

# Serial Banking Crises and Capital Investment

Felix Rioja\*, Fernando Rios-Avila\*\*, and Neven Valev\*\*\*

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**Abstract:** We find that banking crises have a sizable, multi-year cumulative negative effect on investment in capital. Moreover, in countries that have experienced several banking crises over the years, each additional crisis lowers the investment to GDP ratio by more than the previous crisis. In addition, the recovery of investment following a banking crisis is conditional on earlier crises in the same country. The recovery is slower in countries that have experienced crises in the past. The results are obtained using data for 75 countries from 1976 to 2005.

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Key Words: Banking Crises, Investment

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\*Department of Economics, Andrew Young School of Policy Studies, Georgia State University, Atlanta, GA 30303, USA. E-mail: [frioja@gsu.edu](mailto:frioja@gsu.edu). \*\*Levy Economics Institute of Bard College, PO Box 117, Germantown, NY 12526, USA. Email: [friosavi@levy.org](mailto:friosavi@levy.org). \*\*\*Department of Economics, Andrew Young School of Policy Studies, Georgia State University, Atlanta, GA 30303, USA. E-mail: [nvalev@gsu.edu](mailto:nvalev@gsu.edu) We would like to thank Lawrence Ball, Barry Bosworth, Daniel Leigh, Elizabeth Searing, and Henry Thompson for valuable comments. Useful comments from seminar participants at the Brookings Institution and Auburn University are gratefully acknowledged.

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## I. Introduction

Recent research shows that banking crises can have a prolonged impact on economic activity. For example, Cerra and Saxena (AER, 2008) find that output remains 7 percent below its pre-crisis trend even ten years after a banking crisis. The IMF's World Economic Outlook (2009) reports that the persistent fall in output in the medium term arises from reductions in both employment and capital. Rioja, Rios-Avila, and Valev (2012) present evidence that banking crises can reduce capital investment for as long as seven years. We contribute to that literature by focusing on the effect of serial banking crises. That is, we study the effects of a banking crisis in countries that have had repeated bouts of such crises. As Reinhart and Rogoff (2009) describe, defaults and financial instability are not one-time phenomena. Instead they find that "serial defaults" are common across countries and time. Specifically, we ask the following two questions:

- Is there a cumulative negative effect of banking crises? That is, does each additional crisis lower investment by more than the previous ones?
- Does investment recover more slowly after a banking crisis in countries that have experienced crises in the past?

We are interested in the effects of the repeated occurrence of banking crises since these could signal deep institutional problems in the financial sector or reduced confidence and may depress investment for many years by creating uncertainty and anticipation of future new crises.<sup>1</sup> Yet, the literature has not explored the effect of "serial banking crises" and has focused

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<sup>1</sup> Other related theoretical literature on the effects of uncertainty on investment includes: the effects of uncertain tax policy (e.g., Hassett and Metcalf, 1999) and the effect of output price uncertainty (e.g., Abel, 1983; and Pindyck, 1982). Peltonen et al. (2011) find that investment adjusts very sluggishly to shocks in emerging countries.

exclusively on the effects of one crisis at a time. Table 1 provides some additional motivation. According to our data set (described in detail in the next section), countries that experienced a first banking crisis within the time span of our sample had an average investment decline of 2.3 percent in the three years after the crisis. In countries that experienced a second banking crisis, investment declined by 6.2 percent in the three years after the crisis as Table 1 shows. Yet again, countries that experienced a third banking crisis had an average drop in investment of over 11 percent in the three years after. The data in Table 1 then provide motivation to study if in fact investment is more adversely affected by a current crisis if the country has experienced more banking crises in the past. Indeed, we find evidence in our estimations that the effect of a banking crisis on investment is conditional on the number of previous crises.

We use data for 75 countries from 1976 to 2005, 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: the availability of credit and other sources of financing; feedback effects from growth to investment; the magnitude of the crisis; and a number of other factors. In fact, the investment to GDP ratio is on average about 2 percent lower during *each* of the 7 to 8 years following a banking crisis. Moreover, our results show that experiencing multiple crises over time reduces investment and partly accounts for the persistence of the effect.

Our focus on serial crises is based on a recent literature showing that dramatic economic events such as banking crises can influence expectations and behavior many years into the future. Malmendier and Nagel (2009) show that people who have lived through a period of high inflation have persistently higher levels of expected inflation. In Giuliano and Spilimbergo (2009), people who have grown up during recessions favor more income redistribution and have

less trust in government. Malmendier and Nagel (2011) show that people who have lived through periods of low stock market returns are less likely to take financial risk and are less likely to participate in the stock market. Furthermore, the effects of such dramatic economic events can persist for decades. In Mudd and Valev (2009), people who had experienced a loss during a banking crisis are more likely to expect another banking crisis even a decade after the crisis. While our paper focuses on banking crisis, Calvo's (1986) paper on a related type of crises, currency crises, shows that economic agents do not expect stabilizations to be permanent in countries with a history of currency crises.<sup>2</sup> Studying the Great Depression, Cagan (1965) modeled the expectations of the future rate of loss on deposits as depending on some average of the past experience of losses. Summing up the literature above, 1) financial instability is a recurrent problem in some countries and 2) it could have a lasting impact on economic agents.

