Lending Booms: Some Stylized Facts*

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February 2000

Abstract

Recent theories of crisis put lending booms at the root of financial collapses. Yet lending booms may be a natural consequence of economic development and fluctuations.

So are lending booms dangerous? This paper investigates empirically this question using a broad sample of lending boom episodes over the last 40 years. The results indicate that (1) lending booms are associated with output gains (unconditionally), (2) lending booms increase the vulnerability of the banking sector and the balance of payments to crisis.

JEL Codes: E44, E51, F32.
Key Words: Credit Boom; Lending Boom; Banking Crisis; Balance of Payment Crisis; Macroeconomic Performance.

*A previous version of this paper was prepared for the Second Annual Conference of the Central Bank of Chile "Banking, Financial Integration, and Macroeconomic Stability," Santiago, Chile, 1998. We thank Peter Henry, Alejandra Roizen, Klaus Schmidt-Hebbel and Aaron Tornell for useful conversations, as well as seminar participants at Princeton and the IMF. This paper presents the views of the authors and does not represent positions or views of the Central Bank of Chile. Pierre-Olivier Gourinchas thanks the Central Bank of Chile for its hospitality. He is also affiliated with the National Bureau of Economic Research (Cambridge), the Center for Economic Policy Research (London) and the Centre d'Enseignement et de Recherche en Analyse Socio-Économique (Paris). Contact address: 311 Fisher Hall, Princeton University, Princeton, NJ 08540. email: pog@princeton.edu.

The main conclusion is very plain [...] [Thanks to] our banking system that we are able to do the sort of trade we do, or to get through the quantity of it.

But in exact proportion to the power of this system is its delicacy —I should hardly say too much if I said its danger.

[Bagehot (1999), pp. 16–17]

1 Introduction

Lending booms are the cornerstone of numerous theories of the recent wave of financial and banking crises.[1] During a lending boom, the story goes, credit to the private sector rises quickly. Leverage increases and bad projects -i.e. projects with low or negative NPV- obtain financing either because the monitoring process gets more difficult when the volume of lending increases rapidly and the likelihood of fraud (including looting, self-lending or 'evergreening') rises, or because domestic borrowers' net worth increases. As exposure increases, funded projects go from bad to worse and the banking sector becomes increasingly vulnerable.

The expectation of a public bailout, should a generalized bankrupcy arise, is an aggravating factor. Bailout guaranties whether explicit or implicit, induce private borrowers and lenders to develop and carry over riskier projects than may be socially efficient. Entrepreneurs and lenders price new projects under the 'best possible scenario', i.e. taking into account the government intervention in the worst states of nature. The quality of new loans worsen considerably.[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.

Most models connecting lending waves to boom-bust cycles rely on some version of the "credit-channel' or 'financial accelerator'.[3] The mechanics are relatively straightforward: during a boom, asset prices increase, increasing borrowers' net worth, facilitating new lending, fueling higher asset demand, even higher asset prices, and so on.

During the bust, the opposite happens: a proportion of agents are not able to repay their loans, banks call in the collateral at firesale prices, and become more vulnerable

[1] See Corsetti, Pesenti and Roubini (1999), Krugman (1998), Sachs, Tornell and Velasco (1996) and Tornell (1999).

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

[3] Kiyotaki and Moore (1997), Schneider and Tornell (1999a), Schneider and Tornell (1999b) and Aghion, Bacchetta and Banerjee (1999), Aghion, Bacchetta and Banerjee (1998).

as the asset side of their balance sheet shrinks. New loans are curtailed and investment collapses together with asset prices. Through increased vulnerability, a mild correction in asset prices may erupt in a full blown banking crisis.[4] In these renditions, the origin of lending booms is diverse. For example, they may arise after a (possibly poorly-regulated) financial liberalization, following an exogenous surge in capital inflow, or due to a terms of trade shock (or other productivity-type of shock) that boosts domestic investment and consumption.

On the empirical side, there is ample evidence showing that credit (over-) expansion and banking crises are related. For instance, Kunt and Detragiache (1997) show that, after controlling for the existence of deposit insurance, the private credit to GDP ratio and (lagged) private credit real growth are significant determinants of banking crises. Furthermore, among the determinants of banking crisis considered in their model, credit-related elasticities are the second and fourth most important from a numerical point of view (the first and third ones are current-period output growth and terms of trade shock). Honohan (1997) considers credit growth as one of the leading variables for diagnosing and predicting banking crises.[5]

As scholars of the recent financial crises have noted, countries relying on foreign capital inflows may experience a nastier variety of financial debacle, associating a banking and Balance-of-Payments (BoP) collapse. Dias-Alejandro (1985), Velasco (1987) and Calvo (1995) study how a banking crisis, due to its fiscal burden, may generate a BoP crisis. Goldfajn and RodrigoValdés (1997) study the direct link between an intermediation boom and the likelihood of banking and BoP crisis through capital flows. Kaminsky, Lizondo and Reinhart (1997) report that 5 out of 7 studies that consider credit growth as a determinant of currency crises find statistically significant results. Moreover, in their own currency crisis warning-system they consider that the M2 multiplier and the credit to GDP ratio are among the 'particularly useful' leading-indicators.

Thus the combination of poorly regulated financial markets, unable to cope with the rapidly increasing activity of financial intermediaries, and ill-conceived implicit or explicit bailout guarantees are a sure recipe for a lending boom followed by financial disaster. Most of the above papers share the conclusion that unchecked lending booms are ultimately harmful to the domestic economy. Uncontrolled growth in lending is the result of inadequately designed financial institutions that distort investment incentives towards socially over-risky projects.

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

[5]Caprio and Klinguebiel (1997) conclude that there are others factors that explain crises, although too much credit may increase vulnerability.

Some proposals in the debate about the 'new financial architecture' concentrate on eliminating the latter and improving the former through increased supervision, training and the establishment of safer and more transparent banking standards. Few doubt that this would be an appropriate response, or as Rogoff (1999) puts it, 'Like motherhood and apple pie, it is hard to assess these recommendations as anything but positive'. Since these reforms are also unlikely to be achieved any time soon (together with most of the current grand-schemes currently on the table), other proposals directly advocate the use of 'speed limits' on credit growth as a prudential tool. Honohan (1997, p21), among others, states 'speed limits [are] (...) the most promising [regulation] so far as bank soundness is concerned'. Others propose controls on capital inflows, as a way to limit the exposure to short term capital flows reversals and currency mismatches.

The message 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 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 (Bernanke and Gertler (1989), Bernanke, Gertler and Gilchrist (1998)) do not imply that fluctuations are 'inefficient'. Fluctuations are only the symptom, associated with contractual inefficiencies. Indeed, it is precisely because entrepreneurs face an 'external finance premium' due to incentive problems that they have to rely on internal funds or collateral. As the value of collateral increases, more valuable projects obtain financing. Limits on the speed of lending would curtail possibly valuable investment. Following up on this inside, Aghion et al. (1999) and Aghion et al. (1998) develop a model where lending booms are the 'normal state of affairs'. In their model, projects have positive NPV and nontraded goods are an input into production. As lending and investment increase, borrowers' net worth increases. This increases the price of nontraded goods. Eventually, the price of nontradable is so high as to wipe out all the revenues from new investment projects. At this point, lending and investment stop and the price of nontradeable collapses. The economy can exhibit cycles. The economy is most sensitive for intermediate levels of financial liberalization, where the collateral constraint is most relevant. Intermediate levels of domestic financial liberalization induce greater macroeconomic volatility and sensitivity of the economy to exogenous shocks. Ultimately, these may cause financial crises. While full financial liberalization and better monitoring would clearly stabilize the economy, 'speed limits' may reduce welfare.

Schneider and Tornell (1999a) develop a model where lending booms accompany asset appreciation in the nontradable sector. There model has multiple equilibria: a high activity

equilibrium, associated with an appreciated real exchange rate high lending and economic activity, but increased financial fragility, and a low equilibrium with a much depreciated real exchange rate and lower levels of economic activity. If agents are not too risk-averse, the 'better' equilibrium from an ex-ante sense may be the high-activity/high-vulnerability one.

Further, a number of empirical studies (Rajan and Zingales (1998), Levine and Zervos (1998)) demonstrate the existence of a causal link from finance to growth and development. Financial development typically occurs in stages, with periods of intense financial deepening and increase in levels of intermediation. These lending phases may be more in the nature of 'take-offs' than booms and need not revert to lower levels of financial depths. Even if lending booms were an important determinant of banking and BoP crises, it is possible that a good proportion of lending booms die of 'natural death': with a subsequent permanent deepening of the domestic financial markets and increased growth.

So are lending booms really that bad? Can we distinguish ex-ante between the good ones and the bad ones? These are the questions that this paper addresses.

We empirically analyzes a large sample of lending boom episodes and document some stylized facts surrounding these events. We are particularly interested in describing the co-variation of domestic credit with other relevant macro variables.

The set of stylized facts that we investigate includes booms duration and time and geographic agglomeration effects. We also analyze the performance of a set of macroeconomic indicators around lending boom country-year episodes and the relation between the occurrence of banking and BoP crises and external disequilibrium. We further investigate the some determinants of the incidence of banking crises and currency crises after lending boom episodes.

The paper is organized as follows. Section 2 describes our definition of a lending boom episode, the data we use, and presents a first set of stylized facts. Section 3 analyzes the behavior of a set of macroeconomic indicators around episodes. Section 4 evaluates how harmful booms are in terms of banking and BoP crises. Section 5 reviews and evaluates some of the stories that explain booms. Finally, section 6 concludes.

2 Lending Booms

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

2.1 Definition and Data

Contrary to a currency crisis, a current account reversal, or other well-defined one-period events, a lending boom episode is something that has a variable duration. Moreover, because economic growth brings about financial deepening, there is a natural (probably stochastic) trend in lending figures. Thus, in order to study lending booms, one needs to define 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 to nominal GDP from a country-specific stochastic trend.[6] We measure private credit as credit from non-monetary institutions (banks and other intermediaries) to the non-banking private sector. To become an episode, the deviation has to be larger than some threshold. We consider two alternative definitions: (i) relative deviation; (ii) absolute deviation. The first one is based on the relative difference between the actual and predicted ratio, implying that, independently from their financial deepening, different countries may have booms. The second one looks at the absolute discrepancy between the actual and predicted ratio, implying that countries with a more developed financial sector may be more prone to have booms. We maintain the distinction between these two types of booms along the paper because we do not know a priori whether the economic impact of a boom depends on relative or absolute magnitudes.[7] One may think that the first definition compares the size of the "extra" lending to the size of the banking sector, while the second definition compares it to the size of the economy.

Figure 1 shows a typical boom episode. A boom becomes an episode when the actual credit to GDP ratio is above certain "boom threshold" (the upper dashed-line). We define three phases in each episode. First, a build-up phase, that starts with the first year in which the ratio is above a "limit threshold" (the bottom dashed-line) and ends one year before the year in which there is the largest difference between the actual credit ratio and its trend. We refer to the latter as peak year and is the second phase of an episode. Finally, the ending phase starts the year after the peak and ends the year before the ratio is below the limit threshold. While the boom threshold is key in determining the existence of an episode (and therefore, the number of cases), the limit threshold only affects the duration

[6] Another possibility is to focus on relative velocity of real credit growth (e.g., vis-a-vis GDP). We prefer our definition because velocities focus only on time derivatives, and therefore do not consider a reference to the lending level. Velocities could identify a boom after a credit crunch just because lending volumes are getting back to normal.

[7] Notice that a velocity-based lending boom definition (such as Goldman Sachs' credit growth above 1.2 GDP growth) is a relative measure.

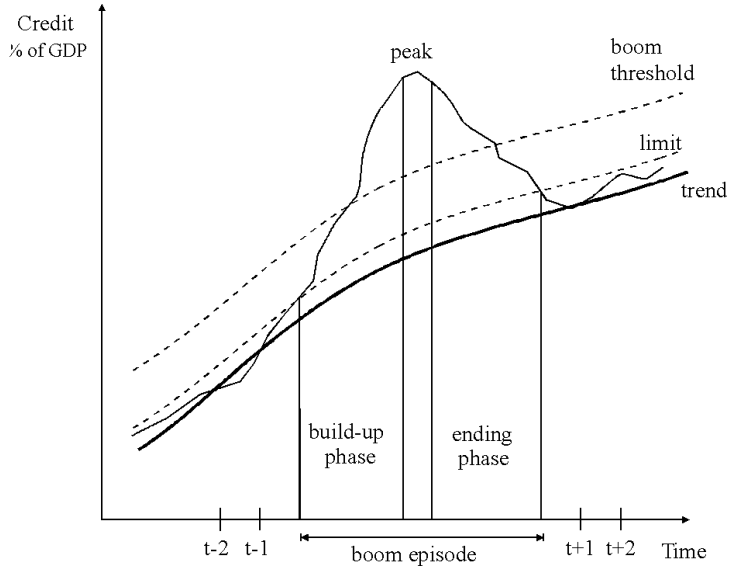

Figure 1: Lending Boom Episode Definition

of episodes. For some exercises we also analyze what happens 1 and 2 years before and after the boom.

Our sample considers 91 countries during the period 1960–1996. These are all the countries with IFS credit data for more than 12 years, with a private credit to GDP ratio of 15% or more in 1 or more years, and more than 500.000 inhabitants. Nominal private credit corresponds to line 22d of IFS, while GDP corresponds to line 99b. Because credit corresponds to a stock variable measured at the end of the year, we consider the geometric average of GDP of 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 the Hodrick-Prescott filter for each country (with parameter set at 1000). Appendix A table A.1 lists the countries in our sample and the episodes that we identify.

In order to show how the procedure of identifying cases works with actual data, figure 2 presents the Chilean case using the relative criterion. The figure shows that there is a lending boom between 1980 and 1986, with a peak in 1982, as well as an earlier boom in 1965-68. Appendix A tables A.2.a and A.2.b present a list of episodes under both the relative and absolute deviation criteria.

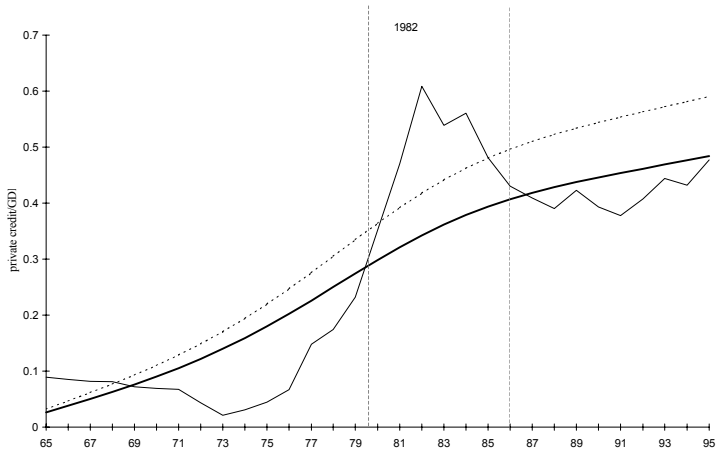

Figure 2: Episodes in Chile (1965-1995). Relative Deviation - 80 Cases

2.2 Characterization of Episodes: A First Look

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 threshold under both measures. With a relative deviation equal to 24% (relative to the credit to GDP ratio) there are 107 cases, while with an absolute deviation of 5% (relative to GDP) there are 94 cases.

In what follows we will focus on three different thresholds that yield exactly 100, 80, and 60 cases for each type of measure. This simplification will allow us to have a more exact comparison between the two definitions and a more straightforward concept of boom: the 'N' cases in our sample in which we observe the largest gap between the credit to GDP ratio and its trend.[8] Somewhat arbitrarily, we choose *limit* thresholds 5% and 2% for the relative and absolute deviations, respectively.

The second dimension we characterize is duration. Besides average duration, we are interested in possible asymmetries between the build-up and ending phases since it is usually believed that credit-driven booms have a rather sudden unwinding (Honohan (1997)).[9]

[8]The thresholds for the relative deviation are 24.92%, 27.71%, and 31.15%, and 4.79%, 5.40%, and 6.45% for the absolute deviation.

[9]In the case of real exchange rate overvaluation episodes, Goldfajn and Valdés (1999) find a sharp asymmetry between similarly-defined phases. In their sample, the build-up phase has a duration that is almost twice the duration of the return-to-equilibrium phase.

Table 1: **Number of Lending Boom Episodes**

Relative Deviation		Absolute Deviation	
Threshold (% Cred/GDP)	Cases	Threshold (% GDP)	Cases
12	203	3	180
18	150	4	129
24	107	5	94
30	63	6	66
36	46	7	52
42	33	8	41

Episodes in total sample.

Table 2 shows the results for our boom episodes.

Average duration of a complete episode is approximately 5 years, independently from the number of cases and from the type of deviation considered. Of course, this duration would change if one considers a different limit threshold. The results show a striking symmetry between the duration of the build-up and ending phases. This symmetry means that there is no evidence of an abrupt ending of lending booms. However, there is still the possibility that in our sample we have two types of very different episodes: one type ends abruptly and the other keeps going for a long time. On average, they may show a duration similar to the build-up phase. To evaluate this possibility Table 2 also presents the standard deviation of phases duration in our sample episodes. The results show again a striking symmetry. Contrary to what one may think, lending booms (at least under our definition) are largely episodes that do not end abruptly.

