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The persistent effect of banking crises on investment and the role of financial markets

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Abstract

Purpose – While the literature studying the effect of banking crises on real output growth rates has found short-lived effects, recent work has focused on the level effects showing that banking crises can reduce output below its trend for several years. This paper aims to investigate the effect of banking crises on investment finding a prolonged negative effect.

Design/methodology/approach – The authors test to see whether investment declines after a banking crisis and, if it does, for how long and by how much. The paper uses data for 148 countries from 1963 to 2007. Econometrically, the authors test how banking crises episodes affect investment in future years after controlling for other potential determinants.

Findings – The authors find that the investment to GDP ratio is on average about 1.7 percent lower for about eight years following a banking crisis. These results are robust after controlling for credit availability, institutional characteristics, and a host of other factors. Furthermore, the authors find that the size and duration of this adverse effect on investment varies according to the level of financial development of a country. The largest and longer-lasting decrease in investment is found in countries in a middle region of financial development, where finance plays its most important role according to theory.

Originality/value – The authors contribute by finding that banking crisis can have long-term effects on investment of up to nine years. Further, the authors contribute by finding that the level of development of the country's financial markets affects the duration of this decrease in investment.

Keywords Investment, Banking crises, Financial development

Paper type Research paper

I. Introduction

A large body of research has established that banking crises lead to a steep decline in output, investment, and employment. This literature finds that economic growth resumes in one to three years after the onset of the crisis, which is the amount of time that it typically takes to resolve the major problems in the financial sector (Kaminsky and Reinhart, 1998; Eichengreen and Rose, 1998; Dell'Ariccia *et al.*, 2008). However, although economic growth resumes, some recent studies find that there may be a long-term decline in output which remains below its pre-crisis trend. Specifically, Cerra and Saxena (2008) find that, even ten years after a banking crisis, output remains about 7 percent below its pre-crisis trend. Hence, banking crises may have persistent effects on



JEL classification – G01, E22

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the economy. The IMF's World Economic Outlook (2009) further finds that the persistent fall in output in the medium term arises from reductions in both employment and capital.

We explore the origins of the persistent effect by focusing on investment in capital, a key component of output, which typically accounts for a large part of the variations in output during crises. We investigate whether investment declines after a banking crisis and, if it does, for how long and by how much. The paper uses data for 148 countries from 1963 to 2007, including the well-known Reinhart and Rogoff (2008) event data on banking crises episodes. Our results confirm that banking crises have long-term consequences. We find that crises reduce investment even after controlling for feedback effects from growth to investment, the magnitude of the crisis, institutions, level of development, and a number of other factors. In fact, the investment to GDP ratio is on average about 1.7 percentage points lower during each of the seven to nine years following a banking crisis.

We follow the work of Cerra and Saxena (2008) who study the long-term impacts of banking crises (and other shocks) on output, but we focus on investment, funding for which may critically depend on the banking sector. Further, whereas Cerra and Saxena (2008) use a time series approach, we use panel methods that allow us to control for a host of other factors that may contribute to the decline in investment. We are also cautious about potential reverse causality as a banking crisis could be the outcome of a deteriorating economic environment and reduced investment. Although we cannot entirely rule out the potential of reverse causality, we confront this issue to the degree that we can using a lagged structure in our empirical models.

Perhaps, the closest paper to our work is Joyce and Nabar's (2009). They study the effects of "sudden stops" (sudden declines in capital inflows) and banking crises on investment in 26 emerging market economies. They find that banking crises can affect investment negatively but that sudden stops do not have an independent effect on investment. We extend Joyce and Nabar (2009) making the following contributions. First, we test how long the adverse effects of banking crises last and measure the size of the effect over a number of years. Second, we consider a larger sample of countries, 148, than Joyce and Nabar (2009) which studies 26 countries.

