

# International Financial Crises: Is the Problem Growing?<sup>1</sup>

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## 1. Introduction

Prominent among the features of recent financial crises is their international scale and scope. Consider the 1997-8 crisis in Asia: not only did it engulf the entire Asian region, but its repercussions were felt as far away as Eastern Europe and Latin America. When the crisis reached a climax with default in Russia and the collapse of the mega-hedge fund Long-Term Capital Management in August-September 1998, U.S. President Clinton warned of “the gravest financial crisis of the postwar era.”

But this 1997-8 episode, while extreme, was hardly unique. The next set of crises in Argentina and Turkey in 2001 was similarly felt far and wide, by Brazil, Poland, South Africa, and South Korea, to name just four of the affected countries. Historical precedents for this phenomenon are myriad. The 1931 financial crisis, to whose study Carl Holtfrerich has importantly contributed, engulfed large parts of Central Europe, helping to trigger the deepest economic depression of the 20<sup>th</sup> century. The 1907-8 crisis broke out when the Bank of England raised its discount rate, puncturing the stock market bubble that had developed in the United States and Continental Europe; this crisis infected not just the U.S., Canada, Italy and Sweden but in addition economies from Argentina to Japan. The 1890-1 Baring Crisis affected not merely

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Argentina and the City of London but also Brazil, Canada, Italy, Portugal, and (with some delay) Australia, New Zealand and the United States, some of whose finances superficially resembled Argentina's and all of which depended on British capital to finance their trade and investment. The only modern period that does not appear to have been marked by crises with global reach was the 1950s and 1960s, decades when capital flows were controlled and domestic financial systems were tightly regulated, leaving little scope for national banking crises, much less for their international spread.<sup>2</sup>

The ease with which such examples can be marshaled casts some doubt on the presumption that the problem of crises with the capacity to infect the entire world and to threaten the stability of the global financial system has been rendered more acute by recent changes in the structure and operation of international financial markets. Have the deregulation of banking systems, the explosive growth of international capital flows, and the increasing amounts of leverage at the disposal of banks, hedge funds and individual investors really rendered national economies more vulnerable to financial problems elsewhere in the world? Is the danger of a major international crisis affecting a substantial number of national economies and threatening the stability of the global financial system really more clear and present than in earlier decades? Or is there nothing new under the sun -- have we simply returned, following a quarter-century-long hiatus, to the kind of financially integrated world, with obvious efficiency advantages but also worrisome instabilities, that existed in the 19<sup>th</sup> century and the first half of the 20<sup>th</sup>?

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<sup>2</sup>Some may argue that the cluster of currency devaluations in 1949 and 1971 constitute exceptions. But there are questions about whether these devaluations, many of which were taken voluntarily, are properly classified as crises, and whether events occurring in these years, at the very beginning and end of the Bretton Woods period, are characteristic of that regime. I return to these issues below.

These are the questions that I seek to address in this paper. Section 2 provides the conceptual background; it distinguishes channels through which financial problems can spread and describes factors that may have intensified their operation in recent years. Sections 3 and 4 then introduce the data and methods used to develop the evidence presented in Section 5, where I use count data, Poisson regression, and historical time series to examine whether the nature and causes of international financial crises have been changing over time. Section 6 draws out the implications for history and current policy concerns.

## **2. Conceptual Issues**

There is no agreed definition of financial crises; economists and historians typically assert that “they know them when they see them.”<sup>3</sup> Eichengreen and Portes (1985), in an attempt to go further, define a financial crisis as a disturbance that leads to widespread distress among financial institutions and market participants, disrupts the market’s capacity to allocate financial resources efficiently, and has repercussions for the nonfinancial economy. An international financial crisis, according to their definition, is one where these disturbances and their effects spill over national borders. 20 years later, I am of the view, perhaps predictably, that it is still hard to improve on this definition.

But the generality of this definition points up the difficulty of moving from theory to empirics. Disturbances to financial markets are not independently observed; they must be inferred

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<sup>3</sup>Plucking two books with the word “crisis” or “crises” in the title more or less at random from the shelf (Hubbard 1991, Krugman 2000), one is struck that the editors of both invoke this familiar phrase but go no further in attempting to define the phenomenon with which they are concerned.

from the behavior of asset prices and quantities. This is standard practice in the literature on currency and banking crises, where disturbances to the foreign exchange market are inferred from the behavior of exchange rates, interest rates and foreign reserves and disturbances to the banking system are inferred from interbank rates and changes in deposits. But how large must such changes be to qualify as a crisis? Does it make sense to construct continuous measures of “exchange market pressure” (weighted averages of exchange rate changes, interest rate changes and reserve changes) and “banking sector pressure” (weighted averages of changes in overnight rates and deposits), in effect treating the economy as continuously in a state of actual or near crisis? Is it better to select an arbitrary cutoff above which observed indicators signal a crisis? In previous work and in what follows, I opt for the discrete cutoff approach -- that is, I select a particular value for the market pressure indicator above which a crisis is said to occur-- on the grounds that extreme events are likely to have highly nonlinear effects.

International crises that affect different countries simultaneously are analytically distinct from systemic crises that threaten the stability of the global financial system, although the former are arguably a precondition for the latter. Systemic crises are harder to measure; dating them requires, in addition to solutions to the problems cited in the preceding paragraph, a way of independently identifying threats to the stability of the global financial system. Given the difficulty of this problem, the limited literature on this subject focuses on international crises -- that is, periods when a number of national economies experienced financial distress simultaneously, leaving implicit the question of whether these events were “systemic.” This is also what I do below.

International crises which afflict different countries simultaneously are frequently

attributed to “contagion.” Researchers characterize them as originating in one or more countries and then spreading, like an infectious disease, to others. There exists an agreed definition of contagion in international financial markets as when the occurrence of a crisis in another country increases the likelihood of a crisis in the subject country, after controlling for the other fundamental determinants of crisis risk.<sup>4</sup> Yet it may not always be appropriate to conceptualize international financial problems in these terms. Countries can experience crises at the same point in time when they are running similar policies -- they can experience simultaneous currency crises when they have all but running unsustainable monetary and fiscal policies, for example -- even if there are few economic and financial linkages between them. They can experience crises as a result of destabilizing changes in conditions abroad that affect them in similar ways -- examples include a decline in U.S. import demand or a rise in U.S. interest rates that make it more difficult to import financial capital -- again in the absence of direct links among them.<sup>5</sup> Given the difficulty of distinguishing international crises reflecting the operation of contagion as opposed to common shocks and common policies, I refer in what follows not to contagion but to international crises.

