bank's total equity. The dependent variable is the value of the bank indicator recorded three years after the initial intervention and varies by column. Capital is measured by total capital ratio. Liquidity is measured by the ratio of liquid assets to total assets. Profitability is measured by return on average assets. Asset quality is measured by the ratio of problem loans to gross customer loans. Size is the log of total assets. Lending is captured by the ratio of customer loans to total assets. All variables are expressed in percent. All regressions include country*year fixed effects. Robust standard errors are clustered at the country level

time—at end-2017, as we do here—may be distorted by when a country was hit and when its government intervened. To address this, we replicate Fig. 4 using holdings at the 5-year mark from the first intervention (Fig. A2 in the Appendix). While the order of countries changes, the observation that divestment pace has been different across countries remains valid.

Looking at individual bank characteristics, we find that public asset holdings remain high in banks with lower capitalization, profitability, and asset quality. The average direct intervention saw governments take a stake of 26% in financial



institutions, of which an average of 2.6% of total bank equity remained at end-2017. Dividing the sample of banks by financial soundness measures, we see that the remaining public asset stake is higher for banks with lower capital adequacy, profitability, and asset quality (Fig. 5). Stakes in these weaker banks may be harder to divest to the private sector. Interestingly, we find that the public asset stake is also lower in banks with lower liquidity, although this result does not hold in multivariate regression analysis.²⁷

To further explore these patterns, we regress the government stake at a given point in time following the first intervention in a given bank on bank characteristics and country macro-financial conditions, as well as bank, country, and year fixed effects:

$$State_{bct} = \alpha + \beta X_{b,t-1} + \gamma Y_{ct} + \varphi_b + \gamma_c + \delta_t + \varepsilon_{bct} \quad (3)$$

The left-hand side variable is the government stake in bank b in country c in year t , measured as the winsorized total public holdings of equity, hybrid instruments, and debt divided by the bank's total equity. X is a vector of lagged bank characteristics (capitalization, liquidity, profitability, and asset quality in the previous period; as well as lagged size), Y is a vector of macro-financial conditions (real GDP growth, credit growth, inflation, unemployment, public debt-to-GDP ratio, the monetary policy rate, and the financial stress index), and φ_b , γ_c , and δ_t are bank, country, and year fixed effects, respectively.²⁸ Error terms are clustered at the country level.

The results suggest that, conditional on being intervened, better-capitalized banks and those with higher liquidity and profitability see bigger declines in the stakes the government has taken in them (Table 6). Interestingly, subsequent changes in government stake are not as much predicted by bank equity but are more connected to current operating performance. A potential explanation is that interventions are initially motivated by the goal of boosting bank equity but divestment appears to be more forward-looking with an eye on getting banks back to sustainable dynamics so that poorly-performing banks for not become undercapitalized again after exit.²⁹ There is also some indication that higher unemployment and lower public debt tend to be associated with a higher government stake. In terms of economic magnitudes, country conditions seem to be more powerful than bank variables. For instance, a 1-standard-deviation or 2.5-percentage-point increase in unemployment corresponds

²⁷ This may be because big banks are generally more liquid and divestments in big banks may occur more slowly given their systemic importance. Alternatively, intervened banks may rely more on liquidity support provided by central banks and may have stronger incentives to hold sovereign bonds—which are classified as liquid assets and are often used as collateral to access central bank liquidity assistance. Moral suasion or an incentive to align their fate with that of the sovereign may also incentivize these banks to hold more sovereign bonds.

²⁸ In unreported results, we expand the time coverage for each bank to also include the period before the first intervention takes place and add as control the variable *InitialIntervention*, which is the bank-specific initial intervention at time t (equal to zero for $t < T$ and to the amount of the first intervention for $t \geq T$, where T is the year during which the first intervention took place in bank b). The findings are broadly the same.

²⁹ We thank an anonymous referee for offering this explanation.



to a 0.3-standard-deviation or 3.7-percentage-point rise in the government stake (based on column 7). By contrast, a 1-standard-deviation or 1.1-percentage-point decrease in profitability corresponds to a 0.12-standard-deviation or 1.5-percentage-point rise.

The correlation between remaining public holdings and bank characteristics is much stronger for smaller banks. We split the sample between big banks and smaller (i.e., small and medium-sized) banks at a threshold of \$50 billion (Table 7). We find that the coefficient estimates on capitalization, liquidity, and profitability are negative and significant for small and medium-sized banks, whereas for big banks the coefficient estimates are not significant, even though they have the expected sign. The difference in the regression results for big and small banks is in line with big (systemic) banks receiving public support even when they are not facing capitalization issues, possibly because authorities act preemptively to prevent liquidity and profitability issues in these banks from leading to systemic distress.

3.2 Pace of Intervention, Recovery, and Instruments

Country experiences differed widely by date of intervention and speed of resolution. The scale of the interventions differed markedly—we group countries into four categories: large, medium, small, and minimal interventionists (Fig. 6).³⁰ But even within each of the groups, the speed of interventions and resolutions was different. For example, interventions in the United States, Denmark, and Ireland reached their peak level shortly after the start of interventions and gradually declined thereafter. In other countries, interventions started modestly but later increased in size.³¹

The difference may be attributable to the fact that some of these countries were hit twice: first by the GFC, and later by the euro area crisis and, in some cases, more idiosyncratic national crises. The patterns observed in Cyprus, Greece, Italy, and Portugal particularly fit this more complex narrative (in fact, the first hit from the GFC barely harm these countries). The divestment or recovery of the interventions also follows different paths. In several countries, the government stake starts dwindling within a year after the initial intervention and is almost entirely unwound by the fourth or fifth year. For instance, in the United States, nearly all funds for recapitalization provided through the TARP were repaid as early as 2013. In other

³⁰ Gross direct interventions are categorized as large if they exceed 10% of 2017 GDP, medium if they are between 4 and 10%, small if between 1 and 4%, and minimal if below 1%. The categorization may seem too simple or arbitrary, so we try an alternative where we use the size of the cumulative residuals from regressing intervention size on a type-of-intervention dummy and changes in the financial stress index, banking system assets, Herfindahl index, and system-wide bank profitability, liquidity, and capital ratios. The majority of the countries (60%) remain in the same category as before and no country move more than one step up or down. Accordingly, the patterns displayed in Fig. 6 also remain broadly unaltered.

³¹ One concern is that the patterns of unwinding may reflect valuation losses since the government stake is expressed in market value whenever such information is available (that is, when the intervened bank is and continue to be publicly traded). To address this, we construct an alternative version of Fig. 6 with total value of the equity in the intervened banks instead of GDP in the denominator. The picture remains broadly the same (available upon request).



