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Lending Booms: Latin America and the World

Lending booms are the cornerstone of numerous recent theories on financial and banking crises.[1] The precise origins of lending booms are diverse. They may arise following a possibly poorly regulated financial liberalization, a surge in capital inflow driven by external factors, or a terms-of-trade shock (or other types of supply shock) that boosts domestic investment or consumption or both. They may also come as a consequence of a macroeconomic stabilization program: it has long been noted that exchange rate–based stabilization programs are often associated with ultimately unsustainable booms in consumption, output, and credit.

During a lending boom, the typical story goes, credit to the private sector rises quickly. Leverage increases, and financing is extended to projects with low—possibly even negative—net present value, either because monitoring becomes more difficult when the volume of lending increases rapidly, which increases the likelihood of fraud (including looting, self-lending, and evergreening), or because domestic borrowers' net worth increases. As lending expands, the quality of funded projects goes from bad to worse, exposure increases, and the banking sector becomes more vulnerable.

Some scholars emphasize the aggravating effect of expected public bailouts in the event of a generalized bankruptcy. Bailout guaranties, whether explicit or implicit, induce private borrowers and lenders to develop

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1. See Corsetti, Pesenti, and Roubini (1999); Sachs, Tornell, and Velasco (1996); Tornell (1999). See also Paul Krugman, "What Happened to Asia?" (web.mit.edu/~krugman/www/ [July 1998]).

and carry over riskier projects than may be socially efficient. Entrepreneurs and lenders price new projects under the best possible scenario, taking into account the government intervention in the worst states of nature, and the quality of new loans worsens.[2] The story usually ends in tears: the private sector gets scared or the projects fail to deliver, the bailout guaranties are called in, and the whole edifice comes tumbling down.

Others focus on the importance of the credit channel or financial accelerator.[3] The mechanics are relatively straightforward: during a boom, asset prices increase, which increases borrowers' net worth, facilitates new lending, fuels higher asset demand and even higher asset prices, and so on. During the bust, the opposite happens: a proportion of actors are not able to repay their loans, and banks call in the collateral at firesale prices. The banks become more vulnerable as the asset side of their balance sheet shrinks. New loans are curtailed, and investment collapses together with asset prices. As a result of this increased vulnerability, a mild correction in asset prices may trigger a full-blown banking crisis.[4]

Consumption booms serve as the basis for many other explanations of the boom-bust cycle. For instance, the cycle may stem from an unsustainable consumption boom rooted in a less-than-perfectly-credible exchange rate stabilization program. Calvo and Végh provide an extensive review of these theories.[5]

There is ample empirical evidence that credit overexpansion and banking crises are related. Demirgüç-Kunt and Detragiache, for instance, show that after controlling for the existence of deposit insurance, the ratio of private credit to gross domestic product (GDP) and the (lagged) real growth of private credit are significant determinants of banking crises.[6] Honohan considers credit growth one of the leading variables for diagnosing and predicting banking crises.[7]

As scholars of the recent financial crises note, countries that rely on foreign capital inflows may experience a nastier variety of financial debacle that combines a banking crisis and a balance-of-payments collapse. Chile

2. See Merton (1977); Schneider and Tornell (1999a).

3. Kiyotaki and Moore (1997); Schneider and Tornell (1999a, 1999b); Aghion, Bacchetta, and Banerjee (1999a, 1999b).

4. Gavin and Hausmann (1996) stress this type of vulnerability.

5. Calvo and Végh (1999).

6. Demirgüç-Kunt and Detragiache (1997).

7. Honohan (1997). Caprio and Klinguebiel (1997), however, conclude that other factors explain crises, although too much credit may increase vulnerability.

in 1982, Argentina in 1979, Mexico in 1994, and Thailand in 1997 are notorious examples. Several studies examine how the fiscal burden of a banking crisis can generate a balance-of-payments crisis.[8] Conversely, a weak financial sector may prevent financial authorities from defending their currency, effectively hastening its demise. Goldfajn and Valdés, as well as Goldstein, study the direct link between an intermediation boom and the likelihood of banking and balance-of-payments crises occurring as a result of capital flows.[9] Kaminsky, Lizondo, and Reinhart report that five out of seven studies analyzing credit growth as a determinant of currency crises find statistically significant results.[10] In their own currency-crisis warning system, these authors consider that the M2 multiplier and the credit-to-GDP ratio are among the particularly useful leading indicators.

In sum, lending booms are generated for a variety of reasons—because financial markets are poorly regulated, because monitoring authorities are unable to cope with the rapidly increasing activity of financial intermediaries, because implicit or explicit bailout guarantees aggravate the tendency toward extending credit to high-risk projects, because credit market imperfections increase systemic risk, and because a country adopts a less-than-perfectly-credible exchange rate–based stabilization program. Uncontrolled growth in lending is thus the result of inadequately designed financial institutions or micro imperfections that distort investment incentives toward excessively risky projects. Regardless of the source, lending booms are often seen as a sure recipe for financial disaster. If left unchecked, they are ultimately harmful to the domestic economy.

Some proposals in the debate about the new financial architecture concentrate on eliminating distortions and improving incentives through increased supervision and training and the establishment of safer, more transparent banking standards. Few doubt that this would be an appropriate response. As Rogoff puts it, "Like motherhood and apple pie, it is hard to assess these recommendations as anything but positive."[11] These reforms are unlikely to be achieved any time soon, however, as is the case with most of the grand schemes currently on the table. Other proposals, therefore, directly advocate the use of speed limits on credit growth as a prudential tool. Honohan, for example, states, "Speed limits . . . [are] the

8. Dias-Alejandro (1985); Velasco (1987); Calvo (1995).
9. Goldfajn and Valdés (1997); Goldstein (2001).
10. Kaminsky, Lizondo, and Reinhart (1997).
11. Rogoff (1999, p. 36).

most promising [regulation] so far as bank soundness is concerned."[12] Still others propose controls on capital inflows as a way to limit exposure to reversals of short-term capital flows and currency mismatches. The message in all of these proposals is clear: *until we know how to build safer roads, let's make slower cars*. The argument has been most forceful in the context of capital flows. Even the International Monetary Fund (IMF)—the guardian of the doctrine—has shifted from an unconditional advocacy of full capital account liberalization to a more nuanced position that acknowledges the benefits of targeted capital controls.

This need not be. First, financial accelerator models do not imply that fluctuations per se are inefficient.[13] Fluctuations are only a symptom, associated with contractual inefficiencies. Indeed, it is precisely because entrepreneurs face an external finance premium stemming from incentive problems that they have to rely on internal funds or collateral. As the value of the collateral increases, more valuable projects obtain financing. Speed limits on lending would curtail possibly valuable investment. Aghion, Bacchetta, and Banerjee develop a model in which lending booms are the normal state of affairs and in which the economy can exhibit cycles.[14] Similarly, Schneider and Tornell develop a model with multiple equilibria, in which the high lending equilibrium might ex ante be better.[15]

Second, a number of studies empirically establish the existence of a causal link from finance to growth and development.[16] Financial development typically occurs in stages, with periods of intense financial deepening and increases in levels of intermediation.[17] These lending phases may represent permanent takeoffs rather than transitory booms, and they need not revert to lower levels. Thus even if lending booms are an important determinant of banking and balance-of-payments crises, it is possible that a good proportion of them dies a natural death, with a subsequent permanent deepening of the domestic financial markets and increased growth.

So are lending booms really that bad? Which theories best explain these episodes empirically? Are speed limits desirable? This paper examines these

12. Honohan (1997, p. 21).
13. Bernanke and Gertler (1989); Bernanke, Gertler, and Gilchrist (1999).
14. Aghion, Bacchetta, and Banerjee (1999a, 1999b).
15. Schneider and Tornell (1999a).
16. For example, Rajan and Zingales (1998); Levine and Zervos (1998).
17. Financial intermediation may later subside as firms and households gain direct access to financial markets.

questions by contrasting the experience of Latin America with that of the rest of the world, for two reasons. First, Latin America experienced a relatively large number of lending booms in the 1980s and 1990s; second, a number of Latin American countries implemented exchange rate–based stabilization programs throughout the sample period. It is therefore only natural to ask whether Latin America's lending booms are somehow different in nature from the rest of the world. We proceed by empirically analyzing a large sample of lending boom episodes and documenting some stylized facts surrounding these events. We are particularly interested in describing the covariation of domestic credit with other relevant macroeconomic variables. The set of stylized facts that we investigate includes the duration of booms, temporal patterns, and geographic agglomeration effects. We also analyze the performance of a set of macroeconomic indicators around specific episodes of lending booms and the relation between the occurrence of banking and balance-of-payments crises and external disequilibrium.

The paper is organized as follows. The next section outlines our definition of a lending boom episode, describes the data we use, and presents a first set of stylized facts. We then analyze the behavior of a set of macroeconomic indicators around episodes and, subsequently, evaluate how harmful booms are in terms of banking and balance-of-payments crises. The following section compares the characteristics of lending booms in Latin America with those occurring in the rest of the world. The paper then revisits different explanations of booms. Finally, we present our concluding remarks.

Lending Booms

In this section we present our operational definition of a lending boom episode and describe the data used to identify events. We also provide a first characterization of lending boom episodes, analyzing a number of cases, their duration, their temporal distribution, and their geographic agglomeration.

Definition and Data

In contrast to a currency crisis, a current account reversal, or other well-defined events occurring only in one period, lending boom episodes have a variable duration. Moreover, because economic growth brings about

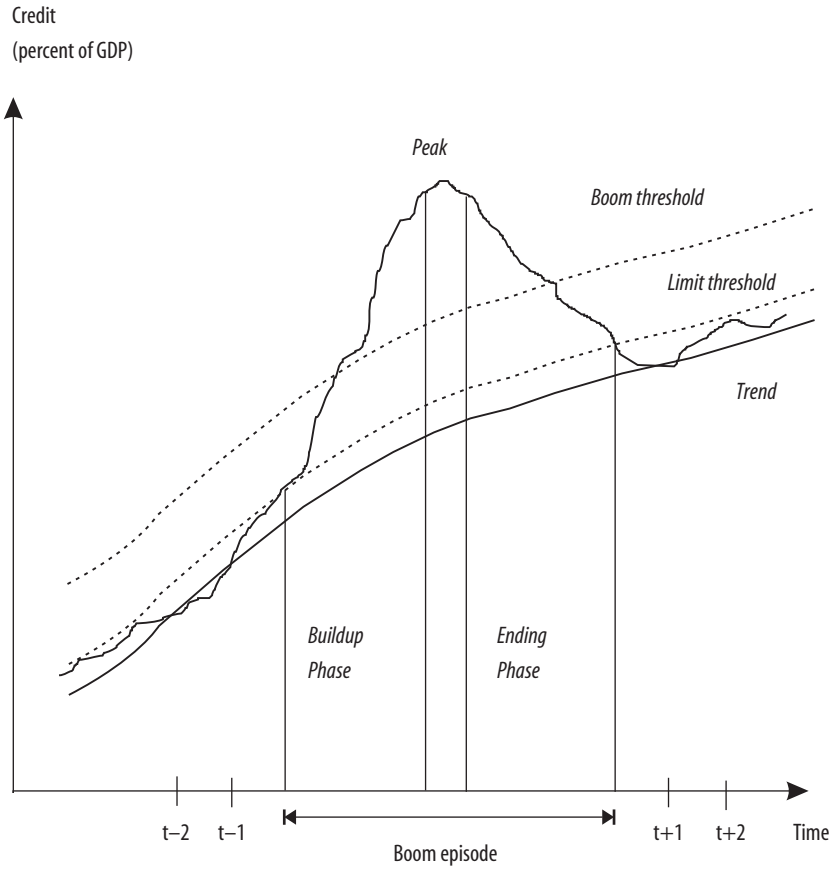
financial deepening, lending figures follow a natural trend. Any study of lending booms must therefore start by defining a complete event, differentiating between normal increments in the volume of lending and boom episodes. In this paper we define a lending boom episode as a deviation of the ratio between nominal private credit and nominal GDP from a rolling, backward-looking, country-specific stochastic trend.[18] A rolling, backward-looking trend uses only information available up to the time the lending boom is detected in the data. This is the correct approach as far as speed limits are concerned: some increases in lending may lead to permanent financial deepening, while others lead to reversals. In the first case, a trend defined on the entire sample period would incorporate this increase in the trend; in the second case, it would flag a lending boom. Of course, a policymaker observing a given increase in lending would not know whether it is ultimately to be reversed or not.