Contagion can be more convincingly identified if the channels through which crises spread can be explicitly modeled. Recent studies have distinguished several such channels:

**Trade effects.** Early studies, inspired by the experience of the 1930s but using data from the 1960s, 1970s and 1980s for OECD economies (e.g. Eichengreen and Rose 1999), found that countries that trade heavily with one another or with the same third markets import crises from

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<sup>4</sup>The definition is due to Eichengreen, Rose and Wyplosz (1996).

<sup>5</sup>Masson (1998) refers to the simultaneous outbreak of financial distress in different countries due to changes in common external conditions as “monsoon effects.”

one another. This pattern is interpreted in terms of competitiveness (“beggar-thy-neighbor”) effects. The generality of these results immediately became an issue, with some authors arguing that these findings were unlikely to carry over to the 1990s and to emerging markets where financial as opposed to trade linkages are more likely to be important.<sup>6</sup>

**Capital flow effects.** Crises can spread if portfolio investors, observing problems in one market, herd out of other markets where policies and circumstances are similar. These effects will be an increasing function of financial market developments and policies that heighten the volume and importance of portfolio capital flows, short-term flows in particular. Calvo and Mendoza (1999) suggest that when information on country conditions is costly to assemble and process, the prevalence of herding will increase with the number of countries open to international investors.<sup>7</sup>

**Common creditor effects.** A number of recent studies (e.g. Kaminsky and Reinhart 1999b) have focused on the behavior of money center banks and other institutional investors, emphasizing that if a set of capital importing countries shares a common creditor, losses suffered by that creditor due to a crisis in one market will force the banks in question to sell claims on the other markets to raise liquidity and/or rebalance their portfolios.

**Technical contagion.** The portfolio-rebalancing channel just noted is an instance of the

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<sup>6</sup>See for example Kaminsky and Reinhart (1999a). Glick and Rose (1999) and de Gregorio and Valdes (2000) explore the generality of this finding, using data that encompasses the 1990s and a number of emerging markets. Glick and Rose find unconditional support for the hypothesis that contagion is heavily trade based. De Gregorio and Valdes reach the same conclusion at short horizons (transmission over intervals of three months and less) but find that other channels (described below) also matter at longer intervals.

<sup>7</sup>On the assumption that investors will then have more internationally diversified portfolios, reducing their incentive to sink the fixed costs of assembling and processing information on any one country.

more general phenomenon of “technical contagion,” in which the procedures used by market participants to manage their portfolios (and by regulators to manage the risks) transmit financial difficulties from one country to another. For example, Kodres and Pritsker (1997) describe how institutional investors engage in cross-market hedging of macroeconomic risks (taking short positions in one country’s assets as a way of hedging against exposure to another), and how this can lead to herding behavior. Other examples of the technical rules and procedures as a result of which crises can spread include margin calls, capital requirements, and value-at-risk models, all of which can force investors to sell some claims when they incur losses on others.

This enumeration of channels suggests reasons for thinking -- and a few for not thinking -- that there may have been a growing tendency for crises to spread internationally in recent years. World trade as a share of world income has traced out a u-shaped pattern over the last century; only now are we again approaching the levels scaled at the beginning of the 20<sup>th</sup> century. This suggests that while trade as a source of contagion is not new, it is back. And in some parts of the world like Asia, where regional trade linkages were limited historically, these have grown more important in recent years, creating new channels for regional contagion. Portfolio capital flows, measured on a net basis (that is, by the absolute value of current account balances), have still not matched the levels scaled before 1913, but they have grown significantly with the deregulation of markets and removal of capital flows. That said, gross flows, and short-term flows in particular, are many times greater.<sup>8</sup> Leverage, though difficult to summarize, has clearly risen as a result of the development of markets (which provide increasingly ready access to credit for those seeking it) and of the financial safety net (which encourages market participants to take

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<sup>8</sup>See Bloomfield (1968), Zevin (1992), and Bordo, Eichengreen and Irwin (1999).

on additional risk).<sup>9</sup> This suggests that contagion due to “delevering” may have become more important. The direction of international financial flows does not obvious indicate whether common creditor effects have grown more or less important. Before 1913, Great Britain was the source of roughly half the capital exports to the “emerging markets” of the period and, as in the case of the Baring Crisis, the City of London was an important channel for transmitting financial disturbances from country to country. Similar importance is attached to the behavior of U.S. banks in the late 1920s, by which time the U.S. had emerged as the leading capital exporter, and to that of Japanese banks in the Asian crisis.<sup>10</sup>

Thus, whether international financial crises have grown more or less prevalent and how their incidence is affected by global and local conditions are empirical questions. There is scant evidence with which to answer it. The two studies of which I am aware, both of recent vintage, are Bordo and Murshid (2000) and Mauro, Sussman and Yafeh (2000). Bordo and Murshid observe that the correlation of asset returns across markets rises in turbulent periods and ask whether this tendency has been growing stronger in recent years. They find scant evidence of this; to the contrary, their findings point in the other direction, to a declining tendency for cross-market correlations to rise in turbulent periods.<sup>11</sup> Mauro, Sussman and Yafeh study the co-

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<sup>9</sup>Kaufman (1996) estimates that the ratio of capital to assets in the U.S. banking system fell from 0.23 in 1870-1913 to 0.07 in 1970-1992, while that of nonfinancial firms held steady.

<sup>10</sup>Thus, Japanese banks had substantial exposure to Thailand, Indonesia, Malaysia and South Korea in late 1997, and their behavior is said to have played a role in the international spread of the Asian crisis (Kaminsky and Reinhart 1999b, p.1).