Table 6 Evolution of Government Stake and Bank/Country Conditions. *Sources* National authorities; European Commission; bank reports; S&P Market Intelligence, IMF staff estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Bank variables							
<i>Capitalization</i>							
Tier 1	-0.12*** [0.01]						
Equity/assets		0.02 [0.04]					0.05 [0.07]
<i>Liquidity</i>							
Liquid/total assets			-0.11*** [0.01]				-0.09*** [0.01]
<i>Profitability</i>							
ROAA				-1.23*** [0.24]			-1.32*** [0.24]
NIM					-1.92*** [0.10]		
<i>Asset quality</i>							
NPL						0.23 [0.15]	0.13 [0.12]
<i>Size</i>							
Total assets, log	4.41*** [0.48]	4.82*** [0.40]	4.83*** [0.42]	4.18*** [0.68]	4.59*** [0.42]	4.24*** [0.47]	5.29*** [0.58]
<i>Country variables</i>							
GDP growth	0.12 [0.29]	0.24 [0.27]	0.10 [0.29]	0.45 [0.27]	0.33 [0.26]	0.09 [0.28]	0.23 [0.26]
Credit growth	-0.10 [0.15]	-0.06 [0.15]	-0.06 [0.15]	0.04 [0.13]	-0.10 [0.13]	-0.17 [0.14]	0.10 [0.16]
Inflation	-0.53 [0.55]	-0.64 [0.59]	-0.43 [0.56]	-0.56 [0.51]	-0.66 [0.50]	-0.58 [0.46]	-0.37 [0.58]
Unemployment	1.53*** [0.31]	1.65*** [0.39]	1.51*** [0.36]	1.36*** [0.28]	1.29*** [0.26]	1.11*** [0.29]	1.49*** [0.48]
Public debt	-0.20** [0.09]	-0.25** [0.09]	-0.16* [0.09]	-0.28*** [0.08]	-0.26** [0.09]	-0.28*** [0.08]	-0.24** [0.10]
Policy rate	-0.95 [0.58]	-0.61 [0.73]	-1.12 [0.66]	-0.61 [0.54]	-0.76 [0.52]	-0.51 [0.58]	-0.69 [0.78]
Financial stress index	0.33 [0.25]	0.30 [0.25]	0.25 [0.28]	0.36 [0.22]	0.45* [0.24]	0.32 [0.19]	0.19 [0.27]
Observations	2,619	2,961	2,895	2,966	2,874	2,758	2,687
R2	0.72	0.72	0.72	0.72	0.72	0.72	0.43

This table shows the results of regressing the evolving government holdings in a bank on bank characteristics and country conditions. Government holdings are computed as the winsorized total public holdings of equity, hybrid instruments, and debt divided by the bank's total equity at a given time following the initial intervention in the bank. Capitalization is measured by Tier 1 ratio or, alternatively, by total capital ratio. Liquidity is measured by the ratio of liquid assets to total assets. Profitability is measured by return on assets or, alternatively, by net interest margin. Asset quality is measured by the ratio of problem loans to gross customer loans. All variables are expressed in percent except for the financial stress index, which is designed to be zero on average with negative (positive) values indicating below (above)-average financial market stress. All bank-level variables are lagged by one year. All regressions include bank, country, and year fixed effects. Robust standard errors are clustered at the country level



countries, divestment stops or slows down after a few years. As a result, substantial public stakes remain even a decade after the initial investment. For instance, in the United Kingdom, some £20 billion remained outstanding at end-2017, primarily in the form of a 71% stake in Royal Bank of Scotland.

Slow recovery of provided support is associated with worse macroeconomic outcomes. We relate the divestment patterns underlying the remaining asset holdings to country-level macro-financial conditions. Notably, we see that relatively small unwinding of the government stake—defined as below-median recovery of assets as of 2017—is associated with lower private investment growth and lower bank credit growth (Fig. 7), and to a lesser extent with lower overall GDP growth.³²

Furthermore, in countries with slow recovery we also observe deterioration in financial access, depth, efficiency, and competition, while the improvement in financial stability is not as pronounced as in countries where the public stake has been reduced more swiftly (Fig. 8).

Unwinding equity (and hybrid) stakes takes longer than unwinding debt instruments (Fig. 9). This could simply be due to the nature of the instrument, with debt contracts having a well-defined maturity. It could also be a reflection of the challenge in finding the right time to put an acquired equity stake on the market. The initial choice of the instrument is likely endogenous and could be indicative of the nature or severity of the problems in the intervened bank. For instance, authorities may believe equity stakes are needed because of deep-rooted managerial quality issues that require more time to fix.

4 Other Aspects of The Interventions: Impaired Assets And Indirect Costs

Country-level data from official sources provide complementary information on the fiscal costs associated with gross direct interventions and confirm our findings. The bank-level data in Sections II and III do not include all components of the impact of direct interventions on public finances. For instance, they do not capture the revenue and expenditure streams associated with government assets holdings. Moreover, while the bank-level dataset allows us to assess the remaining public holdings of individual financial institutions, it does not include public holdings of impaired assets, therefore potentially underestimating total public holdings of banking assets due to GFC interventions. We thus turn to official data at the country level to complement the dataset developed in the earlier sections of this paper. These data are available on a consistent basis for a narrower set of countries—those in the European Union and the United States.

For the European Union countries, we examine Eurostat's Excessive Deficit Procedure (EDP) Supplementary Tables and European System of Central Bank's

³² We group countries based on how much reduction they have achieved in their public holdings of equity in the banks that were intervened. The documented associations are not about the level of government ownership but rather about the change in the level of government stake from its peak.



Table 7 Evolution of Government Stake: Big vs Small/Medium Banks. *Sources* National authorities; European Commission; bank reports; S&P Market Intelligence, IMF staff estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Big banks							
<i>Capitalization</i>							
Tier 1	-0.14 [0.13]						
Equity/assets		-0.56 [0.51]					-0.80 [0.58]
<i>Liquidity</i>							
Liquid/total assets			-0.17 [0.11]				-0.11 [0.15]
<i>Profitability</i>							
ROAA				-0.56 [1.12]			-0.59 [1.06]
NIM					-0.57 [0.78]		
<i>Asset quality</i>							
NPL						-0.05 [0.14]	-0.09 [0.13]
<i>Size</i>							
Total assets, log	4.73 [4.54]	2.71 [4.06]	5.39 [5.00]	4.00 [3.51]	5.09 [4.85]	3.67 [4.33]	3.22 [5.53]
Country controls	yes	yes	yes	yes	yes	yes	yes
Observations	360	413	400	425	377	355	337
R2	0.72	0.73	0.73	0.72	0.72	0.73	0.74
Small/medium banks							
<i>Capitalization</i>							
Tier 1	-0.13*** [0.01]						
Equity/assets		-0.01 [0.02]					-0.05*** [0.01]
<i>Liquidity</i>							
Liquid/total assets			-0.09*** [0.00]				-0.08*** [0.00]
<i>Profitability</i>							
ROAA				-1.34*** [0.16]			-1.39*** [0.18]
NIM					-1.95*** [0.02]		
<i>Asset quality</i>							
NPL						0.40*** [0.06]	0.27*** [0.03]



Table 7 (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Size</i>							
Total assets, log	4.59*** [0.04]	5.11*** [0.03]	5.10*** [0.05]	4.53*** [0.70]	4.71*** [0.04]	4.43*** [0.07]	5.57*** [0.08]
Country controls	yes	yes	yes	yes	yes	yes	yes
Observations	2,254	2,541	2,486	2,537	2,521	2,400	2,345
R2	0.73	0.73	0.73	0.74	0.73	0.73	0.75