Third, we investigate how investment is affected in countries with different levels of financial development. We are motivated by an earlier literature that shows a non-monotonic effect of financial development (typically proxied by credit issued to the private sector) on GDP per capita growth. According to this literature, credit may have only a small effect on economic growth at low levels of financial development ("low region") for the following reasons. Banks may be too small to fund large, high-productivity investments (Acemoglu and Zilibotti, 1997); banks may not effectively pool and diversify risk (Saint-Paul, 1992; Bencivenga and Smith, 1991); and banks may still be gaining experience allocating credit (Lee, 1996). Only after the financial system attains a critical size (entering a "middle region") the above issues are overcome, and it starts to have a strong positive effect on economic growth. However, once the banking system grows large past another threshold and enters the "high region", its positive effects decline. This may be due to the following reasons: diminishing returns set in (Greenwood and Jovanovic, 1990); market-based financing becomes increasingly important as a substitute for credit (Levine and Zervos, 1998, De Gregorio and Guidotti, 1995); or because a larger fraction of credit is allocated to households for consumption (Beck *et al.*, 2012). The findings in Rioja and Valev (2004) confirm the non-monotonic effect of the financial system on economic growth described above. Another related

paper to this research is Rioja *et al.* (2012). However, that paper studies the role of serial crises in the persistent effect of banking crises on investment.

Following this literature on the non-monotonic effect of the financial system, we investigate whether the effects of banking crises vary with different levels of financial development. We show that the adverse effect of banking crises on investment is most pronounced in countries where credit has the strongest positive impact – in the “middle region”. Investment interestingly rebounds more rapidly in countries with a low level of financial development.

The rest of the paper is structured as follows: Section II describes the data and methodology; Section III discusses the results; and Section IV concludes.

II. Data and methodology

Reinhart and Rogoff (2008) identify episodes of banking crises as:

[...] periods when bank runs lead to the closure, merging or takeover of financial institutions or, if there are no runs, the closure, merging, takeover or large program assistance from the public sector to an important financial institution [which] led to similar distress in other financial institutions.

Using this definition, Reinhart and Rogoff (2008) identify 156 banking crises in 110 countries from 1963 to 2007. We construct a dummy variable denoted *crisis* that takes the value 1 for the year when a banking crisis started, and zero otherwise. The frequency of banking crises has varied over time but seems to have trended upwards. For instance, only three banking crisis in our dataset occurred between 1960 and 1975, whereas about 35 percent of all crises occurred in the 1980s and 45 percent in the first half of the 1990s. This trend declined in the latter years of the sample as only 16 percent of the crises happened after 1995. Of course, this does not include the latest crises of 2008-2009 as our sample only goes up to 2007. Appendix 1 presents summary data on the number of banking crises in different country-income groups and in different regions of financial development. Countries in the middle region of financial development experienced the most number of banking crises and also have five countries that have experienced three or more crises.

We are interested in the effect of banking crises on capital formation. We define *Investment* as real gross capital formation as share of GDP. The investment data come from the *Penn World Tables* (Heston *et al.*, 2011). As the summary statistics in Table I show, investment is on average 17 percent of GDP in our sample of countries. Since we are interested in how a banking crisis may affect investment, we define our dependent variable as the deviation of investment from its trend. Presumably a banking crisis will result in a decrease in investment below its trend. We are interested in how large this effect may be and how long investment remains below its trend. We compute a simple quadratic trend for investment country by country and denote it $Trend_{i,t}$. Then we compute the deviation of actual investment in the country from its trend, so $Investment\ Deviation_{i,t} = Investment_{i,t} - Trend_{i,t}$. Our basic empirical specification is:

$$Investment\ Deviation_{i,t} = \alpha + \sum_{k=1}^{10} \theta_k crisis_{i,t-k} + \gamma X_{i,t} + e_{i,t} \quad (1)$$

We construct lagged values of the crisis variable for each country in the sample and enter up to ten lags. This specification allows us to estimate the effect of a crisis on investment

					Persistent effect of banking crises
Variable	Mean	SD	Min.	Max.	
Investment ratio	16.55	9.20	0.15	55.14	67
Investment deviation	− 0.50	3.75	− 17.57	24.60	
Crisis	0.03	0.18	0	1	
Main controls					
GDP per capita	10,686	9,804	365	76,228	
Avg. GDP growth	1.63	2.94	− 11.71	13.83	
Inflation	27.63	322.37	− 11.69	11,749.64	
Gov. spending	19.79	7.97	3.30	61.43	
<i>Private Credit</i>	42.68	38.13	0.41	269.76	
<i>Credit Deviation</i>	0.00	0.13	− 0.78	1.63	
<i>Value Traded</i>	28.14	51.08	0	427.85	
Openness	77.86	53.30	10.53	456.56	
Capital account openness	0.40	1.57	− 1.83	2.50	
<i>Law and Order</i>	3.82	1.47	0	6	

Table I.
Summary statistics

up to ten years after the onset of the crisis[1]. We are interested in the magnitude and statistical significance of the estimated parameters θ at different lags. For example, $\hat{\theta}_6 < 0$ would indicate that a banking crisis reduces investment in the sixth year after the crisis began[2]. We estimate equation (1) using the entire sample and then for three separate subsamples of countries based on their level of financial development.

