

Do financial crises discipline future credit growth?

Puspa Amri

*Department of Economics, Ithaca College, Ithaca, New York, USA and
Claremont Institute for Economic Policy Studies, Claremont Graduate University,
Claremont, California, USA*

Eric M.P. Chiu

*Graduate Institute of National Policy and Public Affairs,
National Chung-Hsing University, Taichung, Taiwan*

Greg Richey

*California State University San Bernardino, San Bernardino, California, USA and
University of California, Riverside, California, USA, and*

Thomas D. Willett

*Department of Economics, Claremont Graduate University, Claremont,
California, USA*

Abstract

Purpose – The purpose of this paper is to test whether financial crises themselves provide some degree of *ex post* discipline. In other words, is there learning from the mistakes associated with crises? The authors test this hypothesis on credit growth, a frequent contributor to banking crises.

Design/methodology/approach – The study uses statistical tests (comparison of means) on a sample of 72 banking crises, the onset of which occurred between 1980 and 2008. Tests for significance of the difference are conducted using Kolmogorov–Smirnov equality in distribution tests.

Findings – The results show that real credit growth fell substantially (relative to average) by about 8 per cent points from pre- to post-crisis periods, and that average banking regulation and supervision strengthens after a crisis.

Originality/value – This paper provides empirical support for the proposition that while financial markets may fail to give sufficient warning signals before a financial crisis, they may discipline governments to undertake reforms in the aftermath of a crisis.

Keywords Financial markets, Financial markets and the macroeconomy, Credit, International finance

Paper type Research paper

1. Introduction

It has frequently been argued that financial markets can provide strong discipline over the financial behavior of governments and central banks. This view is personified in the comment made by a former presidential advisor in the USA that if he were reincarnated, he would like to come back as the financial market because then he could scare anyone. To many, such discipline would be a good thing, helping to offset various biases toward



excessive financial laxity discussed in the literature on time-inconsistency problems, political business cycles, etc. To others, generally from the left of the political spectrum, such discipline is seen as being excessively harsh, forcing governments to curtail desirable actions.

Both of these frequently expressed views share the assumption that for good or ill, financial markets do provide considerable discipline over the decision-making of public officials. Recent analysis, however, suggests that such discipline is often lacking. Indeed, the frequency of financial crises themselves suggests the limitations of this discipline hypothesis, at least in its strong form that market discipline will force governments to correct policies that are heading toward crises.

Two things are required for this strong form of the discipline hypothesis to work: that markets give early warning signals that government policies are heading toward problems *and* that governments then respond to these signals. As documented in [Willett *et al.* \(2014\)](#), there are many cases in which financial markets have failed to give any substantial early warning signals. The failure of interest rate premia to rise substantially on government debt of countries such as Greece before the outbreak of the euro crises is an important recent example. Similarly [Prabha *et al.* \(2012\)](#) found little evidence of strongly rising risk premia on the debt of the major commercial banks before the US subprime crisis.

Once the euro crisis broke out, however, it appears that financial markets “woke up” and at least until the time of the ECB’s commitment to do whatever it takes to save the euro, they reacted sensitively to the policies being adopted. Indeed, some have argued that during the height of the euro crisis, the markets imposed excessively harsh discipline on governments. While much more detailed analysis is necessary, these developments suggest that there is likely a good bit of truth to the discipline *during* crises hypothesis.

In this paper, we explore a third type of discipline hypothesis: do painful financial crises induce governments and private sector decision makers to adopt more prudent policies for the future? In other words, is there learning from the mistakes associated with crises? While such learning behavior seems quite plausible, it is not obvious how strong the effect will be. In some countries, special interest forces may continue to generate excessive credit creation even in the face of public demands for reform. Regulatory reforms that are undertaken may prove to be largely ineffective in the face of such pressures. There may also be considerable disagreement about the major causes of crises and hence what lessons should be learned. For example, at the political level, the right in the USA has frequently argued that the major cause of the subprime crisis was excessive government interference in the housing markets, while many on the left have blamed excessive financial deregulation[1].

There is also a well-known tendency for memories to be short. This is not always the case. The horrors of the German hyperinflation still influence the anti-inflation attitudes of the German officials and the general public. Still tendencies to lapse into past excesses cannot be fully discounted and our analysis found a number of examples of such failures.

Our focus is on the extent to which banking crises tend to provide future discipline in the form of lower rates of credit growth than those prior to the crisis. Bank credit tends to fall while a crisis is in process and this is typically the result more of the direct effects of the crisis than better disciplined policies. Thus, we compare rates of credit growth after, not during, the crisis period with those that preceded the crisis[2].

Of course, excessive credit growth is not the only cause of banking crises, so comparing before and after rates of credit growth does not capture the full range of possible discipline effects but there has been considerable research on the relationship between credit growth and banking crises. Credit booms are neither a necessary nor sufficient condition for banking crises but there is a positive relationship. The general conclusion of this research is

that while many credit booms do not end in banking crises, a majority of banking crises are preceded by credit booms. For example, [Mendoza and Terrones \(2008\)](#) found slightly over half of the crises in their sample are preceded by credit booms, while [Elektdag and Wu \(2011\)](#) found 69 per cent of the crises were preceded by booms in their sample.

High credit growth is the result of a combination of financial sector and government decisions and regulations. For example, in the US subprime crisis, excessive risk-taking by banks played a major role, while Alan Greenspan's belief that competition in the banking sector would provide sufficient discipline (such that little regulatory oversight was needed) proved to be false. Many argue that the low interest rate policy of the Federal Reserve also contributed importantly to the buildup of the housing and credit bubble. For the most part, regulators had the ability to offset these factors but failed to do so. Thus, the bubble was the result of the interaction of a number of government and private sector policies. The first task, on which we focus, is to determine to what extent future credit growth was disciplined, i.e. what are the basic facts.

A follow-on task is to investigate the various channels through which discipline may occur. While we will likely never be able to fully accurately assign relative weights to the various factors that contribute to these outcomes, it is possible to explore some aspects of these composite effects. We undertake an initial investigation of one possible channel, specifically strengthening of financial regulation and supervision[3].

This study examines 72 banking crisis (country-year) episodes, the onset years of which occurred between 1980 and 2008. We focus particularly on a sub-set of 55 credit-growth-driven banking crises. Our primary analysis looks at bank credit but we are also able to look at the growth of non-bank credit for a smaller sample of countries. The results for both measures are generally the same.

We found that while on average rates of credit growth fall and financial supervision was strengthened following crises, there were substantial differences across countries in the responses of both credit growth and strengthening of financial supervision. Roughly two-thirds of our sample showed drops in credit growth, but in one third of our sample there was no such fall. Thus, it becomes important to attempt to understand the major factors that influence these differences.