This table shows the results of regressing the evolving government holdings in big versus small and medium-sized banks on bank characteristics and country conditions. Big (small/medium) banks are those with more (less) than \$50 billion in total assets. Government holdings and bank-level variables (lagged by one year) are defined as in Table 6. All regressions include bank, country, and year fixed effects, as well as country-level macro-financial controls as in Table 6 (coefficients of which are not reported for the sake of brevity). Robust standard errors are clustered at the country level

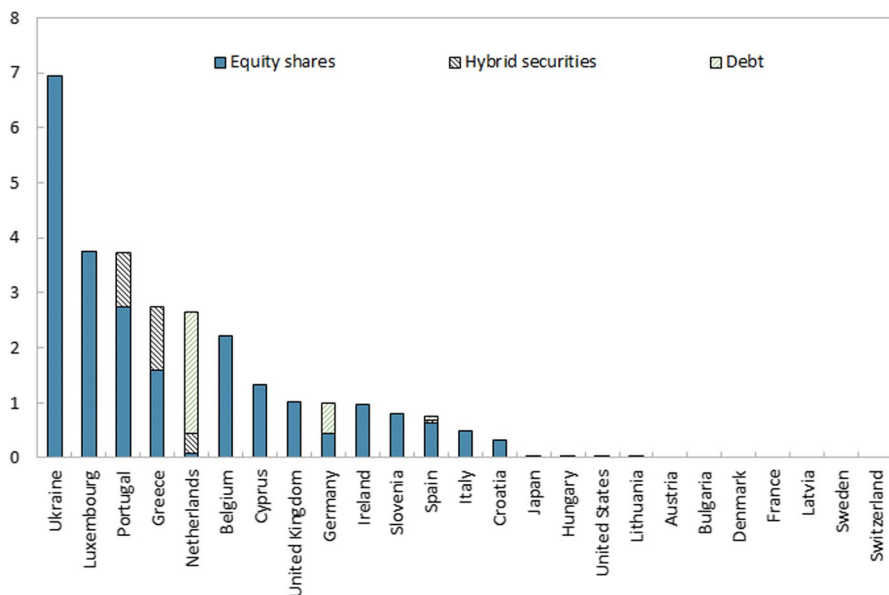


Fig. 4 Public Asset Holdings by Instrument (2017; in percent of GDP). This figure shows public asset holdings in banks in 2017, expressed as a percent of 2017 GDP. Data reflect the available information as of April 2018 for EU countries and as of end-2018 for the United States. *Sources* National authorities; European Commission; bank reports; IMF staff estimates

(ESCB) Financial Assistance Measures (FAM) Tables (as of April 2018). For the United States, detailed information is available on the TARP, but less is known on, for instance, the public asset holdings and revenue/expenditure streams resulting



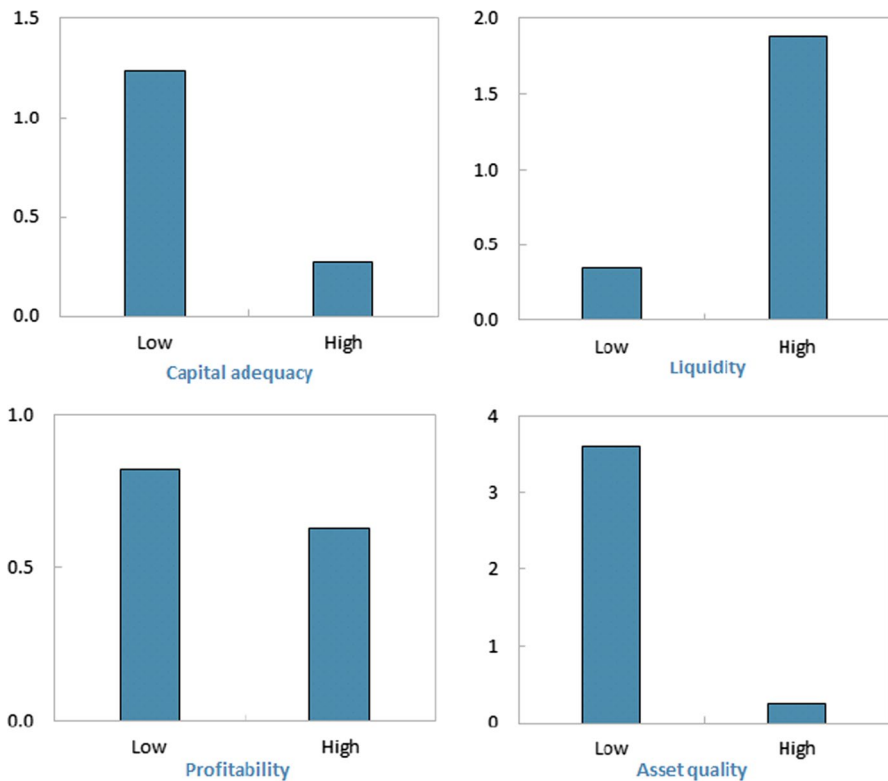


Fig. 5 Remaining Public Holdings in a Bank by Certain Lagged Characteristics (in percent of total bank equity). This figure shows the average remaining public holdings in a bank as a percent of the bank's total equity on the vertical axes by various levels of capital adequacy, liquidity, profitability, and asset quality on the horizontal axes. Public holdings are calculated the winsorized total public holdings of equity, hybrid instruments, and debt divided by the bank's total equity. The remaining stake is as of 2017. Bank variables [profitability, capitalization, liquidity, and asset quality] are measured in 2016 and are labeled high [low] relative to the mean. Capitalization is measured by the Tier 1 ratio. High [low] capitalization indicates above-[below-] average Tier 1 capital ratio. Liquidity is measured by the ratio of liquid assets to total assets. High [low] liquidity indicates above-[below-] average liquid assets to total assets. Profitability is measured by the return on assets. High [low] profitability indicates above-[below-] average return on assets. Asset quality is measured by the ratio of problem loans to gross customer loans. High [low] asset quality indicates below-[above-] average problem loans to gross customer loans. Data reflect the available information as of April 2018 for EU countries and as of end-2018 for the United States. *Sources* National authorities; European Commission; bank reports; S&P Market Intelligence, IMF staff estimates