Our paper extends the literature on the medium and long term effects of crises by Cerra and Saxena (2008) and the World Economic Outlook (2009) with a specific focus on investment and the impact of multiple crises. We also contribute to a long-standing literature showing that uncertainty adversely affects capital investment and economic growth, e.g. Aizenman and Marion (1993, 1999), Brunetti and Weder (1998), and Lensink, Bo, and Sterken (1999).<sup>3</sup> We provide supporting evidence by investigating the role of serial banking crises.

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.

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<sup>2</sup> The hysteresis of currency substitution has also been explained by persistent expectations of renewed instability (Melvin and Fenske, 1982; Clements and Schwartz, 1992).

<sup>3</sup> Ranciere, Tornell, and Westermann (2008) study how taking on systemic risk can reduce financial constraints and lead to growth despite occasionally causing crises along the way. Conversely, our paper focuses on how the level of investment is affected in the years after a banking crisis.

## II. Data and Methodology

We use the well-known Reinhart and Rogoff (2008) data set to identify banking crises. 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.<sup>4</sup> Regarding the frequency of banking crises, 35% of all crises occurred in the 1980s and 45% in the first half of the 1990s. This trend declined in the latter years of the sample as only 16% of the crises happened after 1995. The data also show that different regions have been affected differently by banking crises. Latin American economies have experienced a high number of banking crises. For example, Argentina suffered 4 banking crises in our period of study, while Brazil suffered 2 crises. Many countries in Sub-Saharan Africa, Eastern Europe, and Central Asia have also suffered from multiple banking crises. Only a quarter of the countries in these three regions have not experienced a banking crisis, while 13 countries experienced two crises.

Since we are interested in the effect of banking crises on long-run capital formation, our dependent variable is *Investment*, which is defined as real gross capital formation as share of GDP. These data come from the Penn World Tables (Heston, Summers, and Aten, 2008). As the summary statistics in Table 2 show, investment is on average 18% of GDP. In order to investigate how long a banking crisis may affect investment, we construct a dummy variable *crisis* that takes the value 1 for the year when a banking crisis started, and zero otherwise. We

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<sup>4</sup> We use a subsample of countries for which we have data on all variables needed for the analysis which is from 1976 to 2005. This provides an unbalanced panel of 1056 observations across 75 countries and 29 years.

then construct lagged values of the *crisis* variable for each country in the sample and enter up to 10 lags in the following benchmark empirical specification:

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

This specification allows us to estimate the effect of a crisis on investment up to ten years after the onset of the crisis. We are interested in the magnitude and statistical significance of the estimated parameters  $\theta$  at different lags. For example,  $\hat{\theta}_6 < 0$  would indicate that a banking crisis reduces investment in the 6<sup>th</sup> year after the crisis began. The vector of control variables is denoted  $X$  and its components are explained below. The unobserved country-specific effect is denoted by  $\lambda_i$ .

In order to investigate the effect of multiple crises, we add the variable *Multiple Crises*<sub>*i,t*</sub> that equals the number of crises that country *i* has experienced through year *t*. For example, in 1996, Argentina had experienced four banking crises within our sample period (1980, 1985, 1989, and 1995), while Indonesia had experienced one banking crisis (1992). Hence, the variable *Multiple Crises* in the year 1996 would take a value of 4 for Argentina and a value of 1 for Indonesia. We are interested in testing if the number of crisis experienced affects investment, so we estimate the following equation:

$$(2) \quad Investment_{i,t} = \alpha + \sum_{k=1}^{10} \theta_k crisis_{i,t-k} + \sigma Multiple Crises_{i,t} + \gamma X_{i,t} + \lambda_i + e_{i,t}$$

Our hypothesis is that the occurrence of multiple crises would reduce investment as they are a strong indicator of recurrent instability. *Multiple Crises* may reduce long-run confidence in economic stability and would tend to lower investment over the years, so we would expect that  $\sigma < 0$ . In addition, the inclusion of *Multiple Crises* in the estimation allows us to observe what

happens to the coefficients on the crisis dummies,  $\theta$ 's. It is possible that a new banking crisis is simply a reminder that crises are a recurrent problem in a particular country. Then, the estimated  $\theta$ 's may be smaller once one adds *Multiple Crises*. This would indicate that a potential reason for the decline in investment after a banking crisis is that confidence in economic stability is reduced for a number of years. The estimated value of the coefficient  $\sigma$  and the change in the  $\theta$ 's when we include *Multiple Crises* are central to our investigation as they address directly the two questions posed in the introduction of the paper. The coefficient  $\sigma$  measures the long-run cumulative effect of banking crises on investment, while the  $\theta$  coefficients measure the adverse effect from individual crises and, hence, how fast investment recovers.