<sup>11</sup>Their statistical results are subject to the “Forbes-Rigobon critique,” namely, that correlation of asset returns will increase in periods when markets are volatile whether there are links between the respective markets or not. How this bias should affect intertemporal comparisons is not clear.



movement of emerging market spreads in the two periods of financial globalization, 1870-1913 and the 1990s. They find that country-specific events played a larger role in the determination of spreads in the earlier period, while global conditions play a larger role today. This is suggestive of a growing role for common shocks, common policies, or contagion.

The two studies that most directly address the questions at hand reaching opposing conclusions, additional analysis is called for. It is to this that I now turn.

### **3. Data**

For purposes of empirical analysis I make use of the data base on financial crises in 21 countries, spanning the period 1880-1998, developed by Bordo and Eichengreen (1999) and Bordo, Eichengreen, Klingebiel and Martinez-Peria (2001). This is the universe of countries for which we were able to obtain reasonably consistent data for the entire period. For the years since 1973, we consider in addition a larger sample of industrial and developing countries, 56 in number.

We distinguish banking crises, currency crises and twin crises. 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.<sup>12</sup> 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

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<sup>12</sup>In addition, we construct an 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 (Great Britain before 1913, the United States thereafter). 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.

system capital.<sup>13</sup> And for an episode to classify as a twin crisis, we must observe both a currency crisis and a banking crisis in the same or immediately adjacent years. This compact description of how we identified crisis dates conceals difficult conceptual issues and the very considerable historical judgment involved in such an exercise. Reasonable people can disagree about whether a particular period of strain is properly classified as a crisis.<sup>14</sup> Some of the criteria we use to identify crises -- whether most bank capital was eroded or whether an international rescue was mounted, for example -- are difficult to measure with precision. And classifying such events as crises according to other criteria, such as whether or not serious output losses follow, runs the risk of pre-judging contentious issues such as whether crises have important output effects and how these have been changing over time.

The number of crises as we measure them is shown in Figures 1-5. The figures distinguish the pre-1914 period, the interwar years (1919-1939), the Bretton Woods period (from the close of World War II through 1971), and the post Bretton Wood era (1973-1998). There are two versions of the figure for the 1973-1998 period, one for the 21 countries followed throughout, the other for the larger 56 country sample. When banking and currency crises occurred in the same or adjoining years, these are not counted both as banking and currency crises on the one hand and twin crises on the other; they appear only in the panel for twin crises. The panel for all crises is the sum of the other three.

Evidently, a randomly-selected country had nearly a five percent probability of experiencing a crisis in a randomly-selected pre-1914 year. There is then a sharp increase in the

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<sup>13</sup>This is the same criterion used by the World Bank to identify systemic banking crises.

<sup>14</sup>Thus, Schwartz (1986) in a well-known article refers to a number of widely-cited events as “pseudo crises.”

frequency of all three types of crises; the probability of a randomly-selected country experiencing a crisis in a randomly-selected year in the 1920s and 1930s was nearly three times and great as before 1913. While it is tempting to ascribe the change to the instability of the early 1930s -- indeed, the prevalence of crises in the first three years of the 'thirties was unprecedented then and has been unmatched since -- doing so would not be correct. There was another cluster of crises at the beginning of the 1920s and yet another at the end of the 1930s. Indeed, crises were a pervasive feature of the period: 1928 is the only year in these two decades for which we find none in any of our 21 countries.

The Bretton Woods years were again different, as noted. Tight regulation of banks, financial markets and capital flows meant that there were virtually no banking crises anywhere in the middle- and high-income world; in our sample there is one such event, in Brazil in 1963, which we classify as a twin crisis due to the banking problems that occurred in the same year.<sup>15</sup> But, unlike banking crises, there was no shortage of currency crises in this period; these occurred at the rate of roughly six per cent per country-year, half again as frequently as before 1913. They were, however, somewhat shorter and considerably milder than had been the case either in the interwar period or before World War I.<sup>16</sup>

Since 1973, the probability of a randomly-selected country experiencing a crisis in a randomly-selected year has been twice as high as in the prior period of globalization, 1880-1913; that rate is 10 per cent for the same sample of countries and 12 per cent for the expanded sample, the latter reflecting the even greater incidence of crises in developing countries. This rise in

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<sup>15</sup>Also in the year immediately preceding.

<sup>16</sup>Evidence to this effect is presented in Bordo, Eichengreen, Klingebiel and Martinez-Peria (2001).

frequency reflects the increasing prevalence of currency crises: while the incidence of banking crises appears to have been roughly the same before 1914 and after 1972, currency crises were much more frequent in the final quarter of the 20<sup>th</sup> century; as a result, there was a growing number of twin crises as well. Evidently, the smooth operation of the gold standard (the credibility of the commitment to peg the exchange rate in the theorist's terminology) is part of the explanation for the stability of the prewar financial environment.<sup>17</sup>

How many of these crises were international in scope? I define a crisis as international when it affected at least six of the 21 countries under consideration in a period of three or fewer consecutive years.<sup>18</sup> Five such periods occurred in the third of a century prior to World War I, in 1889-91, 1892-4, 1897-8, 1907-8 and 1914. These are five famous crisis episodes: the Baring Crisis, the panic associated with the Sherman Silver Purchase Act in the United States and the collapse of real estate speculation in Australia, the 1897 crises in the Southern Cone and Scandinavia, the commercial crisis originating in 1907 in the United States, and the crisis precipitated by the outbreak of World War I.

By this same measure, the interwar period is essentially one continuous international crisis. The only years which do not qualify by the "six-crises-within-three years criteria" are 1924-1928, and even they come close, there having been crises in Belgium in 1924, Belgium and Chile in 1925, Belgium and France in 1926, and Japan in 1927. Bretton Woods stands in contrast, by this

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<sup>17</sup>Others (e.g. McKinnon 1997) would also point to the absence of large swings in the bilateral exchange rates of the creditor countries, analogous to today's dollar-euro and dollar-yen swings, as an aspect of this international financial system that was conducive to currency stability in the developing world.

<sup>18</sup>I also require the periods I identify to be nonoverlapping.

like other measures; the only years in which there were six or more crises in three or fewer consecutive years were 1949 and 1967. Whether these episodes should be categorized as international crises is questionable. The data for 1949 pick up the general realignment of European currencies, which precipitated (or was precipitated by) a crisis in the United Kingdom, while those for 1971 once again pick up the general realignment of European currencies, this time in response to the devaluation of the U.S. dollar, which signaled the beginning of the end for the Bretton Woods System. In between, there were no comparable international problems.