Another potential explanation for symmetry arises from the construction of the private credit to GDP ratio. Since the denominator of this indicator is nominal GDP, a possible bias could stem from sudden falls in this variable towards the end of the episode. The recessive impact of the end of the boom could hold our measure of private credit from falling as rapidly as it should. To evaluate this possibility Table 3 presents the same exercise as Table 2, but with a private credit to GDP ratio computed with a smooth GDP. For this purpose we smooth the real component of nominal GDP using an HP-filter. In order to maintain comparability we use the same thresholds as before. This generates a slightly

Table 2: **Average Duration of Lending Boom Episodes (years)**

	Relative Deviation					
	60 Cases	S.D.	80 Cases	S.D.	100 Cases	S.D.
Build-up Phase	2.1	(1.8)	2.1	(1.8)	1.9	(1.8)
Ending Phase	1.8	(1.6)	1.8	(1.7)	1.9	(1.7)
Total	4.9	(2.1)	4.9	(2.2)	4.8	(2.3)
	Absolute Deviation					
	60 Cases	S.D.	80 Cases	S.D.	100 Cases	S.D.
Build-up Phase	2.0	(1.7)	1.9	(1.7)	1.9	(1.7)
Ending Phase	2.0	(1.5)	1.8	(1.5)	1.6	(1.4)
Total	5.0	(2.1)	4.7	(2.2)	4.5	(2.1)

Measured in years. Total includes peak year.

different number of cases for each threshold. The results show that the symmetry result holds.

The third characteristic we analyze is the temporal distribution of episodes. If lending booms were due to external or international factors one would observe 'bunching' of episodes. Of course, if the origin of episodes were internal factors, and the latter are correlated across countries (for instance following a wave of financial liberalization), one would also observe some agglomeration.

Figures 3 and 4 show the number of countries under lending boom as a percentage of possible episodes (so we take into account the unbalanced nature of our panel due to data constraints) during each year of our sample period for 60, 80 and 100 episodes.[10] When we measure booms as relative deviations, there is a clear pattern of cycling, with three peaks of episode occurrence: 1962, 1978-82, and 1995. Changes in the number of episodes are important from an economic perspective. While the peak number of episodes in 1978-82 was between 15 and 22% of potential cases (depending upon the boom threshold), the trough of 1971 was between 3 and 8%. When we measure booms as absolute deviations, there is

[10]There is a caveat in the interpretation of these figures. At face value, each number reads as the probability of having a lending boom in that period. However, because our episodes last more than one period, the correct interpretation is the probability of a year/country observation being part of a boom episode. This distinction will also be important in the interpretation of table 4.

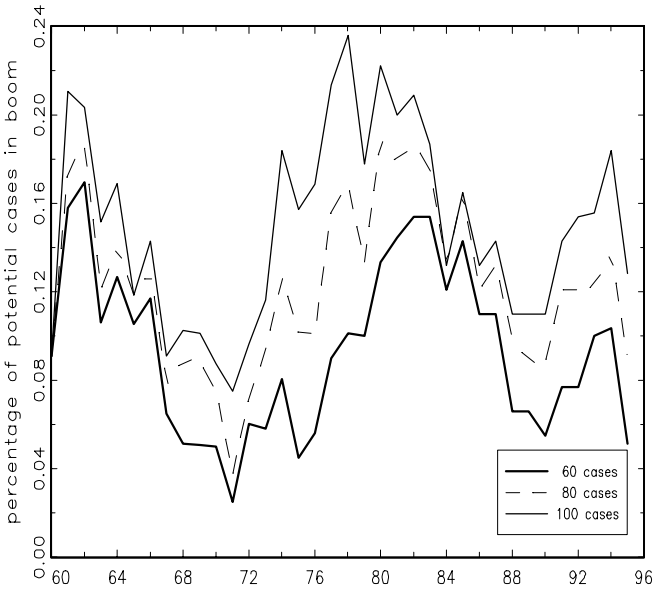

Figure 3: Time Distribution of Boom Episodes. Relative Deviation Criterion

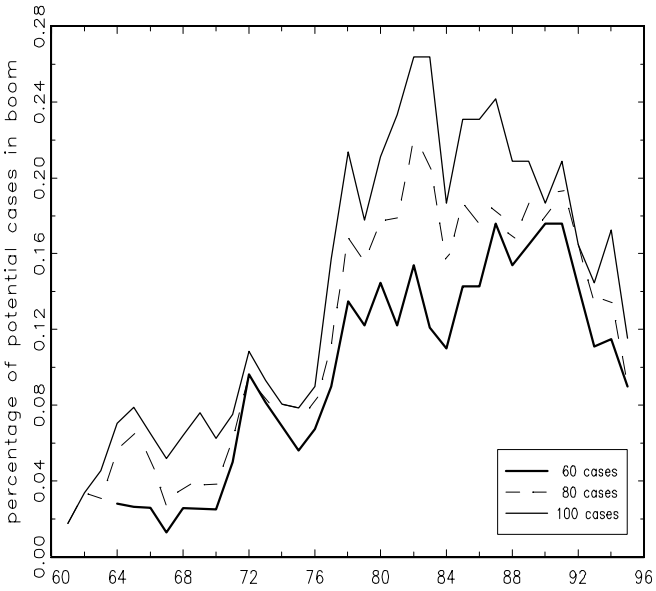

Figure 4: Time Distribution of Boom Episodes. Absolute Deviation Criterion

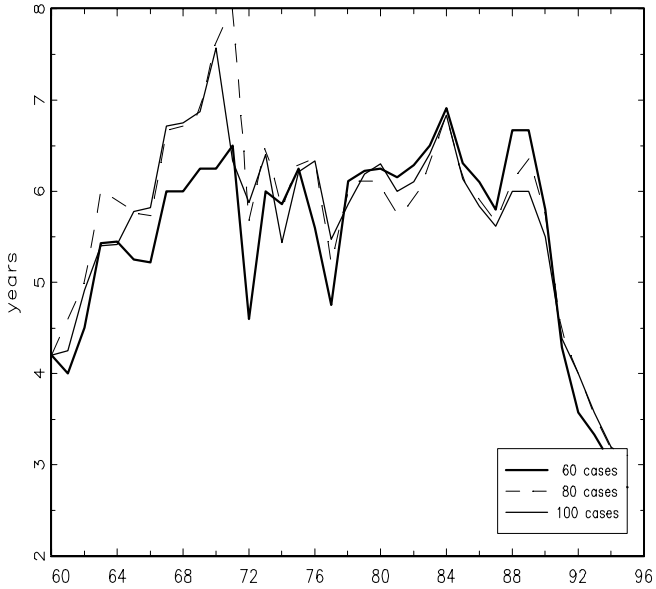

Figure 5: Duration of Boom Episodes. Relative Deviation Criterion

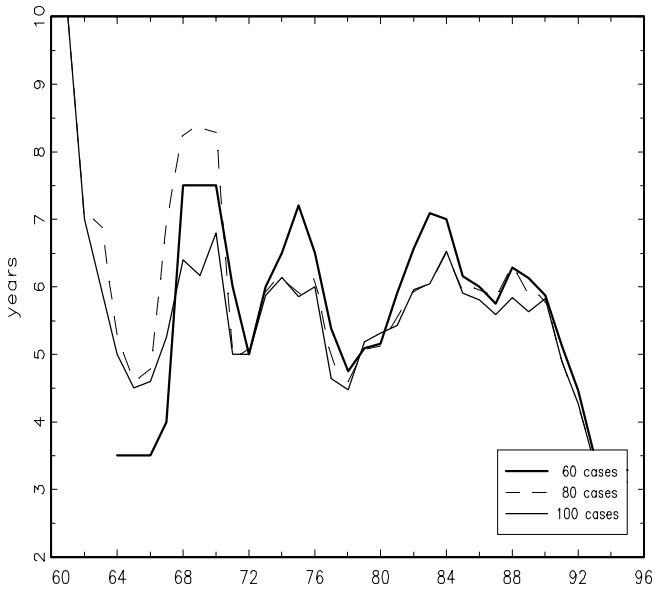

Figure 6: Duration of Boom Episodes. Absolute Deviation Criterion

Table 3: **Average Duration of Lending Boom Episodes with Smooth GDP (years)**

	Relative Deviation					
	50 Cases	S.D.	71 Cases		86 Cases	
Build-up Phase	2.1	(1.8)	2.0	(1.8)	1.9	(1.7)
Ending Phase	2.0	(1.6)	2.0	(1.7)	1.9	(1.7)
Total	5.1	(2.1)	5.0	(2.2)	4.8	(2.2)
	Absolute Deviation					
	58 Cases		79 Cases		97 Cases	
Build-up Phase	2.0	(1.7)	1.8	(1.5)	1.9	(1.7)
Ending Phase	2.0	(1.5)	1.8	(1.5)	1.6	(1.4)
Total	5.0	(2.0)	4.6	(2.1)	4.5	(2.1)

Measured in years. Total includes peak year.

a natural upward trend in the number of episodes due to financial deepening. Despite this trend, there is a peak in the number of episodes in 1982.

The fourth characteristic we look at is changes in the duration pattern over time. Internationalization of financial markets (and globalization in general) could change the length of episodes in either way. For example, larger capital inflows may increase the length of lending boom episodes. Alternatively, a more sophisticated and scrutinizer international financial market may exert more discipline upon booming countries with bad fundamentals, by interrupting financing and shortening the length of the lending boom.

Figures 5 and 6 show the average duration of episodes during each year of our sample period. We calculate the average duration of episodes "active" during each year, independently of the phase in which they are. We consider only complete events. Since there is an obvious sample selection at the beginning and end of our sample —duration is truncated— we only analyze the mid-years. Between 1966 and 1990 we do not find any meaningful change in the duration of episodes. Thus, at least in terms of duration, episodes in the late 60s are very similar to modern ones.

The final characteristic that we examine is the geographic agglomeration of episodes. There is the possibility that some areas (maybe Latin American countries?) are more prone to develop lending booms due to, for example, an incomplete prudential regulation. Table

Table 4: **Geographic Distribution of Lending Boom Episodes**

	Criterion:	Relative Deviation		
	Countries	60 Cases	80 Cases	100 Cases
America	21	6.9	10.6	13.1
Latin America	19	7.7	11.7	14.5
North America	2	0	1.4	1.4
Africa	28	10.3	12.2	15.7
Sub-Saharan Africa	24	11.0	13.2	17.4
Rest of Africa	4	6.5	6.5	6.5
Asia	20	13.5	14.1	14.4
Mid-East Asia	10	10.1	11.1	11.7
Far East Asia	10	16.7	17	17
Oceania	4	0.0	15.2	19.2
Europe	18	2.4	4.0	5.7
	Criterion:	Absolute Deviation		
	Countries	60 Cases	80 Cases	100 Cases
America	21	4.9	6.0	9.8
Latin America	19	4.8	6.11	10.3
North America	2	5.5	5.5	5.5
Africa	28	5.7	8.3	10.1
Sub-Saharan Africa	24	5.6	8.6	9.8
Rest of Africa	4	6.5	7.2	11.5
Asia	20	10.6	12.6	13.5
Mid-East Asia	10	6.6	9.5	10.1
Far East Asia	10	14.3	15.5	16.7
Oceania	4	7.2	7.2	7.2
Europe	18	14.1	16.9	18.1

Probability of observing a year/country episode in the geographical area.

4 presents the results.[11] As expected, the geographic distribution pattern is different under the two criteria. While industrialized regions are more likely to have an absolute boom in comparison to the rest of the regions (because of their deeper financial sector), they are considerably less prone to experience a relative boom. Among developing country areas, Asia (and the Far-East in particular) shows a higher likelihood of having a boom in both types of deviations when one considers 60 cases and 80 cases.[12] For example, in the sample of 60 cases the Asian probabilities are 19.1 (relative) and 15.4 (absolute), while other developing areas have probabilities around 14 and 8 (respectively). Interestingly, Latin America does not appear especially vulnerable to having booms, while Africa (including the Sub-Saharan region) has an important number of both relative and absolute episodes.

Figures 7 and 7 present the decomposition by decade and continent. It is apparent from these figures that the pattern differs quite markedly across continent and time. For instance, using the relative criterion, Latin America was more prone to lending booms in the 70's. Asia seemed more vulnerable in the 60's, Africa and North America in the eighties, while Europe witnessed a steady increase in lending booms, albeit from lower levels , throughout the period. These figures highlight the strong geographical composition of the overall time distribution of lending booms in Figure 3. The peak of the early eighties can be attributed in large part to the lending boom episodes in the African continent.

3 Macroeconomic Indicators Around Lending Booms

In order to investigate the origins of a lending boom and evaluate its macroeconomic impact, this section presents a set of macroeconomic indicators around episodes. Even though lending clearly is an endogenous variable, studying the macroeconomic performance around episodes is useful to confront different theories of lending booms and to evaluate how harmful they are.

We follow the methodology that Rose and Wyplosz (1995) use to study currency crises and that Razin and Milesi-Ferretti (1996) apply to the case of current account reversals. For each macroeconomic indicator we compute the difference between its sample average for each phase (including t-2, t-1, t+1, and t+2) and its average during tranquil periods (years out of episodes and t's). We also calculate the standard deviation of the each episode average. This statistic allows us to evaluate how significant the deviations are.

The set of macroeconomic variables includes 14 indicators and can be grouped into four

[11] See footnote 10.

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

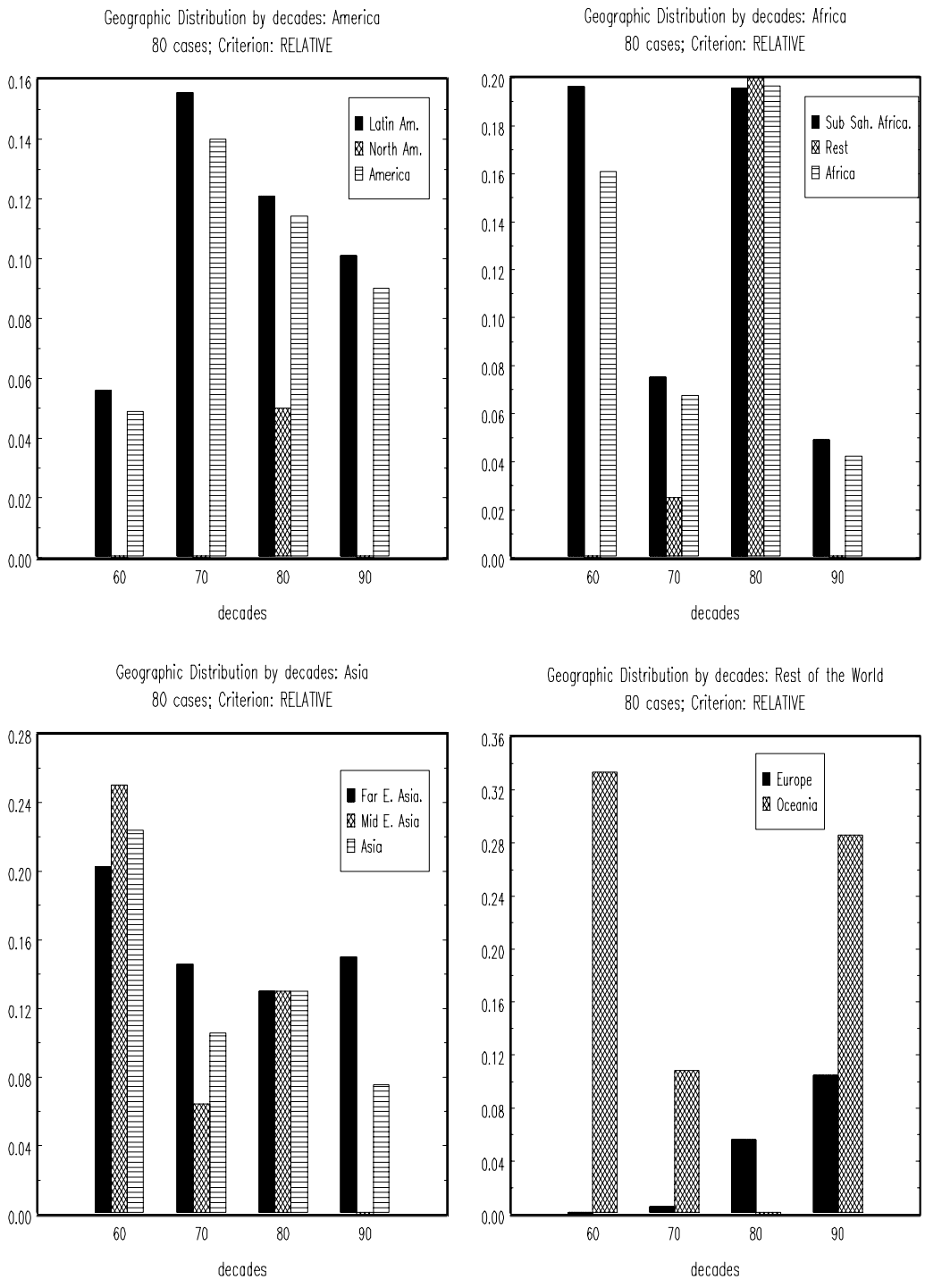

Figure 7: Geographic Distribution by Decades and Continent. Relative Criterion.

