Is the Crisis Problem Growing More Severe?

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Abstract

The crisis problem is one of the dominant macroeconomic features of our age. Its prominence suggests questions like the following: Are crises growing more frequent? Are they becoming more disruptive? Are economies taking longer to recover? These are fundamentally historical questions, which can be answered only by comparing the present with the past. To this end, this paper develops and analyzes a database spanning 120 years of financial history. We find that crisis frequency since 1973 has been double that of the Bretton Woods and classical gold standard periods and is rivaled only by the crisis-ridden 1920s and 1930s. History thus confirms that there is something different and disturbing about our age. However, there is little evidence that crises have grown longer or output losses have become larger. Crises may have grown more frequent, in other words, but they have not obviously grown more severe. Our explanation for the growing frequency and chronic costs of crises focuses on the combination of capital mobility and the financial safety net, including the implicit insurance against exchange risk provided by an ex ante credible policy of pegging the exchange rate, which encourages banks and corporates to accumulate excessive foreign currency exposures.

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1. Introduction

The crisis problem was one of the dominant features of the 1990s. Financial histories of the decade, when they are ultimately written, will undoubtedly be organized around the EMS crisis of 1992-3, the Tequila crisis of 1994-5, the Asian crisis of 1997-8, the Brazilian crisis of 1998-9, and the Russia-LTCM affair. The fact that so many episodes of financial turbulence and distress were packed into fewer than ten years points to what is new and troubling about the economic and financial environment in which we currently live.

Or does it? The premise implicit in many accounts of the most recent decade, that the crisis problem is growing more severe, is just that — implicit. Remarkably, there appear to exist no systematic, quantitative, empirical studies on whose basis the question posed in the title of our paper can be addressed. Even that handful of studies which compares the 1990s with the immediately preceding decades (e.g. IMF 1998, Caprio and Kingebiel 1999) should create some uneasiness on the part of those presuming that ours is a distinctive age of financial instability. Their crisis chronologies suggest that currency and banking crises were chronic problems not just in the 1990s but in the preceding years as well. Anyone old enough to remember the 1980s will not be surprised. Is it really true, in other words, that the crisis problem is growing more severe?

A comparison of the 1980s with the 1990s is hardly an adequate basis for generalization. In this paper we therefore elaborate the comparison along four dimensions. First, we compare the recent period with more than a century of financial crises. We distinguish the Bretton Woods period (1945-1971), the interwar years (1919-1939), and the gold standard era (1880-1913).[2] We consider

[2]That monetary and regulatory regimes differ systematically between these subperiods has led a number of earlier authors, including ourselves, to distinguish them in historical studies of the business cycle (Eichengreen 1994, Bergman, Bordo and Jonung 1998). And this is a relevant periodization when we consider policy implications, since these periods represent distinct eras with regard to the exchange rate, capital account, and regulatory regimes.

currency crises, banking crises, and twin crises (when distress is visible in both currency markets and the banking system in the same or adjoining years) and follow a consistent set of countries over time.

Second, we extend the comparison from the frequency of crises to their depth and duration.

Third, we compare the output losses from crises with the output losses from recessions in which no crises occurred. Clearly, the output loss in the wake of a crisis is less impressive if it is indistinguishable from the output loss in a garden-variety recession.

Even if recessions are more severe when they are accompanied by crises, there remains the question of whether causality runs from the crisis to the severity of the recession or from the severity of the recession to the likelihood of a crisis. Accounts of particular episodes lay stress on the amplitude of the cycle -- and, specifically, on the impetus provided by the preceding credit boom and subsequent bust -- in helping to set the stage for a crisis (see e.g. Gavin and Hausmann 1996). While causality is a difficult nut to crack -- some economists would regard it as impossible to disentangle -- we offer some evidence on it in our fourth extension.

Finally, we ask whether the patterns we observe in the frequency, severity and longevity of crises are best explicable in terms of international economic policies (the flexibility of the exchange rate and the openness of the capital account) or the management of the domestic financial system. It will be evident that these two sets of variables correspond to the two leading explanations for the recent Asian crisis, one which attributes its outbreak and severity to external economic policies (unsustainable currency pegs and precipitous capital-account liberalization), the other which blames it on flawed domestic financial regulation.[3] This illustrates how our findings can be used to shed light on the generality of popular explanations for the recent spate of crises.

By placing contemporary experience in its historical context, we hope to be able to determine

what inferences can be drawn from recent crises about the operation of capital markets. For some, the frequency and severity of crises in the 1990s points to the dangers of financial liberalization and the inability of financial markets to allocate resources efficiently. For others, the crisis problem reflects not the risks of financial liberalization and the inefficiency of deregulated markets but rather the tendency for governments to run monetary and fiscal policies inconsistent with exchange-rate and financial stability and for national and international authorities to weaken market discipline by indiscriminately providing capital and liquidity support to distressed financial institutions. An historical perspective can help to determine which of these views is of more general applicability. Is the crisis problem most severe in periods when financial markets are liberalized and capital accounts are open? Has it grown with the propensity of governments to provide domestic financial institutions with liquidity and capital support? Questions such as these can only be answered by comparing the 1990s with earlier times and places. In other words, they can only be answered historically.

2. Counting Crises

Any study of crises will turn on how these events are identified. While it is tempting to define crises as episodes of financial turbulence followed by output declines, this would be misleading for our purposes. It would bias the results toward finding that crises had output effects and disregard instances when financial distress did not spread to the real economy.

We define financial crises as episodes of financial-market volatility marked by significant problems of illiquidity and insolvency among financial-market participants and/or by official intervention to contain those consequences. We identify them from a review of the historical

[3]On these two interpretations, see Furman and Stiglitz (1998) and Goldstein (1998).

literature.[4] For an episode to qualify as a currency crisis, we must observe a forced change in parity, abandonment of a pegged exchange rate, or an international rescue. In addition, we construct the familiar index of exchange market pressure, calculated as a weighted average of the percentage change in the exchange rate, the change in the short-term interest rate, and the percentage change in reserves, all relative to the same variables in the center country. A crisis is said to occur when this index exceeds a critical threshold (here, one and a half standard deviations above its mean). We count an episode as a currency crisis when it shows up according to either or both of these indicators.

For an episode to qualify as a banking crisis, we must observe financial distress resulting in the erosion of most or all of aggregate banking system capital. This is the same criterion used by Caprio and Klingebiel (1996, 1999) to identify systemic banking crises.

For the period through 1913, we have data for 21 countries, which we classify as industrial or emerging. We follow the same countries over time, though changes in their economic development lead us to reclassify several emerging markets as industrial economies as we move between periods. To facilitate comparisons with other studies of the post-1973 period, we also consider a larger sample of 56 industrial and emerging markets.

To quantify the depth and duration of crises, we calculate the trend rate of growth of GDP for five years preceding the event. We calculate recovery time as the number of years before the rate of GDP growth returns to that trend. We calculate the output loss as the sum of the differences between actual GDP growth and the five-year average preceding the crisis until growth returns to trend.[5]

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[4]For details on data and sources, see Bordo and Schwartz (1996) and Bordo and Jonung (1996, 2000). For more information on the methods used to identify crises and the complete crisis list, see Appendix A below.

[5]There is no single -- or, for that matter, best -- way of measuring the output loss. Mulder and Rocha (2000) argue that the approach used here will overstate the output loss because the pre-crisis growth tends to be unsustainably high, rendering it an inappropriate basis for comparison. They also observe that truncating the calculation at the point where the growth rate

There are reasons to worry about the consistency of the cyclical properties of GDP statistics spanning a century and more. For the United States, Romer (1989) and Balke and Gordon (1989) have attempted to adjust the historical statistics for cyclical consistency with modern data. Reassuringly, previous studies of the changing length and severity of recessions have obtained similar results using these alternative series.[6]

Comparing the behavior of output around crises with its behavior around recessions requires dates for the latter. While for the U.S. we have NBER dates, similar dates are not available for all 21 countries we consider before 1971 or for the even larger country sample we consider subsequently.[7] We therefore follow Stock and Watson (1999) in applying a band-pass filter to identify when the detrended output series turns down. For the U.S., there is reasonable conformance between the NBER dates and those obtained using the band-pass filter.[8]

3. Frequency of Crises

Figure 1 summarizes the frequency of crises, immediately suggesting that the problem is growing. The lightly shaded bar at the far right indicates a frequency of 12.2 per cent for our 56

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returns to trend will understate the loss because the level of output, as distinct from the growth rate, remains depressed for several subsequent years. Using a Hodrick-Prescott filter to estimate the trend, they obtain output losses for the 1973-98 period that are a multiple of ours. However, some of their other estimates yield smaller losses for emerging markets than those reported here. It will be obvious that these alternatives are no less problematic than our method. Adjustments to the pre-crisis growth rate are arbitrary. And truncating the calculation at, say, the point where growth returns to the level extrapolated from some pre-crisis trend rather than at the point where the growth rate recovers to its pre-crisis rate implies the equally arbitrary assumption that the level of output is invariant with respect to the crisis, even over short periods. Fortunately, there is no reason to think that these biases are more severe in one period than another. Since we are primarily concerned with intertemporal comparisons, such biases are likely to be of less moment here than in other applications. For further discussion, see the appendix.

[6]We discuss the direction of any resulting bias at the appropriate point below.

[7]We have NBER historical business cycle chronologies for the UK, France, Germany, Sweden and Canada, and ECRI dates for eight additional countries from 1948 to the present. In principle this should make it possible to compare output losses in recessions using these chronologies with the band-pass filter dates, but only for a relatively limited subsample of countries and years.

[8]As Stock and Watson have noted previously.

countries in the post-1972 period.[9] This means that these countries have had a nearly one in eight chance of suffering a currency crisis, banking crisis, or twin crisis in a given year. Crisis incidence, so measured, is nearly double what it was in 1945-1971. One has to go back to the notoriously unstable interwar years to find a figure that matches our day. The comparable figure for 1880-1913 (4.9 per cent) is little more than a third of today's rate. Put bluntly, the pre-1913 comparison thus suggests that crises at the rate we have been experiencing them are not an inevitable corollary of globalization.

Figure 1 also makes clear that it is the frequency of currency crises that explains why incidence has been so great since 1973. Only in the Bretton Woods period does one find an incidence of currency crises nearly as great.[10] The lesser frequency of currency crises before 1913, when capital controls were absent and capital mobility reached high levels, challenges the notion that it is financial globalization, pure and simple, that has created instability in foreign exchange markets.[11] Rather, there appears to be an increase in the incidence of currency crises over time, as if factors in addition

[9]We divide the number of crises by the number of country-year observations in each subperiod (omitting all but the first year of each crisis episode). The fact that we have a growing number of emerging markets in the sample after 1971 may bias the results toward finding more crises in recent years than in 1880-1913 and 1945-71. We cannot do the same calculation for previous periods for the same 56-country sample, since in earlier years many of the countries in question did not exist. What we can do is to replicate the calculations for 1973-1998 using the 21-country sample employed for earlier periods. When we do, crisis frequency falls, not unexpectedly, to 8.8 per cent, mainly due to a lesser frequency of currency crises. This number, while not matching the disastrous levels of the interwar years, is still noticeably higher than in 1880-1913 and 1945-71. It might be thought that our procedure of counting subsequent crises that break out before recovery from a first crisis is complete as one event, and of excluding from the denominator used in this calculation the years following the onset of the crisis when that recovery is underway biases the results toward finding more crises in the recent decades. There is some basis for this second objection, since it turns out that recovery takes somewhat longer before 1913 than after 1973 (resulting in the exclusion of more observations from the denominator in the earlier period). When we count successive events as separate crises (except those occurring in the same or immediately adjoining years, which we continue to categorize as twin crises), and normalize by all country-year observations (in contrast to the calculations underlying Figure 1, adding back in the years in the exclusion window), the frequencies are 6.4 in 1880-1913, 13.4 in 1919-1939, 7.9 in 1945-1971, and 10.7 in 1973-1997. The contrast between our age and earlier periods is still there, but it is less pronounced.

[10]Some may wish to dismiss some of these recent episodes as "pseudo currency crises" on the grounds that they may not have had the same negative repercussions on the real economy as currency crises occurring in some earlier periods. In fact, as we show below (see for example Figure 4), the average output loss due to currency crises has been broadly similar since 1973, in the Bretton Woods years, and even before 1913. Recent currency crises are not pseudo crises in terms of the associated output loss.

[11]The conclusion follows whether capital mobility is measured by deviations from interest parity or the average size of the

to financial integration (which has a u-shaped time profile) influence their incidence.[12] For example, it has been argued that democratization has made it more difficult for governments to credibly commit to exchange rate stabilization and to subordinate all other goals of policy to the maintenance of a currency peg. The implication is that it is the combination of capital mobility and democratization, and not capital mobility per se, that has undermined the credibility of exchange rate commitments and made currency pegs more fragile.[13] Figure 1 is consistent with this view.

For banking and twin crises, it is not today but the interwar years are the period of exceptional instability. Aficionados of the Great Depression will not be surprised. Disturbingly, however, our era is close behind. In contrast, banking crises were almost nonexistent in the heyday of Bretton Woods, something that was not also true of currency crises, as we saw a moment ago.[14] Thus, while the tight regulation of domestic and international capital markets, which characterized the world following World War II, suppressed banking crises almost completely in the 1950s and 1960s, controls on capital flows were less successful in suppressing currency crises.[15] Moreover, the contrast with 1880-1913, when the incidence of both banking and twin crises was less, again suggests that blame for the frequency of crises today cannot simply be laid on the doorstep of financial liberalization, since such liberalization was equally prevalent before 1913.

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current account ratio (see Zevin 1992, Taylor 1996, and Bordo, Eichengreen and Kim 1998).

[12]If we stick with the same 21-country sample throughout, the trend is not monotonic, insofar as frequency declines slightly after 1972. Moreover, as we emphasize later, there are signs of it declining further after the mid-1980s in the larger sample as well. But this only reinforces our point that the extent of capital mobility is not a sufficient explanation for the frequency of currency crises.

[13]The argument is that governments have found it increasingly difficult to resist the temptation to trade off currency stability against other goals, undermining the credibility of the exchange rate commitment. This tradeoff is at the heart of many second-generation models of speculative attacks (see for example Jeanne 1997). The role of democratization in complicating the task of currency stabilization is a theme of Eichengreen (1996).

[14]There is exactly one banking crisis in our 21-country sample in this period, in Brazil in 1963. Since Brazil also had a currency crisis in 1962, this event shows up as a twin crisis.

[15]Below, we discuss some multivariate analysis of the causes of banking, currency and twin crises in different historical eras. The results are consistent with the present interpretation, in that there is little evidence there that capital controls significantly reduce crisis risk — to the contrary, they appear to increase it (a result also emphasized by Glick and Huchison 2000 and Leblang 2000).

The difference in results for the two post-1972 samples (for 21 and 56 countries) reveals where this greater frequency is concentrated, namely, in the additional developing countries included in the larger sample, which tend to be younger, smaller, and less developed. There is still a noticeable increase in crisis frequency when we stick with the 21-country sample, but it is less pronounced. Figure 2 suggests that crises have always tended to be predominantly an emerging-market problem, although the Great Depression, when financial stability in the industrial center became a casualty, is a prominent exception.[16]

Readers may be wondering whether crises have been growing more frequent *within* the most recent period. We therefore divided the period in 1988, on the eve of large-scale portfolio capital flows to emerging markets. It turns out that currency crises were actually more prevalent in 1973-87 than subsequently.[17] What have been on the rise, however, are banking crises and, therefore, twin crises, whose frequency increased quite noticeably between subperiods.[18] This points clearly to what is new and troubling about our age.