The paper is organized as follows. In [Section 2](#), we describe the data on credit growth and banking crisis, and we explain how we set up the data for analysis. In [Section 3](#) we present cross-country comparisons of changes in credit growth from the pre- to the post-crisis periods. [Section 4](#) looks at changes in the strength of regulation and supervision after banking crises. [Section 5](#) offers concluding comments.

2. Set up and data description

This study examines 72 banking crisis (country-year) episodes, the onset years of which occurred between 1980 and 2008. We excluded crisis episodes preceded by negative credit growth (Russia 1998; Venezuela 1994) and thus focused on a sub-set of 55 crisis episodes that were preceded by positive pre-crisis credit expansion, following the suggestion of [Takats and Upper \(2013\)](#)[4]. Our main variables of interest are credit growth, banking crisis, capital regulation and supervision (CRS). CRS is proxied by a score measuring countries' compliance with international standards of banking supervision taken from [Abiad et al. \(2010\)](#). A more detailed explanation of these data is found in [Section 4](#).

Banking crisis data were taken from [Laeven and Valencia \(2012\)](#), who document occurrences of systemic banking crisis worldwide[5]. In this data set[6], a country experiences the onset of a banking crisis in a particular year if there is either a significant bank run or a substantial government intervention to rescue the banking sector (bank

holiday, deposit freeze, liquidity support or outright bank takeovers). This data set was chosen because it has the widest country and period coverage of all existing data sets (it covers 145 countries with over 150 crisis episodes).

In attempts to capture what constitutes “excessive” credit growth, scholars have used a number of different measures of private credit growth with varying results. The two main underlying measures are growth in real credit and growth in credit/GDP. Each of these measures is designed to take into account one of the important factors that should influence the rate of non-excessive credit growth. Ideally one would like to compare actual credit growth with the results of a well-specified equation, indicating what rate of credit growth is appropriate. Unfortunately, there is no agreement in the literature on how such appropriate levels of credit growth should be estimated. This is reflected in the various measures that have been used to identify periods of credit booms[7]. Thus, we have adopted the cruder measures that have been used in the recent literature. In our preliminary analysis, we chose real growth of credit instead of growth of credit/GDP, since the latter measure does not account for the possibility that credit and GDP could have very different trends and recovery patterns after the crisis. In other words, we might face a situation where credit and GDP are falling individually; however, the growth in credit/GDP might go up because the fall in credit is smaller in magnitude than the fall in GDP.

For this reason, in our main analysis, we followed the recent trend in the literature and used the growth of real credit[8] as our measure, although we also conducted sensitivity analyses using the other frequently used credit measure, the ratio of credit to GDP[9]. We used the criterion that real credit growth before a crisis be positive, and this condition was met for 55 of the 72 advanced and emerging market countries for which we were able to obtain a complete set of data. The argument is that when high credit growth has not preceded a crisis then there would seem to be no major reason to curb future credit growth. It is only when prior credit growth has been seen to be excessive that we would expect that there might be a learning experience that leads to reductions in future credit growth[10].

2.1 Pre- and post-crisis sample periods: choosing a time window

As our main data analysis compares time plots of growth rates of credit before and after the onset of banking crisis episodes, one important point regarding the data setup is the time window to choose as our pre-crisis sample and post-crisis sample. Previous research suggests that it takes a few years of high credit growth to generate crises (Caprio and Klingebiel, 1996; Dell’Ariccia *et al.*, 2012). Behind a credit-growth-induced banking crisis is a high number of bad loans. It could take a number of years for bad loans to accumulate and become evident that they need to be written-off. However, Amri *et al.* (2013) found that the preceding year or two is more substantively significant in explaining banking crises, compared to cumulative credit growth over three-four years preceding the crisis.

Given the foregoing, we took a conservative approach and used a four-year window for our average pre-crisis credit-growth rates[11]. For the crisis period, examination of the data suggested that a conservative window to capture the declines in credit growth that usually occur during crises was again three years. Thus, we began our post-crisis period at $t + 4$ years and again used a four-year window to compute average post-crisis credit growth. In other words, taking t as the onset year of a banking crisis, years $t - 3$ to years t make up the pre-crisis sample period, while years $t + 4$ to $t + 7$ comprise the post-crisis sample period. Our choice was broadly in line with similar research that looked at how credit behaves after financial crises (i.e. during output recovery periods). For example, Takats and Upper[12] (2013) found that credit drops after a crisis tend to level off within two years, which strengthens our case for deleting the three-year period immediately after the onset of a banking crisis.

One point to acknowledge is that even after deleting the three years immediately after the onset of a banking crisis, there are potential biases. One is that as a country recovers from a banking crisis, sharp drops in credit growth *during* the crisis may be so substantial that above average credit growth might be appropriate for a year or two. This would create a bias against finding discipline. Thus, we believe that our estimates for cases of post-crisis discipline are conservative.

One way to allay concerns regarding this type of potential bias is to calculate how long it takes for credit to return to its “normal” levels. Yet, defining what “normal” is would be difficult. Clearly, what we observe in one or two years before the crisis is not normal, as this is the period where credit overshoots (hence a credit boom). In fact, if the immediate pre-crisis credit growth is too high (and thus problematic), this is not the ideal level to which we would want to return. Table I reports the average trend of credit and GDP during and after banking crises. The second column reports average deviation of the log of real credit from its trend, using a Hodrick Prescott filter[13]. Nevertheless, the figures cited here suggest that our choice of time-window discussed in the previous paragraph is reasonable. For example, as seen from Column 3, in the pre-crisis period ($t - 3$ to t), we see that real credit grows sharply, enters negative territory *during* the crisis and recovery period ($t + 1$ to $t + 3$), and in the post-crisis period ($t + 4$ to $t + 7$), average real credit growth is no longer negative and starts to resemble the average figures observed before the crisis.

3. Banking crisis as a potential source of future discipline: examining credit growth before and after financial crises

In this section, we examine patterns in the changes in annual growth of real credit before and after banking crises episodes. We analyze 55 credit-growth-driven banking crisis episodes[14], out of the 72 advanced and emerging market countries for which we were able to obtain a complete set of data and present the results in Table II below. Based on this sample, in the pre-crisis period ($t - 3$ to t), average annual growth of real credit is 9.68 per cent (std. deviation 6.9 per cent). In the post-crisis period ($t + 4$ to $t + 7$), average annual growth of real credit is 1.48 per cent (std. deviation 12.4 per cent). The average difference between pre-crisis and post-crisis is -8.20 percentage[15] points, a very substantial drop.