Finally, in the most recent period we have seen international crises, by this measure, in 1975-6, 1977-9, 1980-2, 1983-5, 1987-9, and 1990-2, reflecting the greatly increased frequency of currency crises, as noted above, and the resumption of banking crises at the pre-1913 rate, the latter reflecting the deregulation of banks and financial markets (perhaps in conjunction with the extension of deposit insurance and other aspects of the safety net, which encourage risk taking and weaken depositor discipline). The tendency for these crises to cluster in time, as measured here, has been even greater than it was before 1913 and every bit as pronounced as in the 1920s and 1930s. The same has not been true of the period since 1992 (no additional international crises, as I measure them, occurred in the 21 country sample), although some would say that such problems have not gone away -- they have simply migrated to the developing world. Indeed, the larger sample provides some support for this assertion: there we also find an international crisis in 1993-4.<sup>19</sup>

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<sup>19</sup>Since the larger sample is 2.6 times the size of the smaller one, I look for at least 16 crises in three adjoining years rather than just 6. Interestingly, while the 1997-8 period comes close by this criteria, it falls short by two observations from qualifying as an international crisis. Extending the sample to 1999 would presumably change this.

International financial crises are no new phenomena, according to these simple measures of their incidence and frequency. But can we say something more interesting about whether, and if so how, their causes are changing?

#### 4. Methods

The obvious approach to answering this question is to relate the number of crises to the state of the world economy in the same period. The complication is that the dependent variable, the number of countries in the 21 country sample experiencing a crisis, is not a normally distributed variable whose properties satisfy the assumptions for ordinary least squares regressions. For count data like these (where the dependent variable counts the number of crises in the period), an appropriate method is Poisson regression. This formulation is derived from the Poisson distribution by allowing the intensity parameter  $\mu$  to depend on covariates. If this dependence is parametrically exact and involves exogenous covariates but no other source of stochastic variation, we obtain the standard Poisson regression. This assumes that the dependent variable  $y_i$ , given the vector of regressor  $X_i$ , is independently Poisson distributed with density

$$f(y_i | X_i) = \frac{e^{-\mu_i} \mu_i^{y_i}}{y_i!}, \quad y_i = 0, 1, 2, \dots$$

and mean parameter

$$\mu = \exp(X_i' \beta),$$

where  $\beta$  is a parameter vector. This model implies that the conditional mean and conditional variance are given by

$$E[y_i | X_i] = V[y_i | X_i] = \exp(X_i' \beta)$$

It therefore assumes equi-dispersion, which means the equality of conditional mean and conditional variance. Maximum likelihood is usually used to estimate the parameter vector  $\beta$ .

In what follows I use this method to estimate Poisson regressions using global averages of variables for my 21 country sample.<sup>20</sup>

## 5. Findings

Table 1 reports the results of estimating Poisson regressions for banking, currency and twin crises as a function of global economic conditions and policies on the entire data set (excluding World War I and II). To minimize problems of simultaneity (since crises affect macroeconomic conditions as well as being affected by them, and evoke a policy response), the independent variables are lagged one year. The covariates, suggested by the empirical literature on financial crises, include inflation, the rate of economic growth, the government budget surplus or deficit as a share of GDP, the ratio of M2 to international reserves, the rate of economic growth, and the state of the cycle (measured as the deviation of GDP per capita relative to the within-period trend).<sup>21</sup> Global totals were calculated by taking unweighted arithmetic averages of country values. Data sources are described in Bordo and Eichengreen (1999).

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<sup>20</sup>It is tempting to attempt to do so also for the larger 56 country sample. But then the global averages would not be consistent across the 1971-2 break, since they would be constructed for the post-1971 period from a country sample that included an additional three dozen low-income countries, and since the counts of crises would no longer be consistent (these being drawn from a larger sample and therefore being more numerous, almost by construction, in the later period).

<sup>21</sup>The within period trend was estimated separately for the each subperiod: 1880-1913, 1919-1939, 1945-71 and 1973-98.

The first column shows the estimates for banking crises. The results suggest that the number of countries experiencing a banking crisis in a given year is significantly higher in periods of high inflation and large budget deficits, both of which can be taken as symptomatic of financial imbalances. The number of such countries is significantly higher when global growth has slowed (the coefficient on lagged growth is positive). It also higher when per capita incomes are above sustainable levels (the coefficient on the deviation of per capita GDP from trend enters positively), as if periods of overheating, fueled typically by credit booms, lead to the build-up of unsustainable financial positions, setting the stage for subsequent difficulties. In addition, the number of countries experiencing a banking crisis is significantly lower when more countries insulate their financial markets from imported shocks by using capital controls. Finally, there is some sign that this number is lower when the ratio of monetary liabilities to foreign reserves is high.<sup>22</sup>

These results are consistent with the earlier empirical literature on banking crises, although the interpretation here is different. (Recall that previous studies have tended to focus on the determinants of individual crises in a cross section or panel of countries, whereas here I seek to understand the determinants of the number of crises at different points in time.) That a global slowdown or recession is conducive to crises is consistent with the findings of Eichengreen and Rose (2001), where slower OECD growth was found to significantly increase the likelihood of emerging market banking crises, and with those of Gorton (1988) and Calomiris and Gorton (1991), who emphasize the role of slowing growth in precipitating financial crises in the pre-1913 era. The results for the deviation of per capita income from trend, which I interpret in terms of

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<sup>22</sup>Although the coefficient on this variable does not differ significantly from zero at the conventional (95 per cent) confidence level.



unsustainable booms, is consistent with the findings of Gavin and Hausmann (1996) for the modern period and with the stories told by authors like Kindleberger (1978) for earlier historical epochs. The results for monetary and fiscal policies are consonant with the core predictions of Goldstein, Kaminsky and Reinhart (2000). And the finding that banking crises are fewer in the presence of capital controls is the same result emphasized by Bordo, Eichengreen, Klingebiel and Martinez-Peria (2001).<sup>23</sup>