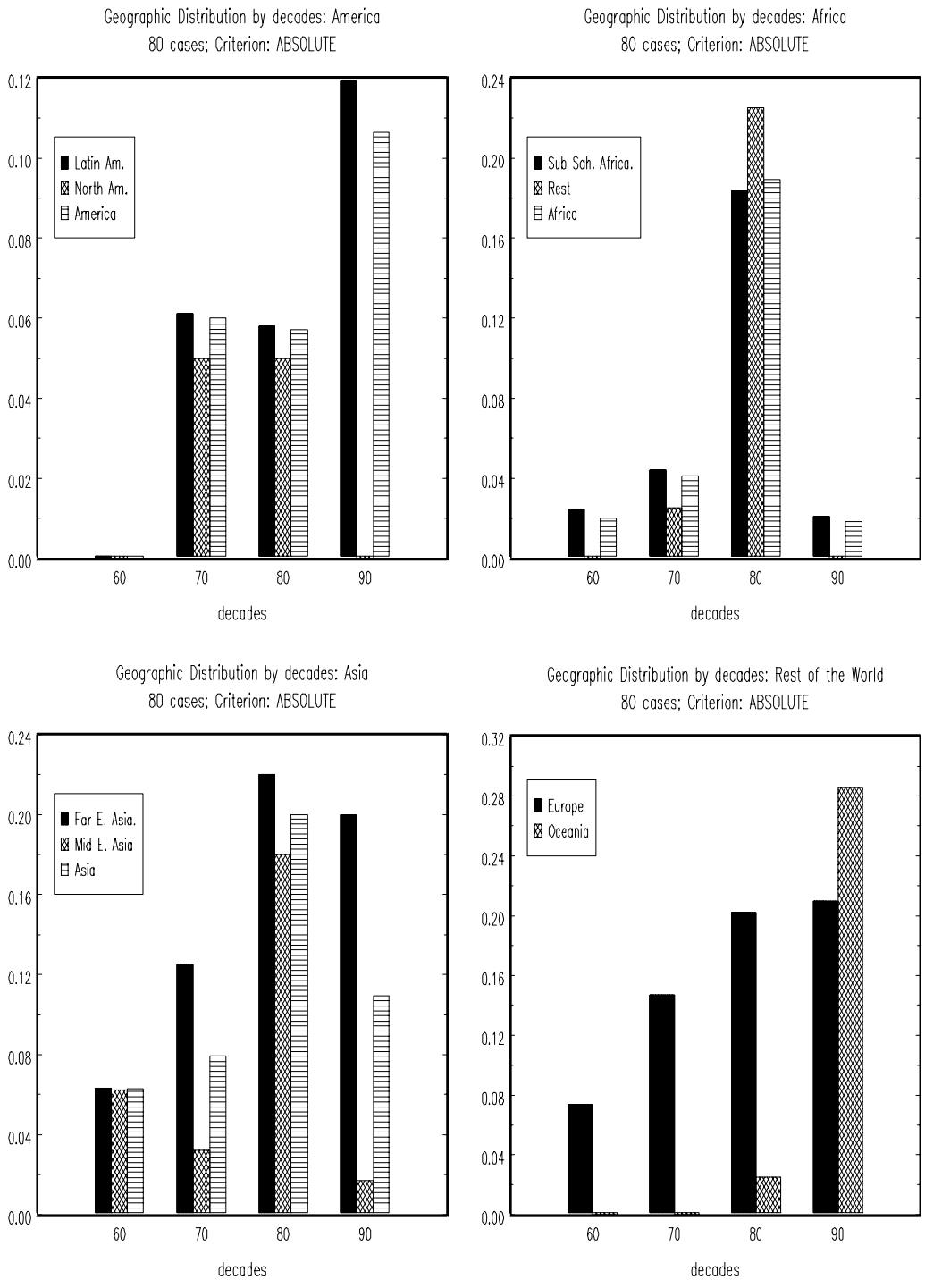

Figure 7: (cont'd) Geographic Distribution by Decades and Continent. Absolute Criterion.

categories: (1) domestic macroeconomic variables (gap between actual and potential GDP, investment to GDP ratio, private consumption to GDP ratio, real interest rate, spread between lending and deposit interest rates, and inflation); (2) domestic policy variables (government surplus as percentage of GDP and months of imports covered by international reserves); (3) international endogenous variables (current account to GDP ratio, real exchange rate overvaluation, private capital inflows as percentage of GDP, and proportion of short term in total debt); and (4) external exogenous variables (terms of trade measured as deviation from long-run trend and international real interest rate). Appendix B presents details regarding source and data availability of each variable.

Because of potentially important cross-sectional variation in each of the indicators we measure each variable as deviation from a country-specific mean. This enhances the significance of the results. We use deviations from trend (calculated with HP filter) to estimate the gap between actual and potential GDP, the deviation of the Real Exchange Rate from "equilibrium", and the deviation of Terms of Trade from its long run value.

Figures 8-9 present the results for the samples with 80 episodes using the relative and absolute deviation criteria, respectively. They show average deviations of each variable from the tranquil period average plus/minus 2 standard deviations. To check that we are indeed computing lending booms the figures also present the evolution of private lending.[13] There are several salient features in the results that are worth commenting. We organize our discussion according to our four categories.

1. Domestic macroeconomic variables;

    - Between t-2 and the build-up phase, output is significantly more above its potential than during tranquil periods by 1.51% (figure 8.3); Since the output gap is essentially zero during tranquil periods, this implies that output is significantly above potential; during the peak year output it is roughly equal potential, while in t+1 (and the ending phase in the case of relative deviation) it is significantly below (-2.23%). The cumulated deviation is positive and significant (0.63% with a standard error of 0.22);
    - Potential output growth falls below tranquil times during the lending bust (figure 8.4). The effect is small (0.04%) but significant and long lasting.

[13]There is a caveat in interpreting the figures for private lending. The figure reports a difference in difference estimate of credit to GDP ratio to its trend relative to the tranquil periods. On average credit to GDP is below average during tranquil periods (by an average of 1.2%). For instance, the 6% average deviation relative to tranquil times in $T-1$ of Figure 8 is consistent with the limit threshold of 5% for our lending boom definition.

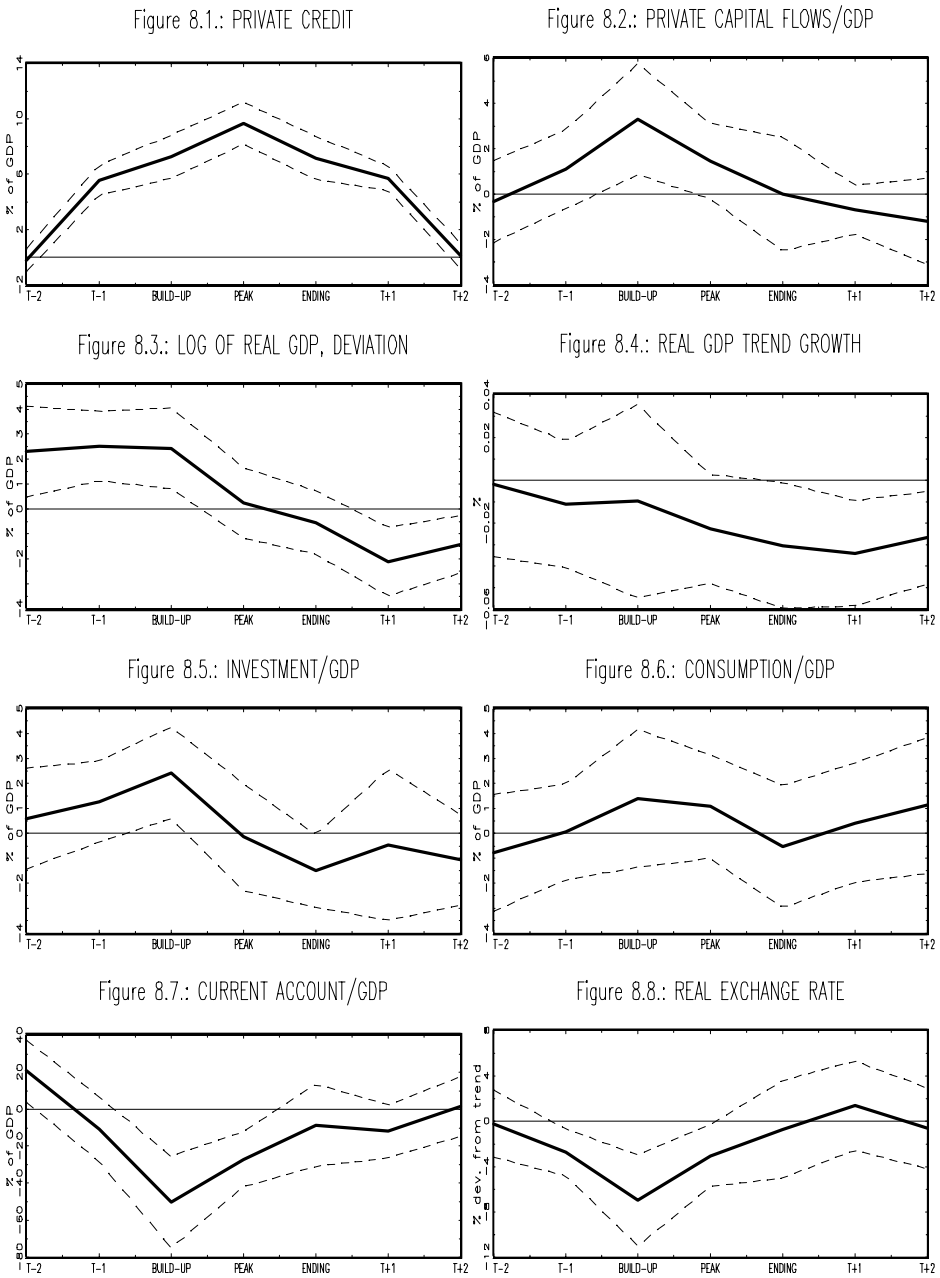

Figure 8: Macroeconomic Indicators Around Episodes. Relative Deviation- 80 Cases

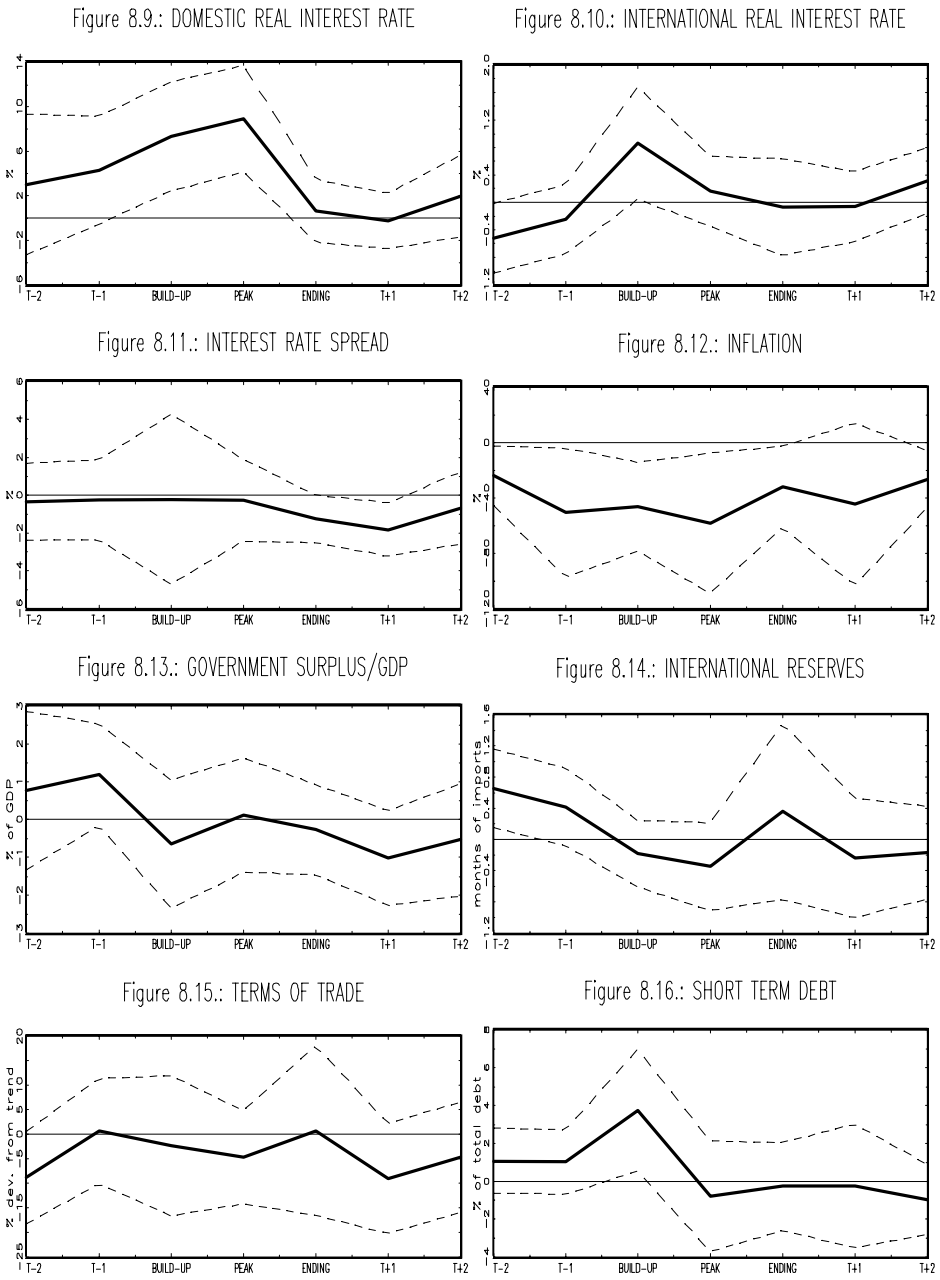

Figure 8: (cont'd) Macroeconomic Indicators Around Episodes. Relative Deviation - 80 cases.

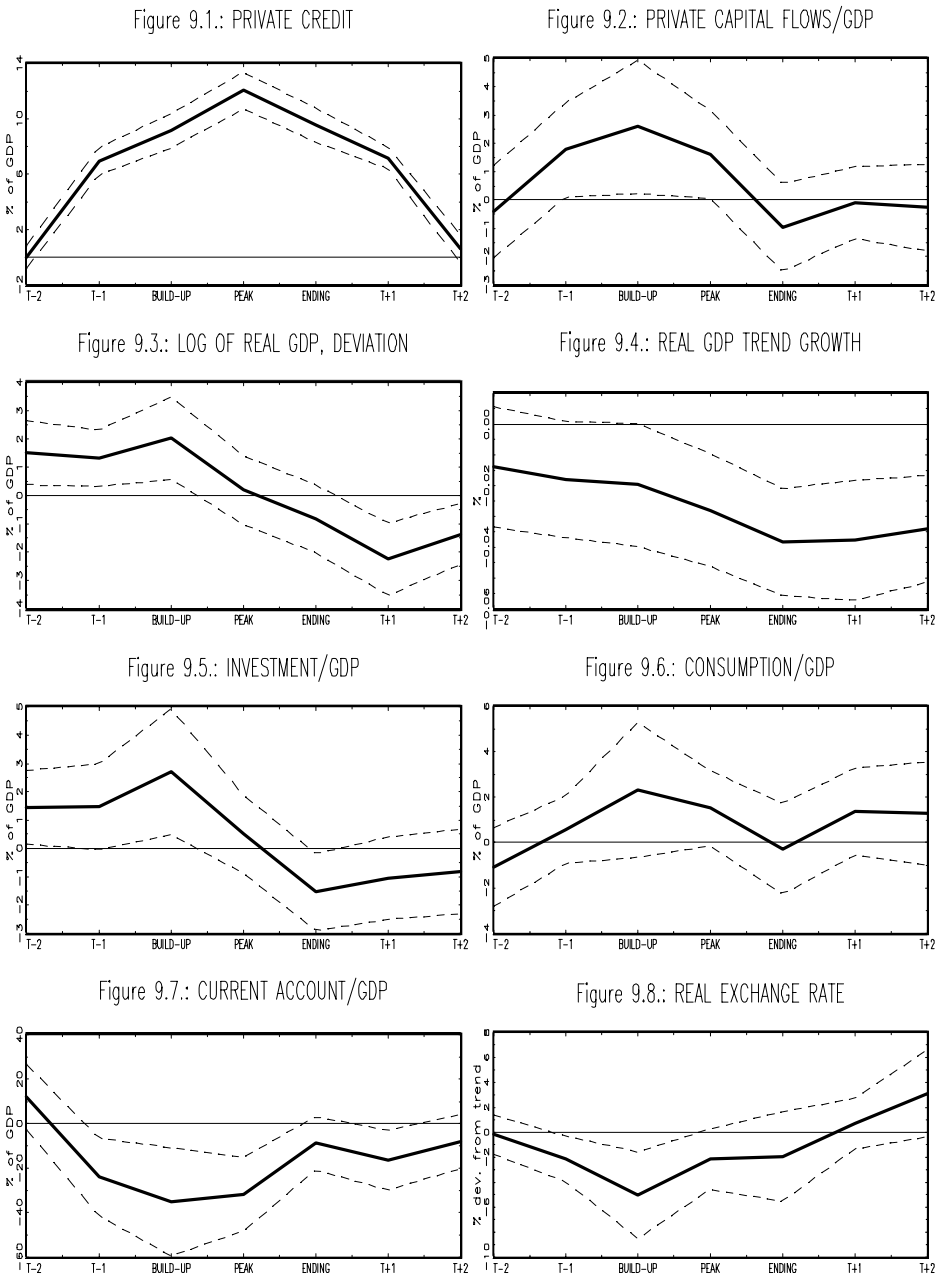

Figure 9: Macroeconomic IndicatorsAround Episodes. Absolute Deviation - 80 cases.