Time window	Average deviation of real credit from trend (%) ^a	Average annual real credit growth (%)	Average annual real GDP growth (%)	Average annual credit/GDP growth (%)
$t - 3$	0.72	3.19	3.05	2.72
$t - 2$	0.36	3.92	2.61	4.94
$t - 1$	4.67	8.32	2.26	9.40
t	7.51	7.22	0.58	6.86
$t + 1$	3.93	-1.20	-0.76	2.93
$t + 2$	-3.45	-4.33	2.58	0.86
$t + 3$	-4.57	0.87	3.83	-0.74
$t + 4$	-3.38	4.04	3.84	1.41
$t + 5$	-3.99	2.76	3.87	0.43
$t + 6$	-3.32	4.64	4.34	2.10
$t + 7$	-2.0	6.28	3.19	4.77

Table I.
Credit and GDP growth around and during banking crises

Notes: ^aDeviation from trend is the percentage-point difference between the variable log of real credit and its (HP Filtered) trend. t is the onset year of banking crisis

The average annual growth of real credit during “tranquil times”, defined as all periods outside our pre- and post-crisis periods, was 6.82 per cent. Forty-one of the 55 cases (75 per cent) were followed by lower credit growth, and in 38 out of those 41 cases, the drop in credit growth was greater than 3 percentage points. In 9 of those 41 cases (most of which were from the emerging market economy group, particularly from Latin America. The two non-emerging market cases were Ireland 2008 and Spain 2008), the drop was greater than 20 percentage points. With the exception of Ecuador 1982, it appears that the distribution of the drop in credit growth across these 38 sub-sample episodes was quite even[16]. Thus, on average, the countries examined here experienced a substantially *lower* average real credit growth after the banking crisis compared to tranquil times. This is illustrated in Figure 1 below.

In Table II, we summarize the changes in real credit growth from pre- to post-crisis by country group[17]. The emerging markets group, the largest of the sample – with 29 of the 55 episodes – showed the sharpest drop from pre- to post-crisis periods by decreasing 9.78 per cent points. The advanced economies group, which is composed of 16 of the 55 episodes, closely resembled the emerging economies average by dropping 9.14 per cent points from pre- to post-crisis. Not surprisingly, the least-developed country group showed the smallest change from pre- to post-crisis. In this group, which consists of 10 of the 55 episodes, credit growth only decreased 2.11 per cent points from pre- to post-crisis.

As a robustness check, we also compared these figures using the growth in credit/GDP as our indicator of credit growth[18]. To be precise, it is the annual growth in real credit/real GDP. We stress this because credit and GDP are deflated using different price indexes: real credit is deflated using Consumer Price Index, while real GDP is deflated using a GDP deflator. We also conducted a sensitivity analysis with non-bank credit. The pre-crisis average non-banking credit growth was 11.81 per cent and the post-crisis average credit growth was 2.52 per cent.

Group	Tranquil years (%)	Pre-crisis ($t - 3$ to t) (%)	Post-crisis ($t + 4$ to $t + 7$) (%)	Before–after difference
ALL	6.82	9.68	1.48	-8.20
EMG	7.27	11.21	1.43	-9.78
ADV	3.10	7.06	-3.07	-9.14
LDC	7.45	9.44	7.33	-2.11

Table II.
Real credit growth
from pre- to post-
crisis period –
country group
summary

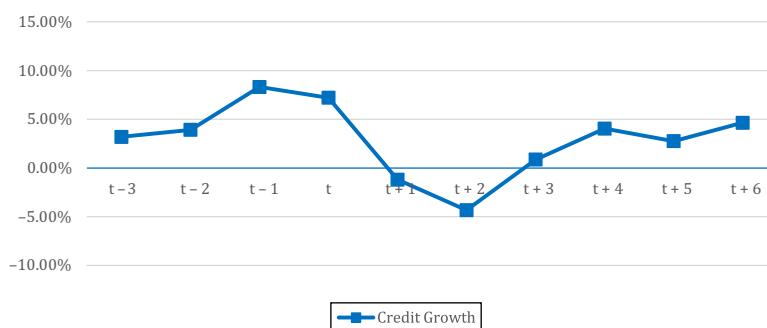


Figure 1.
Annual real credit
growth, before,
during and after a
banking crisis, where
 t is the onset year of
the banking crisis

Thus, the drop in non-bank credit from pre- to post-crisis periods was 9.3 percentage points, slightly higher than the corresponding 8.20 percentage-point drop experienced by bank credit.

One argument against simply looking at real credit growth is that high credit growth by itself is not a cause of concern if credit is being used to finance a growing real economy. Therefore, we examined whether the 55 episodes summarized in Table II also experienced a positive growth in credit/GDP during the pre-crisis period (see Table A2 in the Appendix). The average change in the growth of credit/GDP from pre- to post-crisis was -8.12 per cent, consistent with the results from using real credit growth. It should be noted that when using credit/GDP over the same sample of 55 cases, five crisis episodes were preceded by a negative growth in credit/GDP, even though both credit and GDP rose during this period. These are Costa Rica (1987, 1994), Egypt (1980), India (1993) and Mexico (1981)[19]. In these five episodes, while credit and GDP both went up, the average growth in credit/GDP was negative because the increase in GDP (the denominator) was greater in magnitude than the increase in real credit (the numerator). This illustration stresses that both indicators have their own strengths and weaknesses.

We further test for the significance of the change in credit growth from pre- to post-crisis, as reported in Table II. We conducted Kolmogorov-Smirnov tests for equality in distributions, as reported in Table III. The null of equality of distributions is rejected at the 10 per cent level according to a Kolmogorov-Smirnov test.

As shown in Table III, the change in real credit growth from pre- to post-crisis period was significant for the 55 cases of banking crises that were preceded by positive pre-crisis period credit growth. Not surprisingly, we found that the difference is not significant if we included the entire sample of 72 crisis episodes[20] that consisted of both positive and negative pre-crisis period credit growth. Not only is there less scope for decreases in credit growth for the countries that did not have pre-crisis real credit growth, but it is also more likely that authorities and bankers would see no reason to try to lower future credit growth, as credit growth would not appear to have been a major cause of their banking crises.

In Figure 2 below, we show the relationship between the pre-crisis rates of growth (Y-axis) and the change in the growth rates before and after a banking crisis (X-axis). The plots indicate a strong negative relationship: the higher the pre-crisis credit growth, the smaller the change in growth rates after the banking crisis. This suggests the possibility that those countries with the highest pre-crisis rates of credit growth have weak political and/or institutional situations that made it difficult to make adjustments in the wake of crises. If correct, this would imply that crises fail to impose substantial discipline for the cases where it was needed most. We investigate these concerns in Section 4.