4. Duration of Crises

Figure 3 shows that the story for duration is quite different than the story for frequency — and quite different depending on the kind of crisis one is talking about. The duration of currency crises seems to have been significantly longer prior to 1913; the contrast is most dramatic for the

[16]While fewer than 25 per cent of pre-1913 crises occurred in industrial countries, more than 75 per cent of interwar crises were centered in the industrial countries. In an arithmetic sense, this change is largely a function of the fact that a number of 19th century emerging markets had evolved into industrial economies by the interwar years, leading us to reclassify nine of our pre-1913 emerging markets accordingly in 1919. Not too much should be read into these particular numbers, in other words. But there is still an economic point. Earlier commentators have contrasted the stability of the center with the instability of the periphery under the gold standard (Triffin 1964, de Cecco 1974) while observing that the crisis problem gravitated to the center between the wars (Bernanke and James 1991). Our results are consistent with this interpretation.

[17]Their frequency declined from 8.8 per cent in that earlier period to 5.6 per cent in subsequent years.

[18]This is true of both our 56 and (especially) 21 country samples. The frequency of banking crises doubles in the 21-country sample, and rises by 50 per cent in the 56-country sample. The standard reference to the twin-crises literature is Kaminsky

industrial countries. The other periods are basically indistinguishable. Twin crises show the opposite pattern: the number of years needed to recover from these events, rather than falling, has been rising, most noticeably for the industrial countries. For banking crises, there is little evidence of either rising or falling duration. Put these crosscutting trends together and there is little sign of consistent changes in the duration of crises over time.

These findings constitute a significant challenge to the conventional wisdom. Goodhart and Delargy (1999) argue that countries should have recovered from currency crises more quickly under the gold standard than today. They observe that countries forced to abandon their gold standard pegs often followed a resumption rule, seeking to restore convertibility at the previous parity once the crisis passed.[19] Awareness of this practice should have stabilized capital flows, as foreign funds flowed in, in anticipation of the capital gains that would accrue when the exchange rate was pushed back up. Supported by the return of flight capital, recovery should have been swift. The authors then review the historical record for the pre-1913 period and conclude that it is consistent with this view.

Goodhart and Delargy's finding of relatively quick recovery from currency crises before 1913 is in fact based on an analysis of only six episodes, some of which involved banking as well as currency-market problems. In our larger sample of pure currency crises, average recovery time was shorter after 1973 than before 1913 (2.1 versus 2.5 years), not longer as the resumption rule would suggest.[20] This finding is important. The idea that the resumption rule minimized the severity of

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and Reinhart (1998). We will have more to say about this problem below.

[19]This has been emphasized previously, in historical analyses of the gold standard, by Bordo and Kydland (1995), McKinnon (1997), and Bordo and Jonung (2000).

[20]All of our pre-1913 currency crises were in countries on the gold standard, so the statistic in the text is the relevant one. In addition to considering a larger sample of countries, we also differ from Goodhart and Delargy by categorizing a number of their currency crises as twin crises (Italy in 1894 and 1908, Argentina in 1890), and one of their cases (Australia in 1893) as a banking crisis, not a currency crisis. The resumption-rule argument does not obviously lead one to expect rapid recovery from banking crises, and the speed of recovery from pure banking crises (with no currency-crisis element) was in fact almost exactly the same before 1913 as after 1972. There is a bit of evidence that the resumption rule limited the output loss from banking crises, as we show (in Figure 11 below).

crises has been used to draw some very strong policy conclusions. The notion is implicit in Hanke (1998) who suggests that the Asian crisis countries, to stabilize expectations and restore investor confidence, should have somehow pushed their currencies back up to pre-crisis levels. McKinnon (2000a,b) explicitly references Goodhart and Delargy's finding in arguing that East Asian countries should establish official dollar parities and commit to returning to them after any crisis. Our findings suggest that their conclusions should be taken with a grain of salt.[21]

The overall impression left by this comparison of the duration of crises is how little has changed. Contrary to the presumption that recovery from currency crises should have been faster prior to 1913, we find no evidence to this effect. Insofar as the length of the subsequent slump is an appropriate measure of severity and the two eras of globalization are the appropriate basis for comparison, there is no evidence that the crisis problem is growing more severe. The question then becomes whether the same is true of other aspects of these events.

5. Depth of Crises

The obvious "other aspect" is crisis depth, which we calculate by cumulating, from the onset of the crisis to the onset of recovery, the difference between pre-crisis trend growth and actual growth and express the difference as a per cent. So measured, depth, like duration, does not suggest that the crisis problem is growing more severe. As shown in Figure 4, the output loss from currency crises is only a half to two-thirds today what it was in the prior age of globalization.[22] The output loss from banking crises is only 75 to 80 per cent today what it was between 1880 and 1913. Only twin crises may have been growing more severe, and the difference is slight.

[21]One can still argue that adherence to the gold standard, which implied a commitment to sound and stable monetary and fiscal policies, is part of the explanation for the lesser frequency of crises prior to 1913 (and there are some suggestions of this in the literature, as noted in footnote 46 below), but this is a different matter from the role of the resumption of gold convertibility in limiting the length of crises, which is what is in dispute here.

[22]Depending on whether one prefers the 21 or 56 country sample for the recent period.

Two things that stand out in Figure 4 are the exceptional severity of crises (of all kinds) in the interwar years and the importance of mix. Particularly impressive are the large output losses due to currency crises in the 1920s and 1930s (nearly twice as large as in 1880-1913, and nearly three times as large as under Bretton Woods and today). Twin crises, especially in emerging economies, were also more severe than in other periods. For banking crises the pattern is muted but still there.

The importance of mix is evident in the comparison of the Bretton Woods period with today. When we consider all crises, the average output loss is more than 50 per cent larger today. But this is not because events that the two periods had in common — namely, currency crises — had different associated output losses. Rather, it is that the output losses from banking crises and twin crises are almost always larger than those from currency crises, and that these particularly disruptive events, while having been essentially absent in the Bretton Woods period, are increasingly prominent today.

Not all of the crises we identify caused recessions.[23] Figure 5 shows that no recession has resulted about a quarter of the time since 1973.[24] The exception, not surprisingly, is twin crises, which are always disruptive of growth. The pattern is similar for earlier historical periods, although there are variations. For example, crises more uniformly caused output losses prior to 1913 than in the Bretton Woods or interwar years. Reassuringly, little changes when we limit the sample to crises with output losses.

Overall, then, output losses tell the same story as durations. While crises have grown more frequent, they have not also grown more severe. If anything, the duration of crises and their output losses were greater in the period of globalization before 1913. The Great Depression and Bretton

[23]Readers may be reminded of the most recent Brazilian crisis, in 1998, when the same was essentially true.

[24]In fact, the share of crises occurring in recessions has ranged from 52 per cent in 1880-1913 to 44 per cent in 1919-1939, 54 per cent in 1945-1971 and 49 per cent in 1973-1997. Gupta, Mishra and Sahay (2000) have undertaken a similar exercise limited to currency crises since 1970 and obtained similar results. They consider 298 crises in 125 countries. (Their sample differs from ours mainly by their inclusion of a substantial number of poor -- mainly African -- economies.)

Woods were different, the former because of the exceptional severity of both currency and banking crises, the latter for the virtual absence of the latter. But if these differences are prominent, the similarities are, if anything, more prominent still.

6. Comparisons with Recessions

These output losses from crises are less impressive if they are indistinguishable from the output losses in recessions not accompanied by crises. While crises often occur in recessions, it could be that the occurrence of a crisis adds nothing to the severity of those recessions, and that all we are picking up is the output effects of the latter.

In Figure 6 we compare output losses in recessions in the course of which a crisis occurs with output losses in recessions during which no crisis occurs. For recessions without crises, we then calculate the output loss from the first year following the business-cycle peak to the year when growth returns to its pre-crisis trend. For recessions with crises, it is not obvious whether to start the calculation at the beginning of the recession (as in the middle panel of Figure 6) or the beginning of the crisis, which can be several years into the recession (as in the bottom panel).[25] While we report both variants, we focus on the calculation from the onset of the recession.

That calculation suggests that recessions with crises are more severe than recessions without them; this is true for virtually every period and category of countries considered. The contrast is most pronounced in the interwar period — not surprisingly, given the importance attached to crises in accounts of the Great Depression. Our age is not exceptional in this regard. The output loss is about

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About 40 per cent of their crises do not have associated output losses.

[25]Neither procedure is ideal. The former runs the risk of attributing to the crisis any unusually severe fall in output that preceded the crisis, biasing the results toward finding that recessions with crises are unusually severe. The latter leads us to compare portions of recessions (in the case of recessions with crises) with complete recessions, which creates a bias in the other direction. This is evident from the comparison of the second and third panels of the table.

ten percentage points larger in recessions with crises than in recessions without them both since 1973 (when we consider all 56 countries, as is our convention) and before 1913.[26] In the Bretton Woods period the additional output loss is slightly smaller, but slightly is the operative word. Again, while crises may have been growing more frequent, they have not obviously been growing more costly.[27]

Figure 7 does analogous calculations for recovery times, yielding analogous results. Recessions with crises last longer than recessions without them.[28] It is the interwar period that stands out: recessions with crises lasted more than twice as long as recessions without them. The differential for each of the other periods is less, on the order of 50 per cent, and there is little difference across them. To repeat, while crises have been growing more frequent, it does not appear that they have been growing more severe.

7. Controlling for Other Characteristics of Cycles

There are at least two reasons to pause before concluding that crises make recessions worse. First, simple comparisons between crises and recessions (or between recessions that coincide and do not coincide with crises) may conceal (or spuriously suggest) regularities because they fail to control for other respects in which the two events differ. Some cycles may have other characteristics that make for exceptionally severe recessions, so that once we control for such characteristics any difference between recessions with crises and recessions without crises disappear. Second, what may be going on is that unusually serious recessions cause crises, not that crises aggravate recessions.

[26]If we consider only 21 countries since 1973, the point is reinforced.

[27]This may be the appropriate point at which to revisit the possibility of biases affecting estimates of the cyclical properties of GDP data. Romer (1989) has emphasized that pre-1913 GDP series, which tend to be built on historical evidence on commodity production, may overestimate the amplitude of the cycle by neglecting relatively stable non-commodity-producing sectors. Spurious volatility which exaggerates the amplitude of cycles may also exaggerate the contribution of crises to recessions, since crises tend to coincide with exceptionally severe recessions, and it is these exceptionally severe recessions whose amplitude tends to be overestimated. To the extent that this is true, it puts crises today in a less favorable light.

[28]The one exception being emerging markets before 1914.

In this section we develop a model with which to test these hypotheses.

Taking the recession as the unit of observation, we regress the output loss on a constant, other characteristics of the cycle, and a dummy variable for whether or not a crisis was observed in the course of the recession. As characteristics of the cycle we include the rate of growth in the five-year period preceding the downturn and a dummy variable for whether the country was industrial or an emerging market.[29] A large literature suggests that business-cycle volatility is greater in emerging markets. And the literature on credit booms suggests that the more rapid is growth in the expansion phase, the sharper will be the post-peak contraction (Gavin and Hausmann 1996).

Estimates of this equation are reported in Table 1 for the entire period and the post-1973 years.[30] The positive coefficient on expansion-phase growth confirms the credit-boom hypothesis, while that on the dummy variable for industrial countries does not suggest that recessions are more severe in emerging markets once we control for this other effect (if anything the opposite is true). The coefficient of particular interest is that on "all crises." The point estimate of 9 means that the cumulative output loss is 9 percentage points greater in recessions with crises than those without. The coefficient is significant at the 99 per cent confidence level. In other words, even after we control for other characteristics of the country and the cycle that make certain recessions unusually severe, there is still an association between crises and the output loss.[31]

In the right-hand panel we consider separate indicators for currency, banking and twin crises. All three are positively associated with the severity of recessions, currency and twin crises significantly so. Twin crises add an additional 15 percentage points of output loss, while currency

[29]A variety of other cycle characteristics could be added, and we plan to do so in future work.
[30]We include dummy variables for the successive subperiods, where 1973-97 is the omitted alternative. These suggest that recessions were slightly more severe under the gold standard and in the interwar years, other things equal, and less severe under Bretton Woods, although only this last difference is significant.
[31]9 percentage points is quite similar to what we found in the tabulations in Figure 6.

crises are about half as disruptive, banking crises a quarter. This last result is surprising: we did not expect currency crises to be so much more disruptive than banking crises.[32]

The regressions for the 1973-1997 period are startlingly similar. Twin crises are again twice as disruptive as currency crises, which are twice as disruptive as banking crises. The point estimates are slightly larger than for the longer period but none differs significantly from its full-sample value.[33] Thus, formal tests fail to reject the null that the output effects of currency, banking and twin crises remain the same today as over the century that ended in 1971.

While we have now controlled for other characteristics of cycles that affect the severity of recessions, these inferences may be based on an inappropriate assumption about the direction of causality, which could run from recessions to crises, not from crises to recessions. Those who regard business cycle fluctuations as fundamental and crises as ephemera (e.g. Schwartz 1986, Gorton 1988) would subscribe to this view. The obvious treatment is to instrument the crisis using lagged policy and structural variables. We do so as follows. In the first stage, we estimate multinomial logit regressions of the crisis dummies on lagged policy and structural variables.[34] The instruments used in the first-stage logit are lags of inflation, the ratio of M2 to reserves, the ratio of M2 to GDP, the trade balance, the budget balance, a dummy variable for currency pegs, a dummy variable for capital controls, and a measure of crises in neighboring countries (as a proxy for contagion).[35] In the second stage we use the fitted values in place of the actual crisis indicators. The effect of crises on the

[32]Or the effect to be more significant. A variety of sensitivity analyses (for example, we dropped either the pre-crisis rate of growth and/or the industrial-country dummy from the list of controls) left this result unchanged.

[33]The main difference when we add the three interaction terms for our three types of crises and the dummy variable for the post-Bretton Woods period is that all three types of crises now enter with coefficients that are significantly different from zero at standard confidence levels (where only two did before).

[34]Our dependent variable can take on four values: currency crisis, banking crisis, twin crisis, and no crisis. The multinomial logit model treats these as four mutually exclusive alternatives and relates each of them to the same explanatory variables.

[35]These are among the most important variables suggested by the leading-indicators literature (Goldstein, Kaminsky and Reinhart 2000). The use of lagged values throughout increases the likelihood that these are valid instruments. An alternative specification, in which we dropped the contagion, peg and trade-balance variables yielded essentially the same results. We

severity of recessions, according to the coefficient on "all crises," is now larger than before, a cumulative 14 percentage points of lost growth, and the coefficient still easily differs from zero at the 95 per cent confidence level. We can decisively reject the null that all we are picking up is the effect of recessions on crises.

8. Capital Mobility and Crises

It is tempting to use the first stage from the two-stage-least-squares analysis just described to analyze the causes of crises. This is tantamount to attempting to construct a leading-indicator model of currency and banking crises, however, something that is problematic insofar as theory suggests that crises can occur for a variety of reasons, including both problems with fundamentals and self-fulfilling prophecies. As one of us has emphasized in an earlier issue of this journal (Eichengreen, Rose and Wyplosz 1995), a regression model relating crises to fundamentals is unlikely to have high explanatory power insofar as fundamentals are only part of the explanation for the event.[36] All the evidence is that crises are heterogeneous. These are theoretical and empirical reasons not to expect too much.