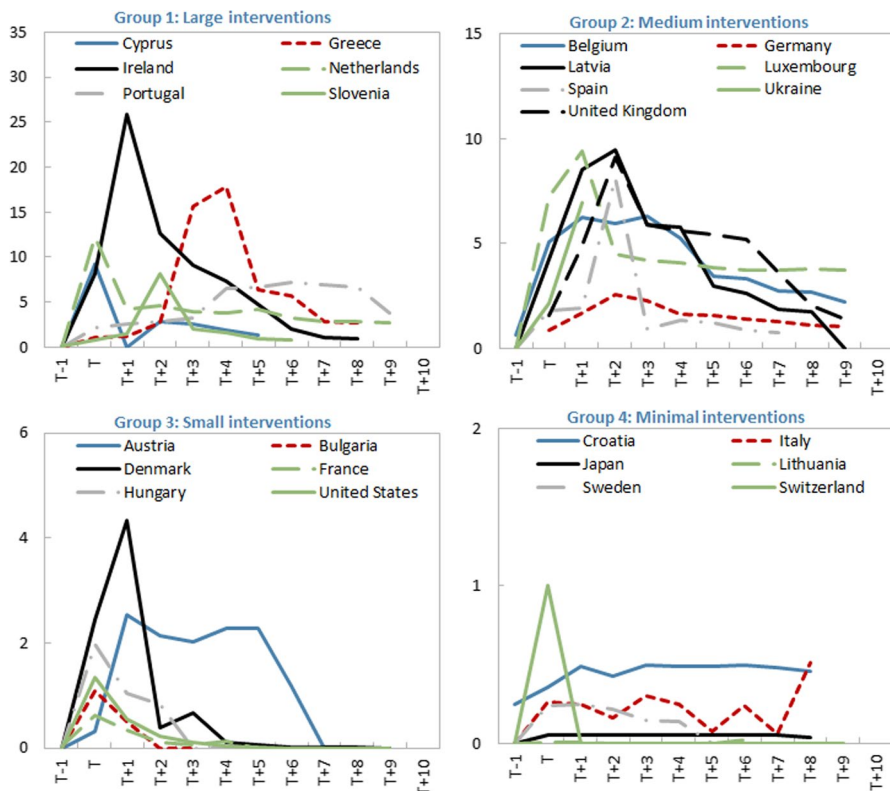


Fig. 6 Bank Liabilities in Public Hands (2007–2017; in percent of GDP). This figure shows the evolution of public holdings in banks that received public support since the GFC as a percent of GDP. T is the country-specific date of first intervention in either equity shares, hybrid securities, or debt instruments. Data reflect the available information as of April 2018 for EU countries and as of end-2018 for the United States. *Sources* National authorities; European Commission; bank reports; IMF staff estimates

from the Treasury conservatorship of Fannie Mae and Freddie Mac. Therefore, the following sections present data solely on TARP.³³

³³ Based on reports available from the Department of the Treasury and the Federal Housing Finance Agency (FHFA), total gross financial support in our sample increases by \$412 billion (at end-2018) once we include the Purchase Programs for GSE and Mortgage-Related Securities and the Senior Preferred Stock Purchase Agreement of Fannie Mae and Freddie Mac. The revenue flows resulting from these agreements have been substantial. For instance, revenue from draws on Treasury commitments to Fannie Mae and Freddie Mac under the second program amounted to 1.5% of GDP by end-2018 (see [here](#) for more information).



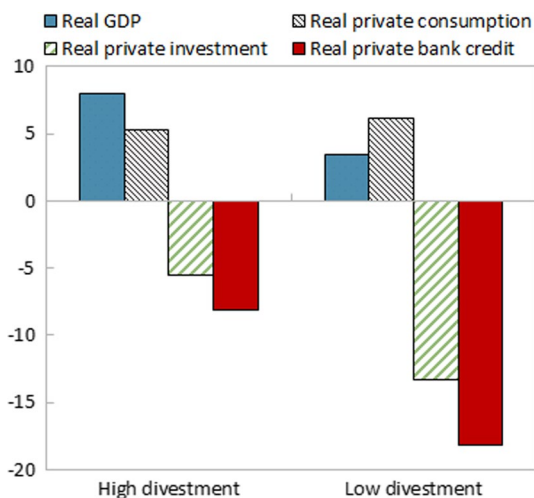


Fig. 7 Divestment and Macroeconomic Aggregates (2008–2017). This figure shows the cumulative percent change in macroeconomic variables between 2008 and 2017 across country groups that differ by the divestment rate of public stakes in banks which received public support since 2008. A country has a high[low] divestment rate if it experienced above- [below-] average drops in public holdings between the peak holdings and 2017. Private investment is measured as the gross fixed capital formation. Data reflect the available information as of April 2018 for EU countries and as of end-2018 for the United States. Sources IMF World Economic Outlook, Haver Analytics, IMF staff calculations

4.1 Current Asset Holdings Including Impaired Assets

An assessment of the remaining public asset holdings in the financial sector should include impaired assets that were transferred onto the general government balance sheet. Such transfers do not show in our bank-level dataset.³⁴ At the country level, however, aggregate data on the acquisition and disposal of impaired assets are available. Accordingly, a country-level approach is appropriate to investigate the overall impact on governments' balance sheets of interventions and subsequent divestments.

The country-level data are consistent with aggregated bank-level data for equity, debt, and hybrid instruments (Fig. A3–A5 in the Appendix). In addition, the country-level data provide information on impaired assets that were purchased by the government and subsequently reclassified into general government balance sheets. For instance, the data reveal that Austria, Germany, and Slovenia still hold sizable impaired assets in excess of 4% of 2017 GDP (Fig. 10). Including these distressed assets, total financial asset holdings that remain on government balance

³⁴ In particular, the lack of available data on these asset management vehicles and their often-complex ownership structures complicate attempts to value the assets they manage, and the profits accrued from any asset sales.



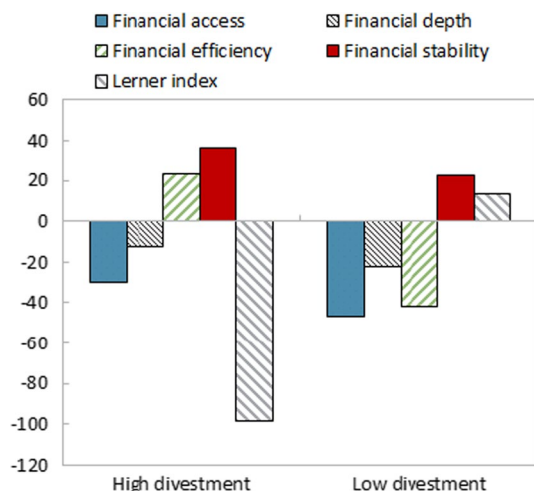


Fig. 8 Divestment and Financial System Characteristics (2008–2016). This figure shows the cumulative percent change in structural variables between 2008 and 2016 across country groups that differ by the divestment rate of public stakes in banks which received public support since 2008. A country has a high [low] divestment rate if it experienced above- [below-] average drops in public holdings between the peak holdings and 2017. Except for the Lerner index, the cumulative percent change in each structural variable is calculated as the average of several structural indicator changes. Financial access is bank branches per 100,000 adults. Financial depth includes five indicators: private credit by deposit-money banks [DMBs] to GDP; DMBs' assets to GDP; nonlife insurance premium volume to GDP; private credit by DMBs and other financial institutions to GDP; and domestic credit to the private sector. Financial efficiency includes seven indicators: bank net interest margin; bank overhead costs to total assets; bank return on assets after tax; bank return on equity after tax; bank return on assets before tax; bank return on equity before tax; and credit to government and state-owned enterprises. Financial stability includes two indicators: bank regulatory capital to risk-weighted assets and liquid assets to deposits and short-term funding. Calculations are as of 2016 because a later update was not available at the time of calculation except for the Lerner index, which was calculated as of 2014. Data reflect the available information as of April 2018 for EU countries and as of end-2018 for the United States. *Sources* World Bank Global Financial Development Database, IMF staff calculations

sheets are currently worth \$356 billion for the countries in the European Union (Table 8, column D).³⁵

4.2 Fiscal Impact of Direct Interventions

Country-level data broadly confirm aggregate individual bank data on gross direct interventions and divestment. Even with the methodological difference in data compilation, the average absolute value of the difference in gross direct interventions between the two datasets is 1/2% of 2017 GDP (Appendix III).