On a final note, several countries in our sample had notably high credit growth in the onset year of the crisis, such as Malaysia 1997 (20.5 per cent annual growth in real credit) and Chile 1981 (19.5 per cent annual growth in real credit). This jump in annual credit growth during the onset year may have been a result of public sector intervention to rescue the banking sector. Diaz-Alejandro (1985) and Velasco (1987) have both noted that the

Table III.
Pre- and post-crisis
real credit growth:
equality of
distribution test

	Kolmogorov-Smirnov tests for the equality of two distributions		
	Pre-crisis average credit growth ($t - 3$ to t)	Post-crisis average real credit growth ($t + 4$ to $t + 7$)	Before-after difference
Sub-sample (55)	9.68%	1.48%	-8.20% ^a
Note:	^a The difference is significant at the 10% level		

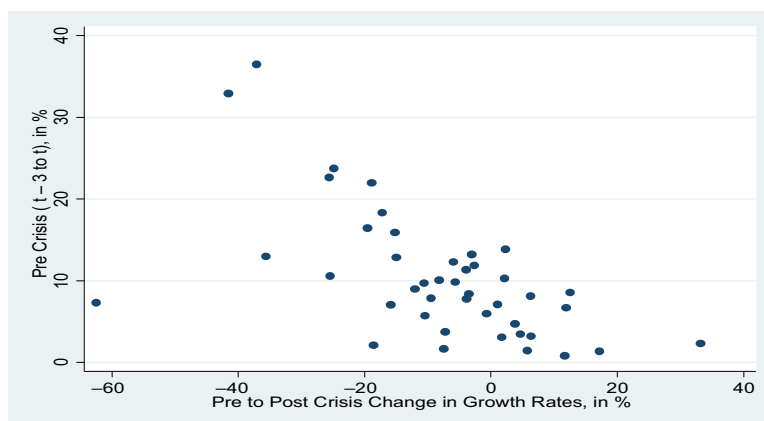


Figure 2.
Pre-crisis real credit
growth and change in
growth rates after the
crisis

bailout of the banking system may have contributed to acceleration in credit creation, as central banks provided subsidized lines of credit to back the financial system's rescheduling of loans, and sectoral lines of credit under soft financial conditions. Since we only have annual data for banking crises, it is also possible that high rates of credit growth in the first part of a year were followed by crises toward the end of the year.

In summary[21], the majority of the banking crises episodes we examined showed large and statistically significant reductions in credit growth from before to after crises. As suggested in the introduction, this drop can be attributed to a combination of different factors besides discipline, and what we are likely capturing is the composite of all these effects. However, by excluding the periods immediately following the crises, we believe that we have abstracted from some of the most important of these other influences. Thus, our calculations are likely to have captured a substantial element of pure discipline.

4. Changes in regulation and supervision

In this section, we examine the extent to which one of the possible channels of discipline, "regulatory discipline" – the strengthening of bank regulation and supervision – played a role in explaining the drop in credit growth in the post-crisis period. More effective banking supervision, such as on-site audits, is a way to discipline banks and prevent excessive credit growth, as the information gained by bank supervisors enables them to more effectively impose remedial measures on imprudent banks (Delis and Staikouras, 2011).

We can only obtain data on regulatory discipline up to 2008. We examined a sample of 58 [22] crisis episodes from 1980 to 2003, and calculated changes in national scores of bank capital regulation and supervision (henceforth CRS) that took place during or following a banking crisis. We also included separate figures for the smaller (sub) sample of 42 banking crises with positive pre-crisis credit growth. The data were taken from the Financial Reform Dataset by Abiad *et al.* (2010) and was constructed based on whether a country has adopted international standards of financial supervision (i.e. Basel Standards of Effective Supervision).

Each country's score is the sum of the following dimensions:

- stringency of capital adequacy ratios;
- independence of regulatory authorities from executive influence;
- effectiveness of on-site and off-site monitoring; and

- the universality of types of financial institutions that fall under the purview of the official supervisory agency.

The index has four possible values/categories: unregulated (0), less regulated (0.33), largely regulated (0.67) and highly regulated (1)[23]. Abiad *et al.*'s coding is based on their judgments, based on various official and unofficial country policy reports, legal documents, as well as expert opinion reports.

Such data sets are of course far from perfect proxies, but they have been used in a number of studies (Ongena *et al.*, 2013; Copelovitch and Singer, 2014), and we believe are worth using. Among competing data sets[24] on banking regulation and supervision, this CRS index has the most extensive cross-country and time-series coverage. Another advantage is that it includes information on the effectiveness of on-site and off-site bank monitoring, items which several important studies (Jackson and Roe, 2009; Quintyn and Taylor, 2002) argue are excellent ways to capture supervisory effectiveness. One interpretation that has emerged is that the CRS index is a good proxy for "regulatory independence" (Masciandaro *et al.*, 2011). The main caveat[25], however, is that there is no compelling evidence that high compliance with international standards of capital stringency is always effective in reducing the likelihood of financial crises, as the 2008 global financial crisis attests (Barth *et al.*, 2006; Wilf, 2016). Alternative and more comprehensive data sets on bank regulation and supervision do exist[26]; however, they are only available since the late 1990s and only for particular years.

We begin our specific data analysis by reporting the proportion of countries that improved CRS after a banking crisis versus the countries that remained in a regulatory status quo. Out of the 58 country-year banking crisis episodes in our sample, 26 cases (45 per cent) were followed by an increase in regulatory and supervisory strength within five years[27] after a banking crisis. The results were very similar with the sub-sample of 42 banking crisis episodes. There was variation across different income groups, as shown in Table IV below. The initial or pre-crisis values for CRS were substantially higher in advanced economies compared to emerging markets and the less developing economies group. The differences in the magnitude of post-crisis regulatory reform (CRS score change) were, however, less stark. Advanced economies experienced on average a 0.40 increase in the regulatory and supervisory score (compared to an initial CRS score of 0.33), which was equivalent to over a 100 per cent improvement in CRS. An increase in CRS of a similar magnitude was observed in emerging markets, where the average CRS score went up from 0.12 to 0.26. Meanwhile, less developing economies increased their post-crisis CRS scores from 0.09 to 0.21.

We also investigate whether there was any relationship between a country's initial (i.e. pre-crisis) regulatory regime and the changes that countries made from pre- to post-crisis periods. The initial level of regulatory stringency did seem to matter. Compared to countries that had some initial level of substantive regulation (a score of 0.33 or 0.67), countries that started with a score of 0 (which is considered "unregulated") tended to have somewhat less improvement in CRS after the crisis (see Table V). To be precise, the proportion of initially "unregulated" countries which had improved CRS scores after a crisis was 44 per cent (18 episodes out of 40),

Table IV.
Changes in capital regulation and supervision (CRS) after a banking crisis, by income group

No.	Group	Average initial CRS score	No. of countries in group	Average change in CRS score from pre- to post-crisis
1	Advanced Economies	0.33	5	0.40
2	Emerging Market Economies	0.12	34	0.14
3	Less Developed Economies	0.09	19	0.12

while the proportion of countries with higher initial CRS scores which improved CRS scores after the crisis was 55 per cent (10 episodes out of 18). However, there was little difference in average post-crisis CRS score changes for the two groups. Out of the 26 episodes which were followed by an increase in CRS, the average score change for the initial unregulated group was 0.35, while the average score change for the higher initial CRS group was 0.33.