This suggests starting with simple tabulations as a way of identifying the most important regularities and changes over time. Among those regularities is the difference in crisis incidence in countries with and without capital controls (Figure 8). Currency crises are significantly more likely in countries with capital controls; this is true of every period but the first, when controls were absent. On the other hand, banking crises have been less frequent since 1973 when controls were present, although the same pattern is not evident in earlier years. Both results are robust to multivariate

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report the first-stage estimates in the next section and in Table 2 below.

[36]Models of self-fulfilling back runs and multiple equilibria in foreign exchange markets (so-called "second generation models" of speculative attacks) suggest that there is unlikely to be a simple mapping from fundamentals to the incidence of

analysis: multinomial logit analysis of the likelihood of various kinds of crises confirms that both effects are statistically significant at standard confidence levels: controls make banking crises less frequent but currency crises more frequent (see Table 2).[37] A Wald test for differences between the full sample and 1973-97 is unable to reject the null that the determinants of crises are no different today than over the entire historical sweep. Thus, our analysis continues to underscore the extent of continuity.

The positive association of controls with currency crises is consistent with theoretical work (e.g. Bertolini and Drazen 1997a,b) suggesting that controls incline the authorities toward riskier policies and send a negative signal about their readiness to defend the rate. The two empirical studies of this issue of which we are aware, Glick and Hutchison (2000) and Leblang (2000), are also consistent with the existence of this adverse signaling effect, in that countries imposing controls are more likely to experience currency crises. Our analysis suggests that their result carries over to earlier periods as well.

Banking crises, in contrast, are less likely in the presence of capital controls. This association is a theme of the literature on the Asian crisis, in which it is argued that banks and corporates sheltered by the financial safety net and implicit exchange rate guarantees used the absence of controls to fund themselves offshore and lever up their bets (see inter alia Goldstein 1998). Our results suggest that this pattern is not new.[38] (We provide some examples of earlier incarnations of these

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crises.

[37]Here we use a more limited list of explanatory variables than in the first-stage regressions of the preceding section. (Specifically, we drop the lag of the peg, the contagion variable, and the current account). More elaborate specifications yield essentially the same results. Specifically, it remains true that both banking and currency crises are significantly more likely in low-income countries where financial systems are underdeveloped. It is still the case, as in Table 2, that currency crises are less likely where lagged reserves are large (relative to M2) and the budget surplus is large. And, importantly, our results regarding capital controls remain unchanged.

[38]This conclusion is reinforced insofar as interaction terms between crisis indicators and dummy variables for the post-1973 period again enter insignificantly, individually and as a group, and change none of the coefficients on the other variables when added to the specification. While the same pattern is evident when we estimate a separate equation on the data for the

same destabilizing dynamics below.)

Since controls have opposite effects on the likelihood of banking and currency crises, it follows that they have no significant effect on the likelihood of twin crises. This is what we find, as reported in Table 2.

The presence or absence of capital controls thus emerges as a key determinant of changes in the frequency of crises over the course of the 20th century. It is at least part of the explanation for why banking crises have grown more frequent while currency crises have become less frequent since the late 1980s. The removal of controls, in conjunction with the changes in the political setting emphasized in Section 3 above, thus helps to account for the single most important feature distinguishing the 1990s from most of the preceding century.

9. Policy and the Cost of Crises

There is no consensus model of the costs of currency and banking crises, although previous authors have considered aspects of the problem.[39] We start by looking for differences in the cost of crises under different policy regimes. Where bivariate comparisons suggest regularities or important changes across regimes, we then ask whether or not that pattern is robust to multivariate analysis. Where it is, we can say that we have identified an important determinant of crisis severity.

We considered a variety of potential explanations for the cost of crises: the size of the current account balance and the budget balance, whether the currency is floating, whether capital controls

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post-1973 subperiod alone, the coefficient on the capital-controls variable does not approach statistical significance at standard confidence levels. The same result has been reported previously, for a different country data set, by Eichengreen and Arteta (2000).

[39]See e.g. Honohan and Klingebiel (2000) on the fiscal costs of banking crises and Gupta, Mishra and Sahay (2000) on the costs of currency crises. We should note that output losses are only one aspect (and therefore a limited measure) of the cost of crises. Currency crises can have other, longer-term costs such as the loss of credibility. The other costs of banking crises include the fiscal costs to the government (and ultimately the taxpayer) and, when the authorities cannot mobilize the resources needed to service the additional debt, the welfare costs of inflationary finance.

are present, and the structure of the financial system (whether the different functions of financial intermediaries are carried out by one institution, strictly separated, or in between).[40] For banking crises we also consider the policies used to facilitate crisis resolution. We constructed separate measures for open-ended liquidity support (the provision of financial support to distressed, often insolvent financial institutions) and capital support (where public resources are used to recapitalize problem banks).[41] Finally, we enumerate instances when governments provide unlimited guarantees to depositors and creditors of financial institutions in the attempt to stem a loss of confidence in the system.

For currency crises we find, for the post-1972 years but not before, that the cost is greater when the current account deficit is allowed to widen significantly in the preceding period (Figure 9).[42] This effect is robust to multivariate analysis, again for the post-1972 years but not for the period as a whole.[43] (See Table 3.) This is the "sudden-stop" problem, in which an abrupt cessation of capital inflows requires the current account deficit to be eliminated in short order by the compression of

[40]This variable captures the range of products and services financial institutions are authorized to provide. In a fully integrated banking system, banks are allowed to conduct both banking and securities business (including underwriting, dealing and brokering all kinds of securities) within the same banking organization. In a separate banking system, banks are not allowed to engage in any type of securities activities. In systems lying in between, financial institutions are allowed to conduct both banking and securities activities (to a varying degree), either through a bank parent or a bank-holding company structure. Before the late 19th century and early 20th centuries, the range of products and services individual financial institutions offered (i. e., the scope of their financial services provision) was in many countries determined by market forces. Over time, however, countries introduced regulatory restrictions on the activities of different financial institutions.

[41]Note, that this type of long-term, open-ended liquidity support is to be distinguished from short-term liquidity support to solvent banks, a la Bagehot, which we are not measuring here.

[42]The budget balance, the structure of the financial system (fully integrated, mixed or separate) and the exchange rate and capital account regime (whether the currency was floating or pegged, whether capital controls were present or absent) did not appear to systematically influence the cost of currency crises.

[43]This is true whether or not a twin crisis dummy is included. (The latter is also consistently significant at conventional confidence levels, confirming that currency crises are more costly when they are accompanied by banking-sector problems). The use of Tobit in estimating these equations is appropriate because, as noted in the discussion of Figure 5, the output loss was zero in a quarter of the crisis episodes considered. We also estimated these equations using a two-stage Heckman procedure (estimating a first stage probit for whether or not a crisis occurred and including the Inverse Mills Ratio from this first stage in the second-stage Tobit for the cost of the crisis). While this is an intuitive approach, in no case did the coefficient on the Inverse Mills Ratio approach significance or did the other summary statistics suggest that selectivity was sufficiently severe to justify the use of the more complex estimator. Hence, we rely on the simpler Tobit estimates in what

consumption, investment and import spending, potentially causing a collapse of output and doing serious damage to the financial system.

It is striking that this problem is apparent in the post-1972 period but not before. The difference is not that large current account deficits were absent in earlier years (to the contrary, as shown by inter alia Taylor 1996), but rather that they did not exhibit the same association with crises (they were less subject to sudden stops). In the period 1880-1972, of the 33 crises that were preceded by current account deficits, those deficits were transformed into surpluses in the year following the crisis in only six cases (a ratio of 15 per cent). In contrast, the same was true in 18 of the 48 crises preceded by deficits in the period 1973-97 (a ratio nearly twice as large). While the comparison is crude, it suggests that current account reversals have been faster in the recent period. And these faster reversals in turn lead to costlier currency crises.

Determining just why sudden stops were less frequent and severe in earlier eras (equivalently, why current account reversals have been slower and smoother) is likely to require a deep historical investigation that cannot be completed here.[44] Be that as it may, the historical literature provides hints. For example, Feis (1930) and Fishlow (1986) emphasize the private-to-private nature of flows and strong complementarities between trade flows and capital flows in explaining how countries were able to run persistent current account deficits before 1913, often of a size unmatched in the mid-to-late 20th century, without suffering debilitating interruptions. They emphasize that capital flowed into export-linked infrastructure investments, which enhanced the recipients' capacity to earn foreign exchange and thus to pay the borrowed money back.[45] (The same cannot be said of much post-1972

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follows.

[44] An obvious way of approaching the analysis is by applying the methods used by Milesi-Ferretti and Razin (1998) to analyze the determinants of current account reversals in recent years.

[45] This is not to suggest that there were no debt-servicing difficulties or currency crises due to sudden stops; to the contrary, these authors highlight their prevalence. But the point is that they were fewer and less severe than the size of current account

lending, which was often public to public or private to public and less consistently export linked.) The willingness of creditors to continue to finance the current account deficit in difficult times may have been enhanced by the knowledge that the resources they provided were flowing into foreign-exchange-generating activities.[46]

For banking crises, the most important regularities concern liquidity support for insolvent banks and the nature of the exchange rate regime. Both since 1972 and in the interwar years, banking crises were more costly when open-ended liquidity support was provided (Figure 10) and when the exchange rate was pegged (Figure 11).[47] There are of course no banking crises to analyze under Bretton Woods, and the pre-1913 period looks like a fundamentally different animal. But both effects are robust when we estimate Tobit equations for the cost of banking crises, including the additional determinants of banking crises described above, for the entire 120 years as well as the post-1972 period (see Table 4).[48]

Why open-ended liquidity support for insolvent banks should increase the cost of crises is no mystery: public loans to banks, when they are not conditioned on restructuring and recapitalization, permit insolvent institutions to gamble for resurrection, facilitate the continued flow of financing to loss-making borrowers, and allow owners and managers to engage in looting (as emphasized by, inter alia, Akerlof and Romer 1993).[49] The operation of these perverse incentives was graphically evident

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deficits and the modern correlation would lead one to predict.

[46]Additional explanations for the absence of sudden stops in this earlier period include the adherence to stable monetary and fiscal policies required by the gold standard and colonial/Commonwealth links, which minimized political uncertainty (Bordo, Eichengreen and Kim 1998).

[47]Domac and Martinez-Peria (2000) also find for the recent period that currency pegs increase the severity of banking crises.

[48]The significance of the exchange rate is sensitive to the inclusion of our measure of financial structure and to whether or not we include a dummy variable for whether the banking crisis in question was accompanied by a currency crisis (that is, whether we include a twin crisis dummy). This is not surprising, since we know that central banks whose currencies are simultaneously under attack have less leeway for intervening to stabilize their banking systems.

[49]Among the policy variables intended to facilitate crisis resolution, capital support and unlimited guarantee do not prove to be significant, i. e. influence the economic costs of banking crises one way or another. These results confirm those of Honohan and Klingebiel (2000) for the modern period. The financial structure variable (fully integrated, mixed or separate)

in Asia in 1997-8, and specifically in Indonesia, where, according to government audits, an estimated US $16 billion of liquidity support (equivalent to 24 per cent of GDP) issued to distressed financial institutions disappeared.[50] The Asian crisis is also a graphic reminder of how pegged rates can provide an implicit guarantee against exchange risk, thereby encouraging the accumulation of unhedged foreign exposures, which increase financial distress when the denouement comes. In addition, central banks bound by the exchange rate constraint are less able to intervene, by reducing interest rates for example, and are more likely to defend a nominal exchange rate at any cost.[51]

History provides many examples of the operation of these perverse dynamics.[52] A notable example is the European banking crises of the early 1930s. There, the Austrian and German governments encouraged domestic banks to provide much-needed "industrial policy loans" to embattled but politically-powerful industrial firms, in return for which they received implicit guarantees of government support. Foreign investors, reassured by these promises of support and under the impression that they were insured against currency risk by the government's policy of pegging the exchange rate, were more than willing to provide the German and Austrian banking systems with short-term credits. When it was revealed in the 1931 Creditanstalt crisis that these loans had gone bad, expectations that the government would be forced to intervene cast doubt over the stability of the currency. As the short-term money attempted to flee, the exchange rate came under pressure and the entire arrangement predictably came to grief. The need to defend the currency peg, together with investor doubts about the credibility of their commitment to do so, then prevented the authorities from lowering interest rates or discounting freely on behalf of even solvent banks. The

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also does not appear to have systematically influenced the costs of banking crises.

[50] *Financial Times* (6 August 2000).

[51] The budget balance, the other macro-economic policy indicator, and the variable characterizing whether capital controls were present or absent do not prove to be significant.

[52] Akerlof and Romer's famous example is Chile in 1982.

result was large-scale capital flight, forcing official intervention to support the banking system and the imposition of exchange controls, considerably more draconian than those of Malaysia, to prevent the collapse of the currency.[53]

While this abbreviated review of interwar history suggests that there is nothing new under the sun, Figure 10 suggests that pre-1913 crisis resolution was different. Then, liquidity support, if anything, was part of the solution rather than part of the problem, its more limited and judicious provision reflecting the more limited political pressure to provide it. Similarly, pegged exchange rates were not clearly associated with more serious banking crises; if anything, the opposite was true, reflecting the greater credibility and durability of the peg and the lesser extent of short-term capital flows.[54]

10. Thailand as a Case in Point

The Thai crisis illustrates these points. (We highlight this case because Thailand's crisis had both currency and banking elements and because each of three of the key relationships in our data -- pegged exchange rates, large current account deficits, and liquidity support for insolvent intermediaries -- played prominent roles.) It illustrates the role of a large current account deficit in magnifying the costs of a currency crisis. By 1996 Thailand's deficit reached eight per cent of GDP. Heavy capital inflows and a credit boom channeled substantial investment into real property, creating an asset-price bubble. Prominent among the participants were a number of lightly regulated finance companies which invested heavily in the booming real estate market. When the real estate bubble burst, they immediately encountered difficulties.

[53]See James (1986), Eichengreen (1992) and Goedde (2000).

[54]While long-term lending and borrowing were large relative to the size of the world economy in earlier periods, short-term capital flows were less, a point emphasized by everyone from Bloomfield (1968) to Bordo, Eichengreen and Irwin (2000),

Initially the government avoided acknowledging the problem by extending liquidity support to the finance-company sector (in the amount of ten percent of GDP). By mid-1997, it was impossible to deny that most of these institutions were black holes of insolvency, compelling the authorities to finally close all but two of the intervened ones (Claessens and Klingebiel 2000). In the interim, however, losses in the finance-company sector mounted precipitously.

The government's response, furnishing the finance companies with additional liquidity, at low cost and without intervening in their operation, only added to the supply of funds in the market with which to attack the peg. It is not surprising that this was the moment at which the perception started to take hold that the exchange rate was misaligned. Already at the beginning of 1997, total private capital flows started to taper off, before turning into massive outflows when the crisis broke. The capital outflow dictated huge swings in the current account. Current account surpluses were achieved primarily through import compression and reductions in income rather than through additional exports. The consequence was a massive recession.

Thailand's crisis also illustrates the additional flexibility in managing banking-system distress that a flexible exchange rate can provide. The country operated a relatively inflexible exchange rate policy from 1985 to mid-1997: that the nominal value of the baht did not change for ten years surely influenced market participants' perceptions of currency risk. Meanwhile, a tight monetary policy that held interest rates above international levels created incentives for residents to fund themselves offshore, increasing their exposure to currency and liquidity risk.[55] These unhedged foreign exposures confronted the authorities with a dilemma: either allow the currency to float and damage the health of a banking sector heavily indirectly exposed to currency risk, or defend the peg at all

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and echoed recently by Greenspan (2000).