Equation (1) also includes a set of control variables that may affect investment, X . The set of control variables is drawn from the literature. One key determinant of investment is the amount of funding or credit issued to the private sector. A measure of credit that has been widely used in the finance and growth literature (Levine, 2005) is *Private Credit*, which we define as the amount of credit issued by banks to the private sector as a share of GDP[3]. Credit booms may be related to expansions of investment and credit crunches may be related to decreases in investment. Since our dependent variable is investment's deviation from trend, it seems also appropriate to control for the deviation of credit from trend. We follow the same procedure described above to compute the deviation of *Private Credit* from trend and denote this variable *Credit Deviation*.

Another key determinant of the fluctuations in investment may be the well-known "accelerator effect". When output in an economy has been growing fast, business profits and cash flows increase, which leads firms to increase investment. Hence, we use the average GDP growth over the previous five years to control for this "investment accelerator" effect. The other variables that comprise our baseline control set are standard controls for investment: GDP per capita, inflation, government spending (as a share of GDP), trade openness (as a share of GDP), and capital account openness. GDP per capita controls for the stage of development of the country. Inflation may be expected to have a negative effect as it affects potential future returns (Aizenman and Marion, 1999). Openness of the economy to trade is likely to have a positive effect on investment (Aizenman and Noy, 2006). The degree of capital (financial) account openness may also affect investment. We use the well-known Chinn and Ito (2006, 2008) index of capital account openness. Another control variable, the government spending share of GDP is typically found to have a negative effect on economic growth; hence, a negative effect on investment would be expected. In some regressions, we also control for stock market activity which can be an alternative source of funds for investment. We use value

traded which measures the value of the traded shares in the domestic stock market as a share of GDP. It measures how active or liquid the country's stock market is. Finally, we use the index of *Law and Order* published by the International Country Risk Guide (ICRG) as measures of institutional development. Adding institutions to the equation is important as banking crises might be a symptom of underdeveloped institutions and, therefore, the effect of crises on investment that we detect could be a proxy for the role of institutions. Appendix 2 shows the definitions and the sources of the data, while Table I presents the summary statistics and Table II presents correlations.

	<i>Investment ratio</i>	<i>Investment deviation</i>	<i>Crisis</i>	<i>Multiple crisis</i>	<i>GDP per capita</i>	<i>Avg. GDP growth</i>	<i>Inflation</i>
Investment ratio	1						
Investment deviation	0.4914	1					
Crisis	-0.0477	-0.0016	1				
Multiple crisis	-0.1151	0.0286	0.1781	1			
GDP per capita	0.5868	0.1466	-0.0682	-0.108	1		
Avg. GDP growth	0.3037	0.2217	-0.0117	-0.1198	0.1143	1	
Inflation	-0.058	-0.0332	0.044	0.0726	-0.0664	-0.0906	1
Gov. spending	-0.2801	-0.1831	0.0105	-0.107	-0.2964	-0.0402	-0.0001
<i>Private Credit</i>	0.5701	0.1537	-0.0249	-0.0812	0.6645	0.1196	-0.0824
<i>Credit Deviation</i>	0.1291	0.1294	0.0979	0.0022	0.061	0.0396	-0.0164
<i>Value Traded</i>	0.3853	0.1569	-0.0353	-0.018	0.5577	0.0612	-0.0411
Openness	0.2952	0.0676	-0.0751	-0.1731	0.2499	0.1583	-0.0796
Capital acct. openness	0.4139	0.1365	-0.0461	0.0186	0.5945	0.097	-0.1188
<i>Law and Order</i>	0.4568	0.0126	-0.0312	-0.1675	0.6928	0.1332	-0.104
	<i>Gov. spending</i>	<i>Private Credit</i>	<i>Credit Deviation</i>	<i>Value Traded</i>	<i>Openness</i>	<i>Capital account openness</i>	<i>Law and Order</i>
Gov. spending	1						
<i>Private Credit</i>	-0.2246	1					
<i>Credit Deviation</i>	-0.0476	0.4084	1				
<i>Value Traded</i>	-0.2637	0.5154	0.0353	1			
Openness	-0.0792	0.3128	0.0113	0.2157	1		
Capital acct. openness	-0.1819	0.4656	0.0538	0.3111	0.2485	1	
<i>Law and Order</i>	-0.0801	0.5427	0.079	0.3238	0.1947	0.4489	1

