



# Stability periods between financial crises: The role of macroeconomic fundamentals and crises management policies<sup>☆</sup>



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## ABSTRACT

This study aims to identify which factors explain why some countries enjoy long durations of stability, while others experience crises in shorter intervals. We analyze the duration of stability periods between currency, debt, and banking crises by employing an innovative econometric strategy, the Finite Mixture Model (FMM). Real and financial variables show high predictive power for stability spells between currency crises. Regarding debt crises, the real interest rate is observed to be the best predictor. The time between systemic financial crises appears to be prolonged through government interventions and through IMF program participation, while bank recapitalization has a negative impact.

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## 1. Introduction

Public and academic debates on the topic of financial crises primarily take issue with the onset and direct recovery from financial crises episodes. Recently, however, some scholars, such as Reinhart and Rogoff (2009, 2010a,b) turned their attention to the recurrence of banking crises. They show that these perennial events have occurred at a relatively stable frequency in both emerging and advanced economies. At the same time, a small share of the literature has been devoted to the fact that some countries have faced a larger number of financial crises than others. In the hope to gain some additional insight, this study attempts to cover the other side of the same coin: The determinants of the length of stability periods between financial crises. To this end, an innovative econometric technique is used: The Finite Mixture Model. To the best of our knowledge, this is the first attempt to do so.

A closely related topic, the frequency of financial crises, has, among others, been analyzed by Jordà et al. (2010), who investigate if crises can be predicted by macroeconomic fundamentals or whether they are randomly distributed events. Rejecting the former, the authors conclude that most financial crises occur randomly. Regarding the

behavior of macroeconomic variables during pre- and post-crises periods, they find that such events are preceded by low natural interest rates and rising credit, while a large share of financial crises episodes are followed by recessions. Distinguishing between “normal” recessions during the business cycle and recessions accompanied by financial crises, they discover that the latter ones are one third more costly in terms of output losses.

Tudela (2004) adopts a duration model approach to analyze the determinants of currency crises. One of the main objectives of the study is to test for time dependence, that is, the length of the time already spent in a tranquil period as a determinant of the probability of exit into a crisis state. A justification for the use of this framework is that duration models allow accounting for duration dependence among the determinants of the likelihood of speculative attacks, without neglecting the use of time-varying explanatory variables. The results exhibit the existence of highly significant negative duration dependence, meaning that the highest probability to exit into a currency crises state is observed during the initial phase of the tranquil period.

While the duration between crises is directly linked to the frequency of crises, distinct conclusions can be drawn from the analysis of either one. Dissimilar economic fundamentals could be at play in a country experiencing a certain number of crises, clustered over a short period of time, and another country experiencing the same number of crises spread out over a larger period of time. Only by examining entire periods of stability can one take into account and disentangle factor development during the period of recovery and consider the immediate time span before financial turmoil occurs.

This study therefore estimates various models analyzing the time span between different types of financial crises in order to determine whether some variables explain why some countries are more prone

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to enjoy long durations of stability, while others experience crises in shorter intervals.

In order to do so, we calculate the duration of stability periods between currency, debt, and banking crises from 1980 to 2008. The distribution of this variable appears to be bimodal for currency and debt crisis. Two groups of observations emerge: One, depicting average stability periods of around 5 years, and a second group experiencing crises roughly each 15 years. The distribution of the duration between banking crises is unimodal with a peak at 11 years.

From a methodological point of view, the existence of bimodal distributions of durations between currency and debt crises makes traditional econometric methods non-valid. One of the main contributions of this paper is that it uses an innovative approach which is robust to the problems of asymmetric, skewed, or multimodal distributions, namely the Finite Mixture Model (FMM). The model permits differentiation between the effects of an explanatory variable on the probability of belonging to either group of observations and on the variability within both groups.

The FMM is estimated separately for currency and debt crises including 3 groups of concomitant variables: Real variables, financial and monetary variables, as well as equilibrium or external sector variables. For each variable, we distinguish between the long term (recovery) and immediate pre-crisis impact. Finally, we focus on systemic financial crises analyzing the impact of different macroeconomic and regulatory policies on the stability periods after those episodes.

The FMM is found to predict durations between financial crises fairly well. However, clear differences between the predictive powers of the different groups of variables exist.

A very intuitive finding, in line with the reasoning of macroprudential policy toolkits, regarding stability periods between currency crises is that high GDP growth and the accumulation of net foreign assets tend to pro-long stability periods. At the same time, an increase in the real interest rate during the three years prior to a crisis decreases the duration of stability periods.

Concerning debt crises, results are consistent with findings in literature on debt sustainability. In addition, the main country characteristics usually considered by rating agencies in order to assess sovereign default risk are statistically significant in explaining the length of stability periods.