[55]The problem was compounded by the fact that the dollar dominated the currency basket to which the baht was pegged, but Japan was more important than the United States as an export market. Thus, while the appreciation of the dollar against the

costs, including by holding up interest rates and betting foreign currency reserves forward. In the end, they had no choice but to allow the exchange rate to float, having depleted their foreign exchange reserves and incurred a large contingent liability as a result of their efforts to prop up the financial system. But this move to greater exchange rate flexibility came too late. A more flexible exchange rate, had it been adopted earlier, would have avoided the impression of an implicit exchange rate guarantee and encouraged Thai residents to more carefully assess foreign currency risk. It also would have allowed the central bank to resort to lower interest rates when the economy started to slow, easing the pressure on financial institutions' balance sheets.

Closely related to this problem were distortions on the financial side, which created artificial incentives for short-term offshore funding. Prominent among these was the establishment of the Bangkok International Banking Facility (BIBF), an offshore financial market which enjoyed tax and regulatory advantages aimed at fostering the development of Bangkok as a regional financial center. Unlike other deposit-type instruments, short-term BIBF monetary instruments (under 12 months to maturity) were not subject to seven percent cash reserve requirements. This tax and reserve treatment of BIBF institutions acted like Chilean holding-period taxes in reverse, encouraging rather than deterring short-term capital inflows. In an effort to sterilize the resulting inflows and to curtail credit expansion, the government tightened monetary policy, which only encouraged further inflows by increasing the differential between foreign and domestic rates and further encouraging offshore short-term funding (Alba, Hernandez and Klingebiel 1999).

Thus, Thailand manifested each of the problems highlighted by our historical analysis: the threat to banking-system stability posed by the fatal combination of an open capital account, the implicit insurance against exchange risk conferred by an ex ante credible currency peg, and open-

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yen did not encourage hedging, it did undermine the country's international competitiveness, setting the stage for the crisis.

ended liquidity support, plus the threat to currency stability posed by the combination of a large current account deficit and policies encouraging short-term borrowing by banks and corporates. Our analysis suggests that, had they known their history better, these dangers would have been more apparent to observers before the fact.

11. Summary and Implications

It will come as no surprise that one conclusion of this paper is that the crisis problem is not new. Banking crises, currency crises and twin crises are hardy perennials; they are evident under a variety of monetary and regulatory regimes. Over the last 120 years, crises have been followed by downturns lasting on average 2 to 3 years and costing 5 to 10 per cent of GDP. Even when one controls for other characteristics of cycles, recessions with crises are more severe than recessions without them. The evidence suggests that this pattern reflects causality running from crises to recessions, at least in part, and not simply from recessions to crises.

What, then, was different about the last quarter of the 20th century? The obvious answer is the greater frequency of crises. After 1973 crisis frequency was double that of Bretton Woods and the classical gold standard period and matched only by the crisis-ridden 1920s and 1930s. History thus confirms that there is something different and disturbing about our age.

Beyond this, the dominant impression is, to echo two of our predecessors, *plus ça change, plus c'est la meme chose.*[56] Crisis length has remained constant. Output losses have changed little. Crises may have grown more frequent but they have not obviously grown more severe.

One qualification has to do with mix. The growing prevalence of twin crises is an important change in the fourth quarter of the 20th century. Twin crises have always been more disruptive than

banking and currency crises, and their incidence has been greater in the last quarter century than in any period other than the disastrous Depression years. To the extent that twin crises have become more frequent in the last 25 years, the cost of a randomly selected crisis was greater, and the resumption of growth took longer. This twin-crisis problem has attracted considerable attention from recent investigators (e.g. Kaminsky and Reinhart 1998); our findings suggest that their preoccupation is fully justified.

There is by now a large literature on the causes of crises, and we have done little more than confirm its main findings. What is new is our evidence regarding the implications for the cost of crises of the exchange rate regime, the current account, and liquidity support. We find that banking crises are more costly in the presence of pegged rates. Official assurances of exchange rate stability encourage the accumulation of unhedged exposures; as noted above, this is a lesson of the 1920s as well as the 1990s. Moreover, restrictive exchange rate commitments limit the ability of the authorities to implement a more accommodative monetary policy in the event of negative shocks, again plausibly making the crisis worse.

The policy implications follow directly. There is an argument for flexible exchange rates as an ex ante measure to minimize the cost of banking crises. This is important because the point is contested. Authors like Hausmann et al. (1999) have argued that floating rates rather than pegs heighten financial fragility by discouraging financial deepening and hindering the development of the capacity to borrow abroad at long maturities in one's own currency. By implication, floats rather than pegs should be associated with costly crises. This is not what we find.

Another key implication is that how the authorities support the banking system is important. The historical record shows that unconditional support for unsound intermediaries makes crises

[56]Goodhart and Delargy (1999).

worse by facilitating looting and gambling for resurrection. While there are theoretical arguments that cut both ways, the evidence shows that prompt public intervention in all distressed financial institutions will limit the macroeconomic costs; waiting to intervene until after the crisis has passed risks throwing good money after bad.

In terms of the severity of currency crises, what matters most is how far out on a limb the authorities permit the economy to crawl in the pre-crisis period. The wider the current account deficit and the heavier the reliance on short-term borrowing to finance it, the more disruptive the dislocations when inflows dry up, and the more difficult the necessary adjustments. Before the Asian crisis, it was fashionable to deny the importance of current account deficits and their financing as sources of vulnerability. Our findings suggest that pundits would not have been so quick to dismiss them had they known their history.

It follows that emerging markets vulnerable to sudden shifts in capital flows — which in practice means all emerging markets — should formulate monetary, fiscal and exchange rate policies with an eye toward limiting current account deficits and managing their financing. They should be sure that tax policies and reserve requirements applied to financial institutions do not artificially encourage maturity mismatches. They should strengthen market discipline so that banks and corporates are compelled to manage their exposures prudently, and they should upgrade the prudential supervision of banks and securities markets to compensate for the inadequacies of market discipline and the moral hazard created by the safety net. And where time is required to raise supervision and regulation to world-class levels, they may want to contemplate Chilean-style holding period taxes on inward foreign investment as interim measures, to further protect against distortions

leading to excessive and therefore dangerous maturity mismatches.[57]

At the same time, our analysis lends little support to the view that capital controls provide governments and investors with protection against currency crises. To the contrary, we find a *positive* association with controls, suggesting that governments enjoying their shelter succumb to the temptation to run riskier policies and that the markets take their presence as an unfavorable signal of official resolve. In a word, the moral hazard due to controls is severe. Moreover, there is a *negative* association of controls with banking crises, as if an open capital account facilitates the efforts of market participants sheltered by a safety net to lever up their bets; again the obvious interpretation is in terms of moral hazard. There has been debate recently about whether the stress laid by academic and official commentators on moral hazard has been overdrawn. Our conclusion is that it has not: moral hazard has long been with us and should be taken seriously.

While our results suggest that open capital accounts are a mixed blessing from the point of view of financial stability, they also remind us of one reason why emerging markets are reluctant to resort to controls. Controls transmit a negative signal about the authorities' commitment to sound and stable policies that may in the end do more to upset than stabilize the markets. But it does not follow that countries should liberalize at will. The historical evidence, from the recent Asian crisis and elsewhere, underscores that countries need to be cautious about how they open their capital accounts. Too many Asian governments liberalized short-term inflows first, encouraging the

[57]The case for these taxes, in this context, is precisely that they can be used to lengthen the maturity structure of the foreign debt and offset the bias toward excessive short-term exposures that may exist when borrowers are protected by a safety net and prudential supervision and corporate governance are weak. The idea that inflows taxes are a third line of defense against excessive reliance on short-term inflows, following market discipline and prudential supervision, is developed by Eichengreen and Mussa et al. (1998). To be sure, there is an enormous debate over the effectiveness of these taxes; some critics argue that they were vitiated by evasion. Others point to the lack of evidence that they limited the overall level of foreign borrowing. The second objection can be dismissed on the grounds that the rationale is not to limit the overall level of borrowing but to alter its maturity structure, and on the maturity front the evidence is compelling. As the definitive study (De Gregorio, Edwards and Valdes 2000) puts it, "the more persistent and significant effect is on the composition of inflows, tilting composition toward longer maturity." As for the first objection, it is important to recall that such a measure, to

accumulation of foreign exposures and rendering the economy susceptible to sudden changes in investor sentiment. Their experience underscores the importance of liberalizing in a way that does not encourage banks and corporates to incur huge maturity mismatches. It highlights the importance of accompanying capital account liberalization with measures to limit official safety nets, improve disclosure regimes as a way of strengthening market discipline, and strengthen the supervisory and regulatory framework under which financial institutions operate.

The continuity that runs through these findings should not allow us to lose sight of what is distinctive about our age. Short-term capital flows, both absolutely and a share of total capital flows, are greater today. This has immediate implications for crisis risk and policy toward it. While late 19th century emerging markets could treat such flows with benign neglect, given their low level, their early 21st century counterparts must attach priority to their management. This means avoiding perverse tax incentives that encourage excessive reliance on short-term obligations, as in Thailand in the mid-1990s, and instead designing tax policies to minimize those risks. It means limiting official safety nets and implicit guarantees so that financial institutions have stronger incentives to consider the consequences of their actions. It means adopting a more flexible exchange rate so that financial and nonfinancial corporations are forced to consider the risks of short-term foreign exposures on an everyday basis.

In addition, our age is different in that the financial safety net is more extensive and the political pressure to bail out distressed financial institutions is greater than a century ago. Then, that pressure was more limited if only because the role of central banks in providing liquidity support had not yet been clearly defined. Central banks erred in the direction of recusing themselves, as a result of which liquidity crises sometimes ran out of control. Now the pressures are to err in the other

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effectively lengthen the maturity structure of the debt, need not be evasion free.

direction. Our results suggest that it is critically important for the authorities to operate their lender-of-last-resort facility so that liquidity support is only provided to solvent institutions for limited periods at penalty rates against collateral (truly as a last resort), ensuring that it cannot be used to support insolvent institutions and delay the recognition of financial distress.

Appendix: Data and Methods

Sample. Our 21-country sample is made up of the following countries. The pre-1914 "emerging markets" are Argentina, Australia, Brazil, Canada, Chile, Denmark, Finland, Greece, Italy, Japan, Norway, Portugal, Spain, Sweden, and United States, while the pre-1914 industrial economies are Belgium, France, Germany, the Netherlands, Switzerland, and Great Britain. While classifying the U.S. as an emerging market will be controversial, we do so because the U.S. was a steady capital importer through much of the period, like the other late developers in our sample, and because it lacked a number of the institutions of an advanced-industrial economy, notably a central bank. Starting in 1919, we re-classify the following countries as industrial: Australia, Canada, Denmark, Finland, Italy, Japan, Norway, Sweden and the United States.

Our 56-country sample is made up of the 53 countries in IMF (1998) plus Senegal, Ghana and Cote d'Ivoire. We added these three in order to increase the overlap with the sample of countries for which we have information on crisis resolution.

Crisis Dates. We date currency and banking crises using both qualitative and quantitative evidence. (The resulting series for banking and currency crises, along with our business cycle turning points, are shown in the accompanying table.) The use of qualitative evidence to date banking crises is standard in the literature. Because asymmetric information is intrinsic to bank intermediation, the value of nonperforming loans becomes available only with a lag, and even then official estimates of loan losses understate the problem. Because of the existence of deposit insurance and lender-of-last-resort intervention, depositor runs do not necessarily accompany banking-sector problems, making the change in the value of deposits a poor measure of banking-sector distress. For all these reasons, any purely quantitative indicator of banking crises will be problematic.

The use of qualitative evidence to date currency crises is less standard. But because of important changes over the long historical sweep in the depth and liquidity of financial markets, as well as their regulation (the imposition and removal of capital controls, for example), the standard measure of exchange market pressure, if relied on exclusively, would suggest that crises were almost entirely concentrated in those periods when the markets were most liquid and least regulated; hence, given our historical perspective, a hybrid measure (the union of our qualitative and quantitative series) is to be preferred. In constructing the quantitative measure, we build on the exchange-market-pressure model of Girton and Roper (1977) and the methodology in Eichengreen, Rose and Wyplosz (1995, 1996a), as is now standard in the literature. Following the latter,

the weights are calibrated to equalize the conditional volatility of the components of the index. We use Britain as the core country through 1913, the U.S. thereafter.

Since we are concerned not just with the frequency of crises but also with the output loss, successive crises, which follow before recovery from a first crisis is complete, are scored as one event. It would create empirical problems to attempt to calculate separate recovery times or output losses associated with overlapping crises (when the first crisis was still going when the second one began). In any case, it is not clear conceptually whether two crises that occur in rapid succession are properly regarded as separate events.

Since Caprio and Klingebiel (1996, 1999) have identified banking crises in the 1970s, 1980s and 1990s using the same methods, we simply adopt their dates. We use only those banking crises that they classify as systemic. The IMF having carried out the comparable exercise for currency crises for the post-1972 period (in IMF 1998), we can again simply adopt their dates. We found a number of anomalies in the IMF crisis chronology, which we corrected before proceeding.

While our methodology for estimating the length and depth of crises is a variant of that in IMF (1998), there are several important differences in implementation. We consider growth relative to the five-year pre-crisis trend, which differs from the three-year pre-crisis trend used the Fund, since we found that considering only three years yields unstable and unreliable results. (This also works to protect our results from one of the biases emphasized by Mulder and Rocha 2000.) Recovery time is defined as the number of years until GDP growth returns to its pre-crisis trend, including the year when it returns to that trend. By definition, then, minimum recovery time is one year. There is of course no single metric for crisis duration and recovery speed and in a previous paper (Bordo and Eichengreen 1999) two of us measured recovery speed by the number of years following the crisis when the growth rate turned positive, and obtained somewhat different results. Research being cumulative, we are prepared to argue that the current metric for recovery speed is more defensible.

While we include all episodes in which currency and banking crises occurred in the same or adjoining years, the currency and banking crises in question are not also included under the "banking crisis" and "currency crisis" headings; again, this differs from the procedure followed by IMF (1998). Since additional crises occurring before recovery from an initial crisis was complete (including of course crises occurring in consecutive years) were counted as a single event, as noted above, the number of crises we identify for the post-1972 period is slightly fewer. Note that we dropped crises for which there was insufficient data to estimate the years required to return to the pre-crisis rate of GDP growth (because of the intervention of a war or because of data problems).

Business Cycles. Our application of the band-pass filter to identify business cycle peaks and troughs is based on

a 3 year centered moving average, with the weights chosen to minimize the squared difference between the optimal and approximately optimal filters, subject to the constraint that the filter has zero gain at frequency zero. The filter places zero weight on all frequencies between 2 and 8 years. Peaks and troughs are then identified in three stages. First, we locate all local maxima and minima. Second, we eliminate all local maxima that occurred such that the log deviation from trend was negative. (In effect, this amounts to removing all peaks with a negative growth rate.) At this stage we also eliminate all local minima around which the log deviation from trend was positive (in effect eliminating all local minima for which the growth rate was positive). Finally, we remove adjacent peaks and adjacent troughs. When there are two consecutive peaks or troughs, the larger of the two is selected. Note that the band-pass filter tends to pick out a number of growth recessions (since it is removing from the data a positive growth trend and leaving decelerations in the rate of growth, which the methodology picks up as recessions). Thus, in text, we refer to recessions in which no output loss occurs. These are the growth recessions in question.

Appendix A: Crises Dates and Business Cycle Turning Points.