For currency crises (column 2), the results are again plausible though less well defined. Again the number of currency crises in a given year is a declining function of the rate of growth of the world economy. Thus, slower growth is a robust predictor of the scope of both banking and currency problems. But, in contrast to the results for banking crises, the variable indicating the number of countries with capital controls now enters positively, not negatively. This is consistent with earlier studies that use cross-section and panel data, such as Glick and Hutchison (2001), Leblang (2000), and Bordo, Eichengreen, Klingebiel and Martinez-Peria (2001) (although, to repeat, the dependent variable there was the likelihood of a currency crisis in a given country, not the number of crises occurring worldwide in a given year). The interpretation there is in terms of theoretical models suggesting that controls incline the authorities toward riskier policies and send negative signals about their readiness to defend the rate (see e.g. Bertolini and Drazen 1997a,b). My results confirm that these negative signaling and moral-hazard effects (where the moral hazard

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<sup>23</sup>Previous work provides no explanation for the counterintuitive positive sign on the ratio of M2 to international reserves. However, international reserves scaled differently (as a share of imports rather than M2) also enter with a counterintuitive sign in the earlier analysis of Eichengreen and Rose (2001).

takes the form of the incentive for the authorities to pursue riskier policies) dominate any positive tendency for capital controls to prevent crises from spilling across borders.

Finally, the results for twin crises (column 3) look very much like those for currency crises. The number of twin crises rises when economic growth slows from what were previously unsustainable rates. Their number rises with lagged inflation. The government budget and number of countries with capital controls enter with the same signs as in the equations for banking crises, but their coefficients no longer differ from zero at standard confidence levels.

To analyze whether the number of crises in a given year is affected differently by these covariates now than in the past, I interact them with a dummy variable for the post-1971 period. I then ask whether the six interaction terms add significantly to the explanatory power of the equation (whether they are significant as a group).<sup>24</sup> If they are, I then attempt to identify which variables are responsible for the change.

The results are striking. For banking crises there is no sign of a change in the relationship after 1971. (The chi-squared of 6.6 does not allow one to reject the null that all six interaction terms are zero at conventional confidence levels.) It is sometimes said that the spread of unlimited deposit insurance guarantees and the too-big-to-fail principle have weakened market discipline and increased the susceptibility of banking systems to changing economic conditions and policies. The results here provide no obvious support for this interpretation; they suggest rather than banks have always been fragile, even when the regulators adopted a more *laissez faire*

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<sup>24</sup>In the Poisson regressions I also include a separate intercept term for the post-1971 period, although it seems to make more sense when constructing the joint significance tests to include only the six interaction terms and not also the separate intercept. In any case, the results are not sensitive to this procedure.

approach to their problems. For currency crises, in contrast, the chi-squared of 28.0 allows us to reject the null of no change at the 99 per cent confidence level. The results for twin crises resemble those for currency crises (as before): the chi-squared testing the null that the coefficients on the six interaction terms is zero is only 3.0.<sup>25</sup>

What variables are driving the different relationship evident for currency crises in the post-1971 years? The answer is the number of countries with capital controls and the M2/reserve ratio.<sup>26</sup> The positive coefficient on the capital controls variable is significantly larger in the post-1971 years than over the entire sample, as if the moral-hazard-for-policy and adverse-signaling effects operated more powerfully in these years.<sup>27</sup> While the M2/reserve ratio is negative and significant over the entire period (at the 99 per cent level), the coefficient on the additional effect for the post-1971 period is positive, even larger (in absolute value), and equally significant (again, at the 99 per cent confidence level). It would appear that low reserves relative to monetary liabilities exposed more countries to the risk of currency crises after 1971, as predicted by standard intuition and a variety of simple models, but that other factors mattered more for currency stability in earlier historical periods. I am tempted to conjecture that in earlier periods (including the previous period of high capital mobility in the 1920s and prior to 1913), the

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<sup>25</sup>Since there is no evidence that the number of banking crises occurring in a given year is affected differently by its covariates after 1971 than before, it follows, quite plausibly, that there should be no difference in how these covariates affect the number of twin crises, since twin crises necessarily have a banking component.

<sup>26</sup>The coefficients on both interaction terms are individually significant, that for capital controls at the 95 per cent confidence level, that for the M2/reserve ratio at the 99 per cent level.

<sup>27</sup>Over the entire sample it is still positive though no longer significantly differ from zero once the additional post-1971 effect is distinguished.

stability of the international monetary system depended more on institutional arrangements, on domestic political arrangements and past performance that shaped market perceptions of the credibility of the authorities' commitment to currency stability, and on the extent of international cooperation -- the factors emphasized by, inter alia, Eichengreen (1996).

## **6. Conclusions**

Are international financial crises growing more numerous and widespread? Or is their history as old as that of financial markets? Is there little new about the operation of 21<sup>st</sup> century international capital markets, in other words, aside from the number of countries that participate and that suffer if their involvement is badly managed?

As with many statistical findings, those reported here can be taken as either good or bad news depending on the temperament of the reader. Some readers will be reassured that international financial crises have always been with us -- that they are not a uniquely modern affliction. That they are viewed as new and uniquely alarming by modern observers reflects the intellectual impression left by the hiatus from global crises during the quarter century of tight domestic financial regulation following World War II. But if the comparison is taken as the six decades from 1880 through 1940, then there is little different about the frequency and incidence of such crises since 1971. The incidence of such events and even their determinants seem strikingly similar then and now.

If the comparison period is limited to 1880-1913, on the grounds that this was the only era of true financial globalization prior to our own, then it is alarming that the frequency of international financial crises afflicting the world's major economies has been greater since 1971

than it was before 1913, when such events also occurred but at more widely spaced intervals. At the same time, such global disruptions appear to have become somewhat less frequent in the middle- and high-income countries since the beginning of the 1990s. If so, there may be learning from history after all. But it is only recent history from which policy makers seem to learn. The lessons that might be learned from the more distant past often have to be relearned, it would appear, at considerable cost to society.