³⁵ The current holdings of financial assets are estimated at nominal value, except for ordinary shares which are estimated at market value. Therefore, given that it is unlikely that a potential sale of these financial assets would take place exactly at current valuations, subsequent columns in Table 8 must be interpreted with caution.



The country-level data provide further interesting insights. First, recovery has been uneven across countries. For instance, Denmark, Lithuania, and the Netherlands recovered more than 80% of the gross direct interventions cumulatively over 2007–2017. In contrast, among the countries with large interventions, recovery stood well below 20% in Cyprus and Portugal over the same period.^{36,37}

Second, the net direct fiscal impact—the difference between gross direct interventions and direct recovery—is \$0.7 trillion (Table 8, column C), equivalent to 2% of 2017 GDP. Net direct fiscal impact is the highest for Greece and Cyprus (Fig. 11). After subtracting remaining asset holdings, the net fiscal impact drops to less than 1% of 2017 GDP (Table 8, column E).

Third, cumulatively over a decade, the net indirect benefits amounted on average to 0.2% of 2017 GDP (Table 8, column F). These benefits have resulted from higher revenue than expenditure streams from public asset holdings (ECB 2016). Such revenues include, for instance, received dividends and fees, while expenditures include interest payments on debt issued to finance the government's support of financial institutions. For many governments the indirect fiscal impact has been positive in net terms (e.g., Greece and Denmark—see Fig. 12), while others have incurred net costs over the last decade (e.g., Cyprus, Slovenia, and Portugal.³⁸ Taking account of these indirect benefits lowers the total fiscal impact of interventions to some \$250 billion or an average 0.7% of 2017 GDP (Table 8, column G).

Putting all components (gross direct interventions, direct recovery, remaining asset holdings, and indirect impact) together, Fig. 13 shows the total fiscal impact across our sample. The total impact varies widely across countries. It is near 20% of 2017 GDP in Greece and Cyprus, 12% in Slovenia, and 9% in Portugal. Other countries saw total costs of 5% of 2017 GDP or less, with 11 countries exhibiting total costs of below 1% of 2017 GDP or even small gains.³⁹

Note that our dataset and analyses have exclusively focused on direct government interventions and the stake the government has taken in banks as a result. In some

³⁶ Country-level (flow) data on gross direct interventions and their recovery for Austria, Luxembourg, and Slovenia are not public and were not made available for this study. Country-level (flow) data on gross direct interventions, their recovery, net indirect and total costs for Ireland were made available for this study but are not public. For these countries, all macro-level data are based on Eurostat EDP Supplementary Tables. Data for Cyprus are estimated based on ECSB and Eurostat data. Euro area and European Union aggregate data, however, do include these countries. Numbers for individual eurozone countries do not necessarily add up to the total eurozone numbers given, for instance, valuation changes in countries for which the data were not provided for the purpose of this study.

³⁷ Since end-2017, Cyprus has liquidated several banks. The recovery rate shown does not take this into account as the cutoff date for our dataset is end-2017.

³⁸ Subsequent revenue and expenditure streams once assets are reclassified into the general government are not captured in the existing European frameworks. Therefore, the full indirect fiscal impact is difficult to estimate. For instance, repayments from the British defeasance structures set up for Northern Rock and Bradford & Bingley, which were both reclassified into the general government after their failure, have amounted to £37.7 billion and significantly reduced the total fiscal impact of gross direct interventions. But because such repayments are within-government and do not affect the general government debt nor deficit, they are not included in either the ECB or the Eurostat data.

³⁹ For more information on the fiscal impact of direct interventions on government debt, see Box 1 in the Online Appendix.



Fig. 9 Direct Holdings by Instrument Pecking Order (2007–2017; in percent of GDP). This figure shows the evolution of public holdings of bank equity shares, hybrid instruments, and debt securities in countries that have used all three types of interventions since the GFC as a percent of GDP. Data reflect the available information as of April 2018. *Sources* National authorities; European Commission; bank reports; IMF staff estimates

cases, the size of government interventions was reduced by means of private sector burden sharing or bail-in (e.g., in Portugal and Slovenia; see Dell’Ariccia et al. (2018) for further information and references). The fiscal cost of public interventions would have been even larger in the absence of bail-ins in the cases where burden sharing has been achieved (e.g., converting to equity or writing off debt holders). This is particularly relevant for future crises, because the reformed resolution frameworks would make greater use of such procedures to resolve distressed banks.

5 Conclusions

This paper presents a new dataset on public interventions in the financial sector during the decade that followed the global financial crisis and that featured additional shocks in some countries. Through these data, we track both gross interventions and recovery in over 1100 individual financial institutions across 37 countries. The dataset is validated against aggregate country-level data. As the latter include impaired assets on government balance sheets and revenue and expenditure streams from public asset holdings, we are able to assess the total fiscal impact of public interventions in the financial sector.

This effort contributes to greater transparency in recording the fiscal implications of financial sector support. Nevertheless, data availability and transparency remain issues in many countries. Data are often inconsistent across countries and not easily accessible; in some cases, they remain confidential even a decade after the onset of distress in banks. Such practices hinder the evaluation of crisis intervention and resolution measures. We hope this paper will advance the discussion on data availability, transparency, and accountability. Special attention and priority could be given to establishing certain standards, including but not limited to annual reporting (if not higher frequencies) and disclosure of the evolution of government stakes and information on the steps the government is actually taking to divest such stakes. This is particularly important from a political perspective given the extensive use of taxpayer money. Other useful practices could involve distinguishing which government interventions require payback and which do not; identifying the governmental agency solely responsible for tracking repayment; tracking state aid even after bank dissolution or bank split (into good and bad banks); acknowledging where the government owns a direct stake or a stake through its agencies; publishing and making available annual reports that detail government holdings and steps taken to privatize banks and divest from stakes; discussion of treatment of state aid in complex cases, such as when the intervened bank is ultimately allowed to fail and/or is fully acquired by the government or a private entity; discussion of any conditions attached to the intervention (e.g.,