Table II.
Correlations

III. Results

The effects of banking crises on investment

We first estimate equation (1) regressing the deviation of investment from its trend on lags of the banking crisis dummy and our baseline control set. Both fixed effects and random effects regressions were initially estimated with the Hausman test indicating that country fixed effects is the more appropriate approach. All the estimations presented in the paper henceforth are fixed effects regressions.

The results in Table III show that investment can be adversely affected by banking crises which decrease investment below its trend for as long as seven to nine years. For example, regression (1) shows that the effect of a crisis reduces investment for up to nine years. The size of the coefficient estimates for the crises dummies measure the percent of GDP by which investment falls. Therefore, the adverse effect of banking crises is economically significant as investment is on average about 1.7 percent of GDP below trend for nine years (ranging from 1.16 to 2.23 percent of GDP). The largest impact occurs three years after the crisis when investment is 2.23 percent of GDP below trend. Regressions (2), (3), and (4) add other control variables; the persistent effect of banking crisis is confirmed in these regressions.

It is useful to compare our results to Joyce and Nabar's (2009). Their estimated effect of banking crisis on contemporaneous investment is about -1.28 percent of GDP. According to our Table III, the effect one year after the crisis is about -2 percent of GDP. As explained in footnote [2], we also estimated our model with a contemporaneous crisis term. The estimated coefficient (unreported) is about -1.0 percent of GDP, similar to Joyce and Nabar's estimate. Hence, while our contemporaneous impact is about the same as Joyce and Nabar's (2009), we estimate the effects in subsequent years which are larger. A second comparison can be made with Joyce and Nabar's (2009, p. 318) estimate of a long-run decrease in investment of 3.75 percent of GDP. In comparison, we find that investment falls by about 1.8 percent for each of the seven to nine years after the onset of the banking crisis. Hence, the cumulative investment losses are about 14 percent of GDP over the period of seven to nine years.

Regarding the control variables, *Credit Deviation* is statistically significant in all regressions. The interpretation is that when credit is below trend, investment is also below trend and vice versa. Since it is possible that the reduction in investment decreases the demand for credit, we do not claim a causal effect of credit on investment, but can only say that they are positively related. Other control variables like the "investment accelerator", GDP per capita, government spending, and the openness of the economy are statistically significant in several regressions and have the expected signs. In contrast, the institutional measure (*Law and Order*) and the measure of stock markets (*Value Traded*) are not statistically significant at standard confidence levels. The effects of banking crises, however, remain significant and of roughly the same size across specifications. In sum, the key finding in Table III is the sizable and persistent negative effect of banking crises on investment after accounting for a host of other factors.

Financial development and the effects of banking crises

We next investigate whether investment is affected in the same way in countries with different levels of financial development. To create three groups of countries with high,