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Poisson Regressions for International Crises  
(Dependent variable is number of countries experiencing a crisis)

Variable	Banking Crisis	Currency Crisis	Twin Crisis
Constant	1.332 (2.17)	0.949 (2.05)	1.361 (1.91)
Inflation	0.005 (3.93)	-0.003 (1.00)	0.005 (2.79)
Budget Deficit	0.272 (3.71)	0.042 (0.67)	0.096 (1.08)
Year-on-Year Growth	-0.153 (4.04)	-0.066 (2.04)	-0.260 (6.31)
Deviation from Trend	9.137 (2.49)	4.764 (1.61)	8.563 (2.03)
M2/Reserves	-0.076 (1.91)	-0.039 (1.30)	-0.063 (1.37)
Capital Controls	-1.191 (3.62)	0.371 (1.52)	-0.511 (1.45)
Pseudo R <sup>2</sup>	0.27	0.03	0.23
Number of obs.	101	101	101
$\chi^2$ (6) for interactions	6.57	28.04	3.04

Notes: All explanatory variables lagged one year.  
z-statistics in parentheses.

Source: See text.

Figure 1  
Pre 1914 Crises  
(1880-1913)

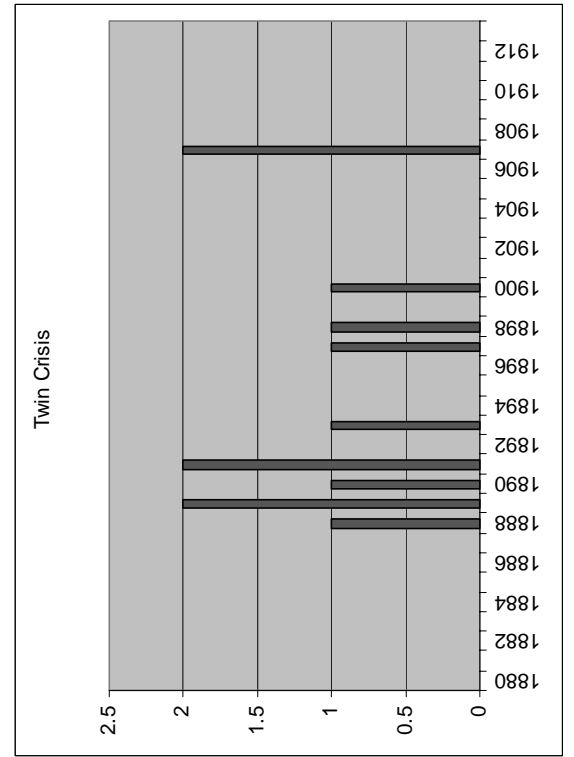
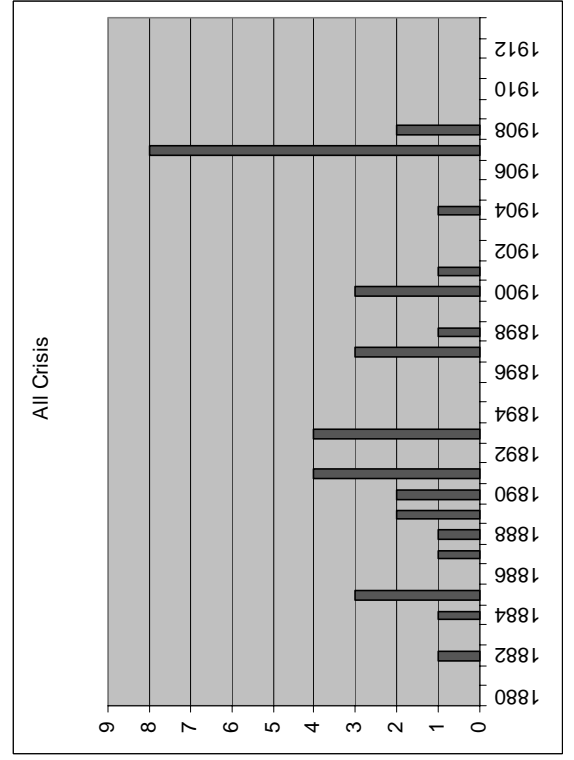
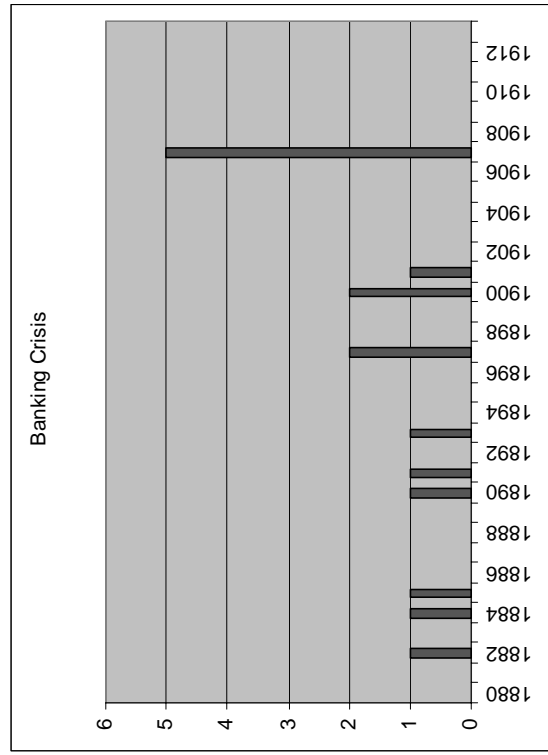
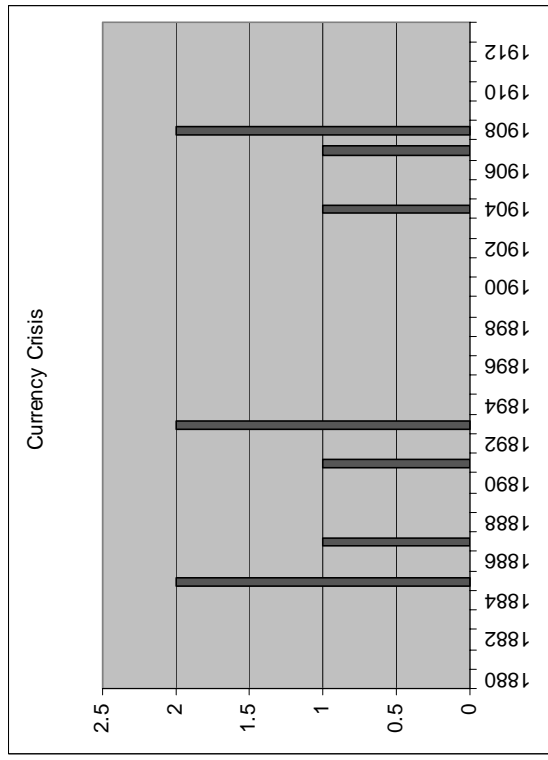