A. 1880-1913

Date	Argentina	Australia	Belgium	Brazil	Canada	Chile	Denmark	Finland	France	Germany	Greece	Italy	Japan	Netherlands	Norway	Portugal	Spain	Sweden	Switzerland	UK	USA
1883																					
1884				T				P						T							BC
1885	CC	T					BC	T		P	CC							P		P	T
1886												P			T		P		P		
1887	T				T	CC	T		T	T				P		P					
1888				P		T			CC			T						T			
1889	P	P		BC, CC				P	P,BC				T				T			T	
1890	BC, CC			BC	P		P							T	P			P		BC	CC
1891	BC				CC	P						BC		P		BC, CC					P,CC
1892	T									T		P	P			T				P	T
1893		BC,T			CC		T	T	T	CC		BC					P	T	T		P,BC CC
1894	P									P		CC			T		T				
1895										T				P			P				T
1896						T		P					T	T		P		P			
1897				BC	T									P,BC				BC	P		
1898	T			T,CC		BC, CC			P	P		T		T						T	
1899		P					P									T	T				
1900	P			BC		P		BC					P.CC							P	
1901				BC	P				T	T,BC		P	BC		P	P					P
1902	T			P			T						T				P				
1903		T						T						P				T	T		
1904					T				P			T	P,CC								T
1905	P					T		P		P				T	T	T		P			
1906					P		P		T								T		P		
1907						BC	BC		BC	CC		P,BC	T,BC				P	BC			P,BC
1908	T,CC			T	CC		BC		P			CC	CC		P	P					
1909					T				T				P	P					T		T
1910							T	T		T		T			T		T	T			
1911		P			P				P				T	T					P		P
1912	P			P		P	P			P							P			T	
1913							T		T							T					

Note: BC represents banking crises, CC represents currency crises, P represents business cycle peaks, T represents business cycle troughs.

B. 1919-1939

Date	Argentina	Australia	Belgium	Brazil	Canada	Chile	Denmark	Finland	France	Germany	Greece	Italy	Japan	Netherlands	Norway	Portugal	Spain	Sweden	Switzerland	UK	USA
1913																		T			
1914							P						P						T		
1915					T	T		P						P	P	P	P	P			T
1916	T			T								P							P		
1917													T		T					P	
1918					P	P		T						T							P
1919		T		P								T					T	T			
1920	P				T											T,BC	BC	P			
1921	T			T	CC	T	T,BC CC	P.BC ,CC				BC	P,CC	P,BC ,CC	P,BC					T	T
1922			T				CC		T						T,BC		P				
1923				BC	BC			T	CC					CC	BC	BC		T			
1924	P		P,CC	P	P	P		P				P			P	P	BC		T	P	P
1925			BC		T	BC		T						T		T	T,BC				
1926	T		BC	T		T	T		CC	T		T								T	T
1927		P	T										T,BC		T						
1928				P				P				P					P				
1929	P,CC				P,CC	P				P				P	P			P	P	P	P
1930	CC		P	CC			P		BC			BC	P			P					BC
1931	BC, CC	T	BC	CC	CC	CC	BC, CC	T,BC CC	BC	BC, CC	T,BC CC	BC	CC		BC, CC	BC, CC	CC BC	BC, CC	BC	CC	BC
1932	T,CC	CC		T		T	CC		BC	T	CC	T	CC			BC	T	BC, CC	T		BC
1933		CC			T		T						T		T			T	BC		T,BC ,CC
1934	BC		T,BC	CC						CC				T			P				
1935	P		CC			P	P					BC, CC		CC					P		
1936		P		P	P		T		T, CC	T		CC				T			T,CC		P
1937			P	CC				P	CC		P				P		T			T	
1938	T		CC				P											P			
1939		T	BC		T			BC					P	BC	T				P.CC		T

Note: BC represents banking crises, CC represents currency crises, P represents business cycle peaks, T represents business cycle troughs.

Date	Argentina	Australia	Belgium	Brazil	Canada	Chile	Denmark	Finland	France	Germany	Greece	Italy	Japan	Netherlands	Norway	Portugal	Spain	Sweden	Switzerland	UK	USA
1940	P		T														P				
1941								T					T	P		P					
1942		P					T					P								P	
1943				T	P	T							P				T	T	T		P
1944	T					P		P					T	T			P				
1945		T										T				T					
1946			T												T					T	
1947				P	T		P				T							P	P	CC	
1948	P							T	CC			P		P							T
1949		P.CC	T,CC	T		T	P	CC	P	CC	P			CC	CC	P	T	CC		CC	
1950	CC			P	CC						CC	T							T	P	
1951			P		P					P			T		T						
1952	T			T													P				P
1953		T		P		P,CC				T	T	P		T		T	T	T		T	
1954		P	T		T				T								P				T
1955				T		T				P	P				P	P	T	P	P	P	P
1956	P		P	P				P	P					P			P				
1957					P	P	T		CC				P			T					
1958								T		T		T					CC	T		T	
1959	CC		T	CC							T		T		T				T		T
1960						T			T		P						T				CC
1961		T			T			P		P										P,CC	
1962	CC			T,CC	CC	P,CC					T	P		T			P				
1963	T			BC, CC						T			P			P	T		P	T	
1964		P				T			P	P		CC			T					CC	
1965			P	P,CC			P				P			P		T	P	P		P.CC	
1966	P						P									P	T			CC	
1967	CC	T	T		P	P	T	T	T	T		T		T	P		P,CC	T		T,CC	P
1968	T					CC	P		CC		T		T						T		
1969						T	P													P	
1970	CC				T		T									T				T	T
1971		T,CC	CC	T			P,CC	CC			CC		P	CC	CC	CC	T,CC	CC	CC		CC

Note: BC represents banking crises, CC represents currency crises, P represents business cycle peaks, T represents business cycle troughs

.

D. 1973-1998

DATE	ARGENTINA	AUSTRALIA	AUSTRIA	BANGLADESH	BELGIUM	BRAZIL	CANADA	CHILE	CHINA	COLOMBIA	COSTA RICA	DENMARK	ECUADOR	EGYPT	FINLAND	FRANCE	GERMANY	GREECE	HONG KONG	ICELAND	NDIA
1972	P				P			P								P	P	P			
1973							P					T									
1974		P										P			P						
1975	CC			P, CC		P		CC						CC						CC	
1976		CC			T		T	T, BC		T	T	T, CC					T	T	T	T	
1977	T		T	T		T		CC	T					P	T		BC				P
1978		T	P		P							P						P		CC	
1979				P			P	P	P		P			CC							
1980	BC	P		CC		P			CC	P					P		P		P	P	T
1981	P			T, CC			CC	BC			CC		BC	T, BC						CC	
1982	CC	T			CC			CC	T	BC		T	CC					T	BC		P
1983	T	CC			T	T	T				T		T				T	CC	BC		
1984	CC							T, CC		T			P, CC					P	T	T, CC	
1985	BC	CC		P							P	P	T, CC					CC			
1986						P	CC		CC				P		T, CC	T		T			T
1987	P, CC		T	BC		CC			P		T, BC	BC									
1988							P	P		P	P		T, CC						P	P	
1989	T, CC BC	P, BC		T					CC			T		P, CC	P	P					
1990	T		P		P	CC BC					T		P	BC				P			P
1991	CC			P					T				T, CC		CC, BC				T		CC
1992		T						T	CC	T		CC				CC					
1993				T								CC	P		T, CC						T, CC
1994						BC		P			P			T		T, BC			P	T	BC
1995	BC, CC	P			T	P		T	P	P											
1996												P									P
1997	T	T	T					P			T								T		
1998	P			P		CC				T									P	P	

D. 1973-1998 (continued)

DATE	INDONESIA	IRELAND	ISRAEL	ITALY	JAMAICA	JAPAN	KOREA	MALAYSIA	MEXICO	NETHERLANDS	NEW ZEALAND	NIGERIA	NORWAY	PAKISTAN	PARAGUAY	PERU	PHILIPPINES	PORTUGAL	SINGAPORE	SOUTH AFRICA	SPAIN	SRI LANKA	SWEDEN	SWITZERLAND	TAIWAN	THAILAND	TURKEY	UK	URUGUAY	ZIMBABWE/ VENEZUELA/ US
1972				P						P								P						P						
1973																												P		
1974																					P									
1975	CC							CC			P, CC	P	T	P	T	P, CC	P			P, CC			P			T			CC	CC
1976	T	T, CC		CC	CC			T	CC	T							T	T, CC	T		CC	T		T	T			T, CC		T
1977			CC BC	T										T		CC				BC	BC	CC	T	CC			P, CC			
1978	CC		T		CC	T	P		T	P	CC					T		CC		T, CC								P		PT
1979		P				CC					T	T	P	CC											P	P	CC		CC	P
1980	P		P	P			CC				CC				P								P	P					P	BC
1981					T, CC	P	T		P, BC			P, CC		P		P	BC	P		P, CC							T		BC	P,C C
1982									CC								P, CC		BC	CC	CC		T				BC	T, CC	CC	TCC
1983	CC			T	P. CC			P	CC	T			T			CC BC	CC	CC	P						BC	BC			CC	
1984			T		T						CC				CC	T				CC				T	T		CC		T	BCC C
1985								BC	CC			T		T	T			T		BC	T									CCT
1986	CC	CC				T					P	CC	P, CC		CC		T, CC			CC		P				T	P		CC	CCT ,CC
1987	T	T	P					T			BC		BC			P			T	T										P
1988					P, CC				T		CC	CC		CC		CC				CC					P				P	CC
1989				P			P						T		P, CC		P	P	P	P		T, BC	P					P		PT, CC
1990		P	T	BC	T			P	CC			P		CC		CC	CC				P			P			T		T	P,C C
1991	P				CC							CC BC				T							BC				CC BC			
1992	BC	CC		CC		BC			P	CC	T					CC			T	CC	CC		CC				P	T, CC		TPC C
1993	T	T			CC		T	T				CC	T	P, CC			T			T			T	T					P	BC
1994				T	P	T			CC BC	T		CC						T			T	P					CC BC			CCT
1995				CC	P				CC		P			CC	BC	P			P	CC	CC				BC	P	T, CC			CC
1996	P		P				P	P	T			T					P			P			P					P		T
1997	CC BC	P					CC BC	CC						CC	T		CC					T		T		CC BC	P		T	CC
1998	CC BC			T	T		CC BC	CC BC	P	P	T		P	T		T	BC		CC				T			CC BC			P	PP

Note: BC represents banking crises, CC represents currency crises, P represents business cycle peaks, T represents business cycle troughs.

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Table 1. Output losses from recessions with and without crises: regression analysis with additional controls
(Dependent variable is output loss in per cent)

1880-1997					
Variable	Coefficient	t-statistic	Variable	Coefficient	t-statistic
Constant	**-6.33**	**2.51**	Constant	**-6.86**	**3.65**
Average growth	**3.20**	**9.08**	Average growth	**3.19**	**9.25**
Industrial	2.36	1.83	Industry	**2.74**	**2.12**
All crises	**8.67**	**5.52**	Banking crisis	3.22	1.72
			Currency crisis	**7.79**	**4.16**
			Twin crisis	**14.84**	**4.87**
N	351		N	351	
R^2	0.41		R^2	0.44	

1973-1997					
Variable	Coefficient	t-statistic	Variable	Coefficient	t-statistic
Constant	**-8.18**	**2.66**	Constant	**-7.98**	**2.46**
Average growth	**3.09**	**5.87**	Average growth	**3.00**	**6.33**
Industrial	**5.45**	**3.08**	Industrial.	**5.89**	**3.46**
All crises	**10.50**	**5.98**	Banking crisis	**4.44**	**2.30**
			Currency crisis	**8.67**	**4.37**
			Twin crisis	**15.95**	**5.42**
N	140		N	140	
R^2	0.40		R	0.46	

Note: t-statistics were calculated using White heteroscedasticity consistent standard errors. The regression for the pooled sample (1880-1997) also includes period fixed effects (not reported). Entries in bold face denote coefficients that differ significantly from zero at the 95 per cent confidence level.
Source: see text.

Table 2. Multinomial logit analysis of determinants of crises
(Dependent variable is type of crisis)

1880-1997						
	Twin Crises		Banking Crises		Currency Crises	
Variable	Coefficient	z-statistic	Coefficient	z-statistic	Coefficient	z-statistic
Constant	**-3.19**	**7.89**	**-2.36**	**5.23**	**-3.11**	**12.25**
Lag of inflation	**-0.01**	**3.02**	-0.02	1.01	0.01	1.61
Lag of capital controls	-0.05	0.14	**-0.97**	**2.10**	**0.53**	**2.52**
Lag of M2 to reserves	-0.02	1.03	-0.02	0.71	**0.02**	**2.62**
Lag of GDP per capita	-0.01	1.24	**-0.01**	**2.92**	-0.01	1.35
Lag of GDP growth	-0.01	0.36	-0.02	0.56	0.01	0.40
Lag of Government surplus	0.03	0.81	0.03	0.61	**-0.04**	**2.02**
N	1722					
R^2	0.04					

Note: entries in bold face are significantly different than zero at the 95 per cent confidence levels.
Source: see text.

Table 3. Tobit Estimates of the Determinants of the Cost of Currency Crises
(Dependent variable is the output loss resulting from currency crises)

	1973-1997		1880-1997	
Variable	Coefficient	t-statistic	Coefficient	t-statistic
Constant	4.82	1.37	**6.74**	**2.47**
Lag of M2 over reserves	-0.05	-0.28	-0.13	-1.21
Lag of trade balance to GDP	**-0.57**	**-2.10**	-0.15	-0.71
Lag of government surplus to GDP	0.06	0.19	-0.05	-0.19
Lag of inflation	-0.00	-0.24	-0.00	-0.20
Lag of GDP per capita	-0.00	-0.55	-0.00	-1.01
Lag of capital controls	-2.72	-0.92	-1.68	-0.77
Twin crisis dummy	**15.69**	**5.29**	**11.53**	**4.75**
Number of Observations	95		155	
Pseudo R^2	0.06		0.03	

Note: entries in bold face are significantly different than zero at the 95 per cent confidence levels.

Source: see text.