Analyzing the effect of policies in the aftermath of systemic banking crises, we show that the duration of stability periods decreases with the level of the maximum of liquidity support in percentage of deposit which monetary authorities accord to banks. Large-scale government interventions may help to restore the confidence in banks and to sustain accelerated recovery of the economy. In addition, an adoption of IMF programs during and/or after a systemic banking crisis may help to stabilize the economy.

In this respect, a further area of research closely related to the topic of this study investigates the factors which bring about financial crises: The “early warning indicators”. Mainly, this strand of the literature aims to identify the predictors of crises by using different econometric methodologies that can be grouped into two broad categories. First, the signals (or threshold) approach, introduced by Kaminsky et al. (1998) and Kaminsky and Reinhart (1999), compares information on indicators in periods of tranquility with identified periods of crisis.<sup>1</sup>

The second approach consists in linear regression or limited dependent variable probit/logit techniques. With this methodology, the probability that a crisis occurs is assumed to be a function of a vector of explanatory variables, allowing the assessment of the simultaneous effect of more variables, instead of evaluating the predictive power of each variable in isolation. Some of the first papers to use these techniques

are: Eichengreen et al. (1995), Frankel and Rose (1996), J. Sachs et al. (1996) and Demirgü-Kunt and Detragiache (1998, 2005).<sup>2</sup>

The remainder of this paper is organized as follows: Section 2 introduces the data used and preliminary statistics on the occurrence of financial crises, as well as on the duration between them. Section 3 presents the econometric methodology, introducing the Finite Mixture Model, and explains the choice and computation of the concomitant variables. Section 4 offers bootstrap estimations as a solution to the small sample issue encountered and estimation results concerning stability periods between currency and debt crises. Subsequently, the predictive quality of each group of variables is assessed. Section 5 provides some tentative policy recommendations and Section 6 concludes.

## 2. Data and descriptive statistics

### 2.1. Data

This study uses annual data from 1960 to 2008 for 176 developing and developed countries. It thus excludes the recent global financial crisis episode. Sources for macroeconomic indicators are shown in Table A-5.

#### 2.1.1. Financial crises indicators

Financial crises indicators are taken from Laeven and Valencia (2008), in which currency, banking, and debt crises are identified over the period from 1970 to 2008.

In this database, the existence of a banking crisis is evaluated on the basis of a number of quantitative and subjective criteria, such as a large number of defaults and a high quantity of non-performing loans. This can be caused by factors such as depressed asset prices, sharp increases in the real interest rate, capital flow reversals, or depositor runs on banks.

The starting year of a currency crisis is identified building on an approach developed by Frankel and Rose (1996). Therein, a currency crisis is defined as a nominal depreciation of the respective currency of at least 30%, which is also at least a 10% increase in the rate of depreciation compared to the year before. Their list also comprises large devaluations by countries under fixed exchange rate regimes.

Sovereign debt crises are reported in the case of sovereign defaults to private lending and in a year of debt rescheduling.

Finally, the starting year of a systemic crisis (twin or triple crisis) is identified as the occurrence of a banking or currency crisis in year  $t$ , combined with at least one other type of crisis during the period  $[t - 1, t + 2]$ .

As can be seen in Fig. 1, the number of currency crises peaked during the early eighties and again during the early nineties with the occurrence of around 30 currency crises per year. After the Asian financial turmoil during the late nineties, currency crises have become less frequent.

Banking crises have in general been less frequent than currency crises and peaked during the early nineties as, among others, several Latin American countries experienced difficulties defending their exchange rates, resulting in financial sector turmoil. The number of banking crises per year increased during the late eighties up to its high in 1994 with 18 crises per year and from then on decreased to a low of two banking

<sup>2</sup> Frankel and Saravelos (2012) provide a more extensive literature review considering other approaches encompassing the use of innovative techniques to identify and explain crisis incidence, including the use of binary recursive trees to determine leading indicator crisis thresholds (Ghosh and Ghosh, 2003; Frankel and Wei, 2005), artificial neural networks and genetic algorithms to select the most appropriate indicators (Nag and Mitra, 1999; Apoteker and Barthelemy, 2000) and Markov switching models (Cerra and Saxena, 2008; Peria, 2002). There is also a micro approach for the early warning indicators focusing on individual bank's balance sheet and market prices to forecast the failure of individual institutions (see Gonzalez-Hermosillo (1999) for a comparison of these studies across countries). By contrast, the objective of this paper is to identify the macroeconomic fundamentals and public policies which contribute to financial stability after a crisis and those which render the economy and the financial system more fragile. To this end, the dependent variable considered is not a dummy variable which indicates the occurrence of crises, but the length of the spell between two financial crises, which are identified from a number of databases and are not explicitly determined via a threshold approach.

<sup>1</sup> Other studies using the signal approach to predict financial crises are Kaminsky (1999), Goldstein et al. (2000), Borio and Lowe (2002) and Alessi and Detken (2011).

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