Figure 2  
Interwar Years Crises (1919-1939)

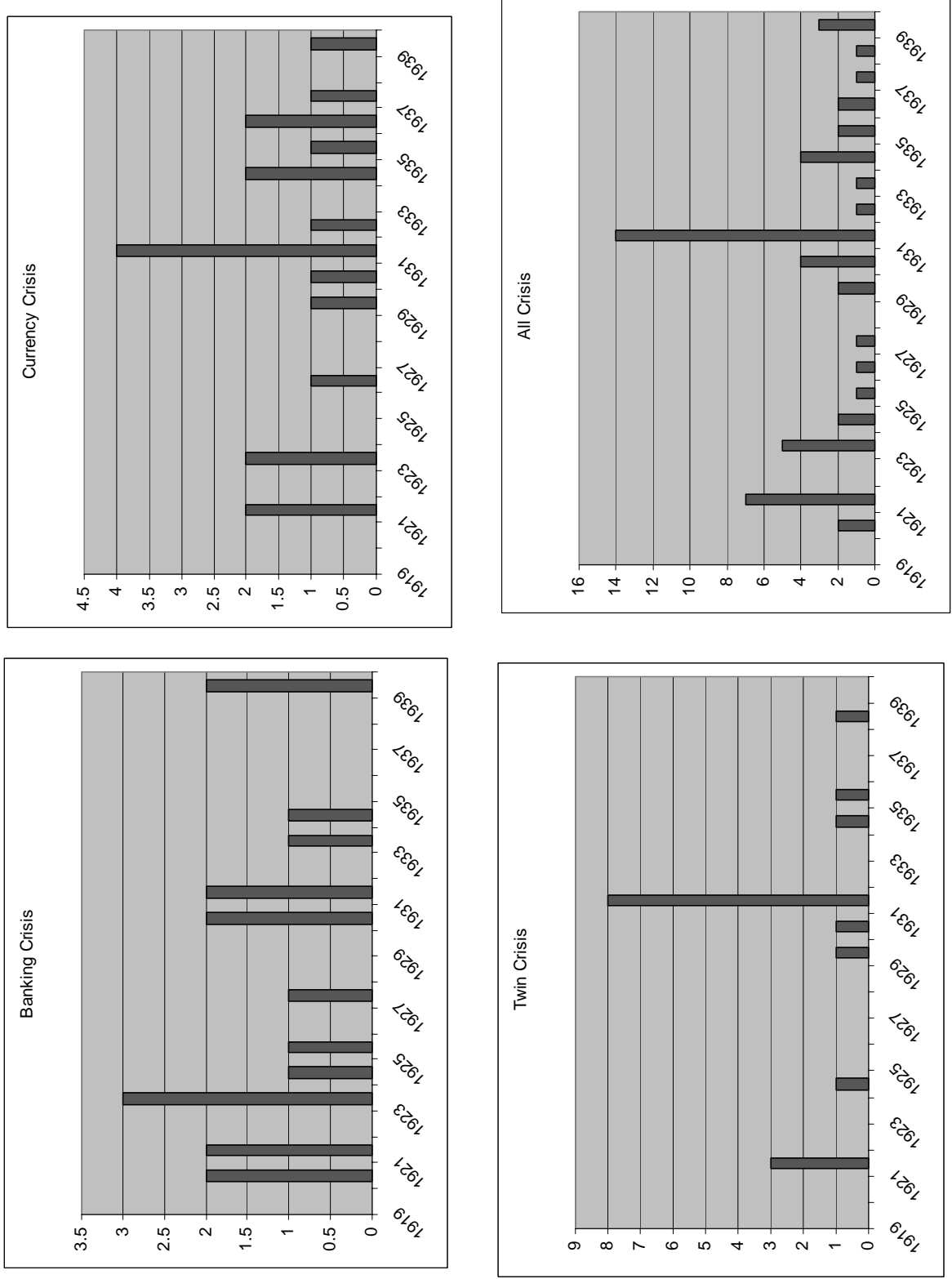


Figure 3  
Bretton Woods Era Crises (1945-1971)