Table 4. Tobit Estimates of the Determinants of the Cost of Banking Crises
(Dependent variable is the output loss resulting from banking crises)

1973-1997								
	Model (4.1)		Model (4.2)		Model (4.3)		Model (4.4)	
Variable	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Constant	4.39	1.01	5.59	1.11	-8.45	-0.51	4.63	0.90
Liquidity support	**7.25**	**2.05**	**9.92**	**2.46**	**11.96**	**3.37**	**10.98**	**2.80**
Capital support	4.82	1.26	5.38	1.20	10.30	1.25	2.76	0.68
Guarantee	-4.96	-1.44	-3.14	-0.79	-6.61	-1.28		
Lag of peg	2.63	0.65	4.31	0.92	8.88	1.83		
Lag of capital controls	-4.81	-1.07	-1.39	-0.27	0.33	0.07	-0.21	-0.04
Twin crisis dummy	**11.71**	**3.23**						
Lag universal banking index					4.19	0.73		
Number of observations	29		29		21		29	
Pseudo R^2	0.09		0.04		0.08		0.04	

1880-1997								
	Model (4.1)		Model (4.2)		Model (4.3)		Model (4.4)	
Variable	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Constant	4.02	1.42	4.72	1.68	9.55	1.42	4.37	1.98
Liquidity support	**5.98**	**1.99**	**6.91**	**2.34**	5.63	1.79	**7.20**	**2.55**
Capital support	2.20	0.67	2.40	0.72	0.20	0.05	2.48	0.82
Guarantee	-0.67	-0.22	-0.70	-0.23	-0.35	-0.10		
Lag of peg	-0.13	-0.05	0.29	0.11	0.78	0.26		
Lag of capital controls	1.56	0.55	2.44	0.87	2.17	0.67	2.36	0.89
Twin crisis dummy	3.60	1.27						
Lag universal banking index					-1.63	-0.71		
Number of observations	76		76		59		79	
Pseudo R^2	0.02		0.02		0.01		0.02	

Figure 1. Crisis Frequency
(per cent probability per year)

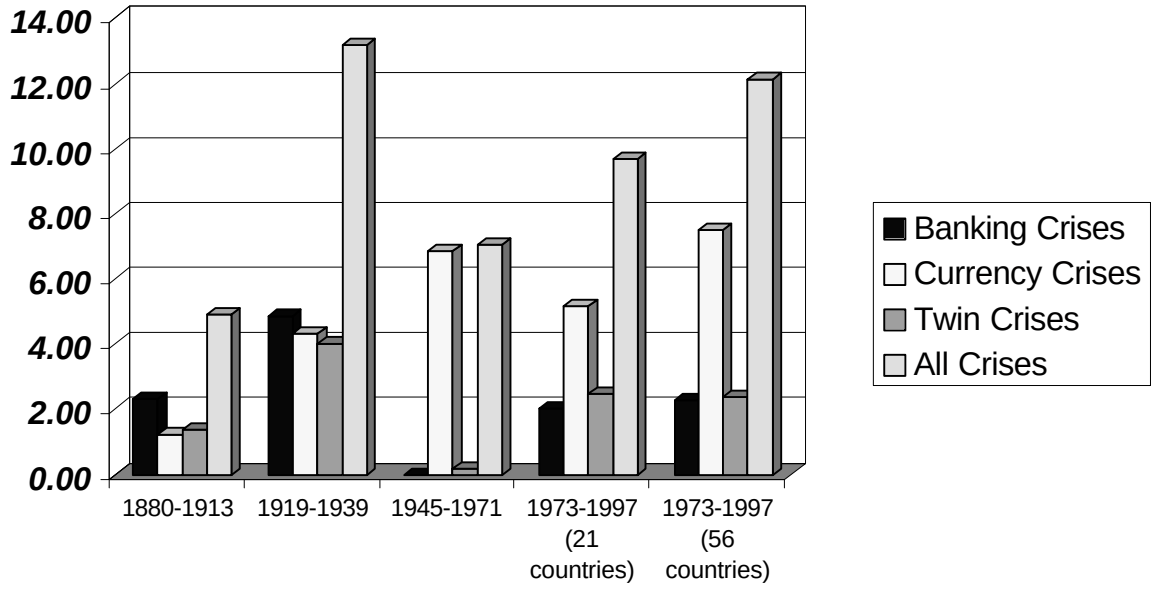
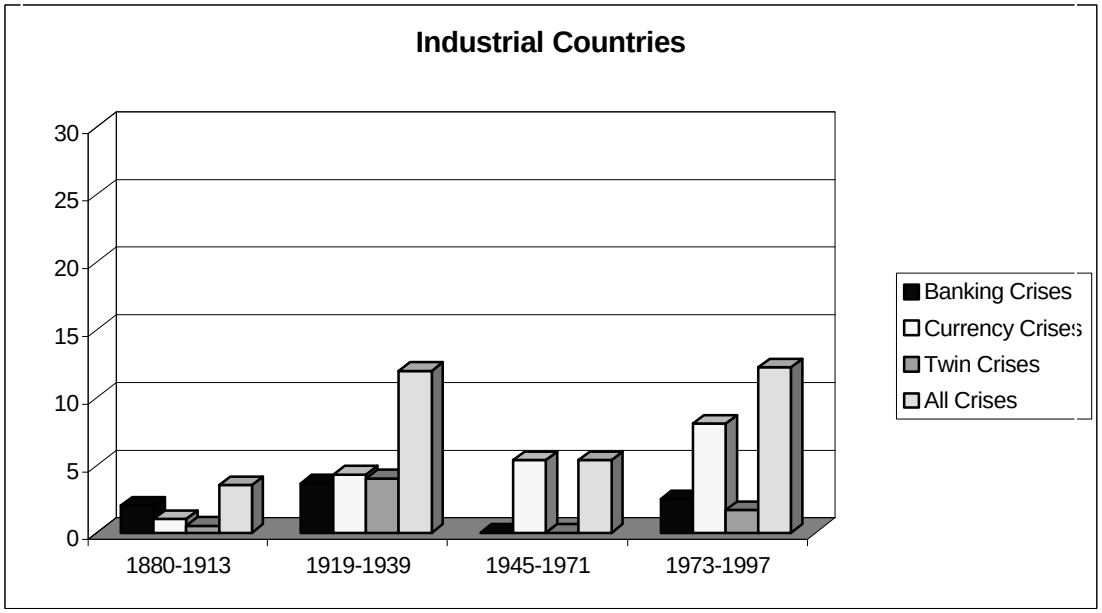


Figure 2. Frequency of Crises - Distribution by Market



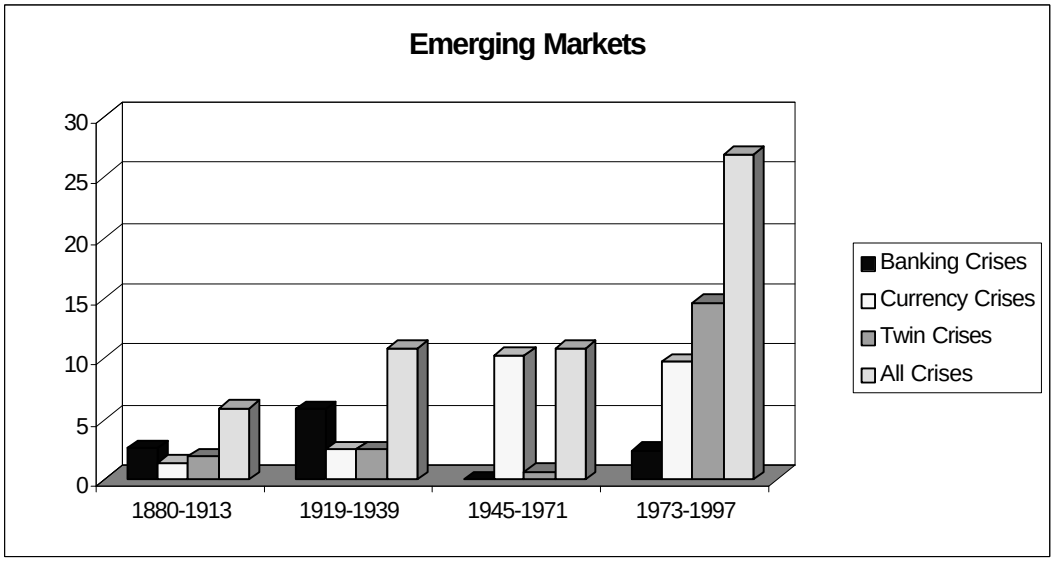
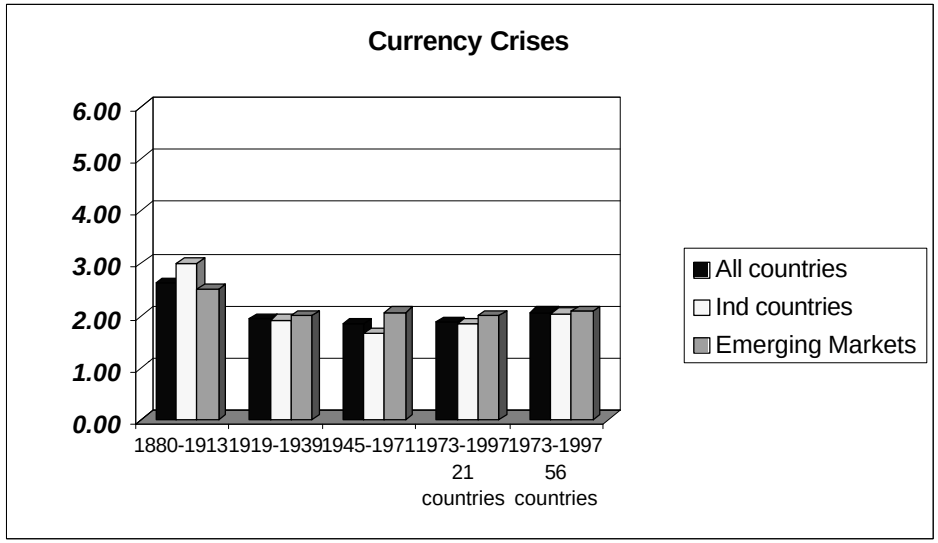
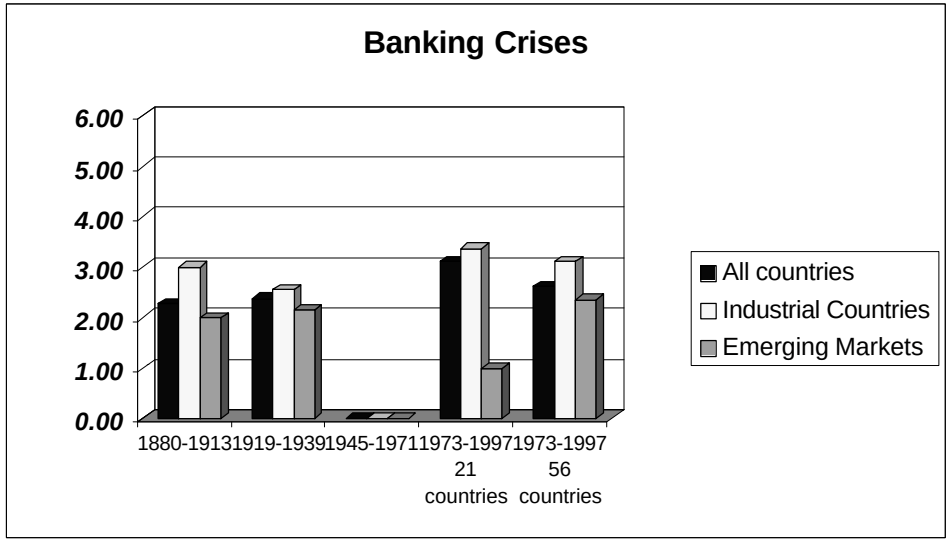
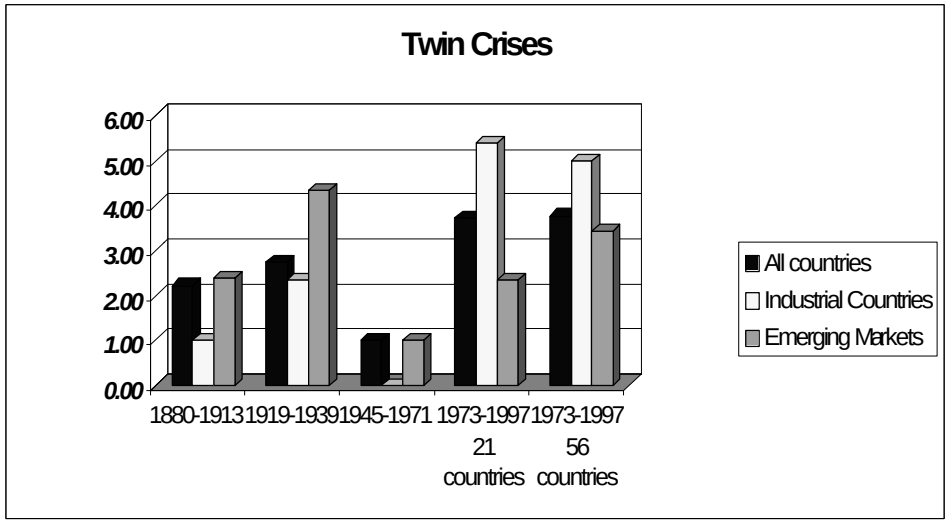


Figure 3. Average Recovery Time
(in years)







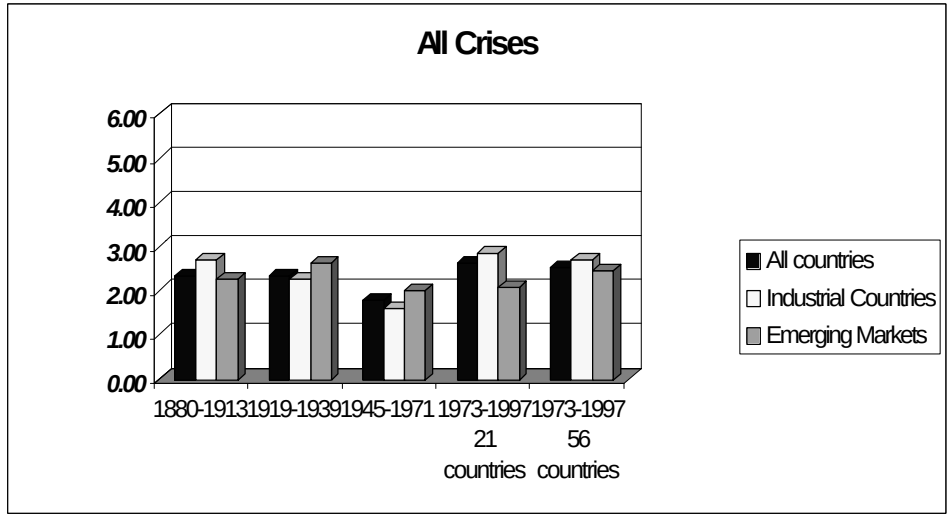
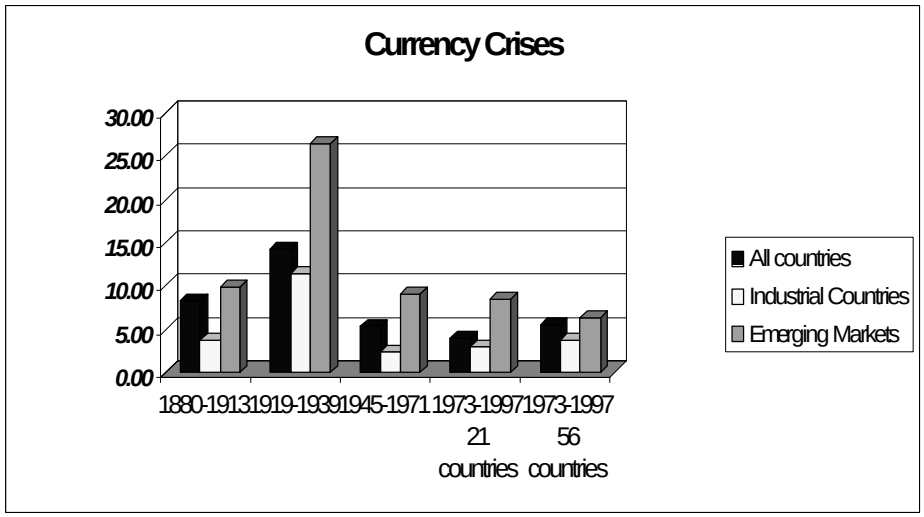
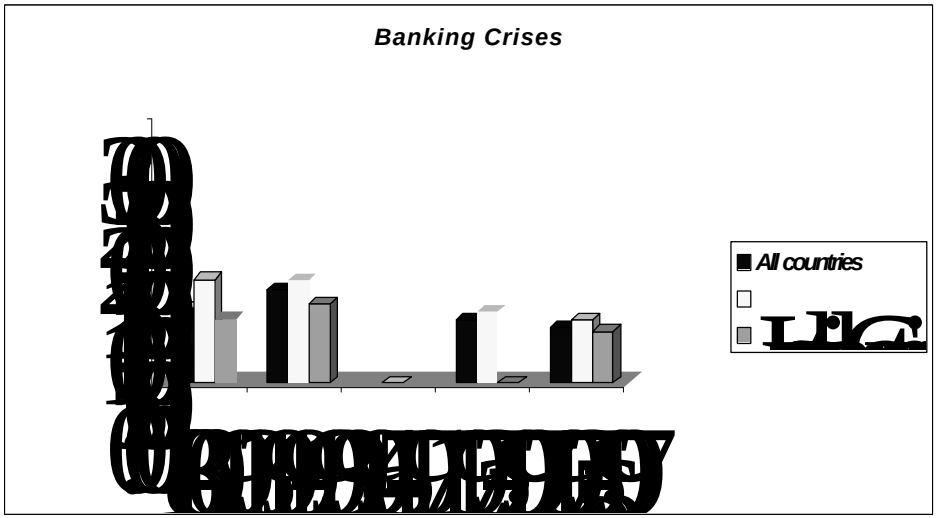
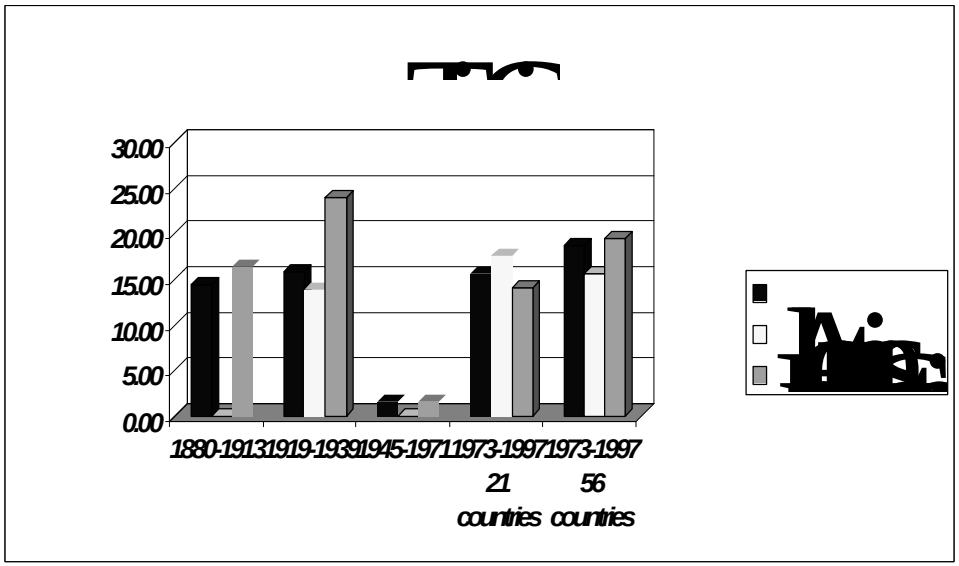