In summary, although the majority of the banking crises episodes in our sample (55 per cent for the sample of 58 crises and 57 per cent for the sub-sample of 42 episodes with positive pre-crisis credit growth) were not followed by a change in CRS scores, a substantial minority were. In fact, on average, post-crisis CRS scores improved by 0.16, and some countries (e.g. Sweden) went from a pre-crisis score of 0 to 0.67. Moreover, among the reformers, there was a good deal of variability in the initial pre-crisis CRS scores, and also in the speed with which they adopted regulatory reforms.

5. Concluding comments

The frequency of major financial crises demonstrates that there are often serious deficiencies in the provision of *ex ante* discipline over financial behavior. In this paper, we investigated whether crises themselves provide some degree of *ex post* discipline. Our primary focus is on rates of credit growth, which have been found to be an important determinant of financial crises. While changes in the rate of credit growth after crises may be influenced by many factors, we believe that discipline effects are a major influence on the changes in before and after rates of credit growth that we calculate, especially as we deleted the periods immediately following crises, where the disruptive effects of the crises generally lead to sharp declines in the provision of credit. Our results show that on average rates of credit growth fell following financial crises, and that these changes were large and generally statistically significant. There was also a great deal of variability across regions and countries, however.

Discipline effects may come both from changes in government policies and from increased prudence in private sector behavior. As a start at attempting to unbundle these various effects, we investigated the impact of crises on changes in government financial supervision and regulation. There was a tendency for the levels of supervision and regulation to increase. Surprisingly however we found that the relationship between changes in regulation and changes in credit growth was positive rather than negative (see [Table A3](#) in the [Appendix](#)). This obviously needs further investigation. At this point, we do not know to what extent this result reflects imperfections in the regulatory proxy versus the failure of regulation to be effective.

Another puzzle is that while we found evidence that, on average, crises were associated with lower rate of future credit growth, [Aizenman and Noy \(2013\)](#) found no learning

No. of crisis episodes with initial CRS scores of 0 or greater than 0	No. of crisis episodes with average post-crisis CRS scores 0 or greater than 0		Total (episodes)
	0 ("Unregulated")	0.33-0.67 ("Less to largely regulated")	
0 ("Unregulated")	22 episodes	18 episodes	40
0.33 – 0.67 ("less to largely regulated")	10 episodes	8 episodes	18

Table V.
Distribution of
initial-level CRS with
changes in CRS post-
crisis

Notes: The numbers reported are the number of crisis episodes which fit the appropriate categories. For example, 22 out of 40 (56%) of the countries that an initial level of CRS equals to zero did not experience a change in CRS scores after a crisis.

behavior in terms of banking crises leading to fewer future crises. Indeed, they found a positive association. These differences clearly warrant further investigation.

The substantial variability of responses in future credit growth and the degree of regulation and supervision found across both regions and levels of economic development raises the issue of what factors influence these differences. For this question, a focus on political and institutional factors will be essential. IMF programs also appear to be associated with more discipline. There are a number of different measures of democracy, and factors such as the rule of law are also likely to be important. Thus, there is a rich research agenda on these questions. The analysis can also be extended to the possible discipline effects of other types of crises on policies such as monetary and fiscal policies[28].

Notes

1. This divide is reflected among others in the Final Report of the National Commission of the Causes of the Financial and Economic Crisis in the USA ([Angelides and Thomas, 2011](#)). The majority report (chaired by Phil Angelides, a Democrat) included two dissenting statements from Republican members of the commission: one written by Wallis and another by Hennessey, Holtz-Eakin and Thomas.
2. We also note that discipline effects can be attributed to supply-side discipline (e.g. do bankers extend less risky loans after a crisis?) or demand-side discipline (e.g. would borrowers be more prudent in their demand for loans?).
3. Some studies have looked at the effects of crises on financial liberalization more generally ([Mian et al., 2014](#); [Rosas et al., 2013](#)). However, it is not clear whether more financial liberalization unambiguously enhances post-crisis discipline effects. For example, financial liberalization that is accompanied by stronger capital regulation and supervision should reduce the likelihood of banking crises ([Angkinand et al., 2010](#)). Thus, we focus on strengthening of prudential supervision which should unambiguously be associated with more discipline. It should be noted, however, that strengthening of formal financial oversight does not always translate into more effective supervision in practice. For example, the high scores that the USA received in the standard measures of quality of regulation ([Abiad et al., 2010](#)) did not keep regulators from failing to take sufficient actions to head off the US sub-prime crisis. Likewise, we found for our sample that increased regulation after crises is not associated with larger drops in the rate of credit creation.
4. Contrary to popular view, there are indeed episodes of systemic banking crises which are not preceded by strong credit growth. The dynamics of credit bust (if any) would therefore be very different if we include these 16 episodes where cumulative credit growth was negative before the crisis. For example, using real credit growth as a measure, the average pre-crisis CG is actually lower than non-tranquil years CG (3.61 per cent vs 5.83 per cent), which is puzzling.
5. Another widely used data set for banking crises is [Reinhart and Rogoff \(2011\)](#), which uses a smaller sample of countries.
6. We largely used banking crisis data from [Laeven and Valencia \(2012\)](#) in its original form, but we exclude Brazil 1990 as an episode, given the authors of the data set consider this a borderline crisis.
7. For further discussion and references to the literature see [Amri et al. \(2016\)](#).
8. Private credit data are taken from International Financial Statistics. We operationalize credit growth as the annual change in the natural log of real credit (the natural log of real credit in year t minus the natural log of real credit in year $t - 1$). Following [Beck et al. \(2000\)](#) and [Mendoza and Terrones \(2008\)](#), real credit is the average of two contiguous end-of-year values of nominal credit, deflated by the end-of-year consumer price index.
9. Other variables that are used are growth rates of the ratio of real bank credit to real GDP and real bank credit per capita.