There are a couple of specification-related issues that need to be discussed. First, we acknowledge that there could be a potential endogeneity issue. That is, both the banking crisis and investment could depend on an omitted variable. We try to partially address this issue by using 1 to 10 lags of the crises variable (a pre-determined variable with respect to time  $t$  investment). We try to also ameliorate this potential problem by including a wide array of control variables in the estimations. We also use lags of the control variables due to the same concern of potential endogeneity with investment. Second, compared to Cerra and Saxena's (2008) time series approach, we use fixed effects panel estimation. Cerra and Saxena (2008) run estimates with lags of the crisis dummies (as we do), as well as with a contemporaneous crisis dummy in addition to the lags. They find that their results are robust to both specifications. We proceed similarly choosing to report the lags-only estimates. However, we also ran estimations with a contemporaneous crisis dummy finding similar results.<sup>5</sup>

The set of control variables that may affect investment,  $X$ , is drawn from the literature. One key determinant of investment is the amount of credit issued to the private sector. We use

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<sup>5</sup> These estimations are available from the authors upon request.

*Private Credit* defined as the amount of credit issued by banks to the private sector as a share of GDP.<sup>6</sup> This measure has been widely used in the finance and growth literature (Levine, 2005).<sup>7</sup> Another key determinant of investment is 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 5 years to control for this “investment accelerator” effect.

The other variables that comprise our baseline control set are: GDP per capita, inflation, government spending (as a share of GDP), and trade openness (as a share of GDP). The reasons to include these control variables are as follows. As in standard growth models, we would expect countries with high GDP per capita to also have high investment rates. We expect inflation 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. The government share of GDP is typically found to have a negative effect on economic growth; hence, a negative effect on investment would be expected. 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 percent of GDP. In some specifications, we also use the real interest rate for robustness to account for the cost of borrowed funds. Finally, we use an *Institutions* index which is a first principal component of two variables: *Legal System and Property Rights* from Gwartney and Lawson (2009) and the Polity IV measure of political stability. We expect that countries with weaker institutions would have lower investment rates. Adding institutions to the equation is important as banking crises might be a

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<sup>6</sup> The Private Credit measure unfortunately does not include trade credit which according to Sheng et al. (2013) can be used as a substitute especially during financial crisis.

<sup>7</sup> Credit typically dries out during and after banking crises which affects investment. An exception may be government-owned banks which may actually increase the credit they issue during crises according to Shen et al. (2012).



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 1 shows the definitions and the sources of the data, while Tables 2 and 3 present the summary statistics.

### III. Results

We first perform fixed effects estimations of our benchmark equation (1) regressing investment as a share of GDP on lags of the banking crisis dummy and our baseline control set. The results in Table 4 show that investment can be adversely affected by banking crises for as long as 8 years. The crisis dummies are negative and significant through year 8 in regressions (1) through (4).<sup>8</sup> The coefficient estimates for the crises dummies indicate the percent of GDP by which investment is affected. Therefore, this adverse effect is also economically large as investment is on average about 2% of GDP lower following a banking crisis. The largest impact is found in years 3 and 4 post crisis. For instance, in regression (1), the coefficient in year 3 is -2.835 which means that a banking crisis reduces investment by 2.835% of GDP in the third year after the crisis. The negative effect diminishes over time to about 1.5% of GDP by the eighth year and is insignificant thereafter. With regards to the control variables, GDP per capita, government spending, and the real interest rate are statistically significant and have the expected sign in the four regressions reported. In summary, the effects of the banking crisis on investment remain significant for 8 years after accounting for a wide variety of determinants of investment.

We now turn our attention to the effect of multiple crises by estimating equation (2); results are presented on Table 5. Regression (1) is a baseline regression without *Multiple Crises* that we use for comparison. The new specifications including the *Multiple Crises* variable are presented in regressions (2), (3), (4), and (5). The estimated coefficients for *Multiple Crises* are

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<sup>8</sup> Regression (2) adds the real interest rate to the set of control variables. Regression (3) adds the *Institutions* index, while regression (4) adds both the real interest rate and *Institutions*.

negative and statistically significant indicating that investment is lower in countries that have suffered several crises. For instance, in regression (2), the coefficient of -1.176 on *Multiple Crises* indicates that, for every additional crisis, investment is about 1.2 percentage points of GDP lower. In a country that has experienced two, three, or more crises, this effect would be compounded accordingly. These estimates are then consistent with the data that were presented in Table 1 that showed investment decreasing by larger amounts after each additional crisis.