Figure 4. Output Loss per Crisis







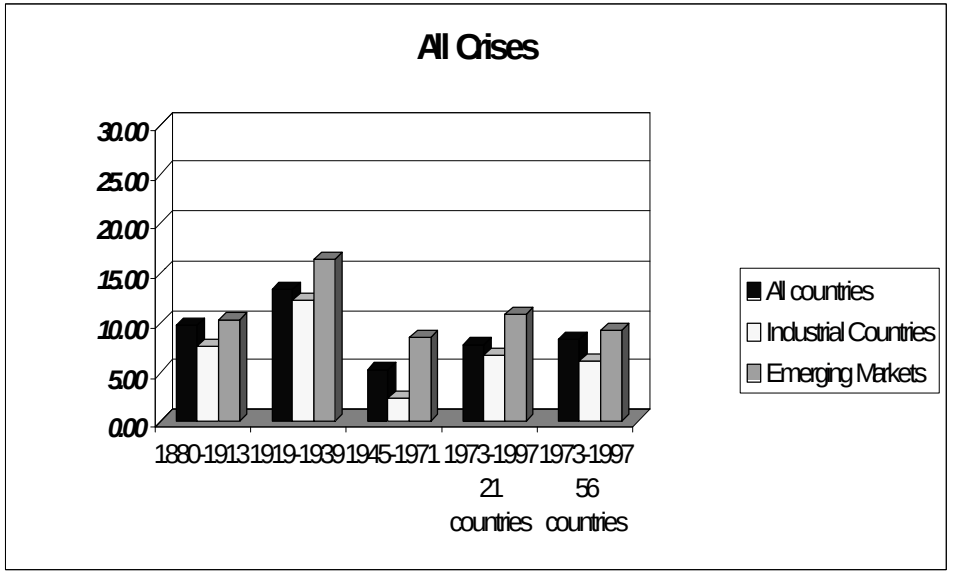
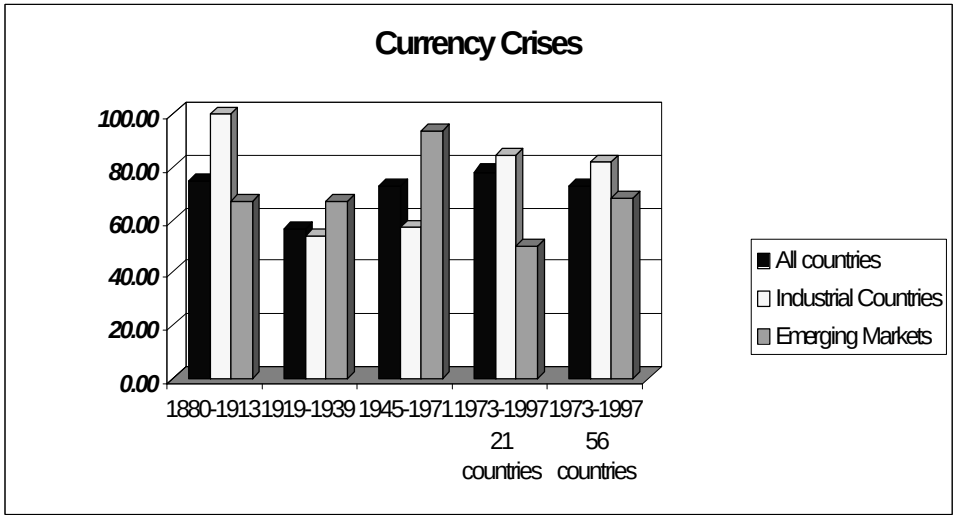
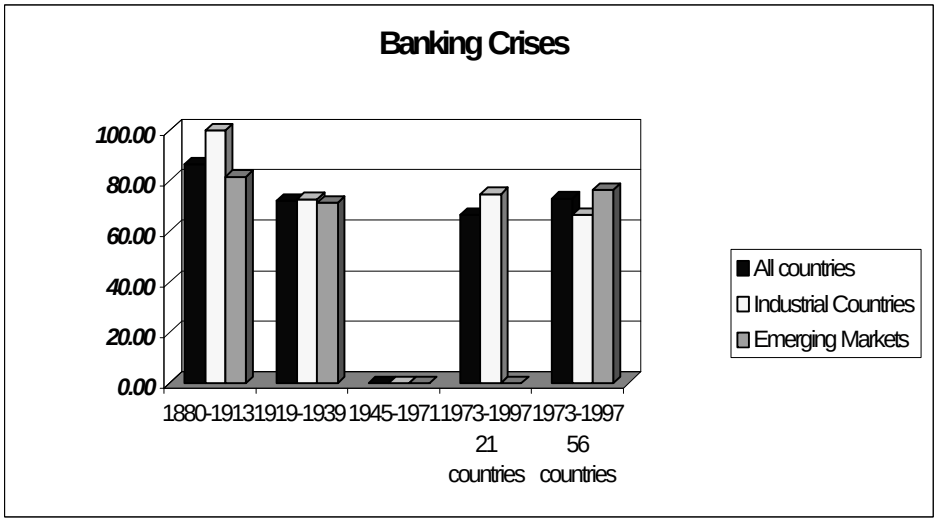
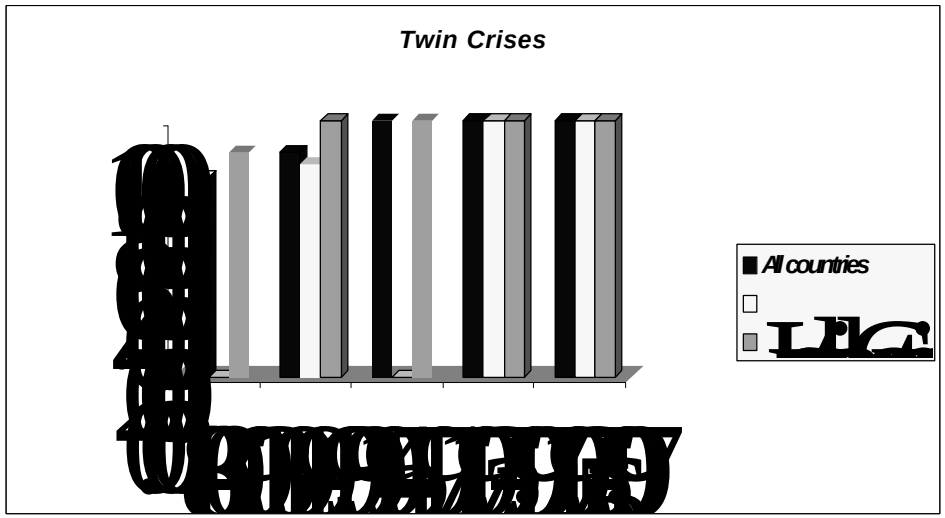


Figure 5. Crises with Output Losses - Percentage of Total







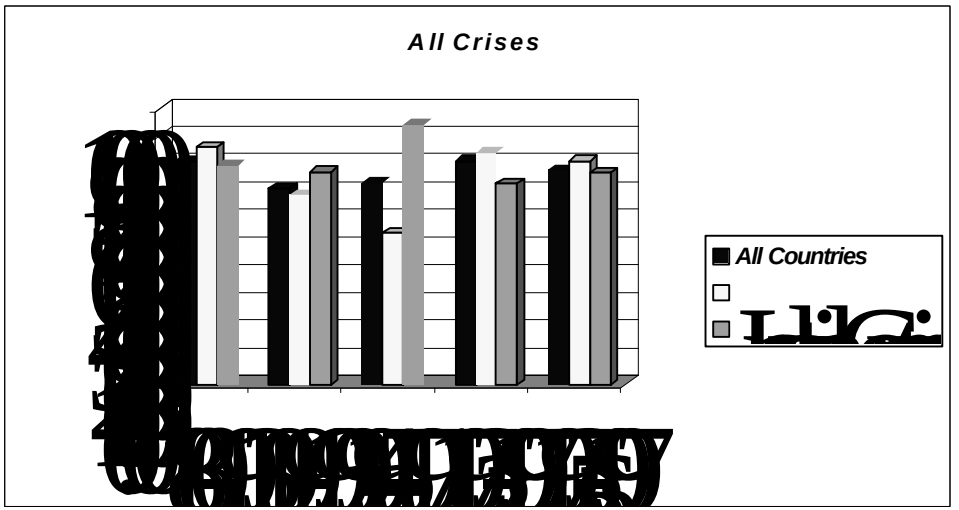
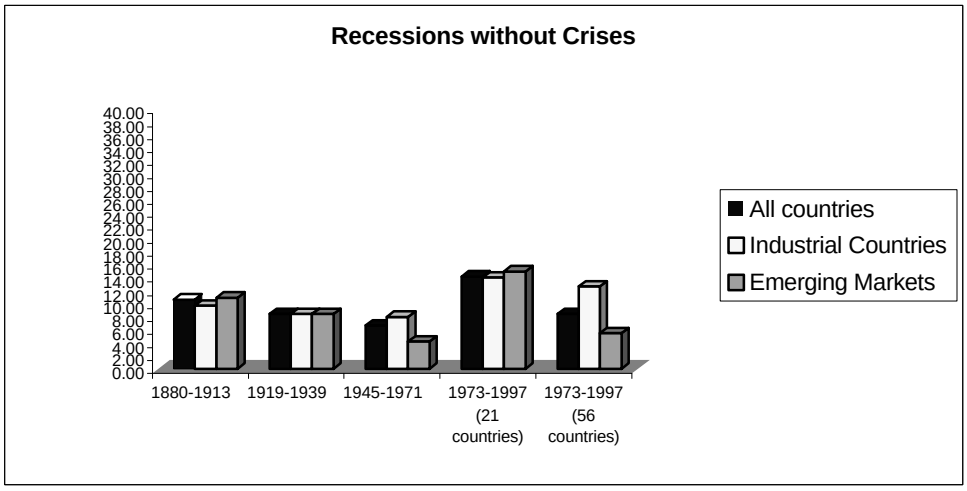
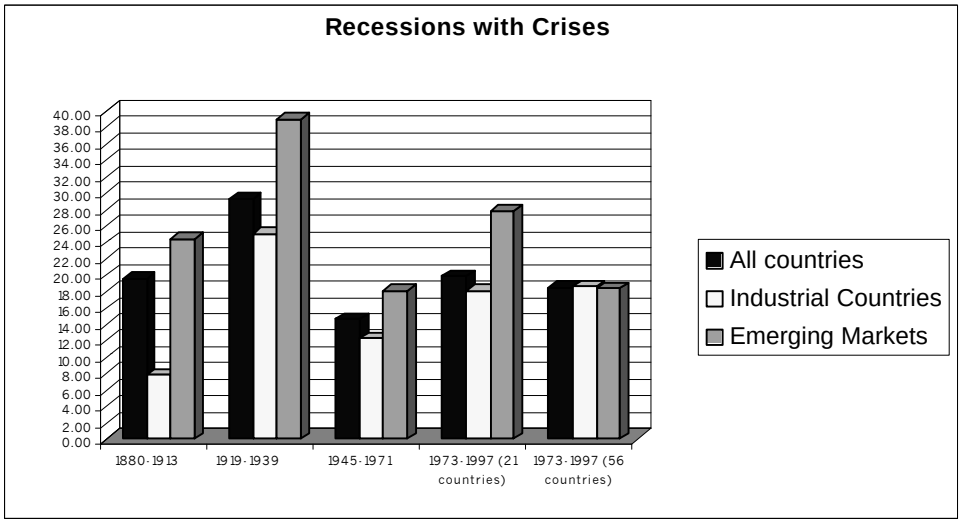