To become an episode, the deviation from the trend has to be larger than a given threshold. We consider two alternative threshold definitions: relative deviation and absolute deviation. The former is based on the relative difference between the actual and predicted credit-to-GDP ratio, implying that different countries may experience a lending boom independent of their financial deepening. The latter looks at the absolute discrepancy between the actual and predicted credit-to-GDP ratios, implying that countries with a more developed financial sector may be more prone to experiencing lending booms. The relative deviation compares the size of the additional lending to the size of the banking sector, while the absolute deviation compares it to the size of the economy. We maintain the distinction between these two types of booms throughout the paper, since we do not know a priori whether the economic impact of a boom depends on its relative or absolute magnitudes.

Figure 1 shows a typical boom episode, which begins when the credit-to-GDP ratio reaches a boom threshold (the upper dashed-line). We define three phases in each episode: a buildup phase, which starts when the ratio rises above the limit threshold (the bottom dashed-line) and ends one year before the episode reaches its largest deviation from the trend; a peak year; and an ending phase, which starts at the end of the peak year and ends

18. Another possibility is to focus on the relative velocity of real credit growth (for example, vis-à-vis GDP). We prefer our definition because velocities focus only on time derivatives and thus do not consider lending levels. Velocities could identify a boom after a credit crunch just because lending volumes are getting back to normal.

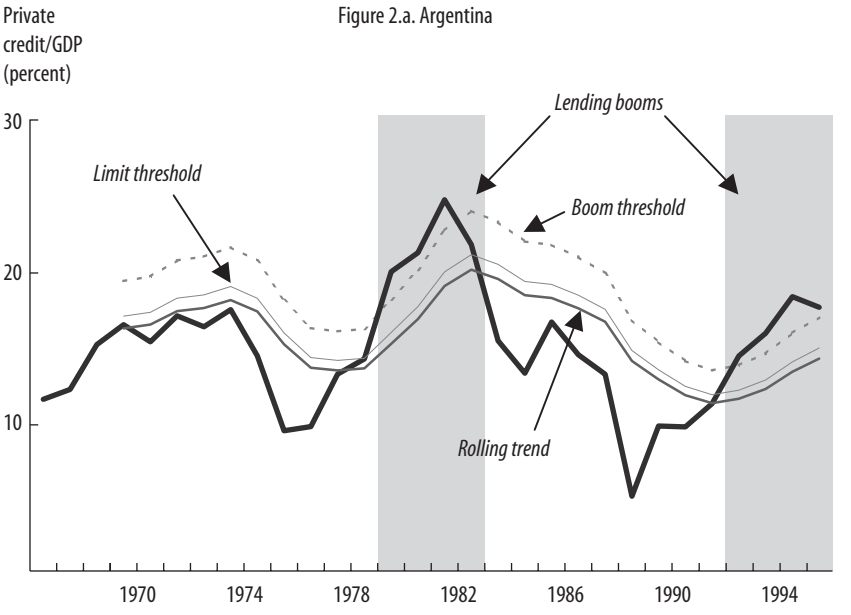
FIGURE 1. Definition of a Lending Boom Episode



when the ratio returns to the limit threshold. The boom threshold identifies episodes (and therefore, the number of cases), while the limit threshold determines their duration.

Our sample consists of ninety-one countries over the period 1960–96. All the countries in the sample have more than 500,000 inhabitants, have more than twelve years of credit data available from the International Financial Statistics (IFS), and show a ratio of private credit to GDP of 15 percent or more in one or more years. We measure private credit as claims on the nonbanking private sector from banking institutions as reported on line 22d of the International Financial Statistics, while nominal

FIGURE 2. Selected Latin American Lending Booms, 1966–96



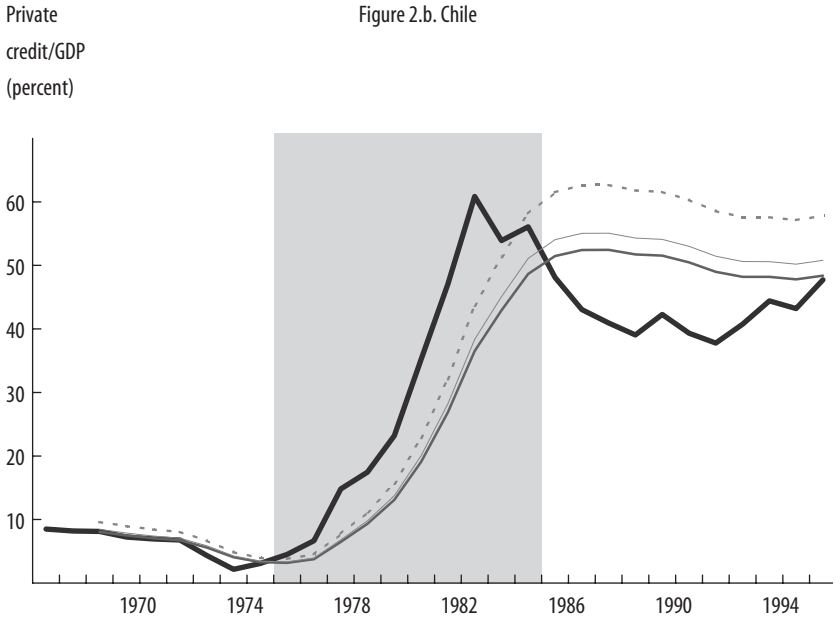
GDP corresponds to IFS line 99b.[19] Because credit corresponds to a stock variable measured at the end of the year, we consider the geometric average of GDP in year t and $t + 1$ as the relevant measure of GDP in the ratio calculations. We estimate the trend of the credit-to-GDP ratio using a rolling Hodrick-Prescott filter for each country (with a parameter set at 1,000).[20]

Figure 2 presents the credit-to-GDP ratio for Argentina and Chile, two relatively well-known cases. The graphs show that Argentina experienced two lending booms in the period, first from 1979 to 1982 and then from 1992 to 1995, and Chile featured a long lending boom from 1975 to 1984. In Argentina, the credit-to-GDP ratio increased by 100 percent in the first episode and by 70 percent in the second, while in Chile it increased by

19. Private domestic credit does not include direct banking credit from foreign banks to local actors (other than funds channeled through the domestic banking system). It could be argued that direct foreign credit should be included in our credit measure.

20. We use the first five years of data to construct the trend.

FIGURE 2. Selected Latin American Lending Booms, 1966–96 (cont.)



1,200 percent. Understanding the underlying forces—and consequences—of such dramatic surges in financial depth is clearly of paramount importance.[21] Appendix A presents a complete list of sample countries and episodes under the relative criterion.

Characterization of Episodes: A First Look

This section provides a first characterization of lending boom episodes, analyzing the number of cases, their duration, temporal distribution, and geographic agglomeration.

SELECTION OF EPISODES. Table 1 presents the number of cases that appear in our sample, considering both types of deviation criteria. As expected, the number of cases decreases with the size of the boom

21. A complete set of figures, as well as the data used for this paper, is available online (www.princeton.edu/~pog/economia.html).

TABLE 1. Number of Lending Boom Episodes in Sample
Percent

Criterion	*Threshold*[a]	*No. cases*
Relative deviation	12	125
	18	92
	24	60
	30	44
	36	31
	42	23
Absolute deviation	3	111
	4	89
	5	65
	6	51
	7	38
	8	33

Source: Authors' calculations, based on International Financial Statistics (IFS) data.
a. The threshold under the relative deviation criterion is the relative difference between the actual and predicted credit-to-GDP ratio; under the absolute deviation criterion, it is the absolute discrepancy between the actual and predicted credit-to-GDP ratios.

threshold under both measures. With a relative deviation equal to 24 percent (relative to the credit-to-GDP ratio) there are sixty cases, while with an absolute deviation of 5 percent (relative to GDP) there are sixty-five cases. Even with relatively high thresholds (42 percent under the relative criterion or 8 percent under the absolute one), we identify a significant number of episodes (twenty-three and thirty-three, respectively).

The following discussion focuses on three different thresholds that yield exactly one hundred, eighty, and sixty cases for each type of measure.[22] This simplification facilitates a more exact comparison between the two definitions and generates a more straightforward concept of a lending boom: the *N* cases in our sample in which we observe the largest gap between the credit-to-GDP ratio and its trend.[23] Somewhat arbitrarily, we set the limit thresholds at 5 percent and 2 percent for the relative and absolute deviations, respectively.

DURATION. The second dimension we characterize is duration. In addition to average duration, we are interested in possible asymmetries

22. See appendix A for a complete list of cases under the relative criterion; see Gourinchas, Valdés, and Landerretche (2001) for additional details.

23. The thresholds for the relative (versus absolute) deviation are 16.4 percent (3.65 percent), 19.5 percent (4.45 percent), and 24 percent (5.40 percent) for the one hundred, eighty, and sixty cases, respectively.

TABLE 2. Average Duration of Lending Boom Episodes[a]

Years

Criterion and sample size	*Buildup phase*	*Ending phase*	*Total*
Relative deviation			
60 cases	2.5	3.2	6.7
	(2.5)	(2.1)	(3.6)
80 cases	2.3	2.8	6.1
	(2.3)	(2.0)	(3.4)
100 cases	2.3	2.7	6.0
	(2.4)	(2.0)	(3.4)
Absolute deviation			
60 cases	2.7	2.0	5.7
	(2.3)	(1.8)	(3.3)
80 cases	2.5	1.9	5.4
	(2.3)	(1.7)	(3.3)
100 cases	2.2	1.6	4.9
	(2.2)	(1.6)	(3.1)

Source: Authors' calculations, based on IFS data and considering completed episodes only.

a. Standard deviations are in parentheses. Total includes peak year.

between the buildup and ending phases, since it is generally believed that credit-driven booms have a rather sudden unwinding.[24]

Table 2 shows the results for our boom episodes.[25] The average duration of a complete episode is approximately six and a half years for the relative cases and five and a half years for the absolute case. While the standard deviations indicate substantial heterogeneity across episodes, the results also show a strong symmetry between the duration of the buildup and ending phases. Interestingly, most of the variation across the number of cases and criteria is in terms of the ending phase. The buildup takes roughly two and a half years in all cases, whereas the unwinding varies from as little as 1.6 years to as much as 3.2 years. The longest boom in our sample occurred in Syria and lasted twenty-seven years. In contrast, eight countries experienced one-year lending booms.

This symmetry implies that there is no evidence that lending booms end abruptly. Is it possible that our sample contains two types of very different

24. Honohan (1997). In the case of real exchange rate overvaluation, Goldfajn and Valdés (1999) find a sharp asymmetry between similarly defined phases. In their sample, the duration of the buildup phase is almost twice the duration of the return-to-equilibrium phase.

25. To avoid truncating lending boom episodes at the beginning and end of the sample, we consider only complete episodes in table 2 and figure 4.

episodes—quick reversals and slow unwindings? If so, the average across these two types of episodes could show a duration similar to the buildup phase. While this is certainly a possibility, the standard deviations are, in fact, extremely symmetrical: ending phases do not show markedly higher cross-country volatility than buildup phases. On the contrary, the standard deviation during unwindings is lower than during buildups. Countries with abrupt reversals should therefore also exhibit different upswings. We interpret this as evidence that lending booms (at least under our definition) are episodes that do not end abruptly.

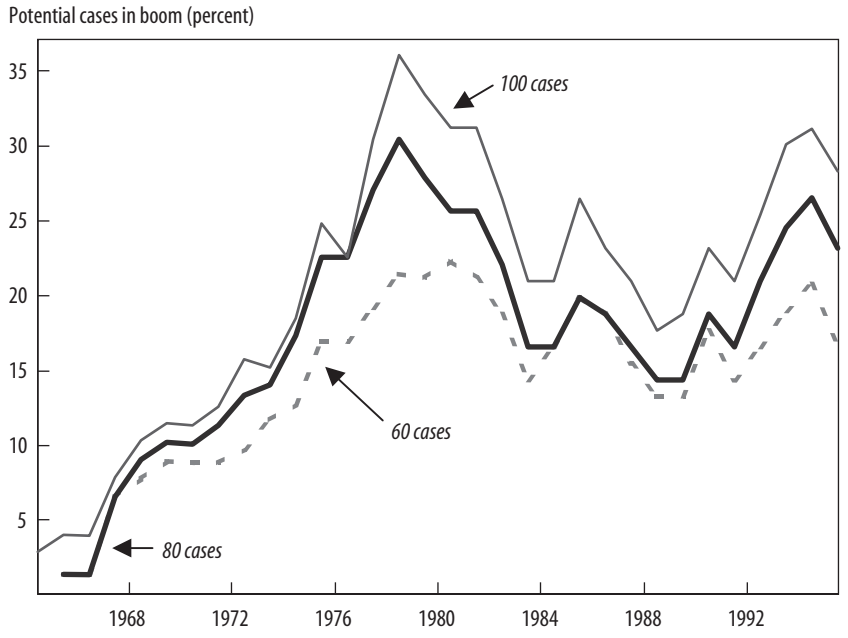
Another potential explanation for the degree of symmetry arises from the construction of the ratio of private credit to GDP. Since the denominator of this indicator is nominal GDP, a possible bias could stem from sudden falls in this variable toward the end of the episode, for example, as a result of the recessionary impact of a cut in domestic credit. This could keep our measure of private credit from falling as rapidly as it should. To evaluate this possibility, we ran the same exercise as in table 2 using a Hodrick-Prescott filter to smooth the real component of nominal GDP prior to computing the credit-to-GDP ratio (see table 3). We used the same thresholds as before to maintain comparability. This exercise generates a slightly different number of cases for each threshold. Using trend GDP instead of actual GDP shortens the duration of the episodes by roughly one

TABLE 3. Average Duration of Lending Boom Episodes, Calculated with Smooth GDP[a]
Years

Criterion and sample size	*Buildup phase*	*Ending phase*	*Total*
Relative deviation			
60 cases	1.8	2.7	5.5
	(1.7)	(2.7)	(3.3)
79 cases	1.8	2.4	5.2
	(1.7)	(2.5)	(3.2)
93 cases	1.9	2.2	5.1
	(1.8)	(2.4)	(3.1)
Absolute deviation			
55 cases	2.2	1.6	4.8
	(2.6)	(1.8)	(3.4)
83 cases	1.9	1.4	4.3
	(2.4)	(1.6)	(3.1)
99 cases	1.8	1.2	4.0
	(2.4)	(1.5)	(3.1)

Source: Authors' calculations, based on IFS data.
a. Standard deviations are in parentheses. Total includes peak year.