How does accounting for *Multiple Crisis* affect the banking crises dummies? One can compare the size of the coefficients on the banking crises lags in regressions with and without *Multiple Crises*. As Table 5 shows, the size of the effect of the banking crisis dummies is lower by about 0.5% of GDP once we account for *Multiple Crises*. For example, the estimated coefficient for lag 4 of the crisis is -2.173 (regression 2) vs. -2.764 (regression 1). In the same manner, the coefficients on the banking crises dummies of every regression in Table 5 can be compared to their counterparts in Table 4. The coefficients are in all cases smaller once *Multiple Crisis* is accounted for. These results suggest that experiencing repeated crisis explains part of the long-lived adverse effects on investment found in Table 4.<sup>9</sup>

We next explore a series of robustness tests to find how they may affect the results described above.<sup>10</sup> Table 6 presents the results of the robustness tests. First, policy volatility in a country could be a source of uncertainty that affects investment and should be controlled for. Hence, we use the variability of inflation as a proxy for policy volatility and include it in regression (2) in Table 6. The estimated coefficient on the variability of inflation is not statistically significant, while the estimated coefficient on *Multiple Crises* remains negative and

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<sup>9</sup> In the main estimations, we use the set of 75 countries for which we have data for all variables used in the regressions. The sample of countries can be expanded for some regressions that do not use the interest rate or institutions as controls. These robustness tests are available from the authors upon request.

<sup>10</sup> We are grateful to two anonymous referees for suggesting some of these robustness tests. Due to data availability, the samples for some robustness specifications becomes smaller than that in the preferred specification.

statistically significant. Second, another potential source of uncertainty in a country could come from institutional instability. Brunetti and Weder (1998) and Lensink, Bo, and Sterken (1999) have found that institutional instability can reduce investment and growth. To proxy for institutional instability, we compute the variability of our *Institutions* index over a window of 5 years prior to the crisis and include it as a control variable in regression (3). The coefficient on institutional stability is positive, though not significant at the 5% level. However, *Multiple Crisis* remains negative and significant after controlling for this institutional stability. We also run a random-effects estimation reported in regression (4). Random effects results are similar to the baseline fixed effects counterparts. In particular, the lags of banking crisis and the *Multiple Crises* variable results are unchanged.

In our next robustness test, we consider an alternative measure of multiple crises: we use a set of dummy variables for countries that have had 1, 2, or 3 and more crises. Hence, we created dummy variables: Crisis1 =1 if the country had 1 crisis at time t in the sample period); Crisis2 =1 if the country had 2 crises at time t in the sample period); Crisis3 =1 if the country had 3 or more crises at time t in the sample period). We use these variables in regression (5). The coefficient on Crisis2 is negative and statistically significant, while the coefficients on Crisis 1 and Crisis3 are not significant. Hence, countries that have had two banking crises have a lower investment share of GDP. We may have expected that Crisis3 would also be negative and significant, but while the sign is negative, the coefficient is not statistically significant at the 5% level. This may be due to the fact that there are few countries that have had 3 or more banking crises in our sample. Our final robustness check includes the level of debt to GDP as control variable. Data for debt to GDP for our sample period is only available for 48 of the 75 countries in our sample. The estimated coefficient on debt to GDP is negative but not statistically

significant. Nevertheless, the coefficient on *Multiple Crises* is still negative and significant after controlling for debt. In summary, *Multiple Crises* remains negative and significant in a battery of robustness tests.

It is interesting to next explore the effect of multiple crises further to see how it might vary across countries of different income levels. We split countries into two groups according to their World Bank classification and denote the groups Higher Income and Lower Income. Our Higher Income group includes the World Bank-defined categories: High Income OECD and High Income non-OECD. Our Lower Income group includes Upper Middle Income countries, Lower Middle Income and Low Income countries. We split all the countries in our sample into two broad groups to maximize the number of countries and of observations.<sup>11</sup> Table 7 reports the results for the two country groups. Two regressions are reported for each country group. The explanatory variables in the first regression are the crisis dummies and the baseline control set (coefficients for the control variables are not reported for the sake of brevity). The second regression adds *Multiple Crises* as an explanatory variable. This is done to test if multiple crises make a difference and to compare how the coefficients on the crisis dummies vary once we account for multiple crises.