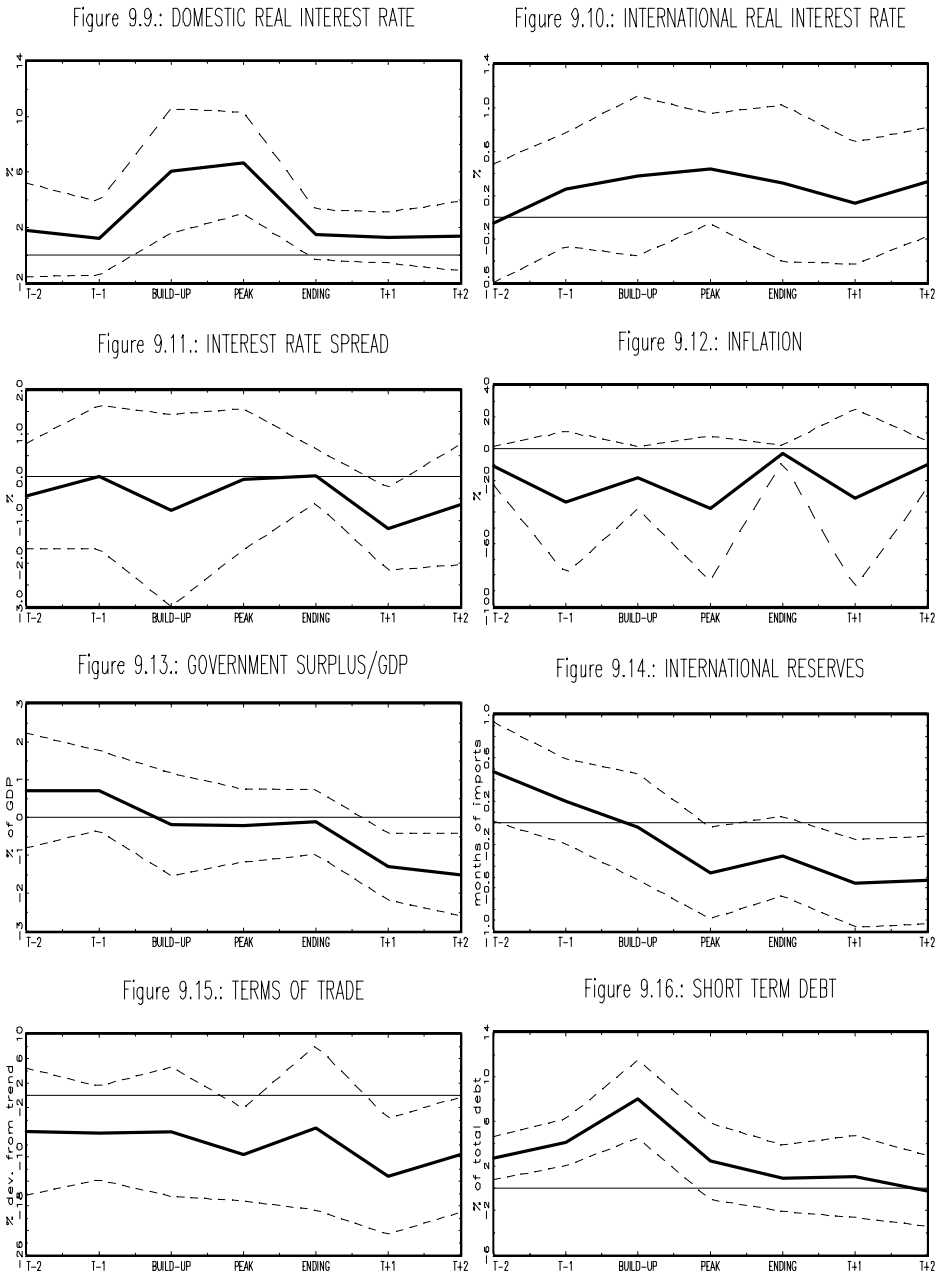

Figure 9: (cont'd) Macroeconomic Indicators Around Episodes. Absolute Deviation - 80 cases.

- Investment to GDP rises significantly from 0.6% above tranquil periods in $t-2$ to 2.4% of GDP during the build-up period and declines subsequently (figure 8.5).
- Consumption to GDP does not show a statistically significant pattern (figure 8.6). The point estimates indicate a mild increase of 1.4% of GDP.
- The domestic real interest rates rises by roughly 665 basis points during the lending build-up. This increase is very significant (figure 8.9).
- The domestic spread (figure 8.11) between lending and deposit rates decreases significantly by 120 basis points significantly in $t+1$.

2. Domestic policy variables

   - International reserves are 0.6 months of import above average in $t-2$ (figure 8.14).

3. International endogenous variables

   - There is a large and significant current account deficit during the build-up phase and peak year, that reaches up to 5% of GDP (figure 8.7).
   - The real exchange rate appreciates by roughly 7% during that same period.
   - Private capital inflows increase significantly by 3.3% of GDP during the build-up phase and peak year. This surge is subsequently reversed during the ending phase (figure 8.2)
   - The proportion of short term debt increases during the early phases by 3.75%.

4. International exogenous variables

   - The terms of trade appreciate continuously, although not significantly.
   - The international real interest rate increases by 86 basis points during the build up.

It is also interesting to note that private lending appears highly symmetrical, increasing by almost 10% of GDP above trend during a typical lending boom. This is in line with the results about duration discussed in last section.

While the results are mostly consistent across the two criterion that we adopted, some stylized facts appear under one sample only:

- The RER becomes marginally undervalued after t+1 in the absolute deviation sample.
- The investment to GDP ratio significantly drops after the peak year in the absolute deviation sample.
- The current account is significantly above trend before the episode starts in the relative deviation sample.
- There is a significant drop in reserves by about 0.5 months of imports, between the peak year and t+1 in the sample with absolute deviation cases.
- Inflation is below trend throughout the episodes in the relative deviation case.

Finally, it is important to mention that these facts appear quite robust when we consider the boom thresholds that yield 60 and 100 cases.[14]

4 Are Lending Booms Dangerous?

Credit growth is considered one of the key determinants of banking crises. However, this does not mean that credit booms are always harmful for the economy. Indeed, a credit boom that finances productive investment may even be beneficial in the long run. The results from the previous section support this interpretation, since unconditional lending booms are associated with a positive cumulated output gap. This leaves open the possibility that lending booms increase the *volatility* of the economy, or increase its vulnerability to economy-wide crises. This is the argument emphasized by Schneider and Tornell (1999b). We address this question in this section by investigating whether the incidence of banking crises and currency crises changes with lending booms.

4.1 Incidence of Banking Crises during Booms

In order to investigate whether boom episodes are related to financial crises, and particularly whether they signal banking troubles, we compare the probability of having a banking crisis

[14]The results are available from the authors upon requests. There is a marginal change in significance in some indicators. Some indicators that become significant in particular samples are: (i) international interest rate is significantly low during t-1 in 100R; (ii) government surplus is significantly high in t-1 in 100R; (iii) short term debt is significantly high in t-1 and t-2 in 100R; (iv) the current account remains in deficit relative to trend during the ending phase and t+1 in 100A; (v) consumption is significantly below trend in t-2 in 100A; (vi) private capital flows fall below trend in the ending phase in 60A;

before and after a boom episode with the probability of having such a crisis during tranquil periods.[15] The 'before' part of an episode includes from t-2 to the build-up phase. The 'after' part of an episode includes from the peak year to t+2.[16]

The basic information that we use to define the existence of a banking crisis are the episodes collected by Caprio and Klinguebiel (1997) and by Lindgren, Garcia and Saal (1996). We consider two alternative indicators (dummy variables for a country/year observation) of banking crisis based on the cases identified in each study.

Caprio and Klinguebiel (1997) construct a large database on banking crisis episodes. From their work we were able to identify 60 episodes in 51 of our 91 countries (43 countries have one case, 7 countries have two cases, and one country has three cases). Lindgren et al. (1996) identify banking problems in two broad categories named "crisis" and "significant" problems. For our exercise we only use those episodes classified as "significant" problems. Using their data base we were able to identify 28 episodes in 24 of our 91 countries (21 countries have 1 case, two countries have two cases and one country has three). Both data bases were constructed on the basis of interviews with IMF desk economists and banking crises accounted for in the international literature. The two major limitations of the these data sets are their imperfect comparability cross countries —what is defined as a crisis in one may not be enough for a crisis in another— and their vague criteria to define the duration of a crisis. For example, the average duration for a crisis in the Caprio-Klingebiel data set is 3.8 years, while in the Lindgren et al. data set it is 4.6 years.

Table 5 presents the results for both banking crisis indicators. They show that the likelihood of having a banking crisis after a lending boom is significantly higher than during tranquil periods. The result holds for both the relative and absolute deviation criteria and for the three samples. On average, using the Lindgreen et al crisis index, the probability of having a banking crisis after a relative deviation boom is 125% higher than during tranquil times. After an absolute deviation boom the average probability is 224% higher than tranquil times.[17] The incidence of banking crisis is not statistically different between tranquil periods and before a lending episode. On average, point estimates show a slightly

[15] We compute per-period (year) probabilities so episodes of different duration are comparable to tranquil period probabilities.

[16] The results do not differ much among the phases that comprise the before and after parts. For simplicity we prefer to consider only these two categories and not all the different 7 phases.

[17] The equivalent numbers using the Caprio and Klinguebiel index are 79% and 117% respectively for the 80 cases sample. It is interesting to compare these results to the outcome studies of completely different fields. For example, taking the Chilean population as reference, smokers have a probability of developing a severe coronary disease that is 60% (relatively) higher than non smokers'. Likewise, obese people have a probability 100% higher than people with normal weight.

Table 5: **Probability of Banking Crisis**

	Relative Deviation					
	Dummy-Caprio and Klingebiel			Dummy-Lindgren et al.		
	60 Cases	80 Cases	100 Cases	60 Cases	80 Cases	100 Cases
Before boom	12.7	11.5	11.7	8.4	6.5	5.6
	(7.6)	(6.6)	(6.1)	(7.8)	(6.8)	(6.3)
After boom	20.8	20.1	18.5	15.0	13.1	12.9
	(6.5)	(5.4)	(4.8)	(6.7)	(5.6)	(5.0)
Tranquil time	11.4	11.2	11.1	5.7	5.8	5.6
	(1.27)	(1.4)	(1.6)	(1.2)	(1.4)	(1.55)
	Absolute Deviation					
	Dummy-Caprio and Klingebiel			Dummy-Lindgren et al.		
	60 Cases	80 Cases	100 Cases	60 Cases	80 Cases	100 Cases
Before boom	13.9	11.6	11.4	6.4	5.2	4.2
	(6.5)	(5.8)	(5.1)	(6.7)	(5.9)	(5.3)
After boom	26.7	22.4	19.6	19.9	16.2	13.8
	(5.3)	(4.8)	(4.5)	(5.5)	(5.0)	(4.6)
Tranquil time	9.7	10.3	10.5	4.6	5.0	5.5
	(1.4)	(1.6)	(1.8)	(1.4)	(1.5)	(1.8)

Actual country/year cases to potential country/year ratio. Standard deviation in parenthesis. Before boom includes from t+2 to build-up. After boom includes from peak year to t+2.

higher probability before a lending episode between 10 and 20%.

Appendix C. shows the results for the case in which we consider other two alternative measures: (i) Dummy-OR, that is a broad measure of crisis that takes de value 1 if the country/year episode is in either study; and (ii) Dummy-AND, that is a more conservative measure that takes the value 1 if a country/year crisis appears in both studies. The results using these definitions do not change in any important way.[18] If one considers the 60 and 100 cases samples the general results do not change. However, with a smaller number of cases the after boom probability of crisis increases (and more so in the sample of relative deviation).

4.2 Conditional Incidence of Banking Crisis

The results so far show that lending booms can be quite harmful in terms of increasing the probability of banking crisis.[19] In this subsection we investigate whether the presence of a lending boom as a signal of banking troubles changes if one considers some other characteristic of the boom episode. The exercise should not be understood as an analysis of determinants of banking crises (e.g., as Kunt and Detragiache (1997)). Rather, we seek to identify whether the nature of the boom episode and or the behavior of a third variable implies that it is more or less troublesome.[20]

We split each episode sample (of 80 cases, both under the relative and absolute deviation criteria) into two subsamples along some variables using the in-sample median of the variable that we want to study. We then calculate incidence of banking crises after boom episodes for each subsample. In this exercise each observation is an episode (independently of its duration) that may or may not present a crisis —a 0 or 1 variable. Consequently, these probabilities are not comparable to the probability observed in tranquil periods (which is a country/year probability).[21] In particular, we are not able to perform a full 'difference-in-difference' estimation, controlling for the changes in probabilities in tranquil period. We simply report the results from the difference between the conditional probabilities of crisis

[18]The significance is nonetheless much reduced under the DUMMY-AND measure. This may be due to the small sample of banking crisis in sample.

[19]Recall nevertheless that, despite this result, section 3 shows that average output performance is not too bad after a lending boom.

[20]Under some characteristics there is a direct link between the variable under analysis and the likelihood of crisis. In that case the exercise simply reads as the change in the conditional probability given the behavior of that characteristic. This distinction is specially relevant in the case of currency crises.

[21]In the case of duration we calculate country/year probabilities to avoid the obvious result that follows from the fact that longer booms include more country/year observations).

for the two subsamples we consider. We consider the following characteristics: (i) the investment to GDP ratio during the build-up phase and peak year; (ii) the consumption to GDP ratio during the build-up phase and peak year; (iii) the RER misalignment during the build-up phase and peak year; (iv) private capital inflows during the build-up phase and peak year; (v) the proportion of short term debt during the build-up phase and peak year; (vi) the duration of the ending phase; (vii) the accumulation of international reserves during the build-up phase and peak year; (viii) and the size of the lending boom.

First, a lending boom that finances an investment boom probably is not as troublesome as one that finances a consumption boom. The *excess expenditure composition* potentially matters for the implications of a credit boom.[22] Second, an overvalued exchange rate could generate additional incentives to run against domestic bank assets. Third, if surges of (exogenous) capital inflows are the root of lending boom occurrences, then a boom financed by inflows should be worse news for the banks' future. Fourth, short term inflows are commonly thought of as more dangerous than long term inflows, while international reserves accumulation can serve as a safety net. Fifth, a more abrupt unwinding of the lending boom may put more pressure on the corporate sector, generate some distress in the banking sector. Finally, one expects that the size of the lending boom matters, relative to the size of the economy, and that a larger lending is more dangerous than a smaller.

Table 6 presents the results of this exercise using both Caprio and Klinguebiel (1997) and Lindgren et al. (1996) dummies for the samples of 80 episodes under both the relative and absolute criterion. The table also presents the p-value of a non-parametric test in which the null hypothesis is that the probabilities of crisis in the top and bottom 50% subsamples (of each split) are equal.[23] The number of actual episodes considered in each subsample varies between 20 and 40. There is little homegeneity in the results. Lending boom definitions as well as banking crisis definitions seem to matter a lot. A robust result relate the size of the lending boom (according to the relative criterion) and the occurrence of banking crisis. The probability increases from 11.5% to 48.6% when using the Caprio Klinguebiel index, and from 3.8% to 28.6% when using the Lindgreen et al measure. We also find that a lending boom (relative criterion) associated with a larger investment to GDP ratio is *less* likely to trigger a subsequent banking crisis as measured by Caprio and Klinguebiel, providing some support for view that the excess expenditure composition matters. Using the absolute criterion, two variables stand out. First, the size of the international reserves matters. Countries with higher reserve levels seem more likely to experience a banking

[22]Razin and Milesi-Ferretti (1996) consider excess expenditure composition as a key determinant of current account sustainability.