FIGURE 3. Time Distribution of Boom Episodes, Relative Deviation Criterion, 1964–96



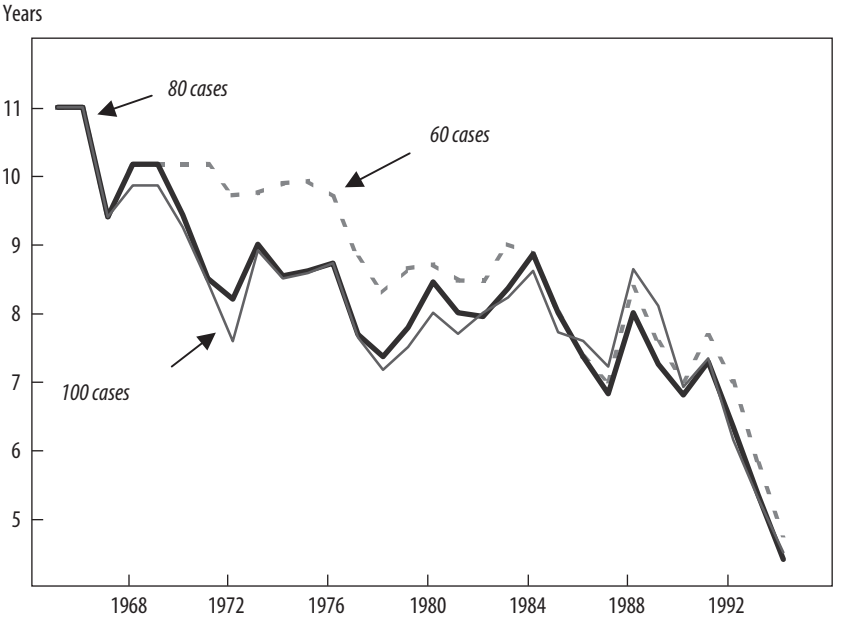
year. Both the buildup and ending phases shorten, however, such that the symmetry result is still obtained.

TEMPORAL DISTRIBUTION. The third characteristic we analyze is the temporal distribution of episodes. If lending booms are due to external or international factors that affect a number of countries simultaneously, we should observe some bunching of episodes. Of course, the same would occur if the episodes originate from internal factors that are correlated across countries (such as a wave of domestic financial liberalization).

Figure 3 shows the number of countries experiencing a lending boom as a fraction of possible episodes (which takes into account the unbalanced nature of our panel).[26] Two peaks emerge: the early 1980s and the mid-

26. There is a caveat in the interpretation of this figure. At face value, each number reads as the probability of having a lending boom in that period. Because our episodes last more than one period, however, the correct interpretation is the probability of a country observation in a given year being part of a boom episode. This distinction is also important in the interpretation of table 4.

FIGURE 4. Duration of Boom Episodes, Relative Deviation Criterion, 1964–96



1990s.[27] Changes in the number of episodes are important from an economic perspective. While the peak number of episodes in 1978–82 was between 20 and 36 percent of potential cases (depending on the boom threshold used), at the beginning of the sample the number was between 1 and 4 percent.[28]

We also look at changes in the duration pattern over time. Figure 4 shows the average duration of episodes during each year of our sample period. The data in the figure represent the average duration of active episodes in each year, independently of the three phases.[29] Under the relative criterion, the duration falls dramatically, from eleven years at the

27. When we measure booms as absolute deviations, the number of episodes exhibits a natural upward trend caused by financial deepening. The peak occurs between 1991 and 1993. See Gourinchas, Valdés, and Landerretche (2001).

28. These low numbers may be partly due to the methodology we adopt: with a rolling filter, if the credit-to-GDP ratio is growing rapidly in the early years of the sample, this will be attributed to the trend. In an unreported exercise, we used a Hodrick-Prescott filter defined throughout the sample period. The results indicate that the early 1960s was a time of high lending boom episodes (around 12–20 percent), with a subsequent trough in the early 1970s.

29. We consider only complete events. See footnote 25.

TABLE 4. Geographic Distribution of Lending Boom Episodes[a]

Criterion and region	*No. countries*	*60 cases*	*80 cases*	*100 cases*
Relative deviation				
America	21	12.3	14.9	16.8
Latin America	19	13.7	15.7	17.8
North America	2	0	8.2	8.2
Africa	28	11.2	14.7	17.1
Sub-Saharan Africa	24	11.8	14.4	17.1
Rest of Africa	4	7.9	16.5	17.2
Asia	20	15.0	16.3	18.6
Middle East	10	16.8	18.0	20.6
Far East	10	13.4	14.6	16.7
Oceania	4	28.0	28.0	28.0
Europe	18	6.2	7.6	13.5
Absolute deviation				
America	21	6.3	8.2	9.3
Latin America	19	6.3	8.4	9.6
North America	2	6.8	6.8	6.8
Africa	28	7.4	9.6	11.4
Sub-Saharan Africa	24	7.8	10.2	10.8
Rest of Africa	4	5.0	5.7	15.1
Asia	20	12.9	14.9	15.8
Middle East	10	6.3	9.8	11.7
Far East	10	19.1	19.7	19.7
Oceania	4	15.2	17.6	23.2
Europe	18	15.4	16.2	16.7

a. Probability of observing a country episode in a given year in the geographic area.

beginning of the sample to just under five years at the end.[30] The typical lending boom episode of the 1990s may thus be significantly different from its 1960s cousin.

GEOGRAPHIC AGGLOMERATION. Finally, we examine the geographic agglomeration of episodes to determine whether some areas are more prone to lending booms than others, for instance, as a result of an incomplete prudential regulation. Table 4 presents the results.[31] As expected,

30. Gourinchas, Valdés, and Landerretche (2001) show that the results appear quite different, depending on which criterion one uses. Under the absolute criterion, the duration increases from roughly five years in 1968 to nine years in 1985, then falls back to roughly five years in 1996. Looking at the underlying episodes, it appears that the difference between the two estimates at the beginning of the sample rests on relatively few episodes with large duration under the relative criterion: Morocco (seven years), Senegal (fourteen years), Syria (twenty-seven years), and Togo (fourteen years) (see appendix A). From 1983 onward, both criteria estimate a duration that falls from about eight years to roughly five years.

31. See footnote 26. Each number represents the probability of experiencing a lending boom in a given year on that continent.

the geographic distribution pattern is different under the two criteria. While industrialized regions are more likely to experience an absolute boom than developing regions (because of their deeper financial sector), they are considerably less prone to experiencing a relative boom. Among developing regions, Asia—especially Far East Asia—exhibits the greatest likelihood of having a boom under both types of deviations.[32] In the sample of sixty cases, for example, the Asian probabilities are 15.0 percent (relative) and 12.9 percent (absolute), while Latin America and Africa have relative probabilities of 13.7 percent and 11.2 percent, respectively. Interestingly, by this measure, Latin America does not appear especially vulnerable to booms: the region experienced fewer lending booms, on average, than Asia under either criterion and fewer lending booms than Africa, especially sub-Saharan Africa, under the absolute criterion.

Figure 5 presents the same decomposition by decade and continent for the relative criterion. It is apparent from this figure that the pattern differs quite markedly across continents and time. One clear message is that Latin America experienced far more lending booms in the 1990s than in previous decades: the probability of a country episode in any given year exceeded 30 percent. By contrast, African economies were more prone to relative lending booms in the 1970s. As for Asia, the Middle East experienced a steady increase in lending booms over decades, while Far East Asia was more prone to lending booms in the 1970s.[33] This figure highlights the strong geographic composition of the overall temporal distribution of lending booms in figure 3.

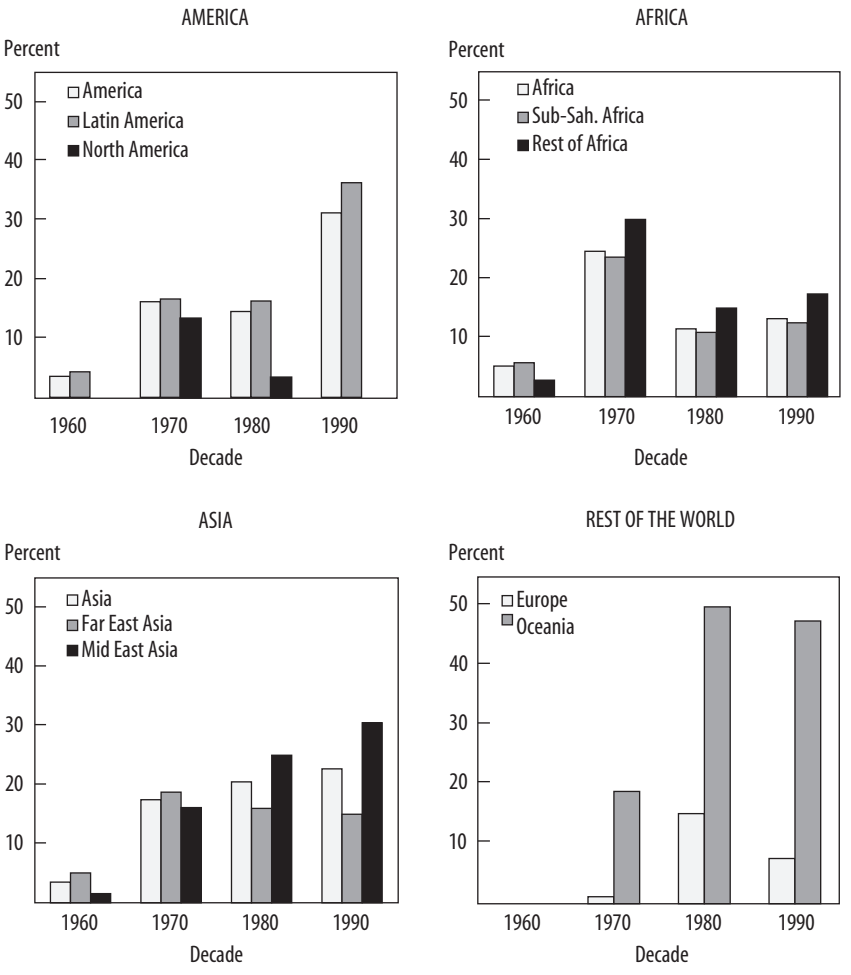
Macroeconomic Indicators around Lending Booms

To further our investigation of the origins of lending booms and to evaluate their macroeconomic impact, we now present a set of macroeconomic indicators around episodes. Although lending is clearly an endogenous variable, closely studying macroeconomic performance around episodes is useful for confronting different theories of lending booms.

32. These results do not change if one considers countries as the basic observation instead of country/years.

33. The results for Latin America are robust under the absolute criterion. In Africa, the number of episodes increased over decades, while in Asia, we observe a pronounced peak in the 1980s. See Gourinchas, Valdés, and Landerretche (2001) for details.

FIGURE 5. Geographic Distribution by Decades, Eighty Cases, Relative Deviation Criterion



We follow the methodology that Rose and Wyplosz use to study currency crises and that Razin and Milesi-Ferretti apply to the case of current account reversals.[34] For each macroeconomic indicator, we compute the difference between its sample average for each phase (including $t - 2$,

34. Rose, Eichengreen, Wyplosz (1995); Razin and Milesi-Ferretti (1996).

$t - 1$, $t + 1$, and $t + 2$) and its average during tranquil periods (before $t - 2$ and after $t + 2$). We also report confidence bands.