Variables	(1)	(2)	(3)	(4)
L1.crisis	-2.036*** (0.352)	-1.966*** (0.368)	-2.046*** (0.385)	-2.418*** (0.469)
L2.crisis	-2.199*** (0.378)	-2.136*** (0.385)	-2.222*** (0.398)	-2.506*** (0.621)
L3.crisis	-2.233*** (0.393)	-2.213*** (0.403)	-2.347*** (0.417)	-2.341*** (0.594)
L4.crisis	-2.024*** (0.370)	-1.960*** (0.376)	-2.013*** (0.399)	-2.026*** (0.552)
L5.crisis	-1.776*** (0.373)	-1.712*** (0.368)	-1.636*** (0.394)	-1.469*** (0.553)
L6.crisis	-1.991*** (0.352)	-1.985*** (0.349)	-1.989*** (0.366)	-1.363** (0.549)
L7.crisis	-2.022*** (0.372)	-1.939*** (0.360)	-1.939*** (0.366)	-1.159** (0.491)
L8.crisis	-1.647*** (0.397)	-1.600*** (0.378)	-1.663*** (0.381)	-0.909* (0.464)
L9.crisis	-1.165** (0.476)	-1.165** (0.464)	-1.280*** (0.449)	-0.679 (0.484)
L10.crisis	-0.575 (0.448)	-0.597 (0.459)	-0.649 (0.438)	0.0514 (0.402)
<i>Credit Deviation</i>	5.730*** (1.490)	5.831*** (1.467)	6.037*** (1.600)	2.465** (1.119)
GDP per cap.	0.795** (0.364)	0.344 (0.421)	-0.868 (0.609)	3.301** (1.635)
Inflation		0.0571 (0.333)	0.191 (0.289)	-0.105 (0.265)
Gov. spending		-0.111** (0.0438)	-0.133** (0.0520)	-0.353*** (0.0753)
Openness			0.0301*** (0.00985)	-0.00332 (0.0108)
Avg. five year GDP growth			0.111* (0.0590)	0.197** (0.0942)
Capital acct. openness			0.0680 (0.130)	0.0769 (0.193)
<i>Law and Order</i>				0.0472 (0.205)
<i>Value Traded</i>				-0.459 (0.533)
Constant	-6.313** (3.123)	-0.0601 (4.164)	8.266 (5.461)	-23.69 (14.75)
Observations	4,157	4,105	3,780	1,406
Number of countries	148	148	141	90
R ² overall	0.06	0.08	0.12	0.32

Notes: Significant at: *10, **5 and ***1 percent levels; the dependent variable is the deviation of investment as a share of GDP from its trend; results shown are from robust fixed effects regressions; *Lj.Crisis* is a dummy variable for a banking crisis that occurred *j* years ago; GDP per cap. is log of GDP per capita; robust standard errors are in parenthesis

Table III.
The effect of banking
crisis on investment

middle or low financial development, we rank order the countries in terms of each country's average value for *Private Credit* over the entire sample period. Using an average over the entire sample period eliminates temporary fluctuations in credit activity and provides a long-term indicator of the size of the credit market in each country. We separate the sample into three roughly equal groups of countries with low, middle, and high level of financial development[4]. Appendix 3 lists the countries within each region.

Table IV shows the results from estimating equation (1) for each of the three groups separately[5]. The results show that banking crises have a relatively short-lived impact on investment in countries with low financial development where the investment decline is only statistically significant for two years. Conversely, in countries in the middle region of financial development, the impact is long: ten years. In countries with a high level of financial development, the impact lasts for about seven years. Thus, the countries in the middle region are affected most adversely.

Persistent effect
of banking crises

Variables	Low		Middle		High	
	(1)	(2)	(3)	(4)	(5)	(6)
L1.crisis	-1.476** (0.574)	-1.420** (0.577)	-2.557*** (0.392)	-2.539*** (0.384)	-1.659* (0.838)	-1.231 (0.956)
L2.crisis	-1.405*** (0.485)	-1.366*** (0.484)	-2.156*** (0.455)	-2.130*** (0.453)	-2.724*** (0.958)	-2.328** (0.998)
L3.crisis	-0.884 (0.828)	-0.942 (0.845)	-2.462*** (0.484)	-2.424*** (0.474)	-2.928*** (0.782)	-2.520*** (0.816)
L4.crisis	-1.260* (0.736)	-1.183 (0.769)	-2.021*** (0.501)	-2.012*** (0.494)	-2.603*** (0.738)	-2.215*** (0.793)
L5.crisis	-1.082 (0.733)	-1.020 (0.732)	-1.908*** (0.593)	-1.934*** (0.593)	-2.071*** (0.609)	-1.757** (0.658)
L6.crisis	-0.938 (0.651)	-0.864 (0.665)	-2.350*** (0.600)	-2.382*** (0.597)	-2.296*** (0.474)	-2.113*** (0.487)
L7.crisis	-1.301 (0.778)	-1.014 (0.741)	-2.401*** (0.617)	-2.423*** (0.617)	-1.915*** (0.489)	-1.937*** (0.528)
L8.crisis	-0.549 (0.796)	-0.287 (0.734)	-2.489*** (0.656)	-2.509*** (0.659)	-1.119* (0.643)	-1.192* (0.639)
L9.crisis	0.467 (1.024)	0.735 (0.962)	-2.524*** (0.723)	-2.539*** (0.735)	-0.680 (0.686)	-0.537 (0.704)
L10.crisis	0.937 (1.093)	1.087 (1.069)	-1.598** (0.612)	-1.647** (0.623)	-0.406 (0.652)	-0.367 (0.578)
Observations	1,151	1,136	1,426	1,416	1,580	1,553
No. of countries	48	48	49	49	51	51
R ² overall	0.06	0.05	0.11	0.11	0.05	0.15