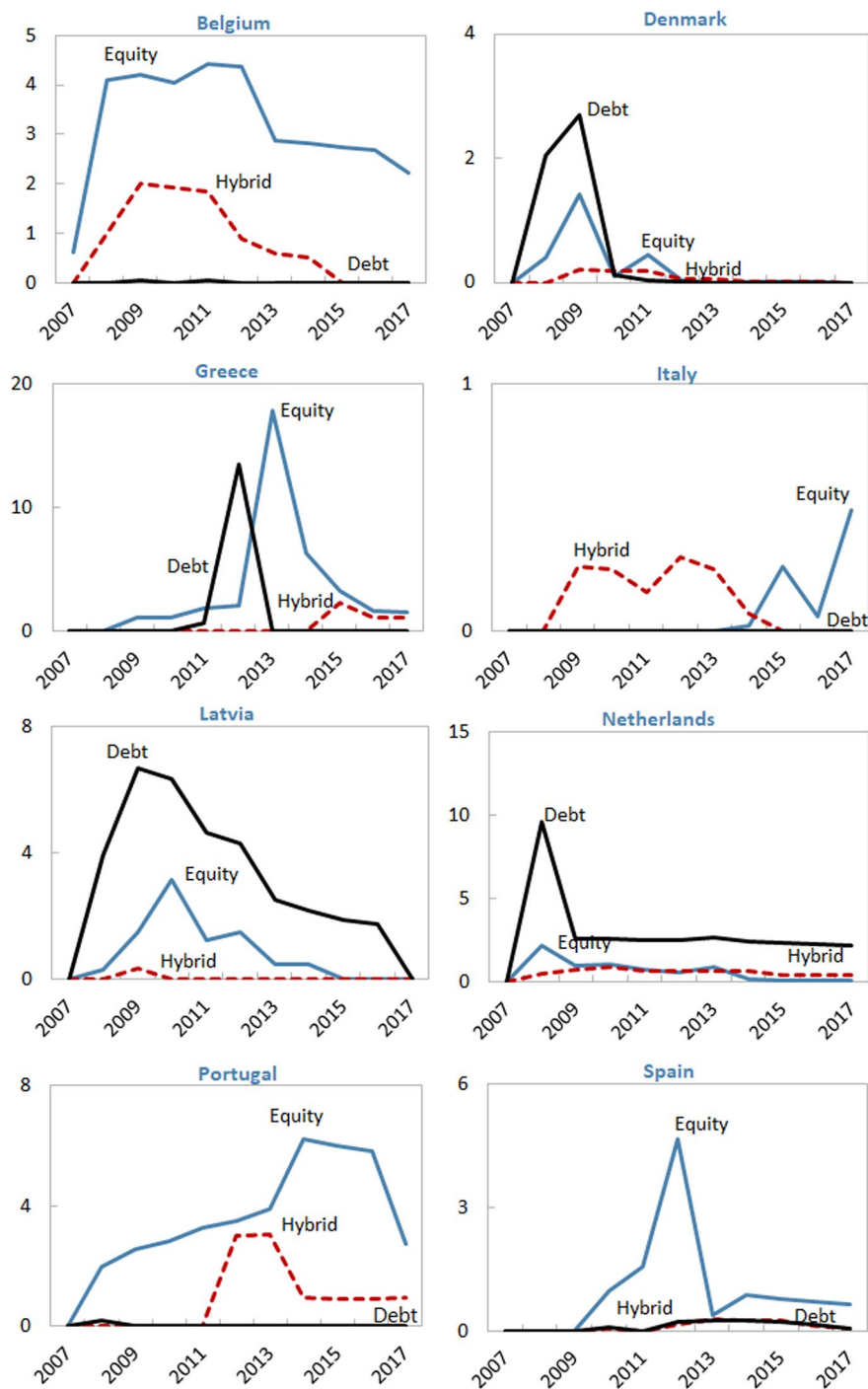


Table 8 Fiscal Impact of Government Interventions in the Financial Sector (2007–2017). *Sources* National authorities; ESCB; Eurostat; TARP; IMF staff estimates. Data vintage: April 2018

	Gross Direct Interventions [A]	Direct Recovery [B]	Net Direct Fiscal Impact [C=A-B]	2017 Financial Asset Holdings [D]	Net Direct Fiscal Impact minus Asset Holdings [D]	Indirect Fiscal Impact [F]	Total Fiscal Impact[G=E+F]
<i>USD billions</i>	1615	935	680	356	324	-75	250
Eurozone	1062	527	535	287	249	-23	225
United States [TARP]	361	332	29	0	29	-41	-13
Non-Eurozone EU	192	76	116	69	47	-10	37
<i>Percent of GDP</i>	4.5	2.6	1.9	1	0.9	-0.2	0.7

[+] indicates a positive fiscal cost; [-] indicates a negative fiscal cost (gain). This table shows the gross direct interventions, the direct recovery, the net direct fiscal impact, the financial asset holdings of governments as of 2017, the indirect fiscal impact, and the total fiscal impact in current billion USDs [end-of-period] and as a [weighted average] percent of 2017 GDP in the full sample of 29 countries. It also shows these measures separately for the Eurozone, the United States, and the non-Eurozone EU in current billion USDs. Data are cumulative from the beginning of the GFC in 2007 until the latest available data at end-2017 and do not include forthcoming support or redemptions. Data reflect the available information as of April 2018 for EU countries and as of end-2018 for the United States



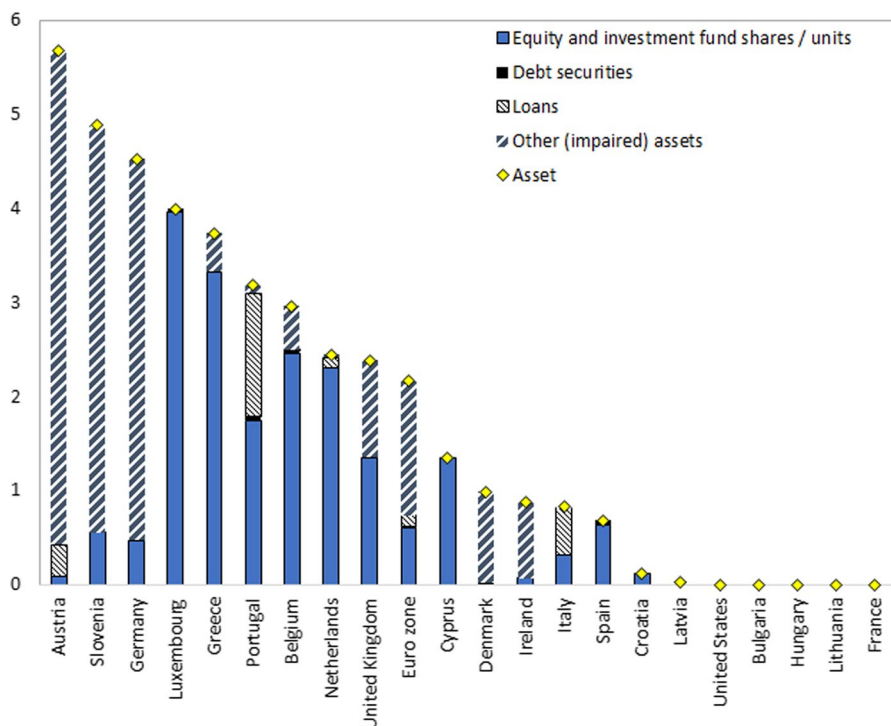


Fig. 10 Asset Holdings by Instrument (2007–2017; in percent of 2017 GDP). This figure shows asset holdings by instrument in selected economies as of 2017, expressed as a percent of 2017 GDP. Instruments include equity and investment funds shares/units, debt securities, loans, and other assets. Data reflect the available information as of April 2018 for EU countries and as of end-2018 for the United States. *Sources* National authorities; Eurostat; TARP and IMF staff estimates. Data vintage: April 2018

restructuring or sale of particular assets); the valuation of illiquid assets at fair or market value if sold or transferred.