The set of macroeconomic variables includes fourteen indicators, which can be grouped into four categories: (1) domestic macroeconomic variables (gap between actual and potential GDP, potential output growth, ratio of investment to GDP, ratio of private consumption to GDP, real interest rate, spread between lending and deposit interest rates, and inflation);[35] (2) domestic policy variables (government surplus or deficit as percentage of GDP and months of imports covered by international reserves); (3) international variables (ratio of current account to GDP, real exchange rate overvaluation, private capital inflows as percentage of GDP, and proportion of short-term debt in total debt); and (4) external factors (terms of trade measured as deviation from long-run trend and international real interest rate). Appendix B presents details regarding source and data availability for each variable.

Because of potentially important cross-sectional variation in each of the indicators, we measure each variable in deviation from a country-specific mean. This enhances the significance of the results. We construct potential output from the Hodrick-Prescott filter of actual output and estimate the output gap as deviations from this measure. In addition, we use deviations from trend (calculated with a Hodrick-Prescott filter) to estimate the deviation of the real exchange rate from equilibrium and the deviation of terms of trade from its long-run value.

Figure 6 presents the results for the sample with eighty episodes using the relative deviation criterion. Each panel plots the evolution of one of the variables, showing the deviation from its tranquil-period average plus or minus two standard deviations. We start with the evolution of private lending to provide a check that we are indeed capturing lending booms.[36] The following discussion is organized according to the four categories outlined above. These results are quite robust when we consider the relative boom thresholds that yield sixty and one hundred cases, as well as the absolute deviation criterion.[37]

(*text continues on page 67*)

35. It would have been quite informative to include durable consumption in this set. Unfortunately, no data are available.

36. In this figure, the country-specific credit-to-GDP trend is constructed using a Hodrick-Prescott filter *for the entire sample*. The deviation from the trend may therefore be below the threshold defining the episodes.

37. The results are available from the authors on request. Some indicators demonstrate a marginal change in significance.

FIGURE 6. Macroeconomic Indicators around Episodes, Eighty Cases, Relative Deviation Criterion

Figure 6.1. Private Credit/GDP

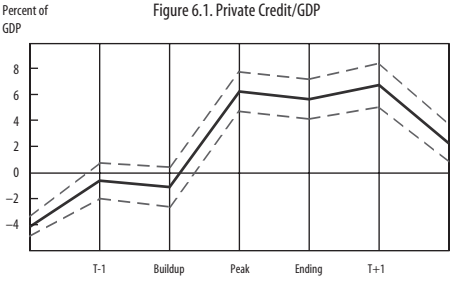


Figure 6.2. Log of Real GDP Deviation

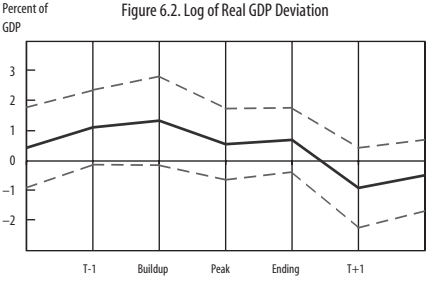


Figure 6.3. Potential Output Growth

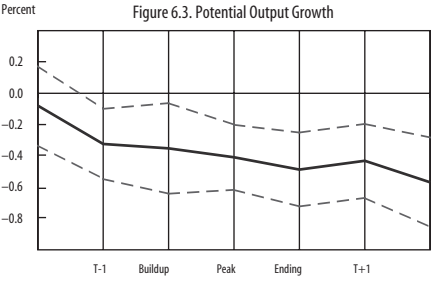


Figure 6.4. Investment/GDP

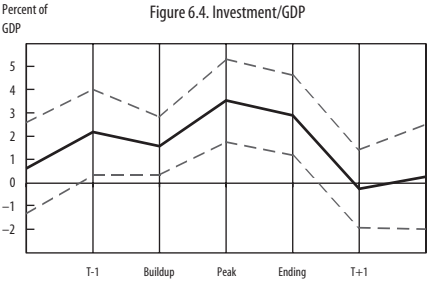


Figure 6.5. Consumption/GDP

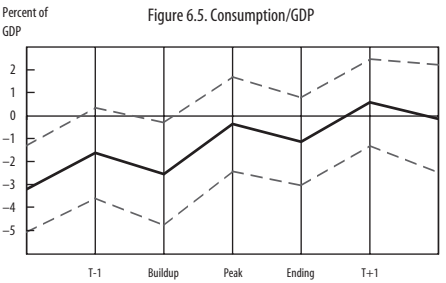


Figure 6.6. Domestic Real Interest Rate

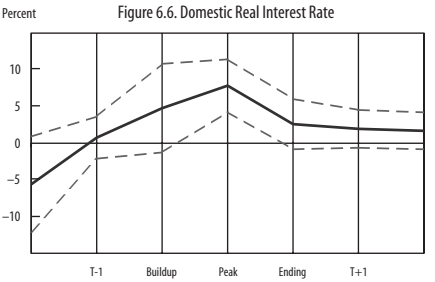


Figure 6.7. Interest Rate Spread

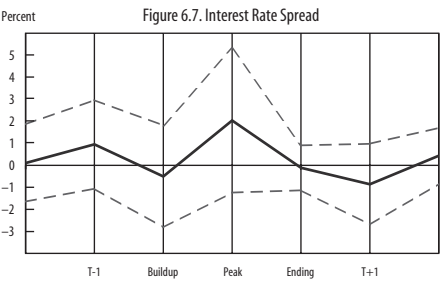


Figure 6.8. Inflation Rate

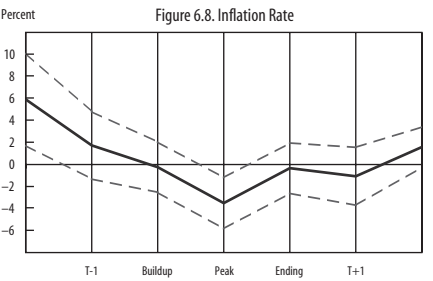


FIGURE 6. Macroeconomic Indicators around Episodes, Eighty Cases, Relative Deviation Criterion (cont.)

Figure 6.9. Government Surplus/GDP

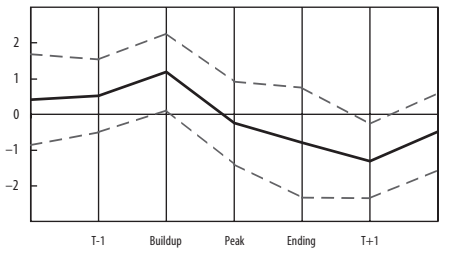


Figure 6.10. International Reserves

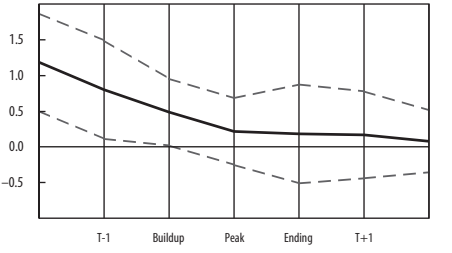


Figure 6.11. Current Account/GDP

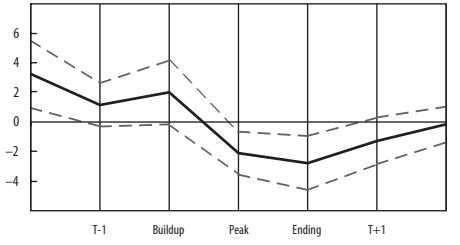


Figure 6.12. Real Exchange Rate

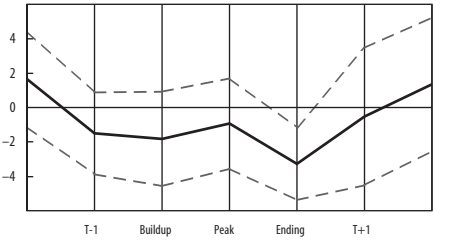


Figure 6.13. Private Capital Flows/GDP

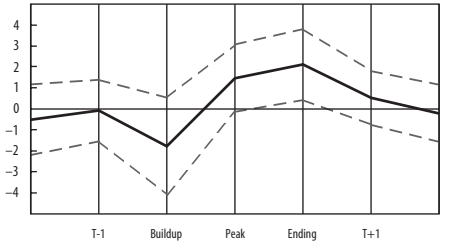


Figure 6.14. Short-Term Debt

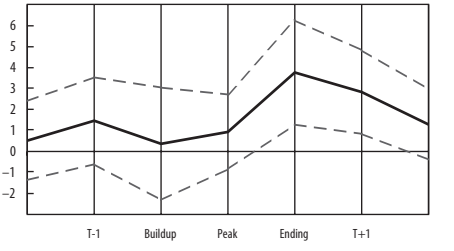


Figure 6.15. Terms of Trade

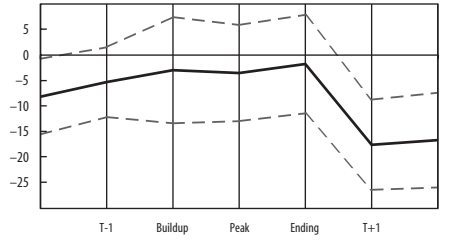
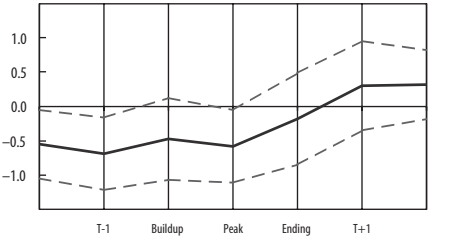


Figure 6.16. International Real Interest Rate



Domestic Macroeconomic Variables

Private lending appears highly symmetrical, rising above the trend by almost 10 percent of GDP during a typical lending boom and slowly decreasing afterward (see figure 6.1). This result is in line with the results on duration discussed in the previous section. The exercise indicates that our methodology may flag lending booms too early: during our buildup phase, on average, private credit is not significantly above trend.

The output gap is higher between $t-2$ and the buildup phase than during tranquil periods by 1.5 percent (figure 6.2). Since the output gap is essentially zero during tranquil periods, this implies that output rises significantly above potential output during this period; during the peak year output is roughly equal to potential, and it then declines below trend, although not significantly. We estimate a cumulated output gain for the entire episode at 2.8 percent, although only marginally significant.

The growth of potential output falls significantly below the average for tranquil times during the unwinding phase (figure 6.3). The effect is large (−0.6 to −1.0 percent), significant, and long lasting.[38] While this decline in the GDP trend is certainly consistent with existing theories arguing that excessive lending leads to an ultimate collapse of the economy, our results do not necessarily demonstrate this point: a positive comovement between credit and GDP is also consistent with the alternative interpretation that shocks to the economy (such as a terms-of-trade shock or a negative productivity shock) simultaneously alter aggregate output and domestic credit.

Investment rises significantly, from 0.6 percent of GDP above the average for tranquil periods in period $t-2$ to 3.5 percent of GDP above the tranquil-period average during the buildup phase. It subsequently declines (figure 6.4). The typical lending boom is thus associated with a strong investment boom.

The consumption-to-GDP ratio is significantly depressed before the lending boom (−3.0 percent). Although consumption increases gradually over the episode, it never exceeds its value during tranquil times (figure 6.5). Taken together, these findings indicate a strong investment boom but no overwhelming evidence of a consumption boom.

38. The estimation window is extended to $t-5$ and $t+5$ for potential GDP growth. Even five years after a lending boom, potential GDP growth is significantly below average.

The domestic real interest rate rises by roughly 700 basis points during the buildup, compared to tranquil times. This increase is very significant (figure 6.6).

The domestic interest rate spread (figure 6.7) does not vary significantly.

Domestic inflation falls by 9 percent, from 6 percent above average in $t - 2$ to a significant −3 percent at the peak; it subsequently rebounds (figure 6.8). This pattern may be consistent with theories that emphasize the role of stabilization programs, especially exchange rate–based stabilization.[39]

Domestic Policy Variables

The ratio of the government surplus or deficit to GDP worsens significantly in the aftermath of the lending boom, going from 0.4 percent above the mean to 1.3 percent below (figure 6.9).

International reserves expressed as months of imports decline from 1.2 months above the mean to 0 (figure 6.10).

International Variables

The large current account improvement seen before the lending boom (3.3 percent of GDP, relative to tranquil times) turns into a large deficit around the peak of the episode (−2.8 percent of GDP). The overall turnaround represents 6 percent of domestic GDP (figure 6.11).

The real exchange rate appreciates by roughly 7 percent relative to the trend and to tranquil times during that same period (figure 6.12). It reverts to the trend after the lending boom.

Private capital inflows increase significantly, by 2.6 percent of GDP from the buildup to the peak year and ending phase. This surge is subsequently reversed (figure 6.13).

The proportion of short-term external debt increases significantly after the lending boom, by 3.75 percent (figure 6.14).