As Table 7 shows, banking crises appear more damaging to investment in the Lower Income group with adverse effects of up to 8 years and reducing investment by as much as 3% of GDP. Conversely, in the Higher Income group, the adverse effects are statistically significant for only 3 of the lags of crises at the 5% level (6 lags are significant at the 10% level). Further the size of the adverse effect is smaller in the Higher Income group. Once *Multiple Crises* is included, it is statistically significant in the Lower Income group only. Further its coefficient is

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<sup>11</sup> The number of crisis by World-Bank income group is presented in Appendix 2. The list of countries for each group is not presented due to space constraints, but available from the authors.

larger than the one obtained from using the whole sample reported in Table 5. These findings lead to the conclusion that the adverse effects of banking crises are particularly bad for middle and low-income countries (our Lower Income group). It has to also be acknowledged that this group of countries has suffered a higher incidence of banking crises than the higher income countries. Hence, the effects are more easily observed in lower and middle-income countries.

#### **IV. Conclusions**

We find that banking crises can decrease investment for 7 to 8 years by about 2% of GDP. This is a fairly persistent and sizable negative effect. In view of the world-wide financial crises of 2007-2009 (which in many cases involved the banking sector), these findings may partly explain why the recovery has been slow in many countries. Within the economics literature, these results extend the contribution of Cerra and Saxena (AER, 2008) who had found a persistent effect of banking crises on GDP.

We explored the issue further by studying the role of repeated or serial banking crisis. We find that investment is more adversely affected in countries that have experienced previous banking crises. This may be explained by a decline in confidence or in the general health of the banking system due to previous crises. In a parallel paper (Rioja, Rios-Avila, and Valev, 2012), we find that the size and duration of the adverse effect of banking crises 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. That result, which echoes the findings of Kalemli-Ozcan, Kamil and Villegas-Sanchez (2010), sheds some light on how crises affect investment, namely through the availability of credit, but a more thorough investigation into alternative channels is left for future research.

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**Table 1: Multiple Crises and Investment**

Cumulative change is the sum of the change in investment (as % of GDP) in the three years after a banking crisis

Crisis Occurrence	Cumulative change in investment year $t$ to $t+3$
1st	-2.3
2nd	-6.2
3rd	-11.0
4th and 5th	-11.2

**Table 2: Summary statistics**

Variable	Mean	Std. Dev.	Min	Max
<b>Investment Ratio</b>	18.54	8.15	2.84	44.65
<b>Crisis</b>	0.04	0.19	0	1
<b>Main Controls</b>				
GDP per capita	12494	9250	750	45694
Avg. 5yr GDP growth	2.25	2.62	-8.34	13.83
Inflation	20.23	251.86	-1.29	7481.66
Gov. spending	19.68	7.58	4.08	55.05
Private credit	0.58	0.44	0.03	3.45
Openness	76.60	53.35	12.84	446.06
Capital Openness	0.78	1.54	-1.83	2.50
Value Traded	0.22	0.40	0.00	3.26
Real interest rate	0.07	0.09	-0.63	0.58
Legal System and Property Rights	0.40	0.90	-5.15	1.67

**Table 3: Correlations**

	<b>Investment Ratio</b>	<b>Crisis</b>	<b>GDP per capita</b>	<b>Avg. 5yr GDP growth</b>	<b>Inflation</b>	<b>Gov. spending</b>
Investment Ratio	1					
Crisis	-0.036	1				
GDP per capita	0.520	-0.077	1			
Avg. 5yr GDP growth	0.328	0.007	0.106	1		
Inflation	-0.037	-0.007	-0.061	-0.100	1	
Gov. spending	-0.216	0.000	-0.246	-0.036	-0.018	1
Private credit	0.483	-0.034	0.666	0.080	-0.071	-0.214
Openness	0.282	-0.063	0.205	0.173	-0.051	-0.030
Capital Openness	0.325	-0.026	0.589	0.089	-0.078	-0.138
Value Traded	0.382	-0.047	0.547	0.117	-0.036	-0.215
Real interest rate	-0.121	0.077	-0.124	-0.073	-0.217	0.126
Legal system and property rights	0.418	-0.029	0.663	0.142	-0.066	-0.051
	<b>Private credit</b>	<b>Openness</b>	<b>Capital Openness</b>	<b>Value Traded</b>	<b>Real interest rate</b>	<b>Legal system and property rights</b>
Private credit	1					
Openness	0.192	1				
Capital Openness	0.383	0.251	1			
Value Traded	0.594	0.165	0.312	1		
Real interest rate	-0.103	-0.065	0.085	-0.125	1	
Legal system and property rights	0.499	0.108	0.436	0.323	0.001	1

**Table 4: The Effect of Banking Crisis on Investment**

Investment as a share of GDP is the dependent variable. Results shown are from fixed effects regressions. *L<sub>j</sub>.Crisis* is a dummy variable for a banking crisis that occurred *j* years ago. Robust standard errors are in parenthesis. \*\*\* denotes significance at the 1% level; \*\* denotes significance at the 5% level; \* denotes significance at 10%.