Notes: Significant at: *10, **5 and ***1 percent levels; the dependent variable is the deviation of investment as a share of GDP from its trend; results shown are from robust fixed effects regressions; regressions for countries in the low, middle, and high regions according to their levels of *Private Credit*; the first regression for each group also include *Credit Deviation* and GDP per cap. as controls (unreported); the second regression includes *Credit Deviation*, GDP per cap., Inflation and Gov. Spending as controls (unreported); *Lj.Crisis* is a dummy variable for a banking crisis that occurred j years ago; GDP pc is log of GDP per capita; robust standard errors are in parenthesis

Table IV.
Banking crisis effects and
financial development
(*Private Credit*)

These results appear to be consistent with the theoretical literature described in the introduction. Several theories predict a small effect of financial development on the economy in countries with low financial development, e.g. Acemoglu and Zilibotti (1997) and Bencivenga and Smith (1991). In these countries, bank credit disruptions may have relatively small effects on the economy. Our results show that indeed a banking crisis may reduce investment for only two years in countries in the low region. Once the financial market attains a critical size and reaches the middle region, however, bank credit plays a larger role in financing investment. Hence, a disruption in financing investment that likely comes with a banking crisis may account for the observed long-term effect of ten years[6].

We tried to ascertain that the differences in recovery times are because of different levels of financial development and not just due to different income levels or institutional quality. Hence, we ran robustness regressions separating countries into three groups by:

- income per capita; and
- by institutional development (using the *Law and Order* variable).

However, we did not find much difference in the effect of banking crisis in the three groups of countries[7]. In other words, the results in Table IV are not a proxy for differences in income levels or institutional quality. The effect of banking crises on investment appears to depend on the importance of the banking system for investment identified in the three regions of financial development.

One more robustness test was conducted. Instead of separating countries into three financial development groups according to *Private Credit*, we separated them by *Liquid Liabilities*. The variable *Liquid Liabilities* is an alternative measure of the depth of the financial system that has been used in the literature (Levine, 2005). It measures currency plus demand and interest-bearing liabilities of banks and other financial intermediaries as percent of GDP. The results presented in Table V confirm our earlier findings as they are very similar to Table IV's. The longest adverse effect on investment is in countries in the middle region.

IV. Conclusions

How do we evaluate the adverse effects of a banking crisis on the economy? Typically the literature has measured the value of the fiscal cost or the output lost within a narrow time frame. Our paper finds an additional dimension to the adverse effect of banking crisis: the prolonged decrease in investment in capital. Banking crises can depress investment by a sizable amount and for a long time. We find that banking crises can persistently reduce investment below its trend for up to seven to nine years. This effect is robust across empirical specifications that control for a range of economic and financial variables.

Moreover, we find that the decrease in investment depends on the level of financial development of the country. Specifically, banking crises have a longer and deeper impact on investment in countries where the financial system, in principle, has a stronger positive effect on the economy during good times. These are the countries in the middle region of financial development. Since many emerging countries are in this region, banking crisis can be particularly debilitating for them.