10. That real credit growth be positive is a fairly weak criterion for inclusion and may bias the analysis against finding discipline effects.
11. [Mian et al. \(2014\)](#) apply a similar method and use five years before the onset year and five years after the last year of crisis as their pre- and post-crisis samples.
12. This paper also excludes financial crises that were not preceded by strong increase in credit and those that occurred in an environment of hyperinflation.
13. We follow the filtering method suggested by [Mendoza and Terrones \(2008\)](#) and [Elekdag and Wu \(2011\)](#).
14. These 55 country-year episodes occurred in 44 countries from 1980 to 2008. The first crisis episode in the sample is Argentina 1980. Taking the pre- and post-crisis periods defined as four-year windows, the entire sample period for our analysis is 1977-2015.
15. If Argentina 2001 is taken out of the sample, the average change in credit growth from pre- to post-crisis is 7.84 percentage points. Inclusion of Argentina 2001 could potentially bias calculations given that Argentina has had continuous banking crisis throughout the 1990s and 2001, which seems to be a clear case of lack of discipline.
16. Ecuador 1982 seems to be an outlier, with a particularly strong drop in credit growth from pre- to post-crisis, which is 62.5 per cent. Without Ecuador, the average range in pre- to post-crisis credit growth is 5.9 per cent points.
17. For complete results of the 55 episodes, see [Table A1](#) in the [Appendix](#).
18. Another alternative to real credit growth is growth of nominal bank credit. We excluded this measure given that several of these banking crisis episodes were accompanied by hyperinflation (e.g. Brazil and Argentina), which would yield an upward bias in nominal credit figures. Using measures such as real credit and real credit/real GDP partly deals with the banking crises that involved cases of hyperinflation.
19. Meanwhile, we also have cases of negative growth in real credit but a positive growth in credit/GDP during the pre-crisis period such as Russia 1998 and Bolivia 1986.
20. The test of difference in distributions for the entire sample of 72 crisis episodes is not included here.
21. While our analysis captures the behavior of bank credit immediately before and following a banking crisis, there has been an interest in investigating how these two credit growth variables behave in these non-crisis or tranquil periods, where countries are nowhere near a banking crisis. In sum, average real credit growth in the pre-crisis years is quite a bit higher compared to non-tranquil years (9.76 per cent in non-tranquil years for real credit growth compared to 6.82 per cent), while considerably lower during the credit-bust years (2.55 per cent in non-tranquil years for real credit growth versus 6.82 per cent).
22. This includes countries that had negative and positive credit growth before the crisis.
23. Based on the authors' original classifications, we rescaled the values to be between 0 and 1.
24. To name a few: [Barth et al. \(2011\)](#), IMF's Annual Report on Exchange Arrangements and Exchange Restrictions and a recently published data set by [Jordana and Rosas \(2014\)](#) on the degree of autonomy of banking regulators.
25. There are other weaknesses of this data set in our view, one among which is the numerical score for each observation has been rescaled by the authors. Originally, a highly regulated financial sector would have a final score that adds up to 6. However, in the data set, this figure is rescaled to be between 0 and 3. The problem arises when interpreting changes in CRS scores from 0 to 1 (e.g. Thailand 1995). We cannot ascertain from which dimension the change originated (capital stringency or effectiveness of on-site monitoring). Another limitation is that this data set does not capture whether there is *de facto* regulatory strengthening. Among countries that reported *de jure* compliance

with Basel 1's 8 per cent capital requirement later on turned out to have a lot of poorly capitalized banks (Demirgüç—Kunt *et al.*, 2008).

26. Barth *et al.* (2011) has a very wide scope (more than 100 dimensions) ranging from limitations on bank activity, entry regulations, as well as the regulatory features of deposit insurance system.
27. We also conducted a Kolmogorov–Smirnov test to compare CRS scores from pre-crisis and post-crisis sample periods and found that the difference is significant (p -value = 0.0001). We choose these six years as a sample period because most regulatory reforms take place from the onset year up to five years after the onset.
28. As noted previously, Aizenman and Noy (2013) found that banking crises are not associated with fewer banking crises in the future. It will be important to investigate the possible reasons for this finding given that we do find substantial reductions on average in credit growth. This will involve investigating other causes of banking crises.

References

- Abiad, A., Detragiache, E. and Tressel, T. (2010), "A new database of financial reforms", IMF Working paper WP/10/266.
- Aizenman, J. and Noy, I. (2013), "Macroeconomic adjustment and the history of crises in open economies", *Journal of International Money and Finance*, Vol. 38, pp. 41-58.
- Amri, P., Prabha, A.P. and Wihlborg, C. (2013), "When is high credit growth harmful: evidence from banking crises", paper presented at the Forum on Crisis, Capital Flows, and Debt Management, George Mason University.
- Amri, P., Richey, G.M. and Willett, T.D. (2016), "Capital surges and credit booms: how tight is the relationship?", *Open Economies Review*, Vol. 27 No. 4, pp. 637-670.
- Angelides, P. and Thomas, B. (2011), "The financial crisis inquiry report: final report of the national commission on the causes of the financial and economic crisis in the United States", Government Printing Office.
- Angkinand, A.P., Sawanggoenyuang, W. and Wihlborg, C. (2010), "Financial liberalization and banking crises: a cross-country analysis", *International Review of Finance*, Vol. 10 No. 2, pp. 263-292.
- Barth, J.R., Caprio, G. and Levine, R. (2006), *Rethinking Bank Regulation: Till Angels Govern*, Cambridge University Press, New York and Cambridge.
- Barth, J.R., Caprio, G. and Levine, R. (2011), "Bank regulation and supervision in 180 countries from 1999 to 2011", *Journal of Financial Economic Policy*, Vol. 5 No. 2, pp. 211-219.
- Beck, T., Demirgüç-Kunt, A. and Levine, R. (2000), "A new database on financial development and structure", *World Bank Economic Review*, No. 14 No. 3, pp. 597-605.
- Caprio, G. and Klingbiel, D. (1996), "Bank insolvencies: cross-country experience", World Bank Policy Research Working paper No. 1620.
- Copelovitch, M. and Singer, D.A. (2014), "Financial levees: capital flows, financial market structure and banking crises", Working paper, University of Wisconsin, Madison.
- Delis, M. and Staikouras, P. (2011), "Supervisory effectiveness and bank risk", *Review of Finance*, Vol. 15 No. 3, pp. 511-543.
- Dell'Ariccia, G., Igan, D., Laeven, L., Tong, H., Bakker, B. and Jerome, V. (2012), "Policies for macrofinancial stability: how to deal with credit booms", IMF Staff Discussion Note 12/06.
- Demirgüç – Kunt, A., Detragiache, E. and Tressel, E. (2008), "Banking on the principles: compliance with basel core principles and bank soundness", *Journal of Financial Intermediation*, Vol. 17, pp. 511-542.
- Diaz-Alejandro, C. (1985), "Good-bye financial repression, hello financial crash", *Journal of Development Economics*, Vol. 19 Nos 1/2, pp. 1-24.
- Elekdag, S. and Wu, Y. (2011), "Rapid credit growth: boon or boom-bust?", IMF Working Paper 11/241.