VARIABLES	(1)	(2)	(3)	(4)
L1.crisis	-2.280*** (0.525)	-2.026*** (0.519)	-2.232*** (0.520)	-1.993*** (0.515)
L2.crisis	-2.566*** (0.582)	-2.390*** (0.604)	-2.581*** (0.587)	-2.410*** (0.609)
L3.crisis	-2.835*** (0.579)	-2.691*** (0.589)	-2.815*** (0.575)	-2.679*** (0.585)
L4.crisis	-2.764*** (0.589)	-2.774*** (0.596)	-2.817*** (0.580)	-2.821*** (0.588)
L5.crisis	-2.629*** (0.545)	-2.694*** (0.547)	-2.643*** (0.529)	-2.704*** (0.535)
L6.crisis	-2.599*** (0.580)	-2.630*** (0.554)	-2.612*** (0.574)	-2.640*** (0.550)
L7.crisis	-1.935*** (0.482)	-2.006*** (0.481)	-1.926*** (0.477)	-1.995*** (0.477)
L8.crisis	-1.482** (0.582)	-1.506** (0.581)	-1.468** (0.580)	-1.492** (0.579)
L9.crisis	-0.774 (0.542)	-0.722 (0.541)	-0.759 (0.540)	-0.711 (0.540)
L10.crisis	0.336 (0.571)	0.339 (0.563)	0.339 (0.572)	0.342 (0.564)
GDP per capita	5.544*** (1.772)	5.370*** (1.764)	5.659*** (1.759)	5.479*** (1.753)
Inflation	-0.652 (0.678)	-1.463 (0.887)	-0.653 (0.676)	-1.433 (0.877)
Gov. spending	-0.210** (0.0849)	-0.192** (0.0837)	-0.212** (0.0839)	-0.195** (0.0828)
Openness	-0.0258 (0.0201)	-0.0258 (0.0197)	-0.0257 (0.0201)	-0.0257 (0.0198)
Avg. GDP growth	0.246 (0.150)	0.233 (0.150)	0.248 (0.150)	0.236 (0.149)
Private credit	-0.815 (1.000)	-0.754 (0.979)	-0.728 (0.976)	-0.679 (0.960)
Capital Openness	0.405 (0.284)	0.444 (0.279)	0.403 (0.284)	0.441 (0.280)
Value Traded	0.290	0.280	0.266	0.259

	(0.822)	(0.822)	(0.823)	(0.823)
Real interest rate		-5.118**		-4.922**
		(1.991)		(1.915)
Legal System and Property Rights			-0.411*	-0.367*
			(0.240)	(0.218)
Constant	-25.00	-23.39	-25.89*	-24.24
	(15.61)	(15.50)	(15.51)	(15.43)
Observations	1,056	1,056	1,056	1,056
Number of Countries	75	75	75	75
R2 overall	0.260	0.267	0.262	0.269

**Table 5: The Effect of Multiple Crises on Investment**

Investment as a share of GDP is the dependent variable. Results shown are from fixed effects regressions. *L<sub>j</sub>.Crisis* is a dummy variable for a banking crisis that occurred *j* years ago. Robust standard errors are in parenthesis. \*\*\* denotes significance at the 1% level; \*\* denotes significance at the 5% level; \* denotes significance at 10%.