Variables	Low		Middle		High		Persistent effect of banking crises
	(1)	(2)	(3)	(4)	(5)	(6)	
L1.crisis	-2.083*** (0.492)	-2.054*** (0.486)	-2.510*** (0.569)	-2.513*** (0.569)	-1.353* (0.753)	-1.207 (0.859)	
L2.crisis	-1.486*** (0.526)	-1.455*** (0.526)	-2.578*** (0.379)	-2.566*** (0.389)	-2.357** (1.040)	-2.370** (1.076)	
L3.crisis	-1.427* (0.733)	-1.478* (0.743)	-2.818*** (0.369)	-2.811*** (0.366)	-2.346** (0.904)	-2.309** (0.914)	
L4.crisis	-1.474** (0.623)	-1.428** (0.645)	-1.998*** (0.555)	-2.030*** (0.539)	-2.475*** (0.757)	-2.355*** (0.784)	
L5.crisis	-0.939 (0.621)	-0.895 (0.619)	-2.135*** (0.645)	-2.206*** (0.638)	-2.097*** (0.622)	-2.058*** (0.649)	
L6.crisis	-0.964* (0.537)	-0.915* (0.538)	-2.496*** (0.637)	-2.573*** (0.645)	-2.349*** (0.573)	-2.403*** (0.579)	
L7.crisis	-1.188* (0.600)	-0.985* (0.563)	-2.341*** (0.647)	-2.403*** (0.649)	-2.287*** (0.631)	-2.497*** (0.662)	
L8.crisis	-0.847 (0.600)	-0.655 (0.550)	-1.840** (0.709)	-1.911*** (0.702)	-1.995*** (0.734)	-2.298*** (0.772)	
L9.crisis	0.352 (0.792)	0.545 (0.756)	-2.195*** (0.782)	-2.260*** (0.777)	-1.476* (0.810)	-1.443 (0.878)	
L10.crisis	0.445 (0.865)	0.553 (0.860)	-0.763 (0.610)	-0.878 (0.606)	-1.293 (0.846)	-1.355 (0.867)	
Observations	1,285	1,272	1,350	1,333	1,522	1,500	
No. of countries	50	50	48	48	50	50	
R ² overall	0.06	0.06	0.11	0.12	0.04	0.13	

Notes: Significant at: *10, **5 and ***1 percent levels; the dependent variable is the deviation of investment as a share of GDP from its trend; results shown are from robust fixed effects regressions; regressions for countries in the low, middle, and high regions according to their levels of *Liquid Liabilities*; the first regression for each group also include *Credit Deviation* and GDP per cap. as controls (unreported); the second regression includes *Credit Deviation*, GDP per cap., Inflation and Gov. Spending as controls (unreported); *Lj.Crisis* is a dummy variable for a banking crisis that occurred *j* years ago; GDP pc is log of GDP per capita; robust standard errors are in parenthesis

Table V.
Banking crisis effects and
financial development
(*Liquid Liabilities*)

The long-term impacts of banking crises on investment and the economy in general merits further research attention. A next logical step is to use disaggregated data on credit and investment to investigate the origins for the prolonged effect of banking crises. Are all sectors of the economy affected in the same way? Is there relocation of investment across sectors during the recovery? The speed of adjustment of investment across the various sectors is likely to play a role in the speed of recovery of aggregate investment.

Notes

1. Joyce and Nabar's (2009) specification is in levels (they do not use deviations from trend); rather they include lagged investment to account for its persistence.
2. Cerra and Saxena (2008) report results using: (i) only lagged values of crisis (as we do) and (ii) using the contemporaneous crisis dummy along with its lagged values. They find the

results are robust to both specifications. We follow a similar approach. As a baseline, we choose the specification with lags only in order to partially address the potential endogeneity issue. In robustness tests, we also include the contemporaneous crisis variable finding the results are unaffected by such inclusion.

3. Most of the literature refers to *Private Credit* as the credit issued by banks and other financial intermediaries to the private sector. We focus on bank credit only as we are particularly interested in the effect of banking crisis.
4. Countries are classified as follows. Low region if *Private Credit* ≤ 0.17 . Middle region if $0.17 < \textit{Private Credit} < 0.369$. High region if *Private Credit* ≥ 0.369 .
5. There are two regression results reported for each region. The first column includes *Credit Deviation* and GDP per capita as controls. The second regression includes *Credit Deviation*, GDP per capita, Inflation and Government Spending as controls. The coefficients for the control variables are unreported for conciseness.
6. We extended the lag structure past ten years in unreported regressions but there were no statistically significant effects beyond ten years.
7. The results are available on request.