39. The results for inflation exclude countries with hyperinflation or very high inflation episodes. The countries excluded are Argentina, Bolivia, Brazil, Chile, Greece, Indonesia, Israel, Kuwait, Oman, Peru, Zambia, and Zimbabwe. Thus we cannot attribute this result to some of the well-known exchange rate–based stabilization programs (Argentina in 1978 and 1991, Brazil in 1986, and Chile in 1978). Some other well-known exchange rate–based stabilization programs with lending booms are still included, for instance, Mexico in 1987 and Uruguay in 1978.

External Factors

The terms of trade appreciate significantly after the end of the episode (figure 6.15).

The international real interest rate increases steadily, by roughly 86 basis points over the episode (figure 6.16).

Are Lending Booms Dangerous?

Credit growth is considered one of the key determinants of banking crises, but this does not mean that credit booms are always harmful for the economy. While the conditional probability of a lending boom occurring before a banking crisis may be quite high, this does not provide any indication of the converse, namely, the conditional probability that a banking crisis will follow a lending boom. As we have argued before, credit booms may in fact reflect fundamental improvements in investing opportunities that are beneficial in the long run. The results from the previous section provide only mixed support for this interpretation, however: while the output gap is positive and mildly significant, trend output growth deteriorates significantly. This section addresses the possibility that lending booms lead to an increase in volatility, that is, in a country's vulnerability to economy-wide crises.[40] We proceed by investigating whether the incidence of banking and currency crises increases around lending boom episodes.

Incidence of Banking Crises during Booms

To analyze whether boom episodes are related to financial crises, and particularly whether they signal banking troubles, we compare the probability of having a banking crisis before and after a boom episode with the probability of experiencing such a crisis during tranquil periods.[41] The period before an episode starts in $t - 2$ and continues through the peak year. The period after an episode encompasses the ending phase through $t + 2$.[42] The

40. This is the argument emphasized by Schneider and Tornell (1999b).

41. We compute probabilities per period (year), so episodes of a different duration are comparable to tranquil-period probabilities.

42. The results do not differ much among the individual phases that constitute the before and after periods. For simplicity we prefer to consider only these two categories rather than all seven different phases.

basic information that we use to define the existence of a banking crisis is drawn from Caprio and Klinguebiel and from Lindgren, Garcia, and Saal.[43] We consider two alternative indicators of banking crises (dummy variables for a country observation in a given year) based on the cases identified in each study.

Caprio and Klinguebiel construct a large database on banking crisis episodes. According to their definition, a banking crisis occurs when the net worth of the banking sector has been almost entirely eliminated.[44] Their work identifies sixty episodes in fifty-one of our ninety-one countries (forty-three countries have one case, seven countries have two cases, and one country has three cases). Lindgren, Garcia, and Saal broadly categorize banking problems as either crises or significant problems. For the present exercise, we consider only those episodes classified as significant problems. Their database uncovers twenty-nine episodes in twenty-four of our ninety-one countries (twenty countries have one case, three countries have two cases, and one country has three). Both databases were constructed on the basis of interviews with IMF desk economists and accounts of banking crises in the international literature. The two major limitations of these data sets are their imperfect comparability across countries—what is defined as a crisis in one country may not constitute a crisis in another—and their vague criteria for defining the duration of a crisis. For example, the average duration of a crisis in the Caprio-Klinguebiel data set is 3.8 years, while in the Lindgren, Garcia, and Saal data set it is 4.6 years. The list of banking episodes under both criteria is presented in appendix A.

Table 5 presents the results for both banking crisis indicators. First, we observe that the probability of a banking crisis occurring after a lending boom is relatively low, from 9.5 to 13.9 percent using the Lindgren, Garcia, and Saal data and from 12.7 to 21.1 percent using the Caprio-Klinguebiel data. Overall, a banking crisis is far from a definite outcome for the episodes in our sample. Second, the likelihood of having a banking crisis up to two years after a lending boom is somewhat higher than during tranquil periods, although the increase is often not statistically significant. Using the Lindgren, Garcia, and Saal crisis index, the probability of having a banking crisis after a relative deviation boom is about 53 percent

43. Caprio and Klinguebiel (1997); Lindgren, Garcia, and Saal (1996).

44. They use World Bank financial sector reviews and interviews with World Bank specialists to assess the scope of the crisis and estimate its total cost (see Caprio and Klinguebiel, 1997, table 1).

TABLE 5. Probability of Banking Crisis[a]

	Caprio and Klinguebiel dummy			*Lindgren, Garcia, and Saal dummy*		
Criterion and phase	*60 cases*	*80 cases*	*100 cases*	*60 cases*	*80 cases*	*100 cases*
Relative deviation						
Before boom	9.5	8.6	8.1	1.6	1.3	1.3
	(6.5)	(5.9)	(5.1)	(6.8)	(6.1)	(5.3)
After boom	14.3	14.1	12.7	10.4	10.6	9.5
	(5.1)	(4.6)	(4.1)	(5.2)	(4.7)	(4.2)
Tranquil times	12.4	12.6	13.4	6.8	6.8	7.3
	(1.5)	(1.7)	(1.9)	(1.5)	(1.7)	(1.9)
Absolute deviation						
Before boom	9.8	9.3	8.1	2.56	2.4	2.1
	(5.8)	(5.1)	(4.8)	(6.0)	(5.3)	(4.9)
After boom	21.1	18.1	16.5	13.9	11.7	11.1
	(5.5)	(4.9)	(4.5)	(5.7)	(5.0)	(4.6)
Tranquil times	11.3	11.7	12.4	6.3	6.7	6.9
	(1.5)	(1.7)	(1.9)	(1.5)	(1.7)	(1.9)

Source: Authors' calculations, based on Gerard Caprio and Daniel Klinguebiel, 1997, "Bank Insolvency: Bad Luck, Bad Policy or Bad Banking?" in *Annual World Bank Conference on Development Economics, 1996*, edited by Michael Bruno and Boris Pleskovic, Washington: World Bank; Carl-Johan Lindgren, Gillian Garcia, and Matthew Saal, 1996, *Bank Soundness and Macroeconomic Stability,* Washington: International Monetary Fund (IMF).

a. Ratio of actual country/year cases to potential country/year cases. Standard deviations are in parentheses. Period before boom includes $t-2$ to peak year; period after boom covers ending phase to $t+2$.

higher than during tranquil times (10.6 percent versus 6.8 percent). After an absolute deviation boom, the average probability is about 75 percent higher than tranquil times (11.7 percent versus 6.7 percent).[45] The incidence of banking crisis is slightly lower before the lending boom than during tranquil times. These results indicate that the presumption that lending booms generically lead to banking crises is largely erroneous: while most banking crises may be preceded by a lending boom, most lending booms are not followed by a banking crisis.[46]

It is interesting to contrast these results with those that emerge if we define our episode using a trend that covers the entire sample period.[47] In that case, a banking crisis is substantially more likely after lending booms

45. The increases in probability using the Caprio and Klinguebiel index are 13 percent and 54 percent, respectively, for the sample with eighty cases.

46. The standard errors are quite large, however, so that the contingency table may have low power. If one considers the sixty- and one-hundred-case samples, the general results do not change, although with a smaller number of cases the post-boom probability of crisis increases (more so using the relative criterion than the absolute criterion).

47. We thank Chris Sims for suggesting this.

than during tranquil times. One possible explanation is that this criterion flags booms that are ultimately reversed, not those that lead to a permanent financial deepening. Part of this reversal probably occurs through a collapse of the domestic financial system. From the point of view of the policymaker, however, it is the deviation from the trend based on purely historical data that matters. Our definition will flag rapid but permanent changes in the credit-to-GDP ratio as booms. For instance, under our present criterion Australia's credit-to-GDP ratio soared from 30 to 60 percent between 1985 and 1993. An analysis of its credit-to-GDP ratio clearly indicates that Australia experienced a rapid and apparently permanent financial deepening throughout this period.[48] While this definition of episodes may appear too conservative—flagging perfectly healthy developments in the financial sector—it can only be extended on the basis of supplementary information. This paper does not attempt to define lending booms on the basis of multivariate systems, but this is clearly an avenue for future work.[49]

Despite the limitations of our criteria (which we view as empirically palatable), the previous section indicates a clear pattern of comovement across a series of key macroeconomic variables and our lending booms. This may make it difficult to sort out healthy booms from dangerous ones on the basis of covariates, which is not really surprising considering the theoretical literature on liquidity and financial crises. A number of existing models emphasize that the economy may be prone to multiple equilibria and thus may or may not experience a collapse at given fundamentals.

Probability of a Currency Crisis during Booms

This subsection evaluates whether lending booms are related to the existence of balance-of-payments or currency crises. We follow the same methodology used above, namely, we compute the probability of having a currency crisis before and after a boom and compare it to the probability during tranquil periods. To determine the existence of a currency cri-

48. Indeed, our previous categorization did not flag the Australian episode as a lending boom. See Gourinchas, Valdés, and Landerretche (2001) for additional details on the Australian case.

49. To tackle this issue at least in part, we did investigate the incidence of banking crises, conditional on some relevant macroeconomic variables, including investment/GDP, real appreciation, and the size of the boom. The results, which are not reported here but which are available from the authors, indicate no clear pattern.

TABLE 6. Probability of Currency Crisis[a]

	Frankel, Meese, and Rose dummy		
Criterion and phase	*60 cases*	*80 cases*	*100 cases*
Relative deviation			
Before boom	7.2	7.4	6.5
	(5.5)	(4.8)	(4.3)
After boom	6.7	7.2	7.2
	(5.2)	(4.6)	(4.1)
Tranquil times	5.6	5.4	5.4
	(1.0)	(1.1)	(1.3)
Absolute deviation			
Before boom	4.8	4.4	4.0
	(5.4)	(4.8)	(4.4)
After boom	7.3	8.0	7.3
	(5.7)	(5.0)	(4.6)
Tranquil times	5.8	5.8	6.0
	(1.0)	(1.1)	(1.2)

Source: Authors' calculations, based on Jeffrey Frankel and Andrew Rose, 1996, "Currency Crashes in Emerging Markets: Empirical Indicators," Working Paper 5437, Cambridge, Mass.: National Bureau of Economic Research; Richard Meese and Andrew Rose, 1996, "Exchange Rate Instability: Determinants and Predictability, University of California at Berkeley, Haas School of Business (mimeographed).

a. Ratio of actual country/year cases to potential country/year cases. Standard deviations are in parentheses. Period before boom includes $t-2$ to peak year; period after boom covers ending phase to $t+2$.

sis in each country/year observation, we construct a set of dummy variables using the definition of currency crash outlined by Frankel and Rose and by Meese and Rose.[50] These authors consider that a currency crisis occurs when the nominal devaluation (on a year-to-year basis) exceeds 25 percent, with an increase of at least 10 percent over the devaluation rate of the previous year, using the U.S. dollar bilateral exchange rate. They also require crises to be two years apart.[51] Appendix A reports our list of currency crises according to these criteria.

Table 6 presents the probability of having a currency crisis before and after a boom and during tranquil periods, using both relative and absolute deviation criteria and our three samples. The results show that the likelihood of a currency crisis is only slightly higher after a boom than during tranquil periods. In fact, using the relative criterion, currency crises are sometimes more likely before the boom than after. Under the absolute criterion, the probability of a currency collapse is highest after a lending

50. Frankel and Rose (1996); Meese and Rose (1996).

51. Our results do not change significantly if we consider a threshold of 15 percent instead.

boom, but because the results are somewhat imprecisely estimated, we cannot reject the hypothesis that the probabilities are indeed the same. Across samples, the average incidence after a boom is between 28 percent (relative deviation) and 32 percent (absolute deviation) higher than during tranquil periods.

Is Latin America Different?

Latin America's recent history features prominent experiences of lending booms and busts.[52] These episodes usually contain three main ingredients: financial deregulation; large capital inflows and capital account liberalization; and a failed exchange rate–based stabilization policy. To examine whether these experiences have a special nature, we now revisit the stylized facts listed in the previous two sections, comparing what happens in Latin America and the rest of the world.

Macroeconomic Indicators

Latin America comprises nineteen countries, which account for twenty-two of the lending booms in our sample of eighty.[53] Figure 7 shows the behavior of macroeconomic variables during booms in Latin America, whereas figure 8 reports what happens in all countries excluding Latin America. Although the overall pattern of behavior in Latin America and the rest of the world appears to be similar, there are important differences.

First, positive capital inflows are more relevant before the lending booms in Latin America than for the rest of the world (figures 7.13 and 8.13). This is consistent with the fact that a number of Latin American countries experienced capital account liberalization during our sample period. Second, positive output gap deviations are stronger (though insignificant), with a cumulated output gain of 6.3 percent. The gains are strong and positive during the peak and ending phases (2.1 and 3.1 percent,

(*text continues on page 79*)

52. These experiences include Chile in 1982, Argentina in 1981, and Mexico in 1994. For details, see de la Cuadra and Valdes-Prieto (1993); Edwards and Cox Edwards (1987); Dornbusch and Werner (1994); Krueger and Tornell (1999).