[23]The test is a χ^2 test of homogeneity.

crisis. This result may be related to the conflict of objectives between the defense of the exchange rate and the function of lender of last resort. Second, the duration of the ending phase of the lending booms increases the likelihood of subsequent banking problems.

Overall, while we can say very little about statistically significant conditional incidence, the difference between the estimates is in line with our predictions: higher consumption, capital inflows, short term debt increase the likelihood of systemic banking problems. It is interesting to note also that the real exchange rate deviations do not appear significantly (the point estimates of the differences are change signs from one definition to another).

More specifically, while the signs usually are the expected ones, specially under the Caprio and Klingebiel dummies, the results show very few splits with statistically significant differences (in part because the sample size is not large). With a 90% of confidence, the only significant differences occur in the following splits (with the subsample in parenthesis): investment to GDP ratio (Relative, CK); boom size (Relative, CK and LGS); ending duration (Relative and Absolute, LGS), but with an unexpected sign; and accumulation of international reserves (Absolute, CK), also with an unexpected sign. There are three variables that even though do not show a statistically significant difference on an individual basis, have a relative consistent pattern across dummies and criteria. They are the proportion of short term debt, the ratio capital inflows to GDP, and duration of the ending phase, with only the first two showing the expected sign.

4.3 Probability of Currency Crisis during Booms

In this subsection we evaluate whether lending booms are related to the existence of BoP or currency crises. We follow the same methodology that we used in subsection 4.1, namely we compute the probability of having a currency crisis before and after a boom and compare it to the probability during tranquil periods.

In order to determine the existence of a currency crisis in each country/year observation we construct a set of dummy variables using the definition of currency crash of Frankel and Rose (1996) and Meese and Rose (1996). They consider that a currency crisis occurs when there is a nominal devaluation (in a year to year basis) over 25% with at least a 10% increase from the devaluation rate of the previous year using the US dollar bilateral exchange rate. They also require crises to be 2 years apart.[24]

Table 7 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 the three samples. The results show that, indeed, the likelihood of a currency crisis is significantly

[24]Our results do not change in any meaningful way if we consider a threshold of 15%.

Table 6: **Conditional Probability of Banking Crisis After Booms**

	Caprio and Klinguebiel (1997) Dummy					
	Relative Deviation Criterion			Absolute Deviation Criterion		
	Top 50%	Bot. 50%	P-value	Top 50%	Bot. 50%	P-value
Investment	22.2	48.0	0.03	31.6	42.4	0.34
Consumption	36.8	26.1	0.39	40.5	32.4	0.48
RER misalignment	36.4	28.6	0.52	41.7	31.4	0.37
Capital inflows	35.0	28.6	0.61	40.0	32.3	0.45
Short debt	32.5	33.3	0.95	41.0	31.3	0.40
Ending duration	17.2	22.2	0.88	21.8	18.5	0.53
Int'l. reserves	37.5	23.8	0.28	40.0	16.1	0.03
Boom size	48.6	11.5	0.00	44.7	27.3	0.13
	Lindgren et al. (1996) Dummy					
	Relative Deviation Criterion			Absolute Deviation Criterion		
	Top 50%	Bot. 50%	P-value	Top 50%	Bot. 50%	P-value
Investment	16.7	20.0	0.74	26.3	12.1	0.13
Consumption	18.4	17.4	0.92	18.9	20.6	0.86
RER misalignment	15.2	21.4	0.53	19.4	20.0	0.97
Capital inflows	20.0	14.3	0.58	25.0	12.9	0.20
Short debt	22.5	9.5	0.20	25.6	12.5	0.17
Ending duration	14.6	5.6	0.05	19.2	3.7	0.00
Int'l. reserves	20.0	14.3	0.58	22.5	32.3	0.36
Boom size	28.6	3.8	0.01	23.7	15.2	0.37

Actual cases to potential cases ratio. After booms includes from the peak year to t+2. Duration probabilities are calculated on a country/year basis. Sample of 80 episodes. P-value of a χ^2 test of homogeneity.

Table 7: **Probability of Currency Crisis**

Frankel-Meese-Rose Dummy

	Relative Criterion			Absolute Criterion		
	60 Cases	80 Cases	100 Cases	60 Cases	80 Cases	100 Cases
Before boom	5.5	5.0	5.0	2.6	3.1	3.8
	(6.6)	(5.8)	(5.0)	(6.3)	(5.5)	(4.8)
After boom	10.3	10.1	9.4	9.9	9.0	8.7
	(5.6)	(4.7)	(4.2)	(5.5)	(4.8)	(4.4)
Tranquil time	5.4	5.3	5.3	5.7	5.7	5.6
	(0.9)	(1.0)	(1.1)	(0.9)	(1.0)	(1.2)

Actual country/year cases to potential country/year ratio. Standard deviation in parenthesis. Before boom includes from t+2 to build-up. After boom includes from peak year to t+2.

higher after a boom than during tranquil periods. Before an absolute deviation boom, currency crises are less likely to happen (although after a relative deviation boom the difference is not significant). The average incidence after a boom (across samples) is between 86% (relative deviation) and 62% (absolute deviation) higher than during tranquil periods. Before a boom the average incidence is not precisely estimated and is not different than the tranquil periods probability at conventional levels of significance.

4.4 Conditional Probability of Currency Crisis

We repeat the exercise of conditional incidence for the case of currency crises using the same 8 characteristics and the two samples with 80 episodes that we considered in the case of banking crises. Table 8 presents the results. They show that there are important differences between the likelihood of BoP problems between splits. The results have consistent signs across the two samples and are quite significant for the relative deviation sample.

Some results show up as expected. A particularly obvious outcome is that a larger misaligment signals future currency troubles. Others results are more informative and a couple are quite puzzling. Boom episodes that happen together with higher consumption and investment (i.e., with higher expenditure, independently from composition), that channel larger capital inflows, and have a higher proportion of short debt tend to have more

Table 8: **Conditional Probability of Currency Crisis after Booms**

Frankel-Meese-Rose Dummy

	Relative Deviation Criterion			Absolute Deviation Criterion		
	Top 50%	Bot. 50%	P-value	Top 50%	Bot. 50%	P-value
Investment	50.0	22.5	0.01	50.0	22.5	0.01
Consumption	47.5	25.0	0.04	50.0	22.5	0.01
RER misalignment	45.0	27.5	0.10	40.0	32.5	0.49
Capital inflows	47.5	25.0	0.04	42.5	30.0	0.24
Short debt	50.0	22.5	0.01	42.5	30.0	0.24
Ending duration	11.0	6.8	0.23	11.3	4.7	0.05
Int'l. reserves	47.5	25.0	0.04	40.0	16.1	0.03
Boom size	42.5	30.0	0.24	42.5	30.0	0.24

Actual cases to potential cases ratio. After booms includes from the peak year to t+2. Duration probabilities are calculated on a country/year basis. Sample of 80 episodes. P-value of a χ^2 test of homogeneity.

currency crises. Surprisingly, the boom size does not seem to be that relevant in determining how dangerous the boom is in terms of BoP crises. Likewise, both international reserves accumulation and duration of the ending phase appear to be detrimental.[25]

5 Stories about the Origin of Booms

What triggers the existence of a lending boom? There are several stories that potentially explain such an event. In this section we quickly review some of them and check whether the facts that we have identified conform to what they predict. In a nutshell, some of the stories and their related stylized facts can be described as follows:

RBC & 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.[26] The ultimate origin of a boom under this story is a technological or terms of trade shock.

One key feature of this story appear in the data: GDP growth in t-1, that is one year before the lending boom, is higher than normal. However, this story is not well suited to explain why the incidence of banking and BoP crises increases after a lending boom. Overall it seems an appropriate story for a large fraction of cases, but is far from being the only one. Moreover, although there is some evidence of procyclical elasticities, this procyclicality does not appear to be very large.[27]

Financial Development An alternative theory (Aghion et al. (1999)), argues that lending booms and subsequent macroeconomic instability may be the consequence of *partial* financial liberalization, in economies that exhibit mild financial constraints. 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 increases further the demand for credit. In their model, increases in wealth and output, lead to a surge in the demand for nontraded inputs into production (such as real estate or services). The result is a real appreciation of the real exchange rate and a surge in the price

[25]One possible explanation for the international reserves result is that we measure them as months of imports and imports could be more important than reserves as a signal of BoP crisis.

[26]Notice that it is not enough to have a highly procyclical demand —a constant buy very high elasticity— because we use the ratio credit to GDP to identify booms.

[27]For example, we estimate a panel fixed-effects regression in our sample trying to explain deviations from trend of the credit to GDP ratio with lagged deviations from trend of real GDP. We find a coefficient of only 0.07 (with a t-test of 7.46).

of domestic assets. This eventually chokes off the initial expansion and lead 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 et al show that the resulting volatility occurs for intermediate levels of financial development, as measured by the severity of the financing constraint. In their story, incomplete financial liberalization may 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 and current account deficit, real exchange rate appreciation and output expansion coincide with the increase in investment and lending.

Capital inflows A lending boom is the domestic counterpart of a large capital inflow surge triggered by exogenous reasons (the so called external factors of Calvo, Leiderman and Reinhart (1993)). International real interest rates are rather low during the lending upswing. There is bunching of episodes because of common external fundamentals. The banking system intermediates the funds increasing credit to the private sector that in turn raises both consumption and investment.

Some of the stylized facts that we identify agree with this story. In particular, there is time-agglomeration of episodes and there is a surge of capital inflows during the boom. However, other key pieces are not present. In particular, the international real interest rate does not show the pattern one would expect. Also, the average size of the inflows is only around 1/5 of the size of the boom (in % of GDP). Thus, the story seems valid only for a limited number of cases.

Consumption boom A lending boom arises because consumption (probably a boom) needs to be financed. A consumption boom may arise because of several reasons. A short list includes: change in agents' perceived wealth (the "euphoria factor" after a market-oriented reform); relaxation of credit constraints; lack of credibility in the sustainability of reforms (e.g., stabilization of inflation); redistribution from capital to labor; an exchange rate-based stabilization plan that reduces the real interest rate; and favorable movements of terms of trade (Montiel (1997)).

The key stylized fact for this story to be relevant is not present in the data: consumption during relative deviation booms is not different from consumption during tranquil periods. In the absolute deviation sample consumption during the peak year is above normal. However, neither the size of this deviation nor its evolution during the build-up phase point to confirm the relevance of this story.

Financial liberalization A lending boom is the natural outcome of a liberalization of a repressed financial system. If a country has interest rate caps, lending that is centrally allocated, and/or an over-regulated banking industry, then the ratio credit to GDP is considerably lower than country that does not have any of these regulations. If regulation is not adequate the boom might become large and troublesome. The evidence shows that after a liberalization both real interest rates rise (Galbis (1993)) and there is a higher probability of both banking and BoP crisis (Kaminski and Reinhart (1999)).

Various stylized facts match what this story predicts. We observe high real interest rates during boom episodes, the probability of banking and currency crises increase and spreads tend to decrease during the ending phase. Moreover, the liberalization may engender an investment (and consumption) boom and therefore some external disequilibrium (RER overvaluation and a larger current account deficit). After a lending boom there is a fiscal deficit because the government ends up paying a share of the party. Larger capital inflows and debt concentration in short maturities may also agree with a liberalization. Furthermore, this story may even explain the bunching of cases insofar as there are waves of financial sector liberalization. Probably the most difficult fact to explain under this story is the output boom observed during t-2 and t-1, but it is certainly a candidate to explain a good portion of episodes.

Investment boom A lending boom occurs because there is a large investment expansion that needs financing. New discoveries of natural resources or a large exogenous change in relative prices may trigger this expansion. Insofar as there are no distortions, under this story one would expect higher growth and macroeconomic stability.

As in the case of consumption, investment booms do not appear important enough to be the driving force of lending boom episodes. They probably account for a small fraction of cases.

In sum, the two stories that agree the most to the stylized facts that we identify are that lending booms follow a (sometimes poorly regulated) financial liberalization and/or a natural GDP cycle. In the latter case boom episodes should not be a problem.

6 Concluding Remarks

This paper has identified a set of stylized facts surrounding lending boom episodes. Independently on whether we define lending booms as a relative or an absolute deviation of the credit to GDP ratio from trend, the build-up and ending phases appear highly sym-

metric. This fact goes against the idea of an abrupt unwinding of boom episodes. We do not find evidence of changes in boom duration in our sample. Episodes show some time-agglomeration. We speculate that this is due to waves of financial liberalization rather than a result from exogenous capital inflow surges. In comparison to other geographical areas, Latin America does not seem specially prone to have lending booms.

We analyze the behavior of several macroeconomic variables during lending booms. The most salient results are the following: (i) GDP is above trend before the boom and during the build-up phase and peak year, afterwards it falls below trend, and on average there is no negative effect of booms on GDP; (ii) the real interest rate is significantly high during booms; (iii) consumption during episodes is not different from tranquil periods, while investment rises during the build-up phase; (iv) capital inflows increase during the build-up phase and peak year but the international real interest rate is similar during boom episodes and tranquil periods; (v) both the current account and the RER are significantly low during episodes; and (vi) the proportion of short term debt increases during the build-up phase. Overall these stylized facts are quite robust to changes in the boom definition along sample sizes and deviation criteria.

The probability of having a banking crisis or a BoP crisis significantly increases after a lending boom. The conditional incidence of having a banking crisis critically depends on the size of the boom. This does not happen in the case of currency crises. However, larger consumption and investment to GDP ratios, more capital inflows, and a higher proportion of short term debt increase the probability of currency crisis after a boom. A larger stock of international reserves (measured as months of imports) does not appear to reduce the likelihood of either crisis.

This set of stylized facts mostly agrees with two stories about the origin of lending booms. One is an RBC story in which lending booms result from exogenous productivity or terms of trade shocks. The second one is a financial liberalization story that in many cases (probably due to poor regulation) ends in a banking crisis. In sum, the evidence casts some doubt on the widespread belief that booms have largely damaging effects. However, they are not panacea either and some speed limits may be desirable, particularly when boom are preceded by a financial liberalization.

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Appendix A. Country and Episodes List

Table A.1.: **Country List**

Algeria	El Salvador	Lesotho	Saudi Arabia
Argentina	Fiji	Madagascar	Senegal
Australia	Finland	Malawi	Singapore
Austria	France	Malaysia	South Africa
Bangladesh	Gabon	Mali	Spain
Belgium	Gambia, The	Mauritania	Sri Lanka
Benin	Germany	Mauritius	Swaziland
Bolivia	Greece	Mexico	Sweden
Botswana	Guatemala	Morocco	Switzerland
Brazil	Honduras	Nepal	Syrian Arab Rep.
Cameroon	Hungary	Netherlands	Thailand
Canada	India	New Zealand	Togo
Central Afr. Rep.	Indonesia	Niger	Trinidad & Tobago
Chad	Iran, Islamic Rep.	Nigeria	Tunisia
Chile	Ireland	Norway	Turkey
Colombia	Israel	Oman	U. Arab Emirates
Congo	Italy	Pakistan	United Kingdom
Costa Rica	Jamaica	Panama	United States
Cote d'Ivoire	Japan	Papua N. Guinea	Uruguay
Denmark	Jordan	Paraguay	Venezuela
Dominican Rep.	Kenya	Peru	Zambia
Ecuador	Korea, Rep.	Philippines	Zimbabwe
Egypt, Arab Rep.	Kuwait	Portugal	

Table A.2**.a: Episode List - 80 Cases Relative Deviation**

Algeria	1972	1972	Gabon	1985	1987	New Zealand	1990	1995
Algeria	1982	1989	Gambia, The	1978	1985	Nigeria	1962	1967
Argentina	1979	1982	Guatemala	1980	1985	Nigeria	1980	1987
Argentina	1993	1995	Hungary	1987	1991	Oman	1976	1978
Belgium	1992	1995	Indonesia	1969	1974	Panama	1961	1961
Benin	1975	1980	Indonesia	1977	1977	Panama	1972	1977
Benin	1985	1988	Indonesia	1990	1993	P. New Guinea	1974	1975
Bolivia	1974	1980	Iran	1977	1981	Paraguay	1965	1966
Bolivia	1992	1994	Israel	1977	1980	Peru	1981	1985
Botswana	1974	1977	Jordan	1961	1967	Peru	1992	1994
Botswana	1991	1994	Korea, Rep.	1961	1962	Philippines	1978	1983
Brazil	1968	1978	Korea, Rep.	1968	1974	Philippines	1993	1995
Brazil	1993	1994	Kuwait	1963	1966	Saudi Arabia	1964	1970
Cameroon	1987	1991	Kuwait	1981	1990	Saudi Arabia	1983	1989
Canada	1981	1982	Lesotho	1974	1974	Senegal	1961	1964
C. African Rep.	1966	1970	Malawi	1978	1983	Senegal	1978	1985
Chad	1969	1969	Malawi	1991	1992	Syria	1964	1966
Chad	1984	1987	Malaysia	1961	1962	Syria	1982	1986
Chile	1965	1968	Malaysia	1973	1980	Togo	1962	1964
Chile	1980	1986	Mali	1961	1966	Togo	1991	1993
Congo	1985	1987	Mauritania	1962	1962	UK	1972	1974
Denmark	1987	1991	Mauritania	1975	1978	UK	1987	1992
Dominican Rep.	1973	1980	Mexico	1977	1980	Uruguay	1980	1983
Ecuador	1981	1986	Mexico	1991	1994	Zambia	1981	1983
Ecuador	1994	1995	Nepal	1961	1963	Zambia	1994	1995
Finland	1988	1992	Nepal	1994	1995	Zimbabwe	1980	1983
Gabon	1977	1978	New Zealand	1961	1970			