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Appendix 1

	No crisis	Number of countries with		
		One crisis	Two crises	Three or more crises
<i>Income group</i>				
High income OECD	8	14	0	1
High income non OECD	10	5	0	0
Upper middle income	16	9	5	3
Low middle income	24	18	10	2
Low income	20	30	7	1
<i>Financial development</i>				
Low region	17	23	7	1
Middle region	13	22	9	5
High region	24	22	4	1

Table AI.
Banking crises by income
group and financial
development

Table AII.
Sources of information

Variable	Definition	Source
Crisis	Dummy variable that assumes the value of 1 for the year when a banking crisis begins	Reinhart and Rogoff (2008)
Investment	Investment share of real GDP per capita	Heston <i>et al.</i> (2011)
GDP per capita	Real GDP per capita (constant prices: chain series) in prices 2005	Heston <i>et al.</i> (2011)
Avg. five year GDP growth	Average annual growth of GDP per capita of the last five years	Heston <i>et al.</i> (2011)
Inflation	Inflation, consumer prices (annual percent)	World Development Indicators
Gov. spending	Government share of real GDP per capita	Heston <i>et al.</i> (2011)
<i>Private Credit</i>	<i>Private Credit</i> by deposit money banks to GDP	Beck and Demirgüç-Kunt (2009)
Openness	Exports plus imports divided as a percentage of real GDP	Heston <i>et al.</i> (2011)
<i>Value Traded</i>	Value of the traded shares in the domestic stock market as a share of GDP	Beck and Demirgüç-Kunt (2009)
<i>Law and Order</i>	<i>Law and Order</i> are assessed separately, with each sub-component comprising zero to three points. The law sub-component is an assessment of the strength and impartiality of the legal system, while the order sub-component is an assessment of popular observance of the law. Thus, a country can enjoy a high rating – 3 – in terms of its judicial system, but a low rating – 1 – if it suffers from a very high crime rate of if the law is routinely ignored without effective sanction (for example, widespread illegal strikes)	ICRG
Capital account openness	The Chinn-Ito index is an index measuring a country's degree of capital account openness	Chinn and Ito (2006, 2008)
<i>Liquid Liabilities</i>	Currency plus demand and interest-bearing liabilities of banks and other financial intermediaries as percent of GDP	Beck and Demirgüç-Kunt (2009)

Low region		Middle region		High region	
Albania	Madagascar	Algeria	Mauritania	Australia	Kuwait
Angola	Malawi	Bangladesh	Mauritius	Austria	Luxembourg
Argentina	Mali	Belgium	Mexico	Bahamas	Macao
Armenia	Moldova	Bolivia	Nicaragua	Bahrain	Malaysia
Benin	Mongolia	Brazil	Oman	Barbados	Malta
Botswana	Mozambique	Bulgaria	Pakistan	Belize	The Netherlands
Burkina Faso	Nepal	Cape Verde	Papua New Guinea	Brunei	The Netherlands Antilles
Burundi	Niger	Costa Rica	Paraguay	Canada	New Zealand
Cambodia	Nigeria	Cote d'Ivoire	Philippines	Chile	Norway
Cameroon	Peru	Ecuador	Poland	Croatia	Panama
Central African Republic	Romania	Egypt	Qatar	Cyprus	Portugal
Chad	Russia	El Salvador	Samoa	Czech Republic	Singapore
Colombia	Rwanda	Estonia	Saudi Arabia	Denmark	Slovak Republic
Congo	Seychelles	Fiji	Senegal	Dominica	South Africa
Dominican Republic	Sierra Leone	Greece	Slovenia	Finland	Spain
Ethiopia	Solomon Islands	Honduras	Sri Lanka	France	St Kitts and Nevis
Gabon	Syria	Hungary	Swaziland	Germany	St Lucia
Gambia	Tanzania	India	Togo	Guyana	St Vincent and Grenadine
Georgia	Turkey	Indonesia	Tonga	Hong Kong	Sweden
Guatemala	Uganda	Iran	Trinidad and Tobago	Iceland	Switzerland
Guinea-Bissau	Yemen	Jamaica	Uruguay	Ireland	Thailand
Haiti	Zimbabwe	Kazakhstan	Vanuatu	Israel	Tunisia
Kyrgyzstan	Kenya	Venezuela	Italy	UK	
Laos		Latvia		Japan	USA
Lesotho		Lithuania		Jordan	Vietnam
Libya		Macedonia	Korea		

Table AIII.
Country list and groups
according to financial
development (*Private
Credit*)

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