53. We keep the same thresholds as for the full analysis, so the episodes are comparable across subsamples.

FIGURE 7. Macroeconomic Indicators around Episodes in Latin America, Eighty Cases, Relative Deviation Criterion

Figure 7.1. Private Credit/GDP

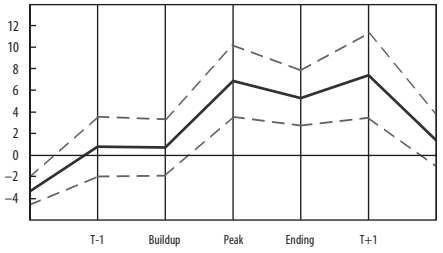


Figure 7.2. Log of Real GDP Deviation

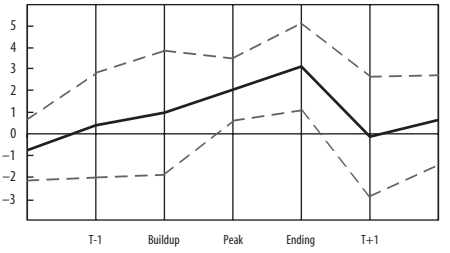


Figure 7.3. Potential GDP Growth

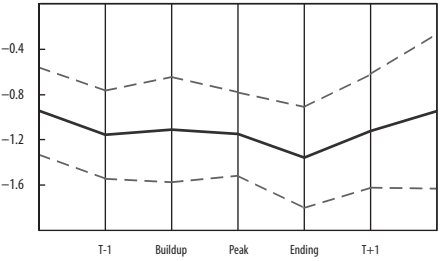


Figure 7.4. Investment/GDP

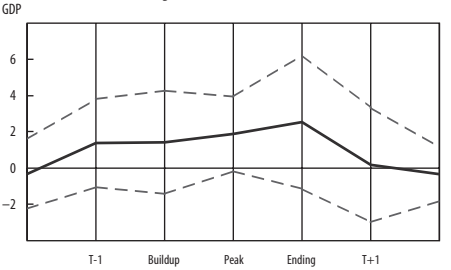


Figure 7.5. Consumption/GDP

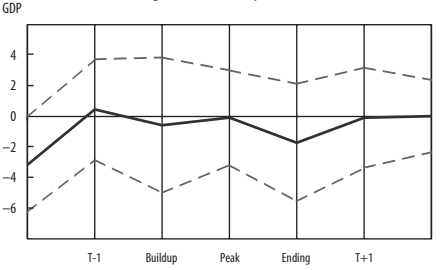


Figure 7.6. Domestic Real Interest Rate

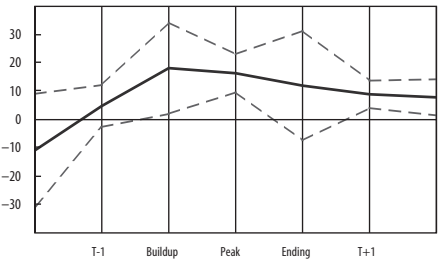


Figure 7.7. Interest Rate Spread

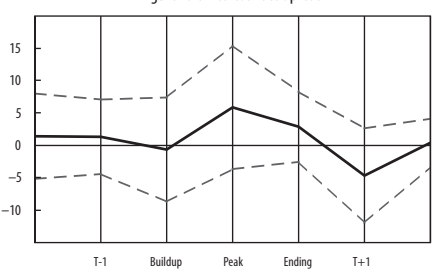


Figure 7.8. Inflation Rate

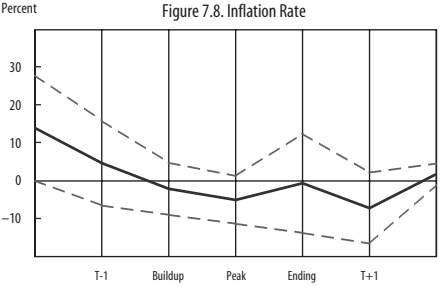


FIGURE 7. Macroeconomic Indicators around Episodes in Latin America, Eighty Cases, Relative Deviation Criterion (cont.)

Figure 7.9. Government Surplus/GDP

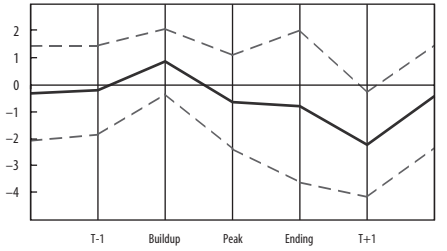


Figure 7.10. International Reserves

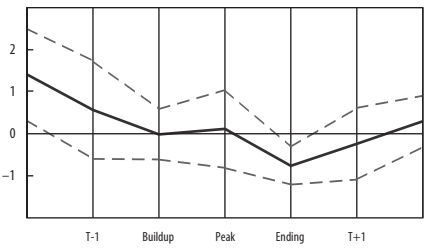


Figure 7.11. Current Account/GDP

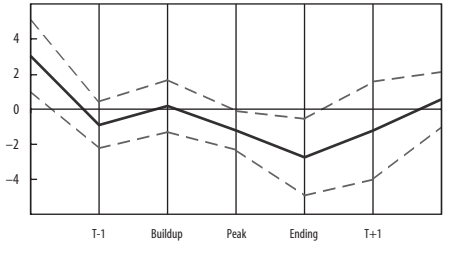


Figure 7.12. Real Exchange Rate

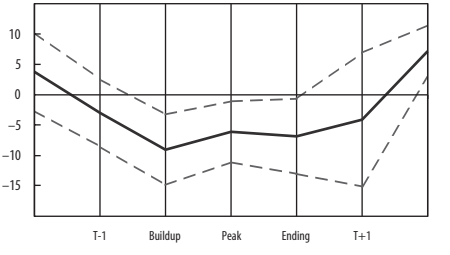


Figure 7.13. Private Capital Flows/GDP

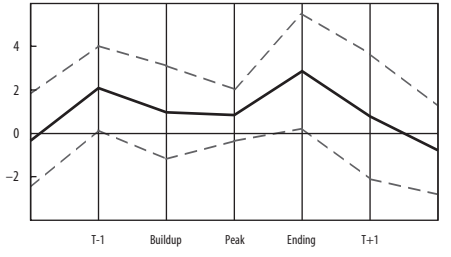


Figure 7.14. Short-Term Debt

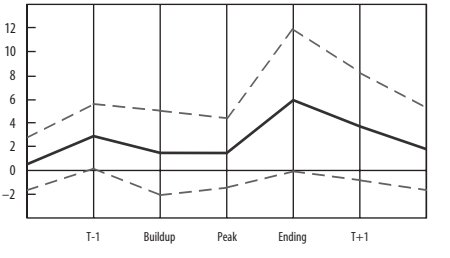


Figure 7.15. Terms of Trade

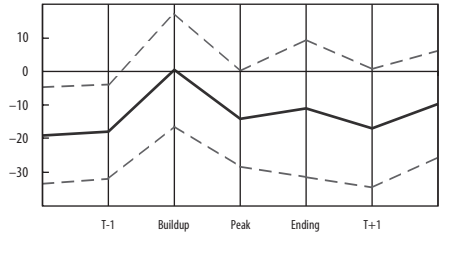


Figure 7.16. International Real Interest Rate

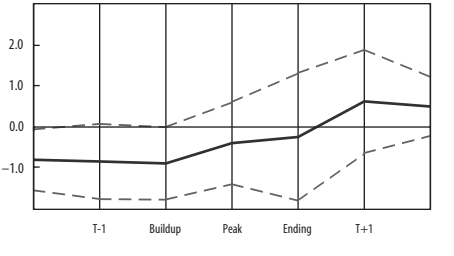


FIGURE 8. Macroeconomic Indicators around Episodes in the Rest of the World, Eighty Cases, Relative Deviation Criterion

Figure 8.1. Private Credit/GDP

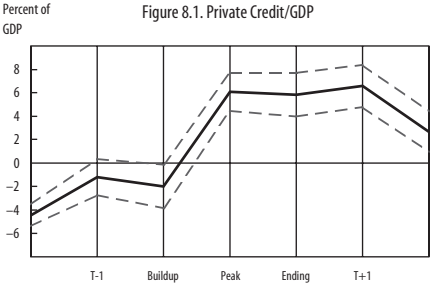


Figure 8.2. Log of Real GDP Deviation

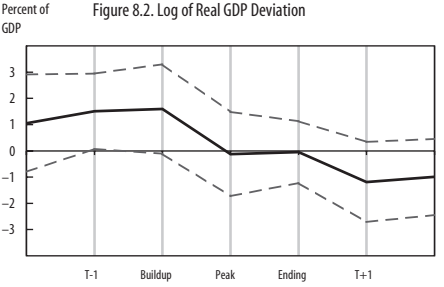


Figure 8.3. Potential Output Growth

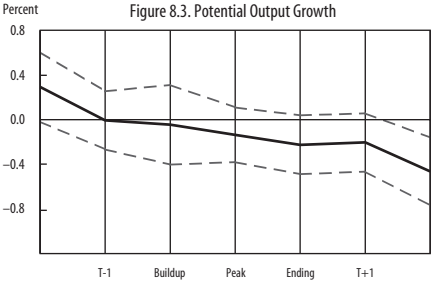


Figure 8.4. Investment/GDP

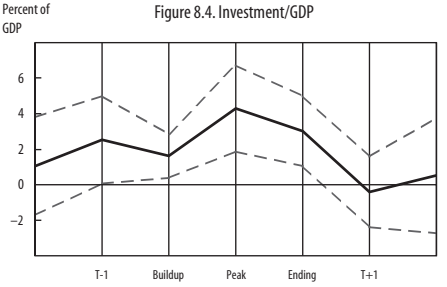


Figure 8.5. Consumption/GDP

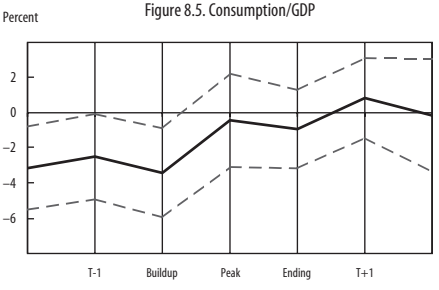


Figure 8.6. Domestic Real Interest Rate

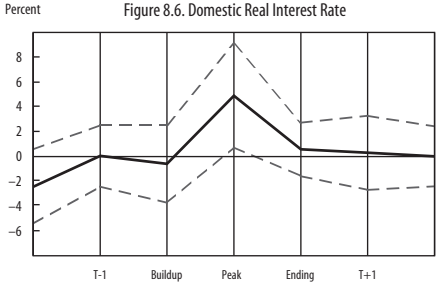


Figure 8.7. Interest Rate Spread

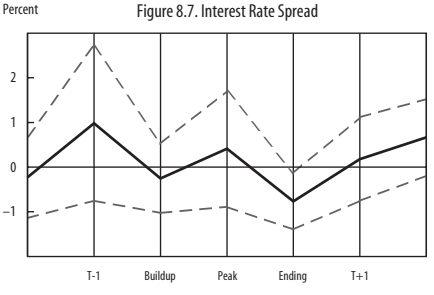


Figure 8.8. Inflation Rate

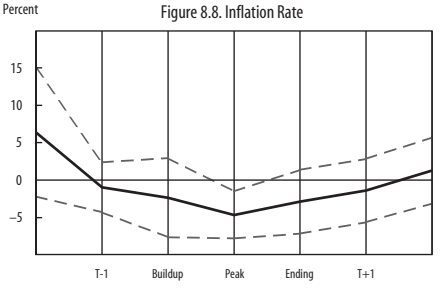


FIGURE 8. Macroeconomic Indicators around Episodes in the Rest of the World, Eighty Cases, Relative Deviation Criterion (cont.)