Table A.2.b: **Episode List - 80 Cases Absolute Deviation**

Algeria	1972	1972	Gambia, The	1983	1985	Peru	1993	1994
Algeria	1982	1989	Hungary	1987	1991	Philippines	1978	1983
Argentina	1979	1982	Indonesia	1990	1993	Philippines	1994	1995
Australia	1989	1992	Iran	1978	1980	Portugal	1971	1976
Austria	1979	1983	Israel	1977	1980	Portugal	1981	1984
Belgium	1992	1995	Italy	1968	1977	Portugal	1993	1995
Benin	1975	1975	Italy	1991	1994	Saudi Arabia	1983	1989
Benin	1978	1980	Japan	1971	1973	Senegal	1978	1985
Benin	1982	1983	Japan	1987	1992	Singapore	1981	1986
Benin	1985	1988	Jordan	1965	1966	Spain	1972	1977
Bolivia	1992	1994	Jordan	1982	1990	Swaziland	1971	1971
Botswana	1974	1977	Korea, Rep.	1968	1972	Swaziland	1991	1992
Brazil	1993	1994	Kuwait	1963	1965	Sweden	1988	1992
Cameroon	1987	1991	Kuwait	1981	1990	Switzerland	1961	1970
Canada	1978	1982	Malawi	1978	1983	Switzerland	1982	1991
Chad	1984	1987	Malaysia	1973	1980	Syrian Arab Rep.	1964	1966
Chile	1965	1967	Mali	1984	1987	Thailand	1993	1995
Chile	1980	1986	Mauritania	1977	1978	Togo	1991	1993
Congo	1985	1987	Mauritania	1989	1992	Tunisia	1989	1989
Denmark	1987	1991	Mexico	1977	1980	U. Arab Emir.	1977	1978
Ecuador	1982	1986	Mexico	1991	1994	U. Arab Emir.	1985	1988
Ecuador	1994	1995	Netherlands	1978	1982	UK	1972	1974
Finland	1988	1992	New Zealand	1990	1995	UK	1987	1992
France	1978	1983	Nigeria	1981	1986	Uruguay	1980	1983
France	1989	1992	Norway	1986	1991	Venezuela	1976	1978
Gabon	1985	1987	Panama	1972	1977	Zambia	1981	1983
Gambia, The	1978	1981	Panama	1993	1995			

Table A.2.c.: **Banking Crisis List -** Caprio and Klinguebiel (1997)

Argentina	1980	1982	India	1994	1995	Singapore	1982	1982
Argentina	1989	1990	Indonesia	1994	1994	South Africa	1977	1977
Argentina	1995	1995	Israel	1977	1983	Spain	1977	1985
Australia	1989	1990	Japan	1990	1996	Sri Lanka	1989	1993
Bangladesh	1987	1996	Kenya	1985	1989	Sweden	1991	1991
Benin	1988	1990	Kenya	1992	1995	Thailand	1983	1987
Bolivia	1986	1987	Kuwait	1986	1986	Togo	1993	1995
Brazil	1994	1995	Madagascar	1988	1988	Turkey	1982	1985
Cameroon	1987	1996	Malaysia	1985	1988	United States	1984	1991
C. African Rep.	1980	1989	Mauritania	1984	1993	Uruguay	1981	1984
C. African Rep.	1994	1994	Mexico	1981	1982	Venezuela	1980	1980
Chad	1980	1996	Morocco	1982	1985	Venezuela	1994	1995
Columbia	1982	1987	Morocco	1995	1995	Zambia	1995	1995
Congo	1980	1991	Nepal	1988	1988			
Costa Rica	1987	1987	New Zealand	1987	1990			
Cote d'Ivoire	1988	1991	Nigeria	1993	1993			
Ecuador	1982	1984	Nigeria	1995	1995			
Egypt	1982	1985	Norway	1987	1989			
Finland	1991	1993	Paraguay	1985	1985			
France	1994	1995	Philippines	1981	1987			
Hungary	1991	1995	Senegal	1988	1991			

Table A.2.d.: **Banking Crisis List -** Lindgren et al. (1996)

Argentina	1980	1982	Jordan	1989	1990	South Africa	1985	1985
Argentina	1989	1990	Kuwait	1984	1986	Spain	1977	1985
Argentina	1995	1995	Malaysia	1985	1988	Sweden	1990	1993
Benin	1988	1988	Mexico	1982	1982	Thailand	1983	1987
Cameroon	1989	1993	Mexico	1994	1996	Turkey	1982	1982
Cameroon	1995	1996	Niger	1983	1996	Turkey	1991	1991
Chad	1979	1983	Norway	1987	1993	Uruguay	1981	1985
Chile	1981	1987	Panama	1988	1989	Venezuela	1994	1996
Congo	1994	1996	Philippines	1981	1987			
Finland	1991	1994	Senegal	1983	1988			

Table A.2.e.:**Currency Crisis List -** Frankel and Rose (1996)

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

Appendix B. Data Sources

Table B.1.: **Data Sources**

Definition	Source	Observations
Private Credit/GDP	IMF-IFS (line 22d)	2997
ln(GDP in constant dollars)	WB-World Tables	2747
Current Account/GDP	WB-World Tables	1947
ln(Multilateral Real Exchange Rate)	Goldfajn and Valdés (1999)	2480
Private Capital Inflows/GDP	Global Developing Finance	1807
Consumption/GDP	WB-World Tables	2903
Investment/GDP	WB-World Tables	2956
Fiscal Deficit/GDP	WB-World Tables	1780
International Reserves/Imports	WB-World Tables	1962
Openness (trade/GDP)	WB-World Tables	3180
Terms of Trade	Goldfajn and Valdés (1999)	2606
Domestic Real Interest Rate	WB-World Tables	1487
International Real Interest Rate	WB-World Tables	3367
Percentage Short Term Debt	WB-World Tables	1685
Interest Rate Spread (dep/len)	WB-World Tables	1377
Inflation	WB-World Tables	3161
CK Banking Crisis Dummy	Caprio and Klinguebiel (1997)	1911
LGS Banking Crisis Dummy	Lindgren et al. (1996)	1911
Currency Crisis Dummy	Frankel and Rose (1996)	3157

Appendix C. Probability of Banking Crisis

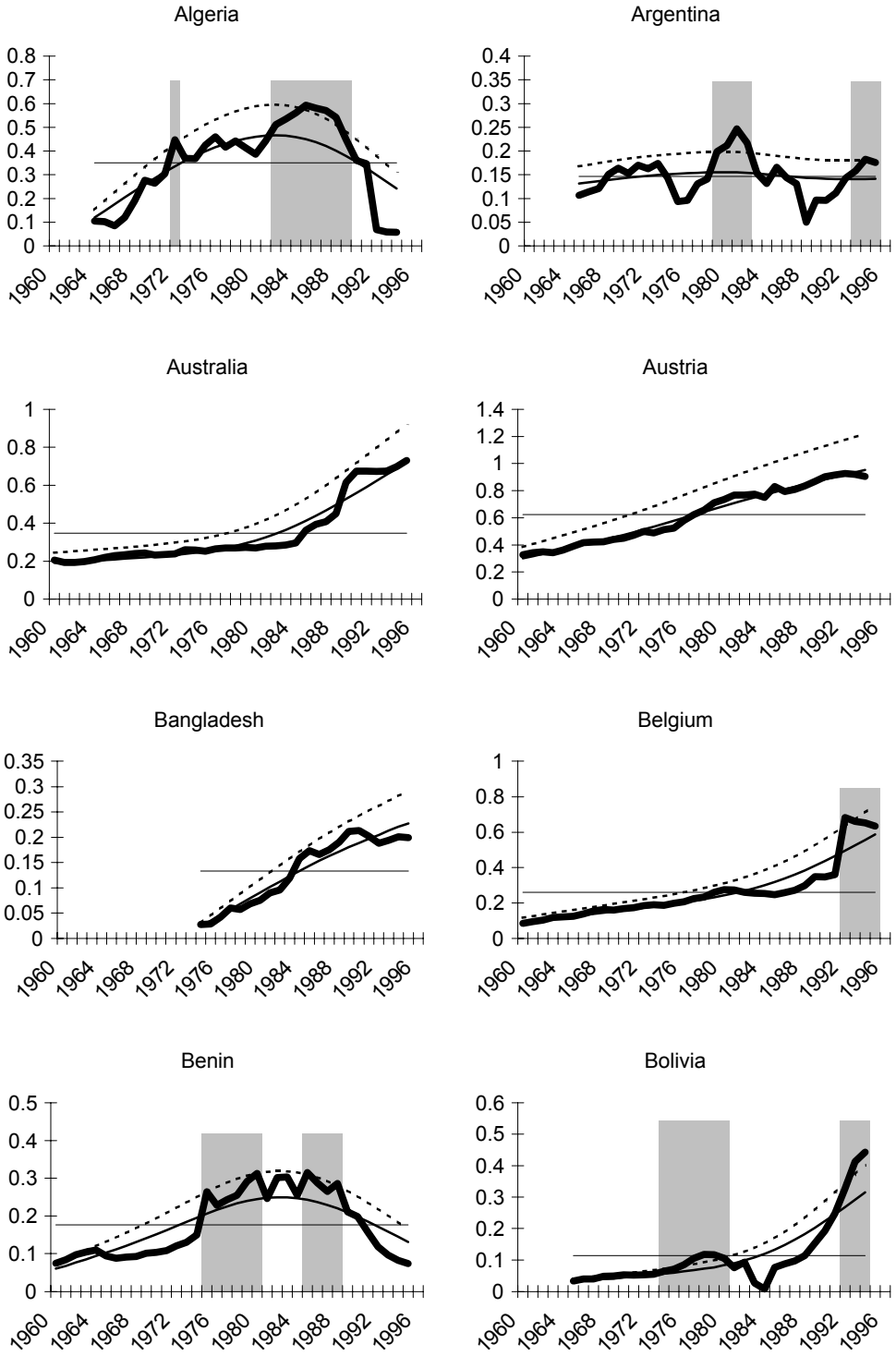
Table C.1: **Probability of Banking Crisis**

	Relative Deviation					
	Dummy-OR Crisis			Dummy-AND Crisis		
	60 Cases	80 Cases	100 Cases	60 Cases	80 Cases	100 Cases
Before boom	14.1	12.6	12.7	7.0	5.5	4.7
	(7.5)	(6.6)	(6.1)	(7.8)	(6.8)	(6.3)
After boom	27.7	25.4	24.2	8.1	7.8	7.3
	(6.2)	(5.2)	(4.7)	(6.9)	(5.7)	(5.1)
Tranquil time	13.9	13.8	13.6	3.2	3.1	3.1
	(1.3)	(1.5)	(1.6)	(1.1)	(1.3)	(1.5)
	Absolute Deviation					
	Dummy-OR Crisis			Dummy-AND Crisis		
	60 Cases	80 Cases	100 Cases	60 Cases	80 Cases	100 Cases
Before boom	14.9	12.5	12.1	5.3	4.3	3.5
	(6.4)	(5.8)	(5.1)	(6.7)	(6.0)	(5.3)
After boom	36.0	30.0	26.1	10.6	8.6	7.3
	(4.9)	(4.6)	(4.3)	(5.8)	(5.2)	(4.7)
Tranquil time	11.7	12.4	12.8	2.7	2.9	3.2
	(1.4)	(1.6)	(1.8)	(1.3)	(1.5)	(1.7)

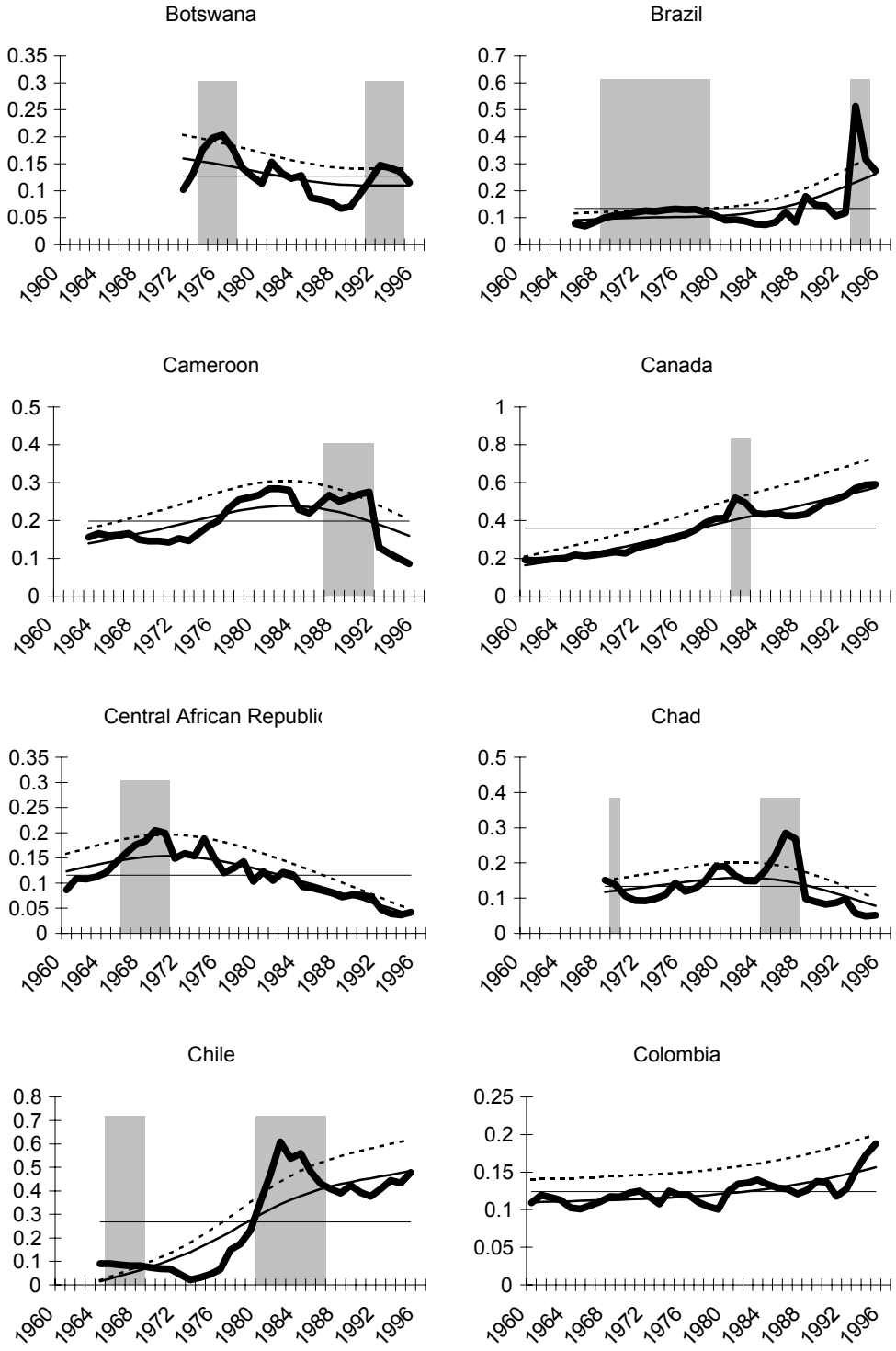
Actual country/year cases to potential country/year ratio. Standard deviation in parenthesis. Before boom includes from t+2 to build-up. After boom includes from peak year to t+2.