VARIABLES	(1)	(2)	(3)	(4)	(5)
L1.crisis	-2.280*** (0.525)	-1.699*** (0.587)	-1.386** (0.552)	-1.655*** (0.571)	-1.358** (0.540)
L2.crisis	-2.566*** (0.582)	-2.012*** (0.558)	-1.784*** (0.560)	-2.031*** (0.560)	-1.808*** (0.563)
L3.crisis	-2.835*** (0.579)	-2.292*** (0.578)	-2.099*** (0.568)	-2.276*** (0.574)	-2.091*** (0.563)
L4.crisis	-2.764*** (0.589)	-2.204*** (0.580)	-2.173*** (0.586)	-2.261*** (0.570)	-2.224*** (0.576)
L5.crisis	-2.629*** (0.545)	-2.113*** (0.533)	-2.144*** (0.540)	-2.131*** (0.518)	-2.159*** (0.527)
L6.crisis	-2.599*** (0.580)	-2.122*** (0.583)	-2.120*** (0.559)	-2.138*** (0.580)	-2.134*** (0.558)
L7.crisis	-1.935*** (0.482)	-1.460*** (0.486)	-1.499*** (0.483)	-1.454*** (0.481)	-1.492*** (0.480)
L8.crisis	-1.482** (0.582)	-1.087* (0.568)	-1.083* (0.569)	-1.076* (0.568)	-1.073* (0.569)
L9.crisis	-0.774 (0.542)	-0.468 (0.550)	-0.391 (0.550)	-0.456 (0.549)	-0.382 (0.550)
L10.crisis	0.336 (0.571)	0.594 (0.550)	0.617 (0.543)	0.595 (0.552)	0.617 (0.544)
Multiple Crises		-1.176** (0.565)	-1.264** (0.565)	-1.168** (0.568)	-1.254** (0.568)
GDP per capita	5.544*** (1.772)	6.366*** (1.574)	6.242*** (1.571)	6.474*** (1.568)	6.342*** (1.570)
Inflation	-0.652 (0.678)	-0.851 (0.675)	-1.728* (0.876)	-0.850 (0.674)	-1.697* (0.866)
Gov. spending	-0.210** (0.0849)	-0.218** (0.0834)	-0.199** (0.0818)	-0.220*** (0.0824)	-0.202** (0.0810)
Openness	-0.0258 (0.0201)	-0.0212 (0.0217)	-0.0208 (0.0215)	-0.0211 (0.0218)	-0.0208 (0.0215)
Avg. GDP growth	0.246 (0.150)	0.221 (0.149)	0.205 (0.148)	0.223 (0.149)	0.208 (0.148)
Private credit	-0.815 (1.000)	-0.809 (0.969)	-0.743 (0.944)	-0.723 (0.943)	-0.670 (0.924)
Capital Openness	0.405 (0.284)	0.439 (0.281)	0.483* (0.275)	0.437 (0.281)	0.480* (0.276)
Value Traded	0.290 (0.822)	0.298 (0.825)	0.287 (0.825)	0.275 (0.826)	0.267 (0.826)

Real interest rate			-5.442***		-5.249***
			(1.933)		(1.860)
Legal System and Property Rights				-0.405*	-0.357
				(0.243)	(0.220)
Constant	-25.00	-31.61**	-30.39**	-32.44**	-31.17**
	(15.61)	(14.05)	(13.96)	(13.99)	(13.95)
Observations	1,056	1,056	1,056	1,056	1,056
Number of Countries	75	75	75	75	75
R2 overall	0.260	0.266	0.274	0.268	0.276

**Table 6: The Effect of Multiple Crises on Investment: Robustness**

Investment as a share of GDP is the dependent variable. Results shown are from fixed effects regressions. *Lj.Crisis* is a dummy variable for a banking crisis that occurred *j* years ago. Regressions include GDP per capita, Inflation, Government Spending, Openness, Average GDP growth, Private Credit, Capital Openness, Value Traded, Real interest rate, and Legal Systems and Property Rights. Robust standard errors are in parenthesis. \*\*\* denotes significance at the 1% level; \*\* denotes significance at the 5% level; \* denotes significance at 10%. # Random Effect model.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
L1.crisis	-1.358** (0.540)	-1.260** (0.568)	-1.436** (0.621)	-1.754*** (0.610)	-1.400*** (0.525)	-0.800 (0.665)
L2.crisis	-1.808*** (0.563)	-1.649*** (0.577)	-1.994*** (0.604)	-2.212*** (0.594)	-1.931*** (0.621)	-1.026 (0.822)
L3.crisis	-2.091*** (0.563)	-1.957*** (0.575)	-2.312*** (0.622)	-2.488*** (0.610)	-2.172*** (0.616)	-1.636** (0.718)
L4.crisis	-2.224*** (0.576)	-2.017*** (0.594)	-2.221*** (0.613)	-2.370*** (0.603)	-2.328*** (0.627)	-1.887*** (0.675)
L5.crisis	-2.159*** (0.527)	-1.971*** (0.509)	-2.206*** (0.608)	-2.312*** (0.591)	-2.175*** (0.555)	-2.077** (0.777)
L6.crisis	-2.134*** (0.558)	-1.965*** (0.522)	-1.831*** (0.535)	-1.954*** (0.529)	-2.193*** (0.572)	-2.480*** (0.879)
L7.crisis	-1.492*** (0.480)	-1.364*** (0.463)	-1.394*** (0.524)	-1.504*** (0.542)	-1.582*** (0.495)	-1.761** (0.712)
L8.crisis	-1.073* (0.569)	-1.021* (0.555)	-1.434** (0.663)	-1.498** (0.659)	-1.169** (0.576)	-1.449** (0.690)
L9.crisis	-0.382 (0.550)	-0.348 (0.545)	-0.839 (0.692)	-0.876 (0.708)	-0.509 (0.565)	-0.668 (0.705)
L10.crisis	0.617 (0.544)	0.626 (0.524)	0.279 (0.637)	0.237 (0.620)	0.479 (0.524)	1.309* (0.739)
Multiple Crises	-1.254** (0.568)	-1.400** (0.566)	-1.532*** (0.520)	-0.929** (0.439)		-1.435** (0.584)
Inflation Volatility		-0.414* (0.240)				
Institution Volatility			0.323* (0.183)	0.299* (0.170)		
One Crisis					0.0473 (0.891)	
Two Crises					-3.280*** (1.234)	
Three or more Crises					-2.946 (2.253)	
Public Debt						-0.0186 (0.0189)
Constant	-31.17** (13.95)	-27.17* (14.03)	-35.67** (14.76)	-20.38** (8.540)	-32.07** (13.09)	-29.05* (16.35)
Observations	1,056	1,054	893	893	1,056	547