Figure 8.9. Government Surplus/GDP

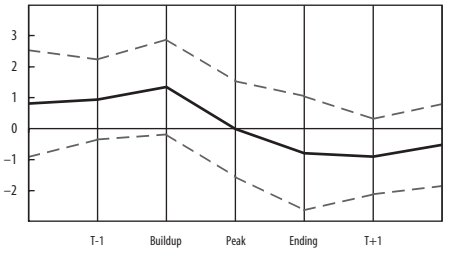


Figure 8.10. International Reserves

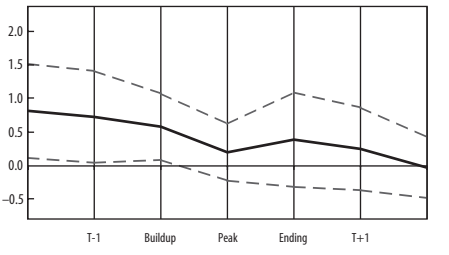


Figure 8.11. Current Account/GDP

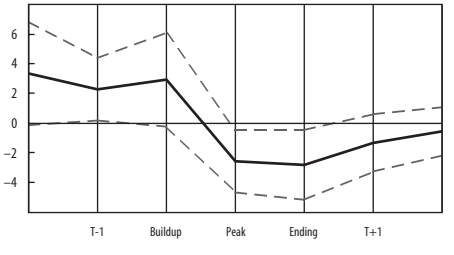


Figure 8.12. Real Exchange Rate

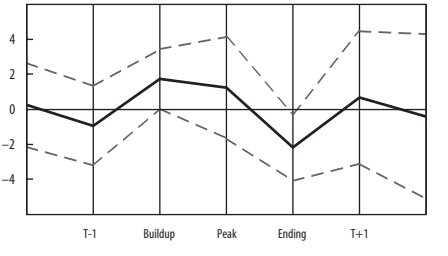


Figure 8.13. Private Capital Flows/GDP

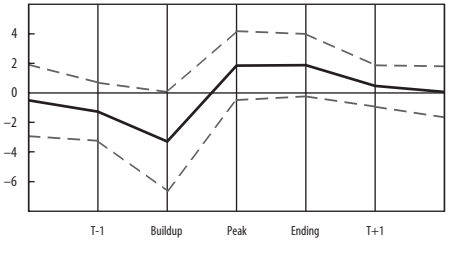


Figure 8.14. Short-Term Debt

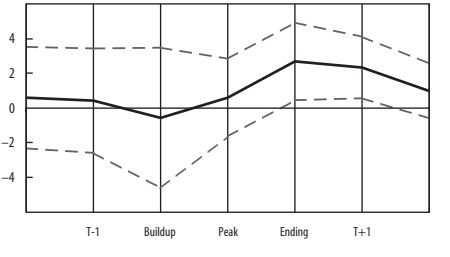


Figure 8.15. Terms of Trade

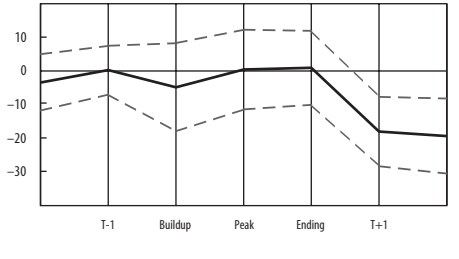
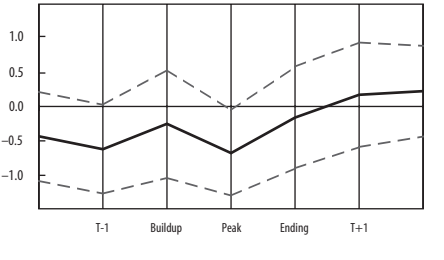


Figure 8.16. International Real Interest Rate



respectively). On the other hand, trend GDP growth is very significantly smaller than average. This decline in trend GDP growth is much more pronounced for Latin America at about 1.4 percent than for the entire sample (figure 7.3). In fact, once Latin American countries are excluded, the decline in output growth is not significant until $t + 2$ (figure 8.3). Latin American countries thus exhibit a pattern of strong temporary output gains and significant decline in future output growth.

Third, there is much less evidence that the increase in output is driven by an investment or consumption boom. Although the investment-to-GDP ratio increases from 0 to 2.5 percent after the boom, the rise is not statistically significant.[54] Clearly, it is hard to conceive of a lending boom that would not be associated with an increase either in lending or in consumption. Recall, however, that we are measuring investment and consumption as a ratio to GDP. The temporary increase in GDP thus translates into an increase in investment and consumption, but investment increases substantially less than in the rest of the world. Taken together, these facts indicate that consumption may play a more important role in Latin America than in the rest of the world.

Fourth, domestic interest rates are significantly higher in Latin America (approximately 10 percent or 1,000 basis points, compared to 4–5 percent in the rest of the world), while the world real interest rate tends to be significantly lower in the early phase. These results indicate that international factors may play a more important role in Latin America than in the rest of the world.

Finally, the real exchange rate overvaluation is much more sustained. It reaches about 8 percent in Latin America and only 2 percent in the rest of the world (and solely during the ending period) (figures 7.12 and 8.12). Despite this stronger appreciation, the current account worsens significantly more in Latin America than in the rest of the world (figures 7.11 and 8.11).

Crisis

Table 7 indicates that the probability that a banking crisis will follow a lending boom is much higher in Latin America than in the rest of the world. Under the relative criterion with eighty cases worldwide, the probability of a banking crisis in Latin America during tranquil times is only 9 percent; this probability jumps to 25 percent after a lending boom. By

54. This may reflect low power, however.

TABLE 7. Probability of Banking Crisis, Latin America and the World[a]

	Latin America			*Rest of the world*		
Criterion and phase	*60 cases*	*80 cases*	*100 cases*	*60 cases*	*80 cases*	*100 cases*
Relative deviation						
Before boom	14.5	11.5	11.1	7.0	7.1	7.0
	(10.9)	(9.6)	(9.4)	(8.1)	(7.3)	(6.1)
After boom	29.7	25.0	23.7	8.8	10.3	9.5
	(9.0)	(8.4)	(8.2)	(6.2)	(5.5)	(4.8)
Tranquil times	7.9	9.0	9.4	13.4	13.4	14.4
	(4.0)	(4.6)	(4.8)	(1.6)	(1.8)	(2.1)
Absolute deviation						
Before boom	19.6	17.4	16.7	7.4	7.0	6.0
	(12.5)	(10.6)	(10.4)	(6.6)	(5.9)	(5.4)
After boom	37.8	34.0	37.0	18.0	14.9	12.8
	(12.5)	(11.0)	(10.3)	(6.0)	(5.4)	(4.9)
Tranquil times	9.2	8.4	7.4	11.9	12.7	13.9
	(3.0)	(3.5)	(3.6)	(1.7)	(2.0)	(2.2)

Source: Authors' calculations, based on Caprio and Klinguebiel (1997).

a. Based on the Caprio-Klinguebiel criterion. Ratio of actual country/year cases to potential country/year cases. Standard deviations are in parentheses. Period before boom includes $t - 2$ to peak year; period after boom covers ending phase to $t + 2$.

contrast, the rest of the world was less likely to experience a banking crisis after a lending boom, with a probability between 7 and 10 percent. The absolute criterion gives an even stronger result, with a 139 percent probability increase in Latin America. A similar pattern is also present for the rest of the world, although to a lesser extent.

Balance-of-payments crises follow a similar pattern (table 8). The frequency of crises is higher in Latin America than in the rest of the world, reflecting the disproportionate occurrence of currency crises in the region. The regional increase is also larger, although not significantly so.

These results indicate that the lending booms identified in this paper are of a distinctive nature in Latin America: post-boom banking and currency crises are almost twice as likely in the region than in the rest of the world.

Theories on the Origins of Lending Booms

What triggers a lending boom? This section briefly reviews leading theories and examines whether our findings support their predictions. While our results clearly do not support a one-size-fits-all theory, some theories

TABLE 8. Probability of Currency Crisis, Latin America and the World[a]

	Latin America			*Rest of the world*		
Criterion and phase	*60 cases*	*80 cases*	*100 cases*	*60 cases*	*80 cases*	*100 cases*
Relative deviation						
Before boom	15.5	15.2	14.4	3.6	4.0	3.5
	(9.4)	(8.3)	(7.8)	(6.7)	(5.9)	(5.1)
After boom	16.9	14.7	13.1	3.4	4.8	5.5
	(9.8)	(8.8)	(8.3)	(6.0)	(5.4)	(4.7)
Tranquil times	11.0	11.1	11.6	4.3	4.1	4.0
	(2.7)	(3.0)	(3.3)	(1.1)	(1.2)	(1.4)
Absolute deviation						
Before boom	12.3	10.8	10.1	2.9	2.7	2.6
	(11.9)	(10.3)	(10.0)	(6.0)	(5.4)	(4.9)
After boom	18.0	19.2	18.7	5.4	5.9	5.0
	(14.1)	(12.0)	(11.3)	(6.2)	(5.5)	(5.0)
Tranquil times	12.0	11.9	12.0	4.1	4.1	4.3
	(2.1)	(2.4)	(2.5)	(1.1)	(1.2)	(1.4)

Source: Authors' calculations, based on Frankel and Rose (1996) and Meese and Rose (1996).

a. Based on the Frankel, Meese, and Rose dummy. Ratio of actual country/year cases to potential country/year cases. Standard deviations are in parentheses. Period before boom includes $t-2$ to peak year; period after boom covers ending phase to $t+2$.

seem better equipped than others to explain the facts. We emphasize that this is only a very impressionistic attempt to gauge the empirical relevance of various theories; more sophisticated work is needed.

Real Business Cycles and Procyclical Elasticity

A lending boom is a by-product of a large real business cycle in which the output-elasticity of the demand for credit is highly procyclical. The ultimate origin of a boom under this theory is a technological or terms-of-trade shock.[55] Technological shocks could certainly explain booms in the sample that excludes Latin America. A key feature of this explanation appears in the data: GDP growth is higher than normal in $t-1$ (that is, one year before the lending boom). Furthermore, the investment boom that arises with the lending boom is a typical outcome in this type of model. The story is also well suited to explaining why the incidence of banking and balance-of-payments crises after a lending boom is not larger than during tranquil times. It is harder to argue, however, that terms-of-trade

55. See Mendoza (1995) for an evaluation of the effect of terms-of-trade shocks in an open, real business cycle–type economy.

shocks are at the root of lending booms. According to figure 8.15, terms-of-trade shocks do not vary over the episode until the very end, when they fall significantly.

Real business cycles provide a less-than-satisfactory explanation of the Latin American sample. Potential output growth in these experiences is below the tranquil-period average before, during, and after the lending boom. GDP is above the trend only when the boom is fully developed. Although terms of trade increase during the buildup (from a negative gap with respect to its trend), they are never above the tranquil-period average. This theory also does not clearly explain the strong vulnerability that booms produce in Latin America. Thus while this may be an appropriate explanation for a large fraction of cases, it provides a poor fit of the Latin American experience.

Financial Development and Liberalization

This theory holds that a lending boom is the natural outcome of a significant liberalization of a repressed financial system. If a country has interest rate caps, lending that is centrally allocated, or an overregulated banking industry, then the credit-to-GDP ratio is considerably lower than in a country that does not have any of these regulations. A lending boom that follows financial liberalization might become large and troublesome if prudential regulation is not adequate. The evidence shows that after a liberalization, both domestic and international real interest rates rise, as does probability of both banking and balance-of-payments crises.[56]

Various stylized facts support the predictions of this theory, particularly in the Latin American sample. Both the real interest rate and the probability of banking and currency crises are high during boom episodes. Moreover, the liberalization may trigger an investment (and consumption) boom, which, in turn, causes external disequilibrium such as a real exchange rate overvaluation and a rise in the current account deficit. Large capital inflows and debt concentration in short maturities may also follow liberalization, especially when this involves an opening of the capital account. This theory may even explain the bunching of cases we observed, since financial liberalization tended to occur in waves. On the other hand, this theory would have a difficult time explaining the output gains seen

56. Galbis (1993); Kaminsky and Reinhart (1999).

before the lending boom. Nonetheless, it may be a good candidate for explaining a considerable portion of the episodes in Latin America.[57]

An alternative theory argues that lending booms and subsequent macroeconomic instability may be the consequence of *partial* financial liberalization in economies that exhibit mild financial constraints.[58] Financial liberalization increases capital inflows. Initially, this increases output and the wealth of investors. Since personal wealth can be pledged as collateral on domestic investment projects, this further increases the demand for credit. In this model, increases in wealth and output lead to a surge in the demand for nontradable inputs into production, such as real estate and services. The result is a real appreciation of the real exchange rate and a surge in the price of domestic assets. This eventually chokes off the initial expansion and leads to a decline in output. As the economy contracts, demand for nontradable inputs falls precipitously, leading to a real depreciation and a collapse in asset prices. Aghion, Bacchetta, and Banerjee show that the resulting volatility occurs for intermediate levels of financial development, as measured by the severity of the financing constraint. Incomplete financial liberalization may thus leave a country exposed to financial and macroeconomic instability. This theory makes a number of predictions about the chain of events leading to a crisis. Large capital inflows, a growing current account deficit, real exchange rate appreciation, and output expansion coincide with the increase in investment and lending. The episodes in Latin America feature many of these characteristics.