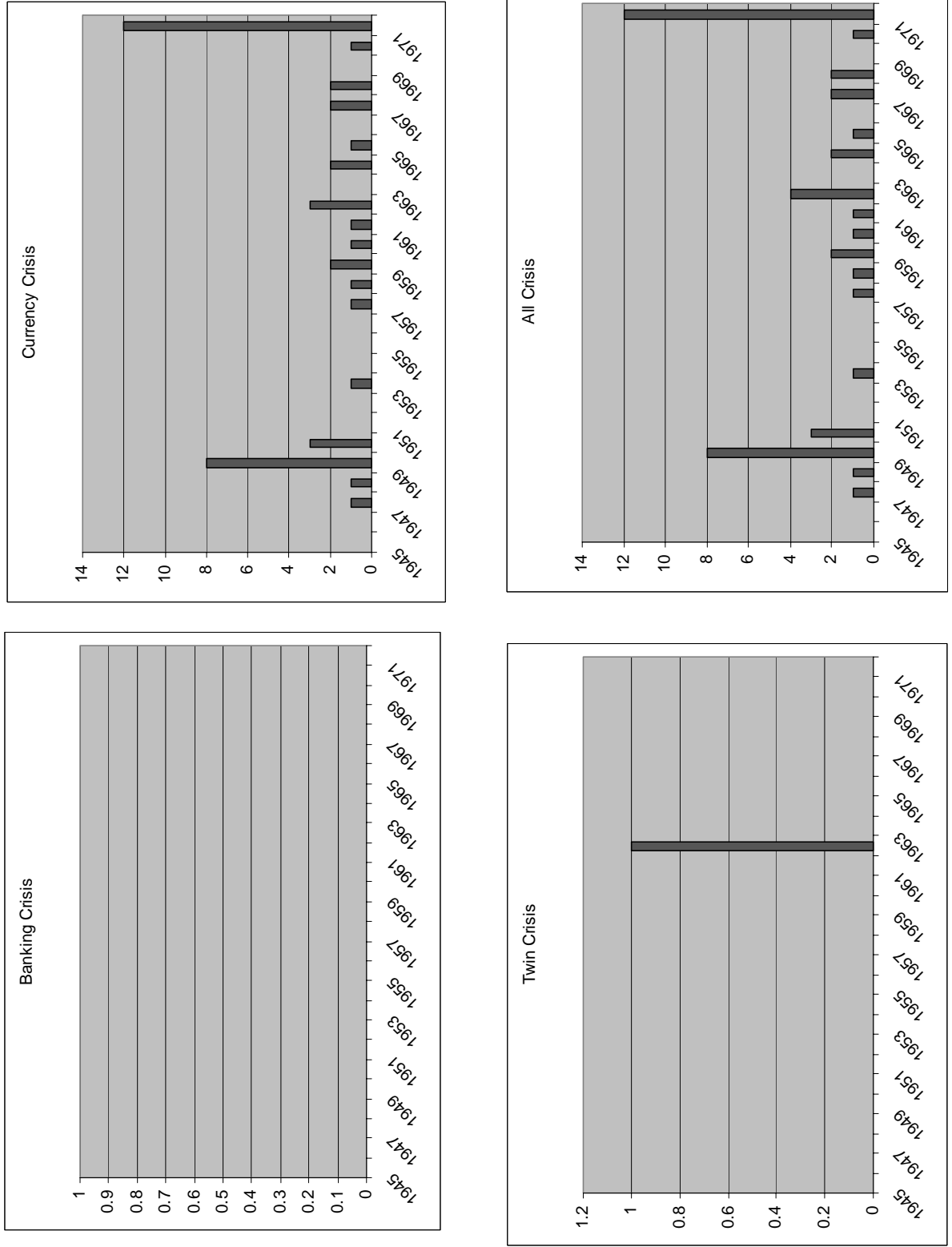


Figure 4  
 Post-Bretton Woods Era Crises (1974-1997)  
 (21 Countries)

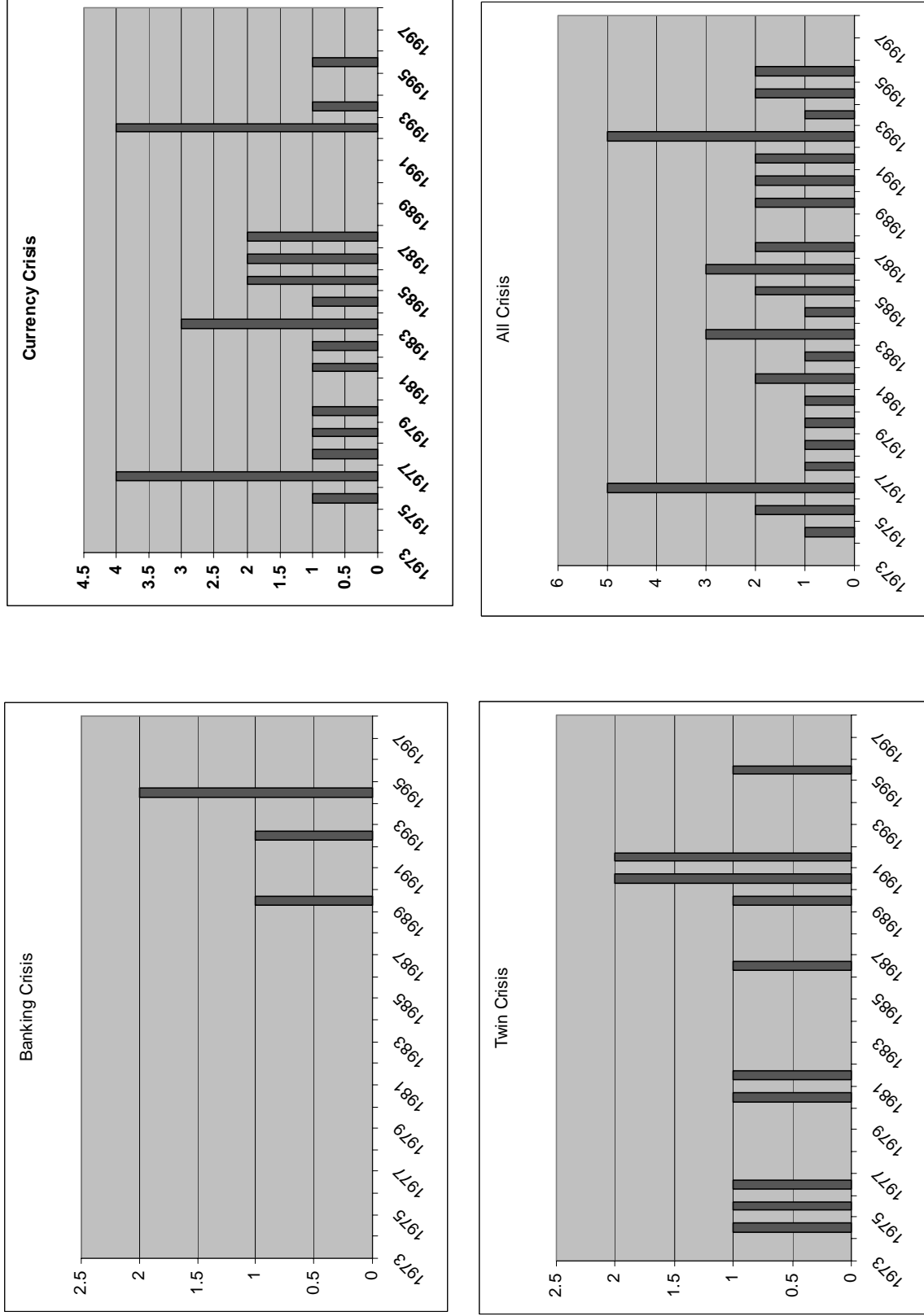


Figure 5  
 Post-Bretton Woods Era Crises (1973-1997)  
 (56 Countries)