Appendix D. Country Episodes (80 cases, relative)

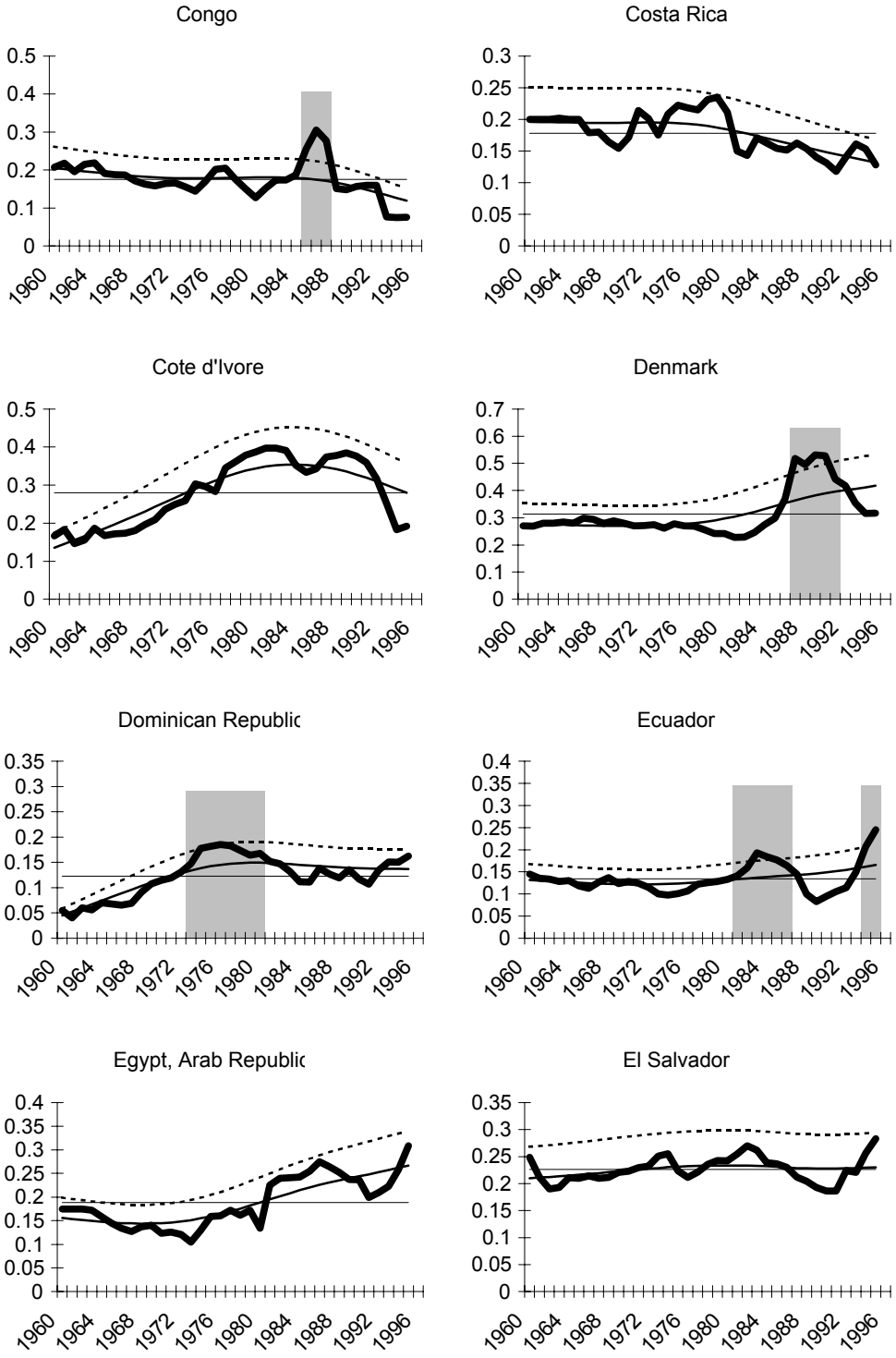
Financial Depth: Country by Country (1-8)



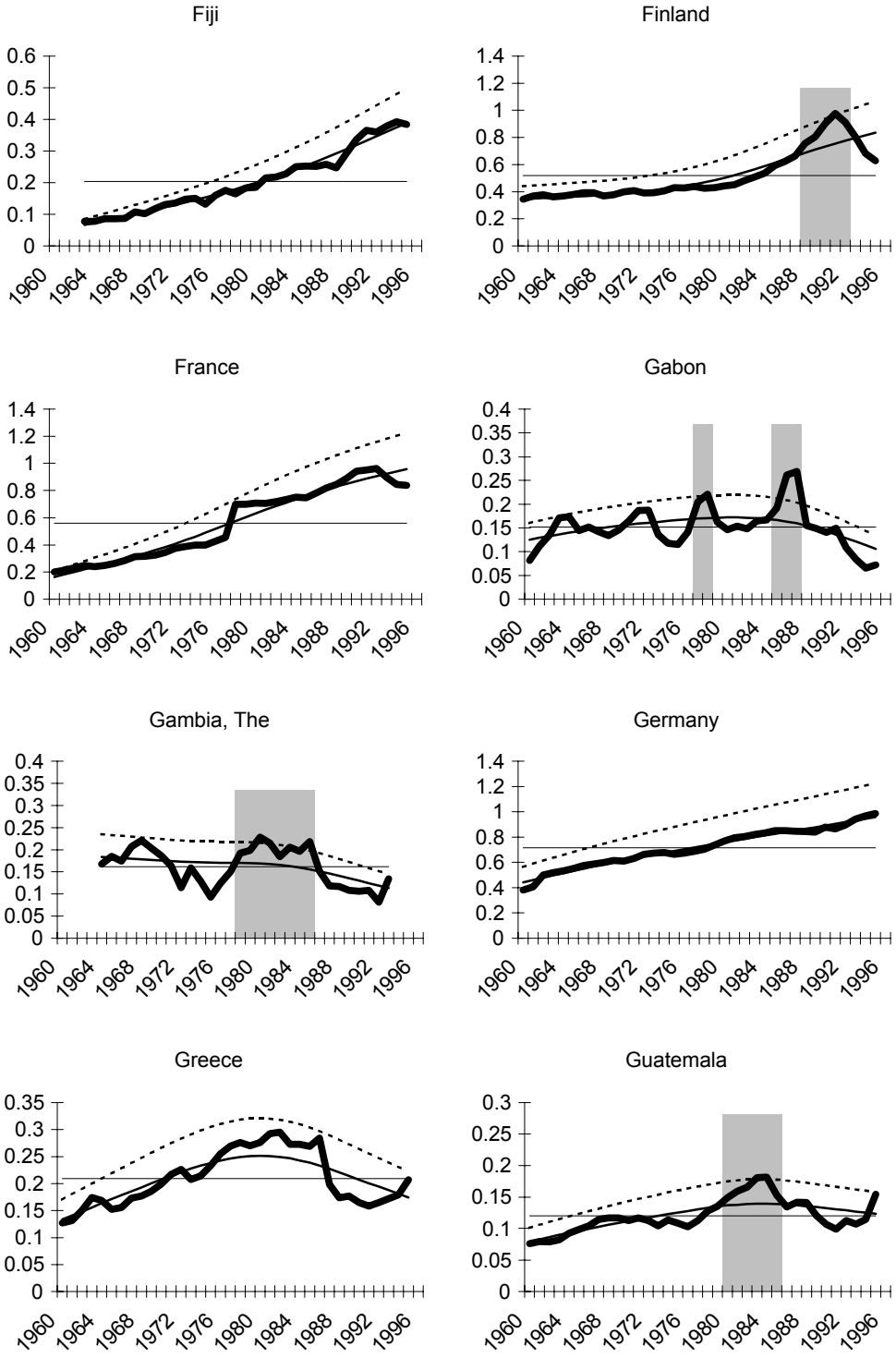
Financial Depth: Country by Country (9-16)



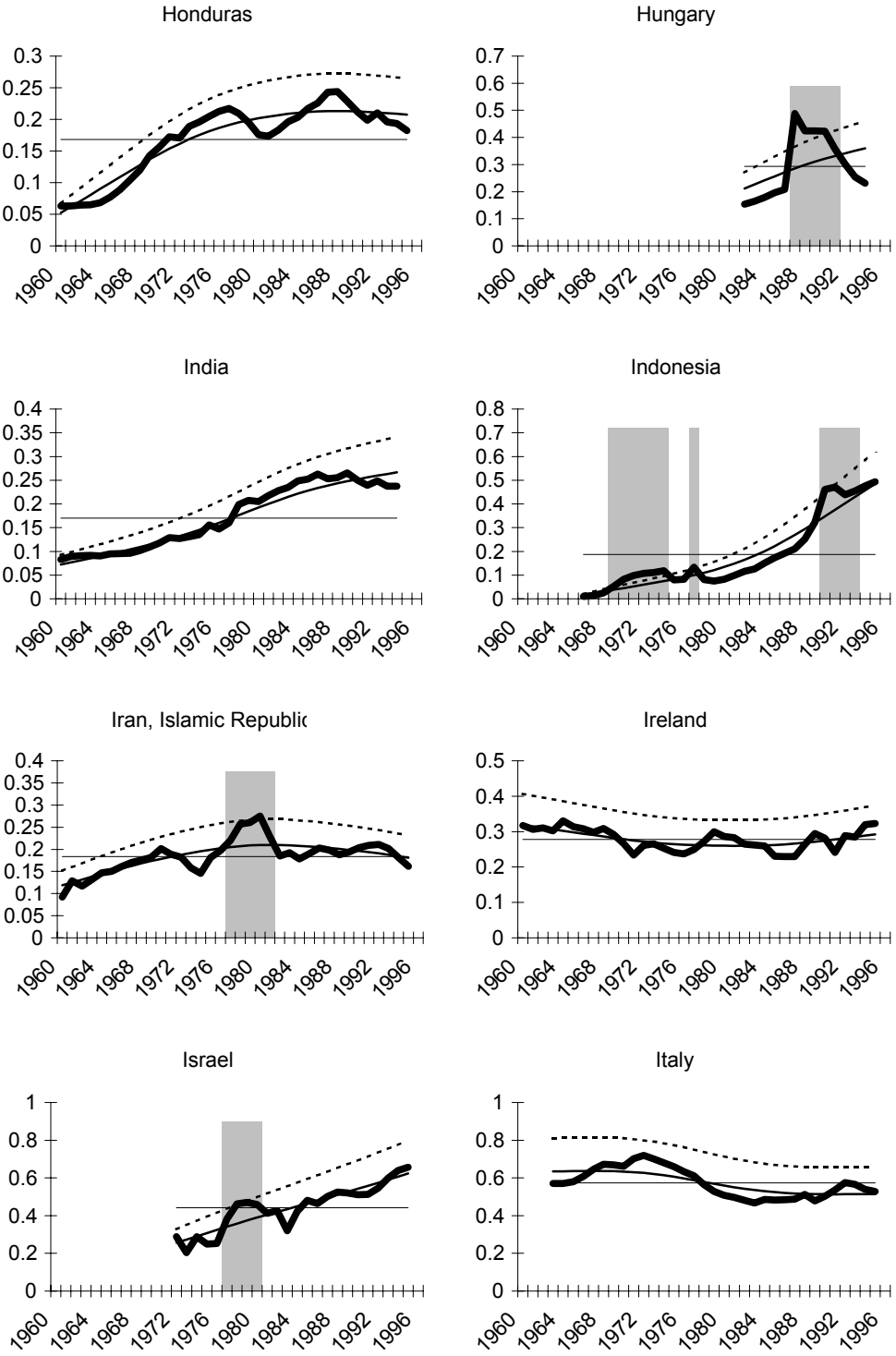
Financial Depth: Country by Country (17-2



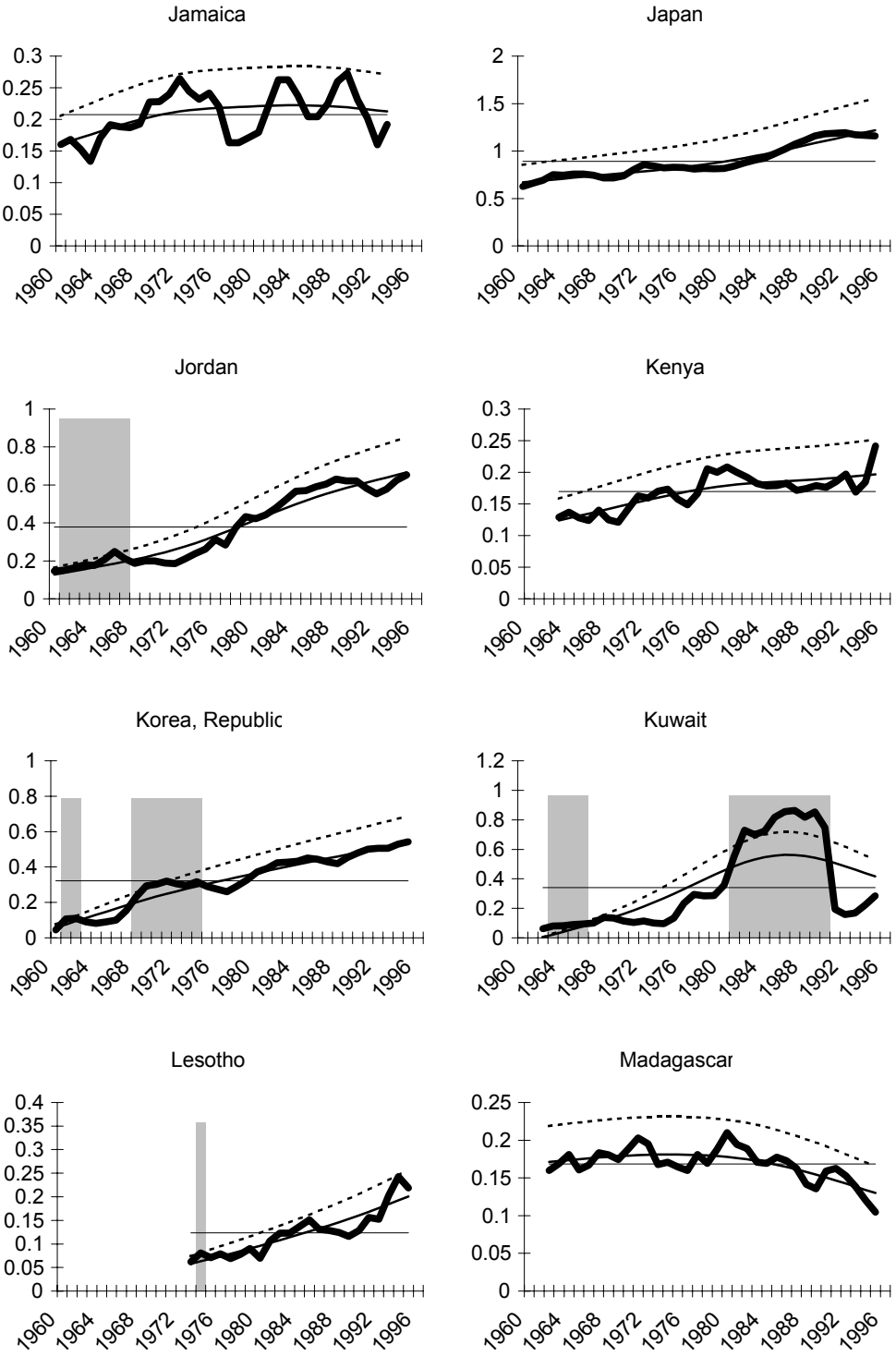
Financial Depth: Country by Country (25-3



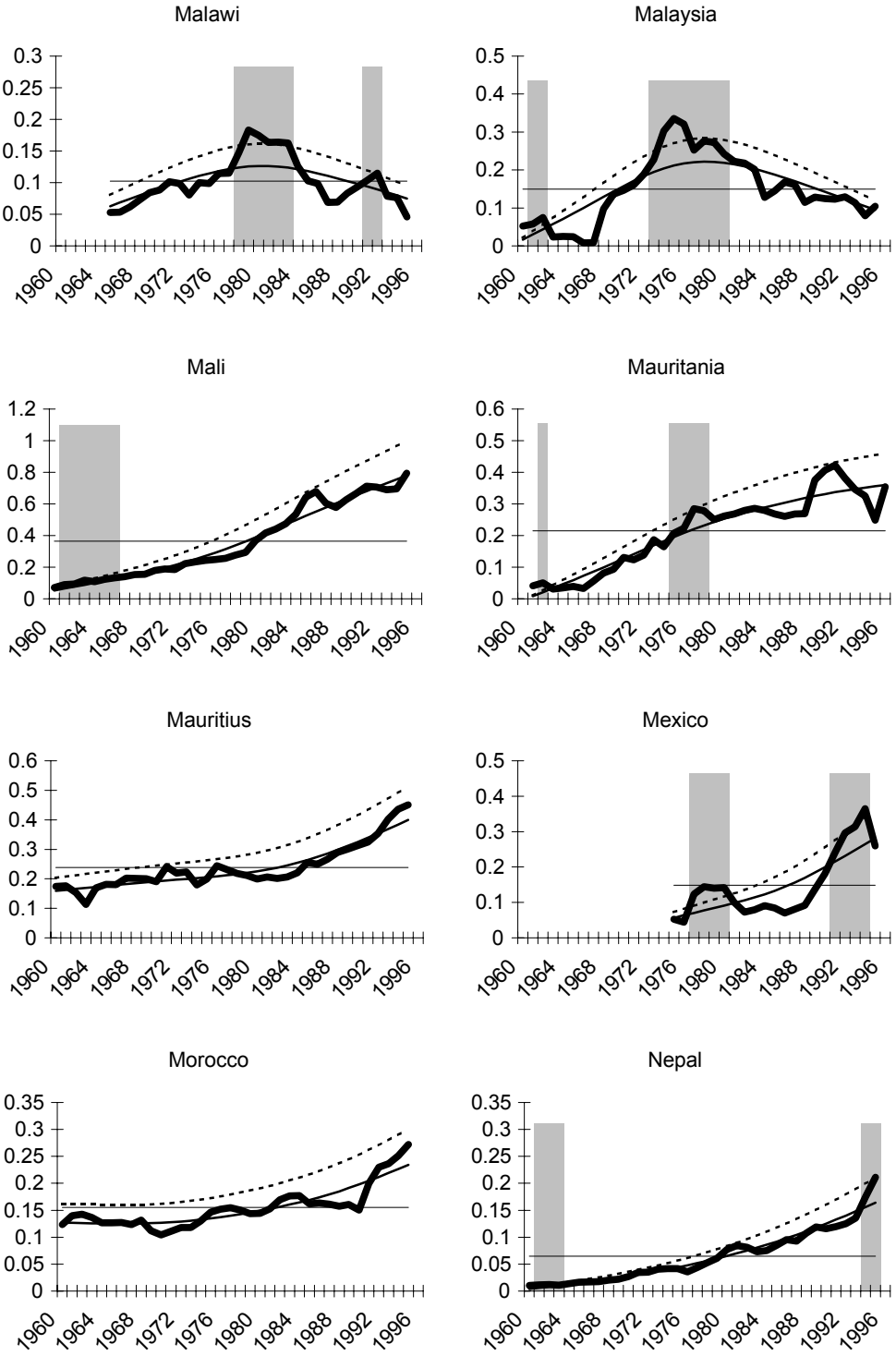
Financial Depth: Country by Country (33-4