Figure 6: Loss of Output per Incident





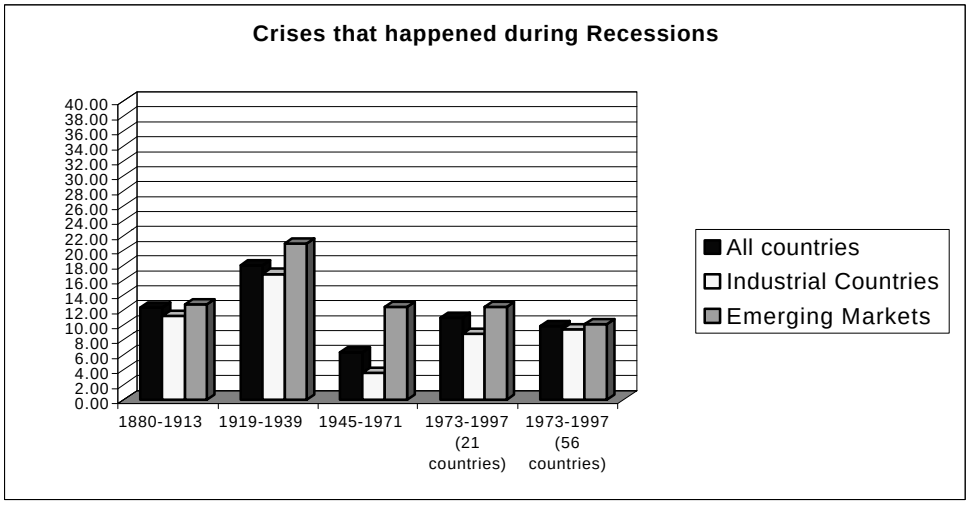
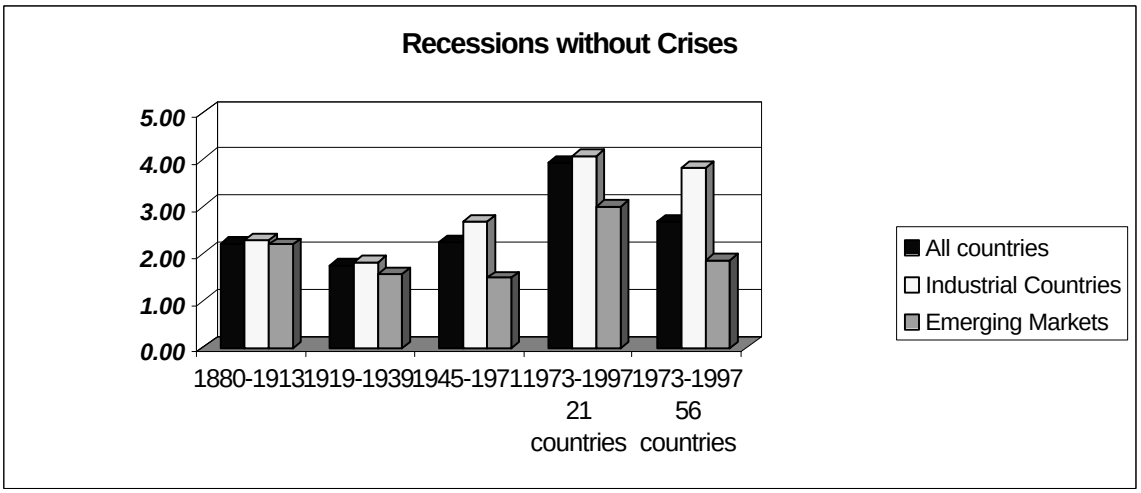
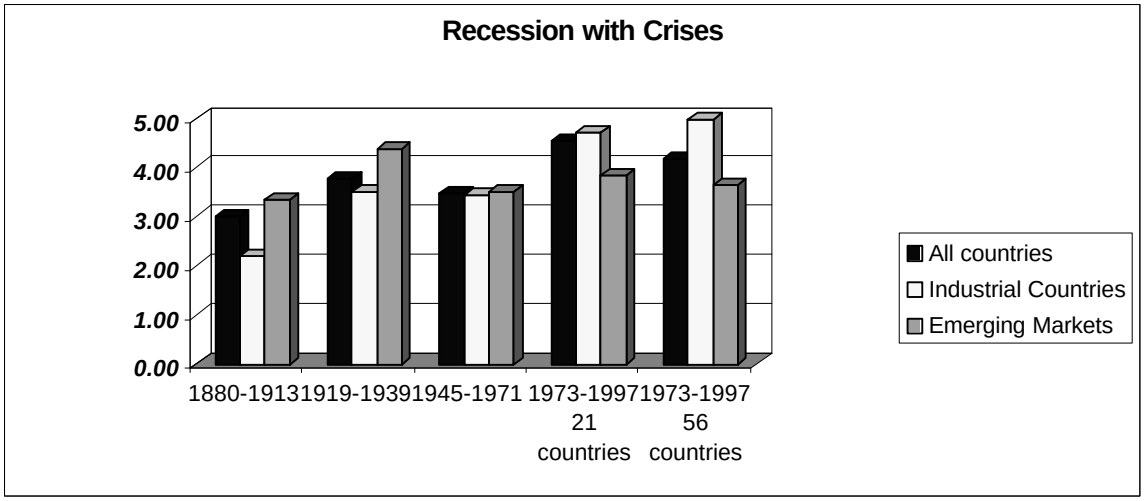


Figure 7. Average Recovery Time
(in years)





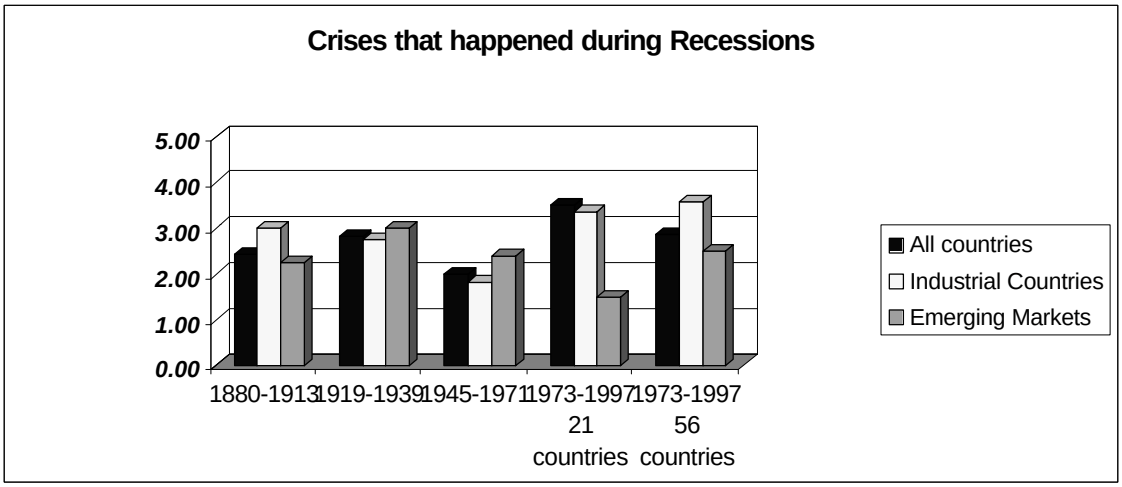
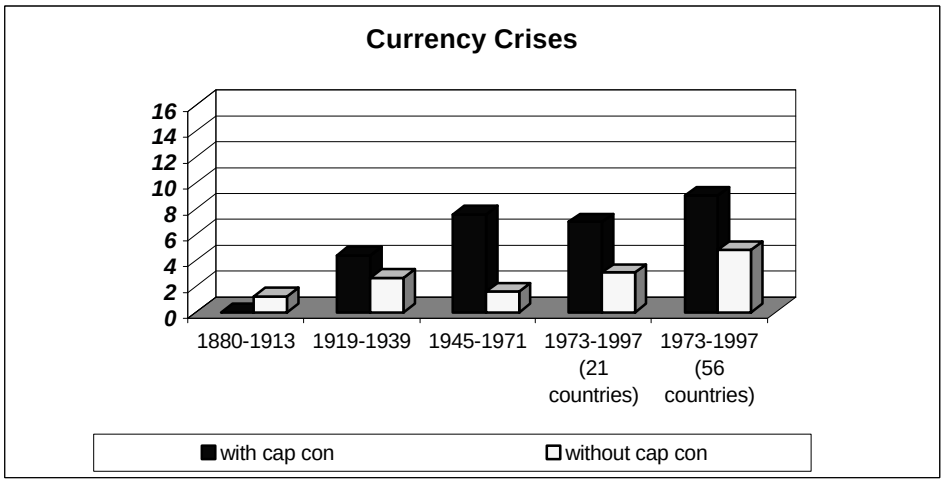
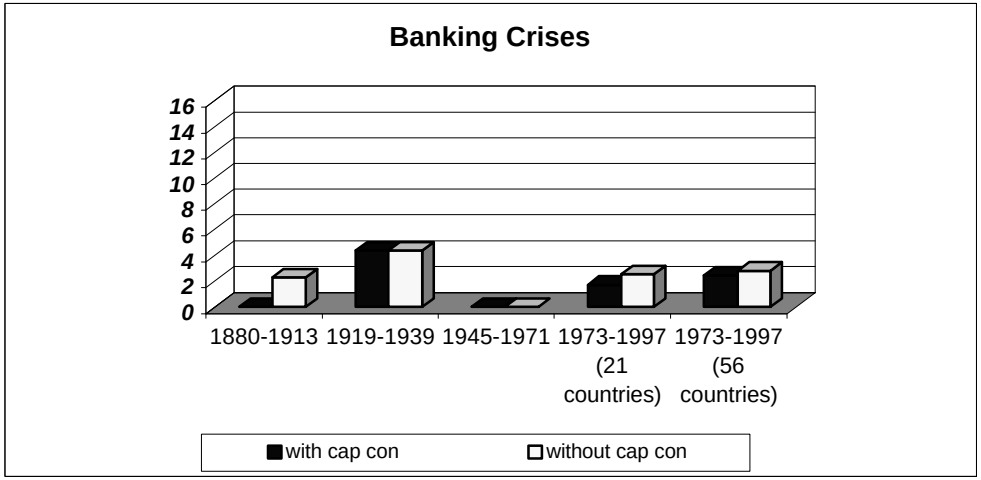
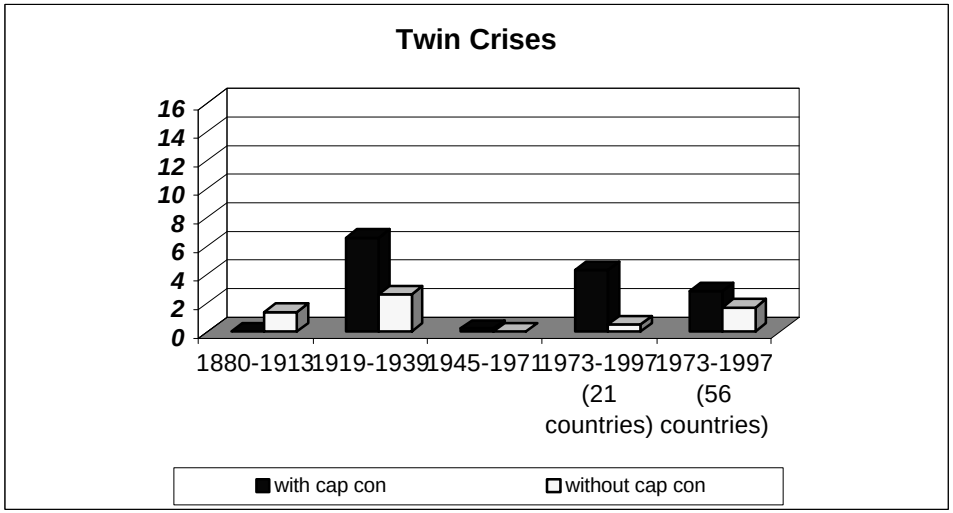


Figure 8. Crises With and Without Capital Controls
(per cent probability per year)







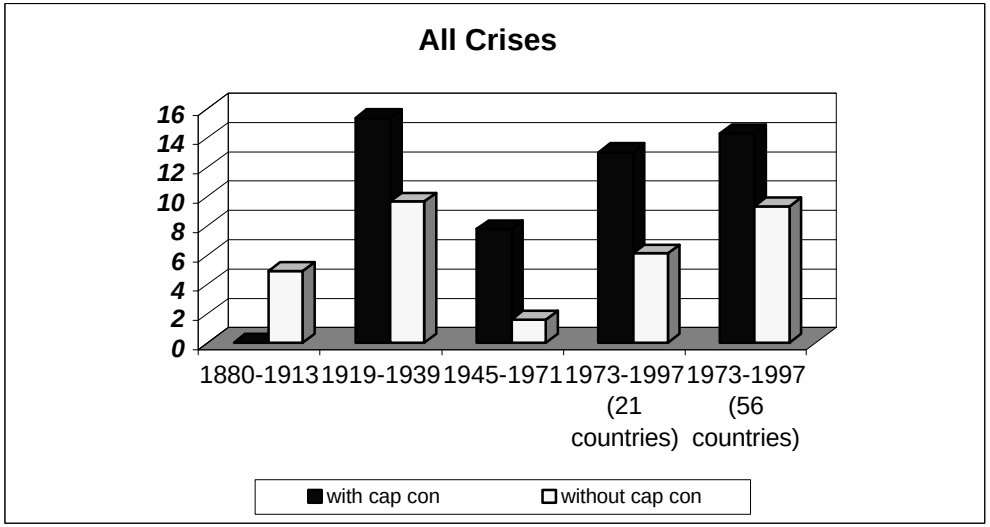


Figure 9. Average Cost of Currency Crises with and without Current Account Deficit (as per cent of GNP)

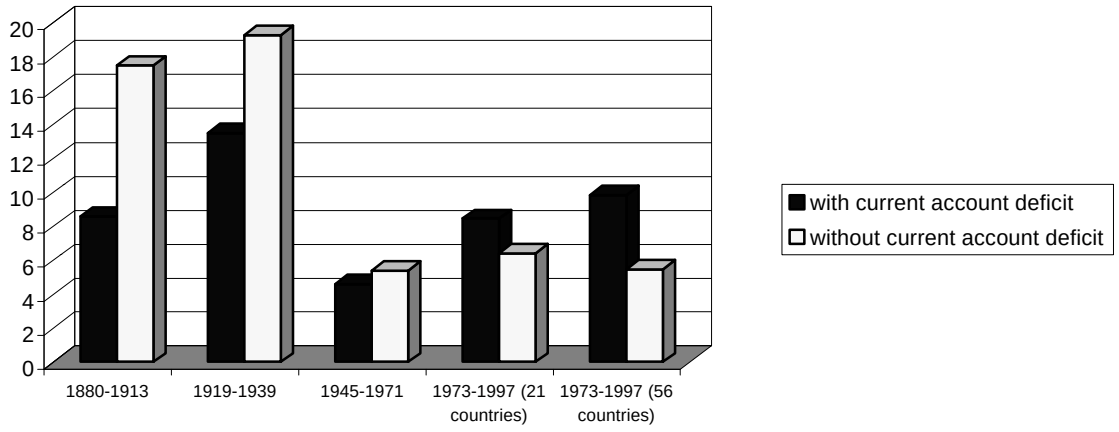


Figure 10. Average Cost of Banking Crises with and without Liquidity Support
(as per cent of GNP)

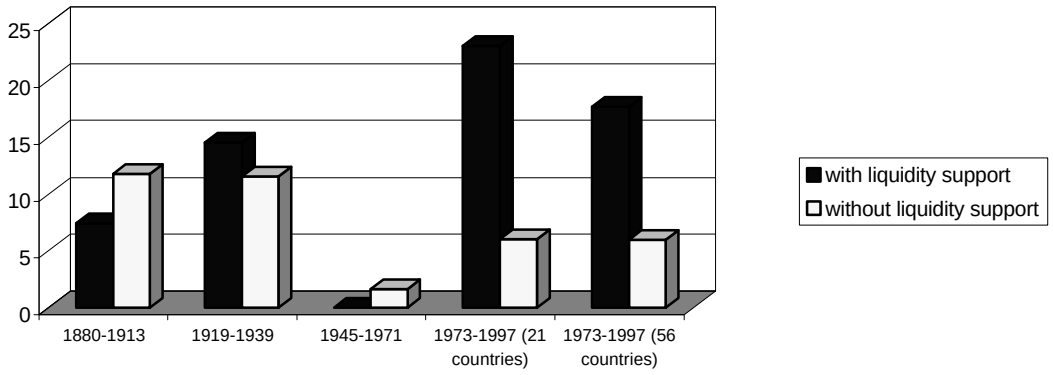


Figure 11. Average Cost of Banking Crises with and without Pegged Exchange Rate
(as per cent of GNP)