It is interesting to consider exchange rate–based stabilization in the context of this story of financial development and liberalization. The massive real exchange rate overvaluation and the consumption turnaround observed in these episodes also characterize stabilizations that lack credibility. The Southern Cone experiences of the early 1980s and the Mexican episode of 1994 share a number of characteristics with the Peruvian experience of 1991–94: all feature broad structural reforms, including price liberalization, privatization, trade reform, and opening up the capital account. One key difference between the successful Peruvian experience and the others is that Peru pursued a monetary-based stabilization.

57. Of course, recurrence is a problem with this explanation, which simply cannot explain every single episode. Empirically, financial liberalizations tend to occur gradually, and it is possible to observe sharp increases in lending at key points in the process.

58. Aghion, Bacchetta, and Banerjee (1999a).

Capital Inflows

A lending boom is the domestic counterpart of a large surge in capital inflows triggered by so-called external factors.[59] Episodes occur in waves because of common external fundamentals. International real interest rates are rather low during the lending upswing. The banking system intermediates the funds by increasing credit to the private sector, which raises both consumption and investment.

Some of the stylized facts that we identify are consistent with this theory. In particular, episodes are bunched together, and capital inflows spike during the boom. Other key pieces are not present, however. In particular, the international real interest rate does not show the pattern one would expect, and the average size of the inflows is only around one-fifth the size of the boom (in percent of GDP). Thus the story seems valid for only a limited number of cases.

Wealth Shocks

A lending boom occurs when a large expansion in investment or consumption needs financing. New discoveries of natural resources, a large exogenous change in relative prices, or relevant structural reforms may trigger this expansion. In the absence of distortions, this theory predicts higher growth and macroeconomic stability. None of the three samples supports this theory. In all cases potential output growth shrinks after the boom, and vulnerability increases after the episodes.

In sum, the two theories that are most consistent with the stylized facts presented in this paper are that lending booms are part of a natural GDP cycle and that they follow a (sometimes poorly regulated) financial liberalization. In the first case, boom episodes should not be a problem. The second story provides a better fit with the stylized facts we identify for Latin American countries.

Concluding Remarks

This paper has identified a set of stylized facts surrounding lending boom episodes. The buildup and ending phases appear highly symmetric, independently of whether we define lending booms as a relative or an absolute

59. Calvo, Leiderman, and Reinhart (1993).

deviation of the credit-to-GDP ratio from the trend. This fact goes against the idea that boom episodes end abruptly. We do not find evidence of changes in boom duration in our sample. Episodes show some agglomeration in time. We speculate that this is due to waves of financial liberalization rather than to exogenous capital inflow surges. In comparison to other geographic areas, Latin America does not seem particularly prone to lending booms.

We analyze the behavior of several macroeconomic variables during lending booms. The most salient results are as follows. First, lending booms are associated with an investment and—to a lesser extent—a consumption boom; a decline in the output growth trend of over 1 percent; a large increase in domestic real interest rates; a large increase in the current account deficit and a corresponding surge in capital inflows; a real appreciation of the domestic currency; a worsening of the fiscal situation; a decline in foreign reserves; and a shortening of the maturity of the external debt. Second, lending booms do not significantly increase a country's banking and balance-of-payments vulnerability.

On restricting our sample to Latin American countries, we find that lending booms are often followed or accompanied by a banking or currency crisis, or both. Macroeconomic variables in the region display an overall pattern during booms that is similar to the rest of the world's. However, the behavior of some key variables demonstrates relevant differences across the two samples, with regard to both timing and intensity. These differences allow us to associate booms in Latin America primarily with financial liberalization and development. Consequently, speed limits could have some rationale in Latin America.

Appendix A. Country and Episodes List

TABLE A1. List of Sample Countries and Lending Boom Episodes

Country	*Episode*[a]	*Country*	*Episode*[a]	*Country*	*Episode*[a]
Algeria	1968–69	Gambia	1977–81	Oman	none
Argentina	1979–82	Germany	none	Pakistan	none
	1992–95	Greece	none	Panama	1965–75
Australia	1985–92	Guatemala	1995–95		1992–95
Austria	none	Honduras	none	Papua New Guinea	1979–86
Bangladesh	none	Hungary	1987–87	Paraguay	1990–95
Belgium	1989–95	India	none	Peru	1981–85
Benin	1972–80	Indonesia	1984–93		1990–94
Bolivia	1975–79	Iran	none	Philippines	1992–95
	1986–94	Ireland	none	Portugal	1992–95
Botswana	1990–94	Israel	1977–79	Saudi Arabia	1975–88
Brazil	1986–86	Italy	none	Senegal	1968–81
	1988–90	Jamaica	1981–83	Singapore	None
	1993–94	Japan	none	South Africa	None
Cameroon	1974–81	Jordan	1974–85	Spain	None
Canada	1976–82	Kenya	1995–95	Sri Lanka	1977–79
Central African Republic	none	Korea, Republic of	1967–71	Swaziland	1990–94
Chad	1973–80	Kuwait	1975–86	Sweden	1987–91
	1985–87	Lesotho	1993–95	Switzerland	
Chile	1975–84	Madagascar	none	Syrian Arab Republic	1969–95
Colombia	1993–95	Malawi	1978–80	Thailand	None
Congo	1975–77	Malaysia	1967–76	Togo	1967–80
	1982–87	Mali	1980–86	Trinidad and Tobago	None
Costa Rica	1971–72	Mauritania	1967–73	Tunisia	None
	1992–94		1975–78	Turkey	None
Côte d'Ivoire	none	Mauritius	none	United Arab Emirates	None
Denmark	1998–90	Mexico	1988–94	United Kingdom	1972–74
Dominican Republic	none	Morocco	1972–78		1981–91
Ecuador	1977–85		1991–95	United States	None
	1993–95	Nepal	1970–74	Uruguay	1980–82
Egypt	1974–79		1978–80	Venezuela	1975–78
	1981–86		1994–95	Zambia	1994–95
El Salvador	1992–95	Netherlands	none	Zimbabwe	1987–95
Fiji	none	New Zealand	1973–82		
Finland	none		1985–95		
France	1978–81	Niger	1974–75		
Gabon	1977–78		1978–83		
	1985–87	Nigeria	1976–83		
		Norway	1984–90		

Source: Authors' calculations, based on International Financial Statistics (IFS).

a. Episodes were identified using the relative deviation criterion, with a 19.5 percent boom threshold and a 5 percent limit threshold.

TABLE A2. List of Banking Crises

Country	*Caprio and Klinguebiel episode*	*Lindgreen, Garcia, and Saal episode*	*Country*	*Caprio and Klinguebiel episode*	*Lindgreen, Garcia, and Saal episode*
Argentina	1980–82	1980–82	Madagascar	1988–88	—
	1989–90	1989–90	Malaysia	1985–88	1985–88
	1995–95	1995–95	Mauritania	1984–93	—
Australia	1989–90	—	Mexico	1981–82	1982–82
Bangladesh	1987–96	—			1994–96
Benin	1988–90	1988–88	Morocco	1982–85	—
Bolivia	1986–87	—		1995–95	
Brazil	1994–95	—	Nepal	1988–88	—
Cameroon	1987–96	1989–93	New Zealand	1987–90	—
		1995–96	Niger	—	1983–96
Central African	1980–89	1976–92	Nigeria	1993–93	
Republic	1994–94			1995–95	
Chad	1980–96	1979–83	Norway	1987–89	1987–93
Chile	1976–76	1981–87	Panama	—	1988–89
	1981–83		Paraguay	1985–85	—
Colombia	1982–87	—	Philippines	1981–87	1981–87
Congo	1980–91	1994–96	Senegal	1988–91	1983–88
Costa Rica	1987–87	—	Singapore	1982–82	—
Côte d'Ivoire	1988–91	—	South Africa	1977–77	1985–85
Ecuador	1982–84	—	Spain	1977–85	1977–85
Egypt	1982–85	—	Sri Lanka	1989–93	—
	1990–91		Sweden	1991–91	1990–93
Finland	1991–93	1991–94	Thailand	1983–87	1983–87
France	1994–95	—	Togo	1993–95	—
Germany	1976–79	—	Turkey	1982–85	1982–82
Hungary	1991–95	—			1991–91
India	1994–95	—	United Kingdom	1976–76	—
Indonesia	1994–94	—	United States	1984–91	—
Israel	1977–83	—	Uruguay	1981–84	1981–85
Japan	1990–96	—	Venezuela	1980–80	1994–96
Jordan	—	1989–90		1994–95	
Kenya	1985–89	—	Zambia	1995–95	—
	1992–95				
Kuwait	1986–86	1984–86			

Sources: Gerard Caprio and Daniel Klinguebiel, 1997, "Bank Insolvency: Bad Luck, Bad Policy or Bad Banking?" in *Annual World Bank Conference on Development Economics, 1996,* edited by Michael Bruno and Boris Pleskovic, Washington: World Bank; Carl-Johan Lindgren, Gillian Garcia, and Matthew Saal, 1996, *Bank Soundness and Macroeconomic Stability,* Washington: International Monetary Fund (IMF).

TABLE A3. Currency Crisis List

Country	*Episode*	*Country*	*Episode*	*Country*	*Episode*	*Country*	*Episode*
Algeria	1989	Costa Rica	1981	Jordan	1989	Senegal	1981
	1994		1991	Kenya	1993		1994
Argentina	1967	Côte d'Ivoire	1981	Korea	1964	South Africa	1984
	1975		1994		1980	Spain	1981
	1978	Denmark	1981	Lesotho	1984	Sri Lanka	1978
	1981	Dominican	1985	Madagascar	1981	Swaziland	1984
	1984	Republic	1988		1984	Sweden	1993
	1987		1991		1987	Togo	1981
	1990	Ecuador	1983		1994		1994
Australia	1985		1986	Malawi	1982	Trinidad and	1986
Bangladesh	1975		1989		1995	Tobago	1993
Belgium	1981		1992	Mali	1981	Turkey	1970
Benin	1981	Egypt	1979		1994		1978
	1994		1990	Mauritania	1993		1981
Bolivia	1973	El Salvador	1986	Mexico	1977		1984
	1982		1990		1982		1987
	1985	Finland	1993		1985		1991
Botswana	1985	France	1981		1988		1994
Brazil	1964	Gabon	1981		1995	Uruguay	1966
	1968		1984	Morocco	1981		1972
	1976	Gambia	1984	Nepal	1968		1975
	1979	Greece	1981		1991		1978
	1982		1984	Netherlands	1981		1982
	1985	Guatemala	1986	Niger	1981		1985
	1988		1990		1981		1988
	1991	Honduras	1990	Nigeria	1986		1991
	1994		1994		1989		1994
Cameroon	1981	India	1966		1992	Venezuela	1964
	1994		1991	Pakistan	1972		1984
Central	1981	Indonesia	1979	Papua New	1995		1987
African	1994		1983	Guinea			1990
Republic	1994		1987	Paraguay	1984		1993
Chad	1981	Iran	1993		1987		1996
Chile	1964	Ireland	1981	Peru	1968	Zambia	1983
	1967	Israel	1975		1976		1986
	1970		1978		1979		1989
	1973		1981		1982		1992
	1976		1984		1985		1995
	1982	Italy	1976		1988	Zimbabwe	1983
	1985		1981		1991		1991
Colombia	1966		1993	Philippines	1970		1994
	1984	Jamaica	1978		1983		
	1989		1984	Portugal	1977		
Congo	1981		1990		1982		
	1994		1994				

Source: Jeffrey Frankel and Andrew Rose, 1996, "Currency Crashes in Emerging Markets: Empirical Indicators," Working Paper 5437, Cambridge, Mass.: National Bureau of Economic Research.

Appendix B. Data Sources

TABLE B1. Data Sources

Definition	*Source*	*No. observations*
Private credit to GDP	IMF: International Financial Statistics (line 22d and line 99b)	2,997
GDP in constant dollars	World Bank: World Tables	2,747
Current account/GDP	World Bank: World Tables	1,947
Multilateral real exchange rate	Goldfajn and Valdés (1999)	2,480
Private capital inflows/GDP	Global Developing Finance	1,807
Consumption/GDP	World Bank: World Tables	2,903
Investment/GDP	World Bank: World Tables	2,956
Fiscal deficit/GDP	World Bank: World Tables	1,780
International reserves/Imports	World Bank: World Tables	1,962
Terms of trade	Goldfajn and Valdés (1999)	2,606
Domestic real interest rate	World Bank: World Tables	1,487
International real interest rate	World Bank: World Tables	3,367
Short-term debt/total debt	World Bank: World Tables	1,685
Interest rate spread (deposit rate/lending rate)	World Bank: World Tables	1,377
Inflation	World Bank: World Tables	3,161
Caprio and Klinguebiel banking crisis dummy	Caprio and Klinguebiel (1997)	1,911
Lindgren, Garcia, and Saal banking crisis dummy	Lindgren, Garcia, and Saal (1996)	1,911
Currency crisis dummy	Frankel and Rose (1996)	3,157