- Jackson, H.E. and Roe, M.J. (2009), "Public and private enforcement of securities laws: resource-based evidence", *Journal of Financial Economics*, Vol. 93 No. 2, pp. 207-238.
- Jordana, J. and Rosas, G. (2014), "When do autonomous banking regulators promote stability?", *European Journal of Political Research*, Vol. 53 No. 4, pp. 672-691.
- Laeven, L. and Valencia, F. (2012), "Systemic banking crises database: an update", IMF Working paper 10/146.
- Masciandaro, D., Pansini, R. and Quintyn, M. (2011), "The economic crisis: did financial supervision matter?", IMF Working paper 11/261.
- Mendoza, E. and Terrones, M. (2008), "An anatomy of credit booms: evidence from macro aggregates and micro data", IMF Working paper 08/226.
- Mian, A., Sufi, A. and Trebbi, F. (2014), "Resolving debt overhang: political constraints in the aftermath of financial crises", *American Economic Journal: Macroeconomics*, Vol. 6 No. 2, pp. 1-28.
- Ongena, S., Popov, A. and Udell, G.F. (2013), "When the cat's away the mice will play: does regulation at home affect bank risk-taking abroad?", *Journal of Financial Economics*, Vol. 108 No. 3, pp. 727-750.
- Prabha, A.P., Wihlborg, C. and Willett, T.D. (2012), "Market discipline for financial institutions and markets for information", in Barth, J., Lin, C. and Wihlborg, C. (Eds), *Research Handbook on International Banking and Governance*, Edward Elgar Publishing.
- Quintyn, M. and Taylor, M. (2002), "Regulatory and Supervisory Independence and Financial Stability", IMF Working paper No. 02/46.
- Reinhart, C.M. and Rogoff, K.S. (2011), "From financial crash to debt crisis", *American Economic Review*, Vol. 101 No. 5, pp. 1676-1706.
- Rosas, G., Aguilera, G. and Ward, D. (2013) "After the storm: how political institutions affect financial governance in the wake of banking crisis", *EPSA 2013 Annual General Conference Paper 837*.
- Takats, E. and Upper, C. (2013), "Credit and growth after financial crises", BIS Working paper No. 416.
- Velasco, A. (1987), "Financial crises and balance of payments crises", *Journal of Development Economics*, Vol. 27, pp. 263-283.
- Wilf, M. (2016), "Credibility and distributional effects of international banking regulations: evidence from us bank stock returns", *Forthcoming in International Organizations*.
- Willett, T.D., Chiu, E. and Walter, S. (2014), "Fixed exchange rate regimes and financial markets as sources of macroeconomic discipline", in Oatley, T. and Wincoff, W.K. (Eds), *Handbook of The International Political Economy of Monetary Relations*, Edward Elgar Publishing.

Further reading

- Demirgüç – Kunt, A. and Detragiache, E. (1998), "The Determinants of Banking Crises in Developing and Developed Countries", IMF Staff Papers 45, Washington, D.C.
- Gourinchas, P.O. and Obstfeld, O. (2012), "Stories of the twentieth century for the twenty first", *American Economic Journal: Macroeconomics*, Vol. 4 No. 1, pp. 226-265.
- Gourinchas, P.O., Valdes, R. and Landerretche, O. (2001), "Lending booms: Latin America and the world", NBER Working paper 8249.
- Kolmogorov, A. (1933), "Sulla determinazione empirica di una legge di distribuzione", *Giornale dell'Istituto Italiano degli Attuari*, No. 4, pp. 83-91.
- Schularick, M. and Taylor, A.M. (2012), "Credit booms gone bust: monetary policy, leverage cycles, and financial crises, 1870-2008", *American Economic Review*, Vol. 102 No. 2, pp. 1029-1061.
- Smirnov, N. (1948), "Table for estimating the goodness of fit of empirical distributions", *Annals of Mathematical Statistics*, Vol. 19, pp. 279-281.

No.	Country	Region	Year of BC onset	Pre-crisis ($t - 3$ to t) (%)	Post-crisis ($t + 4$ to $t + 7$) (%)	Before–after difference (%)
1	Chile	LAC ^a	1981	36.48	-0.55	-37.03
2	Russian Federation	Europe & Central Asia	2008	26.40	9.32	-17.08
3	Philippines	East Asia	1997	23.75	-1.07	-24.82
4	Mexico	LAC	1994	22.64	-2.89	-25.53
5	Bolivia	LAC	1994	21.96	3.10	-18.86
6	Malaysia	East Asia	1997	18.31	1.13	-17.18
7	Uruguay	LAC	1981	16.45	-3.06	-19.51
8	Thailand	East Asia	1997	15.87	0.71	-15.16
9	Ireland	Europe & Central Asia	2008	15.75	-9.74	-25.48
10	Spain	Europe & Central Asia	2008	14.10	-9.29	-23.39
11	Nepal	South Asia	1988	13.83	16.18	2.35
12	Indonesia	East Asia	1997	13.20	10.13	-3.07
13	Peru	LAC	1983	12.95	-22.63	-35.58
14	Paraguay	LAC	1995	12.82	-2.13	-14.95
15	Dominican Republic	LAC	2003	12.29	6.34	-5.95
16	Hungary	Europe & Central Asia	2008	12.04	-8.08	-20.13
17	Uruguay	LAC	2002	11.85	9.26	-2.59
18	Korea, Rep.	East Asia	1997	11.36	7.45	-3.91
19	Argentina	LAC	1980	10.56	-14.86	-25.42
20	China	East Asia	1998	10.26	12.46	2.20
21	Sweden	Europe & Central Asia	1991	10.07	1.88	-8.19
22	Egypt, Arab Rep.	MENA ^b	1980	9.82	4.19	-5.63
23	Burkina Faso	Sub-Saharan Africa	1990	9.70	-0.87	-10.57
24	Sweden	Europe & Central Asia	2008	8.98	3.47	-5.51
25	Finland	Europe & Central Asia	1991	8.96	-3.07	-12.03
26	Costa Rica	LAC	1994	8.53	21.09	12.56
27	Philippines	East Asia	1983	8.38	4.92	-3.46
28	Uganda	Sub-Saharan Africa	1994	8.09	14.40	6.31
29	Colombia	LAC	1982	7.84	-1.57	-9.41
30	USA	North America	1988	7.76	3.94	-3.82
31	Ecuador	LAC	1982	7.30	-55.16	-62.46
32	Argentina	LAC	1989	7.11	8.21	1.10
33	Argentina	LAC	1995	7.05	-8.77	-15.82
34	France	Europe & Central Asia	2008	6.68	0.20	-6.48
35	Thailand	East Asia	1983	6.67	18.60	11.93
36	Italy	Europe & Central Asia	2008	6.63	-2.81	-9.44
37	Portugal	Europe & Central Asia	2008	6.63	-6.99	-13.62
38	USA	North America	2007	6.32	1.78	-4.54
39	Colombia	LAC	1998	5.95	5.29	-0.66
40	UK	Europe & Central Asia	2007	5.81	-2.60	-8.41
41	Brazil	LAC	1994	5.69	-4.72	-10.41
42	Costa Rica	LAC	1987	4.71	8.53	3.82
43	Austria	Europe & Central Asia	2008	4.63	-2.11	-6.74
44	Mexico	LAC	1981	3.74	-3.47	-7.21
45	Netherlands	Europe & Central Asia	2008	3.60	-0.97	-4.57
46	Belgium	Europe & Central Asia	2008	3.59	2.39	-1.19