Going forward, we aim to build on these datasets to provide more in-depth analysis of public interventions. In the preliminary analysis presented here we document that interventions were large, persistent, took primarily the form of equity, and targeted banks with lower capitalization and poorer performance. The initial interventions were also larger when GDP growth was lower and the country had less public debt. Subsequent adjustments to these interventions were more connected to measures of profitability. On average, the fiscal impact is approximately 15% of interventions; in other words, the government can recover 85%. Some interesting questions we plan to examine revolve around the interaction between bank size and government interventions, the macro-financial environment's effect on recovery and divestment rates, the factors underlying the choice of deploying different instruments in asset purchases, and the long-term consequences of government interventions in the financial sector including on growth, stability, and market structure.



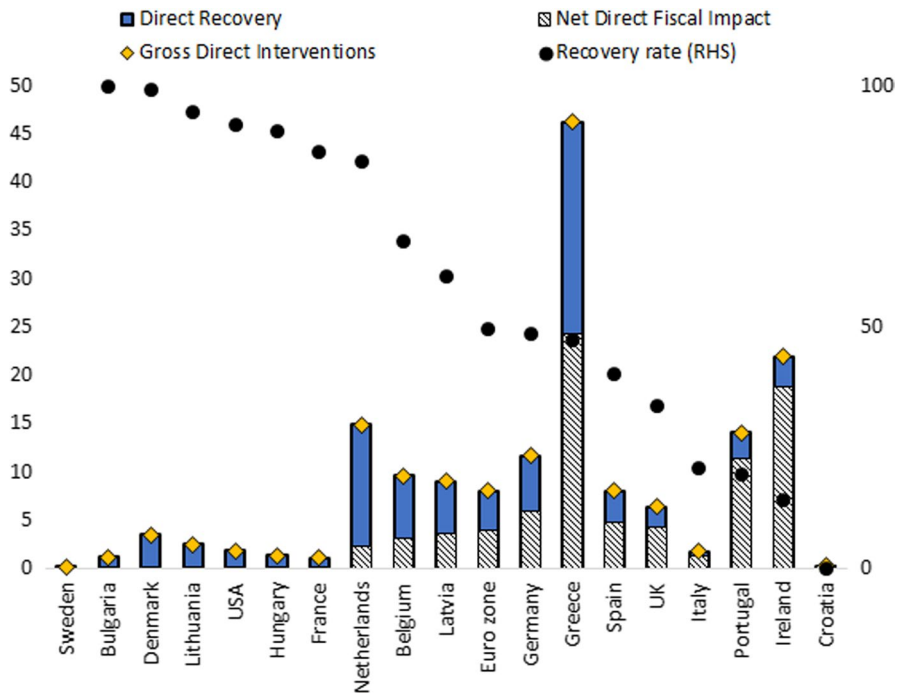


Fig. 11 Recovery Rate (2007–2017; in percent of 2017 GDP and in percent on RHS). This figure shows the gross direct interventions, the direct recovery, the net direct fiscal impact [[+] indicates a positive fiscal cost; [-] indicates a negative fiscal cost (gain)], and the recovery rate in selected economies as of 2017. The first three measures are expressed as a percent of 2017 GDP. Recovery rate is the percent ratio of direct recovery [column B of Table A1 in Appendix II] to gross direct interventions [column A]. A higher ratio is associated with larger recovery of the government support provided to financial institutions. The recovery rate for Sweden is 297% and is not shown. Data reflect the available information as of April 2018 for EU countries and as of end-2018 for the United States. *Sources* National authorities; ECB; Eurostat; and IMF staff estimates. Data vintage: April 2018



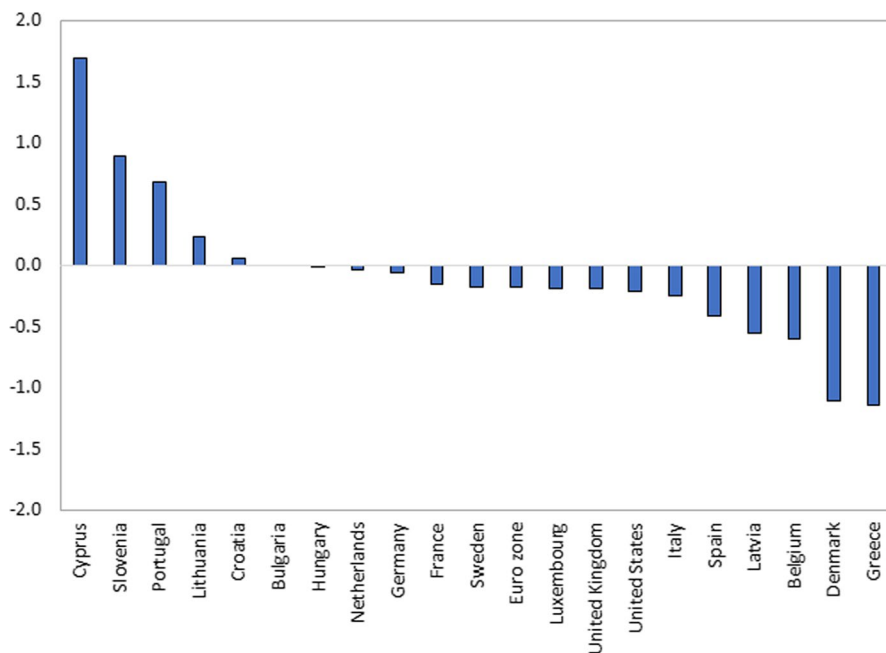


Fig. 12 Indirect Fiscal Impact of Government Interventions (2007–2017; in percent of 2017 GDP). This figure shows the indirect fiscal impact of government interventions as a percent of 2017 GDP. Data is from column F of Table A1 in Appendix II. [+] indicate a positive fiscal cost; [-] indicates a negative fiscal cost [i.e., gain]. For details on the fiscal impact of financial interventions for Austria, please refer to Eurostat EDP tables and Holler and Reiss (2017). Data reflect the available information as of April 2018 for EU countries and as of end-2018 for the United States. *Sources* National authorities; Eurostat; ECB; IMF staff estimates. Data vintage: April 2018