Number of Countries	75	75	75	75	75	41
R2 overall	0.276	0.282	0.269	0.264	0.293	0.296

**Table 7: The Effect of Multiple Crises on Investment in Different Income Groups**

Investment as a share of GDP is the dependent variable. Results shown are from fixed effects regressions. *Lj.Crisis* is a dummy variable for a banking crisis that occurred *j* years ago. Regressions include GDP per capita, Inflation, Government Spending, Openness, Average GDP growth, Private Credit, Capital Openness, Value Traded, Real interest rate, and Legal Systems and Property Rights. Robust standard errors are in parenthesis. \*\*\* denotes significance at the 1% level; \*\* denotes significance at the 5% level; \* denotes significance at 10%.

VARIABLES	Higher Income	Higher Income	Lower Income	Lower Income
L1.crisis	-2.041*** (0.619)	-1.289** (0.635)	-0.906* (0.502)	-0.630 (0.561)
L2.crisis	-2.402*** (0.667)	-1.695** (0.720)	-1.182 (0.764)	-0.937 (0.763)
L3.crisis	-2.856*** (0.650)	-2.149*** (0.702)	-0.969 (0.618)	-0.738 (0.665)
L4.crisis	-3.034*** (0.702)	-2.346*** (0.711)	-1.390* (0.732)	-1.110 (0.812)
L5.crisis	-2.994*** (0.711)	-2.307*** (0.731)	-1.522** (0.580)	-1.351** (0.579)
L6.crisis	-3.097*** (0.755)	-2.443*** (0.783)	-1.069** (0.515)	-0.911 (0.541)
L7.crisis	-2.366*** (0.653)	-1.756** (0.682)	-0.886 (0.649)	-0.678 (0.702)
L8.crisis	-1.594** (0.773)	-1.101 (0.772)	-1.202** (0.555)	-1.021* (0.541)
L9.crisis	-0.717 (0.766)	-0.342 (0.781)	-1.033* (0.557)	-0.858 (0.536)
L10.crisis	0.705 (0.772)	1.000 (0.737)	-0.881 (0.537)	-0.723 (0.521)
Multiple Crises		-1.415** (0.535)		-0.698 (0.914)
Constant	-28.17 (18.10)	-35.46** (16.64)	-84.12** (31.87)	-87.04*** (30.91)
Observations	656	656	400	400
Number of Countries	50	50	25	25
R2 overall	0.283	0.291	0.499	0.501



## Appendix 1. 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)
Multiple Crises	Number of crisis the country has experienced through year t.	Reinhart and Rogoff (2008)
Investment	Investment share of real GDP per capita	Penn World Tables (2008)
GDP per capita	Real GDP per capita (Constant Prices: Chain series) in prices 2005	Penn World Tables (2008)
Avg. 5yr GDP growth	Average annual growth of GDP per capita of the last 5 years	Penn World Tables (2008)
Inflation	Inflation, consumer prices (annual %)	World Development Indicators
Gov. spending	Government Share of real GDP per capita	Penn World Tables (2008)
Private credit	Private credit by deposit money banks to GDP	Beck, et al.(2009)
Value Traded	Ratio of the value of total shares traded in domestic stock markets to GDP.	Beck, et al.(2009)
Openness	Exports plus Imports divided as a percentage of real GDP	Penn World Tables (2008)
Capital Openness	Index of capital account openness.	Chinn and Ito (2008)
Real interest rate	Real interest rate (in %)	World Development Indicators
Institutions index	First Principal component of: a) Legal System and Property Rights (an index of measures of rule of law, security of property rights, an independent judiciary, and an impartial court system.); and b) Polity (IV).	Gwartney and Lawson (2012), Polity IV.

## Appendix 2: Number of countries with multiple crises by income group

Income group	No crises	1 crisis	2 crises	3 or more crises
<i>Higher Income Group</i>				
High Income OECD	11	8	1	0
High Income non OECD	1	4	0	0
Upper Middle Income	6	9	2	2
<i>Lower Income Group</i>				
Low Middle Income	9	13	3	0
Low Income	7	6	0	0