*(continued)***Table A1.**

Real credit growth from pre- to post-crisis period – episodes arranged in descending order of pre-crisis credit growth

No.	Country	Region	Year of BC onset	Pre-crisis ($t - 3$ to t) (%)	Post-crisis ($t + 4$ to $t + 7$) (%)	Before–after difference (%)
47	India	South Asia	1993	3.42	8.11	4.69
48	Jordan	MENA	1989	3.18	9.58	6.40
49	Morocco	MENA	1980	3.04	4.81	1.77
50	Sri Lanka	South Asia	1989	2.31	35.46	33.15
51	Japan	East Asia	1997	2.06	-16.50	-18.56
52	Jamaica	LAC	1996	1.64	-5.80	-7.44
53	Norway	Europe & Central Asia	1991	1.43	7.22	5.79
54	Argentina	LAC	2001	1.37	18.61	17.24
55	Kenya	Sub-Saharan Africa	1992	0.81	12.49	11.68

Notes: ^aLAC = Latin America and the Caribbean; ^bMENA = Middle East and North Africa

Table AI.

No.	Country	Region	BC onset	Pre-crisis ($t - 3$ to t) (%)	Post-crisis ($t + 4$ to $t + 7$) (%)	Before-After difference (%)
1	Chile	LAC	1981	39.91	-7.45	-47.36
2	Mexico	LAC	1994	23.21	-4.96	-28.17
3	Bolivia	LAC	1994	22.63	1.69	-20.94
4	Philippines	East Asia	1997	19.47	-5.71	-25.19
5	Uruguay	LAC	2002	18.66	1.43	-17.23
6	Argentina	LAC	1995	18.07	-4.82	-22.89
7	Ireland	Europe & Central Asia	2008	16.24	-9.04	-25.29
8	Uruguay	LAC	1981	15.76	-8.73	-24.50
9	Russian Federation	Europe & Central Asia	2008	15.58	9.79	-5.79
10	Peru	LAC	1983	14.30	-15.89	-30.19
11	Argentina	LAC	1980	14.06	-4.14	-18.20
12	Uganda	Sub-Saharan Africa	1994	12.61	7.28	-5.33
13	Paraguay	LAC	1995	12.40	-1.61	-14.01
14	Spain	Europe & Central Asia	2008	11.76	-7.35	-19.11
15	Thailand	East Asia	1997	11.45	-4.26	-15.71
16	Brazil	LAC	1994	11.23	-6.95	-18.18
17	Hungary	Europe & Central Asia	2008	10.97	-9.58	-20.55
18	Sweden	Europe & Central Asia	1991	9.49	-2.42	-11.91
19	Finland	Europe & Central Asia	1991	9.40	-8.76	-18.16
20	Malaysia	East Asia	1997	8.77	-3.00	-11.77
21	Nepal	South Asia	1988	7.76	13.27	5.51
22	Colombia	LAC	1998	6.45	1.31	-5.14
23	China	East Asia	1998	6.28	0.63	-5.65
24	Italy	Europe & Central Asia	2008	6.18	-1.11	-7.29
25	Philippines	East Asia	1983	6.04	-1.57	-7.61
26	UK	Europe & Central Asia	2007	6.00	-6.01	-12.00
27	Sweden	Europe & Central Asia	2008	5.93	1.60	-4.33
28	Portugal	Europe & Central Asia	2008	5.63	-5.21	-10.84
29	Colombia	LAC	1982	5.60	n/a	n/a
30	France	Europe & Central Asia	2008	4.89	0.08	-4.82
31	Thailand	East Asia	1983	4.57	7.01	2.44
32	Indonesia	East Asia	1997	4.55	5.27	0.71
33	Dominican Republic	LAC	2003	4.51	-2.42	-6.93
34	Kenya	Sub-Saharan Africa	1992	4.48	-1.09	-5.56
35	USA	North America	1988	4.38	1.67	-2.71
36	Ecuador	LAC	1982	3.82	-13.05	-16.87
37	USA	North America	2007	3.59	-1.88	-5.47
38	Argentina	LAC	2001	3.52	6.55	3.03
39	Jordan	MENA	1989	3.36	5.80	2.44
40	Korea, Rep.	East Asia	1997	3.31	3.71	0.40
41	Burkina Faso	Sub-Saharan Africa	1990	3.18	-2.68	-5.85
42	Austria	Europe & Central Asia	2008	2.19	-2.20	-4.39
43	Jamaica	LAC	1996	1.94	-7.46	-9.41
44	Belgium	Europe & Central Asia	2008	1.83	1.08	-0.75
45	Argentina	LAC	1989	1.81	11.49	9.68
46	Norway	Europe & Central Asia	1991	1.37	3.13	1.76
47	Japan	East Asia	1997	1.20	-5.96	-7.16
48	Morocco	MENA	1980	0.51	-16.23	-16.74
49	Sri Lanka	South Asia	1989	0.40	41.57	41.17

*(continued)***Table AII.**

Annual growth of credit/GDP pre- to post-crisis period based on the 55 episodes

Table AII.

No.	Country	Region	BC onset	Pre-crisis ($t - 3$ to t) (%)	Post-crisis ($t + 4$ to $t + 7$) (%)	Before-After difference (%)
50	Netherlands	Europe & Central Asia	2008	0.33	-0.02	-0.35
51	Egypt, Arab Rep.	MENA	1980	-0.73	4.45	5.19
52	Costa Rica	LAC	1987	-0.85	-1.94	-1.09
53	Costa Rica	LAC	1994	-1.94	17.92	19.86
54	India	South Asia	1993	-3.55	5.36	8.91
55	Mexico	LAC	1981	-5.31	-3.58	1.72

Table AIII.

Variations in changes in credit growth across countries that do and do not strengthen regulation and supervision after a crisis

<i>Based on 58 cases</i>	<i>Average Before-After Difference in Credit Growth</i>
No CRS improvement	-1.23%
CRS improvement	0.24%
<i>Based on 42 cases</i>	<i>Average Before-After Difference in Credit Growth</i>
No CRS improvement	-8.13%
CRS improvement	-6.27%

Corresponding author

Puspa Amri can be contacted at: pamri@ithaca.edu

For instructions on how to order reprints of this article, please visit our website:

www.emeraldgroupublishing.com/licensing/reprints.htm

Or contact us for further details: permissions@emeraldinsight.com