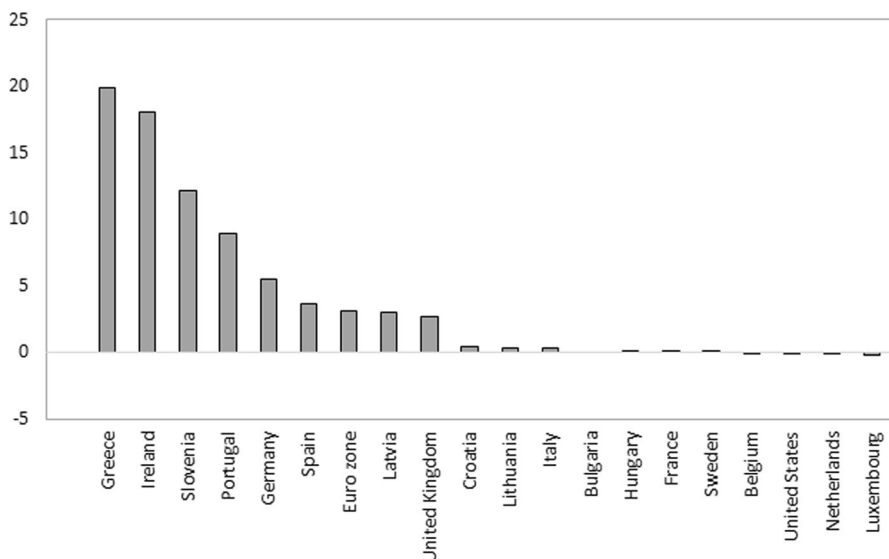


Fig. 13 Total Fiscal Impact of Government Interventions (2017; in percent of GDP). This figure shows the total fiscal impact of government interventions as a percent of 2017 GDP. Data is from column G of Table A1 in Appendix II. [+] indicate a positive fiscal cost; [-] indicates a negative fiscal cost [i.e., gain]. For details on the fiscal impact of financial interventions for Austria, please refer to Eurostat EDP tables and Holler and Reiss [2017]. Data reflect the available information as of April 2018 for EU countries and as of end-2018 for the United States. *Sources* National authorities; Eurostat; and IMF staff estimates. Data vintage: April 2018

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References

- Admati, Anat, and Martin Hellwig. 2014. *The Bankers. New clothes: What's wrong with banking and what to do about it*. Economics Books.
- Baron, Matthew, Emil Verner, and Wei Xiong. 2021. Banking crises without panics. *The Quarterly Journal of Economics* 136 (1): 51–113.
- Bertay, Ata Can, Asli Demirgüç-Kunt, and Harry Huizinga. 2015. Bank ownership and credit over the business cycle: Is lending by state banks less procyclical? *Journal of Banking & Finance* 50: 326–339.
- Blanchard, Olivier, and Lawrence Summers. 2017. Rethinking stabilization policy: Back to the future. *Peterson Institute for International Economics* 8.
- Caballero, Ricardo J., Takeo Hoshi, and Anil K. Kashyap. 2008. Zombie lending and depressed restructuring in Japan. *American Economic Review* 98 (5): 1943–77.



- Calderon, Cesar, and Klaus Schaeck. 2016. The effects of government interventions in the financial sector on banking competition and the evolution of zombie banks. *Journal of Financial and Quantitative analysis* 51 (4): 1391–1436.
- Calomiris, Charles W., and Joseph R. Mason. 2003. Fundamentals, panics, and bank distress during the depression. *American Economic Review* 93 (5): 1615–1647.
- Carvalho, Daniel. 2014. The real effects of government-owned banks: Evidence from an emerging market. *The Journal of Finance* 69 (2): 577–609.
- Claessens, Stijn, Erik Feijen, and Luc Laeven. 2008. Political connections and preferential access to finance: The role of campaign contributions. *Journal of Financial Economics* 88 (3): 554–580.
- Coleman, Nicholas, and Leo Feler. 2015. Bank ownership, lending, and local economic performance during the 2008–2009 financial crisis. *Journal of Monetary Economics* 71: 50–66.
- Cornett, Marcia Millon, Lin Guo, Shahriar Khaksari, and Hassan Tehranian. 2010. The impact of state ownership on performance differences in privately-owned versus state-owned banks: An international comparison. *Journal of Financial Intermediation* 19 (1): 74–94.
- Dell'Ariccia, Giovanni, and Maria Soledad Martinez. Peria, Deniz O Igan, Elsie Addo Awadzi, Marc Dobler, and Damiano Sandri. 2018. Trade-offs in bank resolution. *International Monetary Fund staff discussion note* No. 18/02..
- Diamond, Douglas W., and Philip H. Dybvig. 1983. Bank runs, deposit insurance, and liquidity. *Journal of Political Economy* 91 (3): 401–419.
- European Central Bank. 2016. Compilation guide on government assistance to the financial sector.
- European Commission, Eurostat supplementary table for reporting government interventions to support financial institutions, 2018.
- Friedman, Milton, and Anna Jacobson Schwartz. 2008. *A monetary history of the United States, 1867–1960*, vol. 14. Princeton: Princeton University Press.
- Gambacorta, Leonardo, Tommaso Oliviero, and Hyun Song Shin, Low price-to-book ratios and bank dividend payout policies, Bank for International Settlements Working Paper, 2020, No. 907.
- Gorton, Gary B. 2008. The panic of 2007.
- International Monetary Fund. 2015. Fiscal Monitor—Now is the time: Fiscal policies for sustainable growth.
- Johnson, Simon, and James Kwak. 2011. *13 bankers: The Wall Street takeover and the next financial meltdown*, Vintage.
- Kane, Edward J. 1990. Principal-agent problems in S&L salvage. *The Journal of Finance* 45 (3): 755–764.
- Laeven, Luc, and Fabian Valencia. 2008. Systemic banking crises; A new database, *International Monetary Fund working paper*, 2008, No. 08/224.
- Laeven, Luc, and Fabian Valencia. 2013. Systemic banking crises database. *IMF Economic Review* 61 (2): 225–270.
- Laeven, Luc, and Fabian Valencia. 2018. *Systemic banking crises revisited*, Vol. No. 18/206 2018.
- Peek, Joe, and Eric S. Rosengren. 2005. Unnatural selection: Perverse incentives and the misallocation of credit in Japan. *American Economic Review* 95 (4): 1144–1166.
- La Porta, Rafael, Florencio Lopez de Silanes, and Andrei Shleifer. 2002. Government ownership of banks. *The Journal of Finance* 57 (1): 265–301.
- Richardson, Gary, and William Troost. 2009. Monetary intervention mitigated banking panics during the great depression: Quasi-experimental evidence from a federal reserve district border, 1929–1933. *Journal of Political Economy* 117 (6): 1031–1073.
- Sapienza, Paola. 2004. The effects of government ownership on bank lending. *Journal of Financial Economics* 72 (2): 357–384.
- Schwartz, Anna, Forrest Capie, and Geoffrey Wood. 1986. *Real and pseudo financial crises*.
- Stein, Jeremy C. 2021. Can policy tame the credit cycle? *IMF Economic Review* 69 (1): 5–22.
- Storz, Manuela, Michael Koetter, Ralph Setzer, Andreas Westphal. 2017. Do we want these two to tango? On zombie firms and stressed banks in Europe.
- Tan, Brandon, Deniz Igan, Maria Soledad Martinez Peria, Nicola Pierri, and Andrea F. Presbitero. 2020. Government intervention and bank market power: Lessons from the global financial crisis for the COVID-19 crisis, *International Monetary Fund working paper*, No. 20/275.