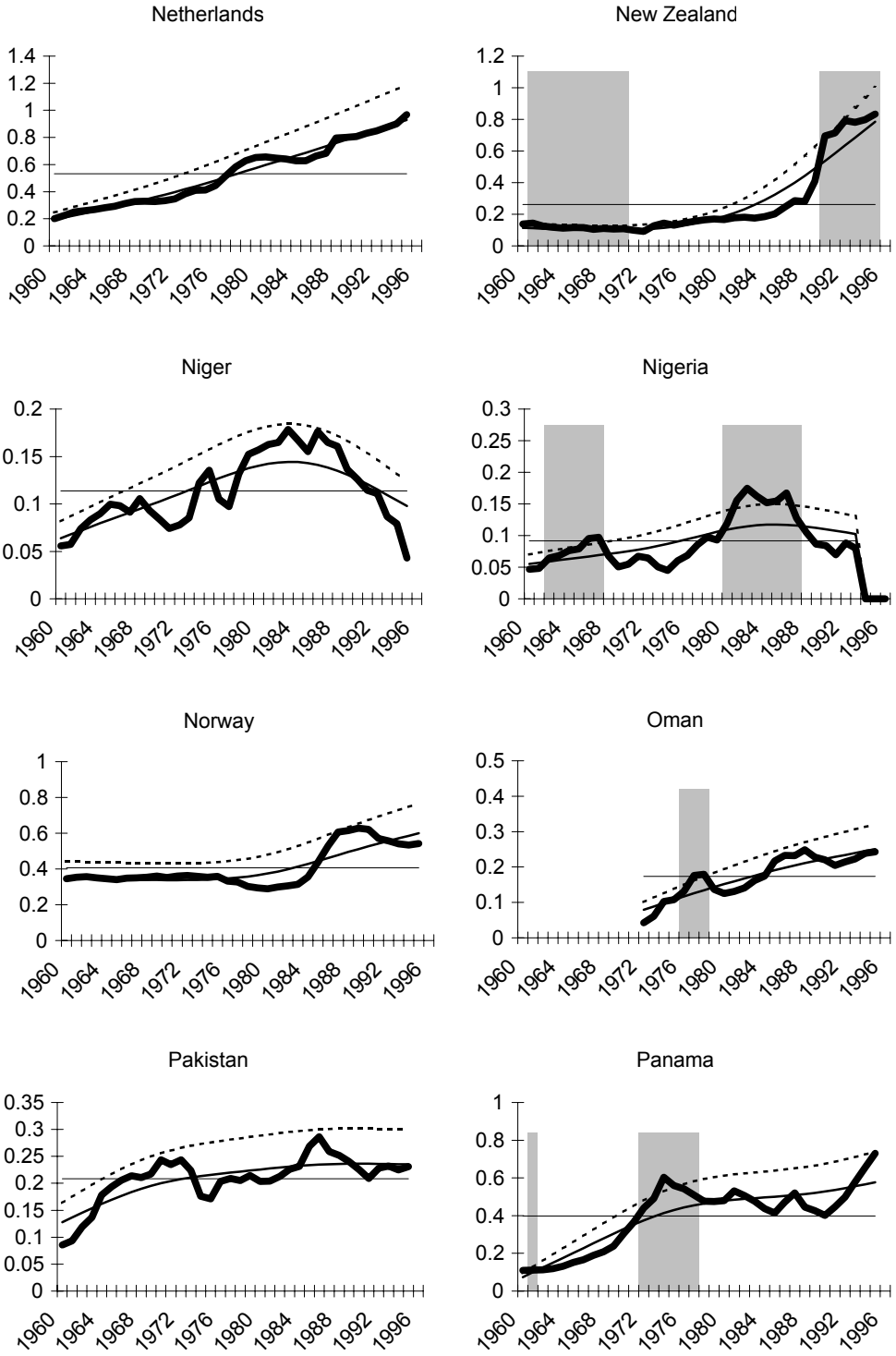
Financial Depth: Country by Country (41-4



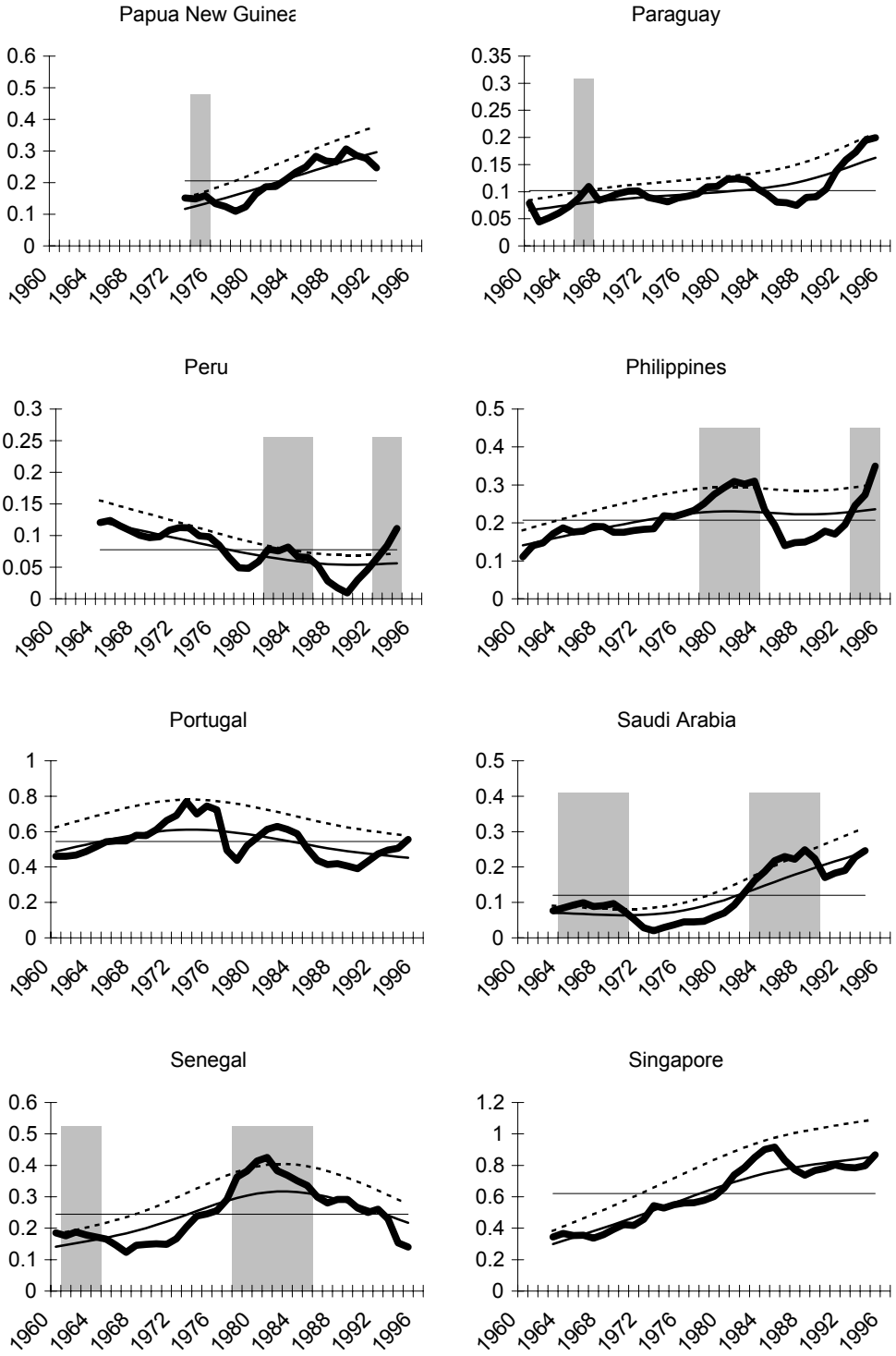
Financial Depth: Country by Country (49-5



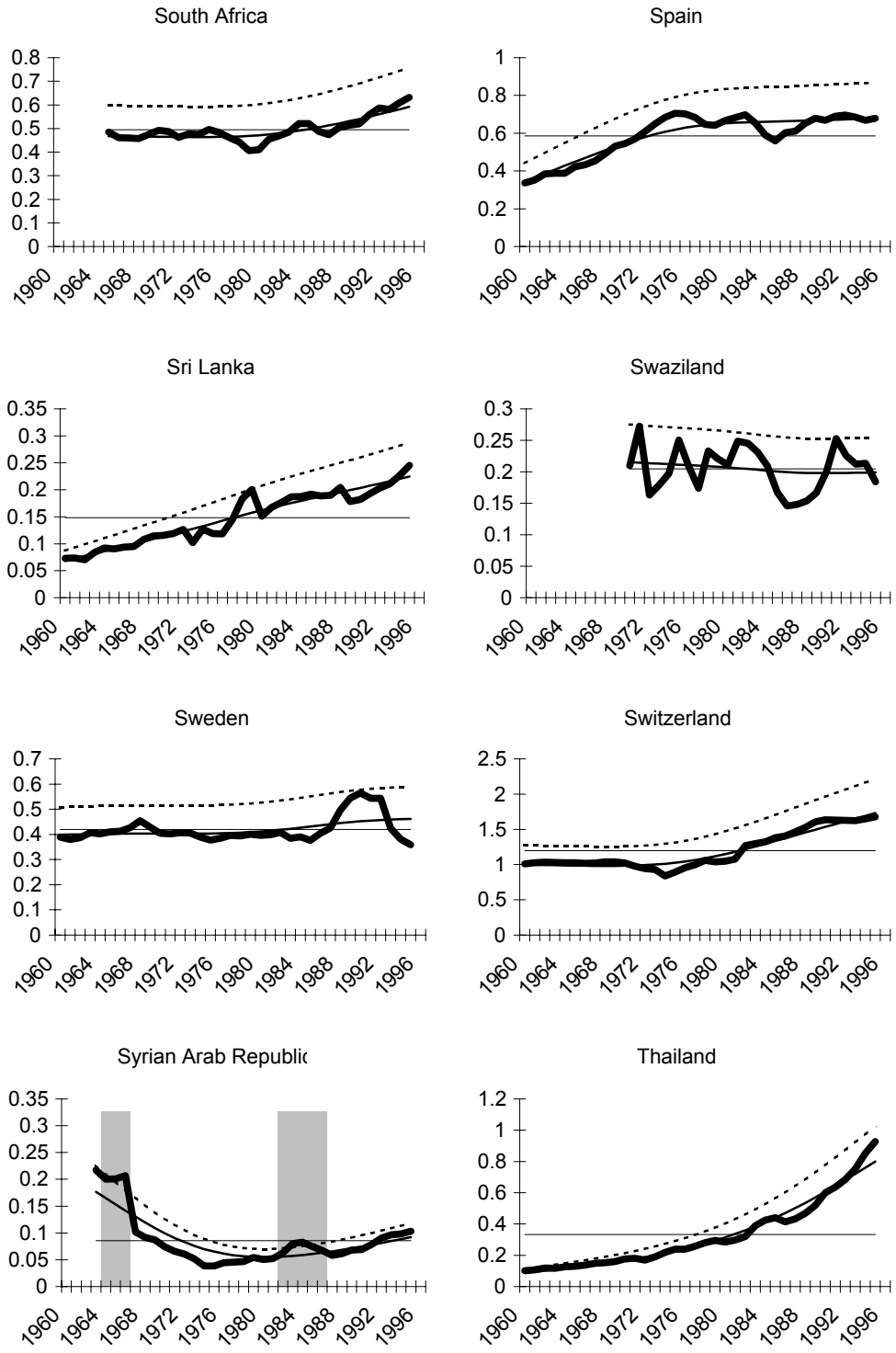
Financial Depth: Country by Country (57-6



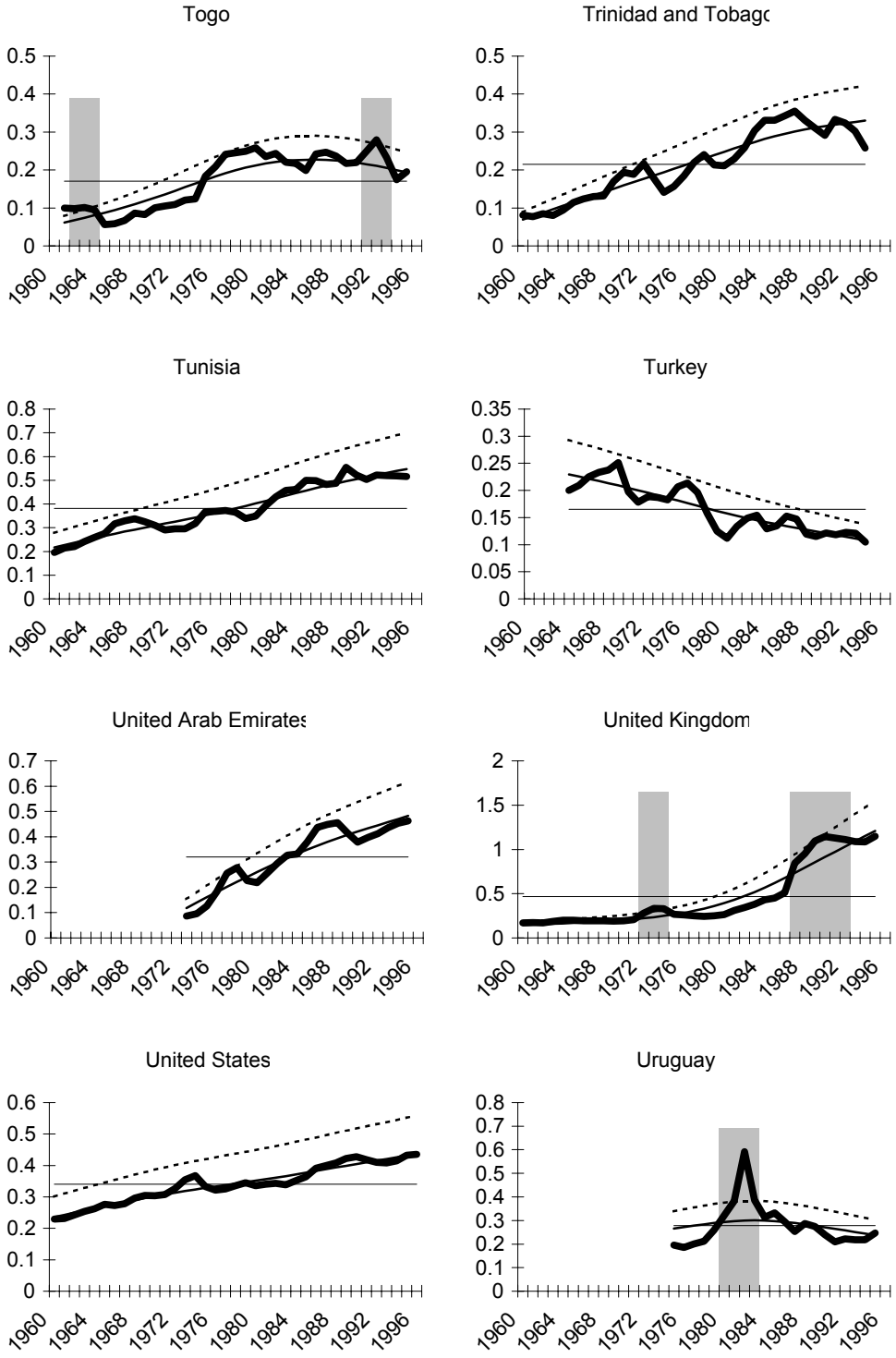
Financial Depth: Country by Country (65-7



Financial Depth: Country by Country (73-8



Financial Depth: Country by Country (81-8



Financial Depth: Country by Country (89-9