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# How to foresee banking crises? A survey of the empirical literature

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ABSTRACT

A survey of the empirical literature on early warning indicators of banking crises is presented. Descriptive analyses have been published for decades, but cross-national panel data analyses have only been performed since the late 1990s. More recently, the severity of the subprime-Lehman crisis has been compared across countries. Most findings corroborate the view that during a typical build-up phase, banks borrow internationally to finance domestic lending, boosting the current account deficit and causing a real estate bubble. Increasing debt and imbalances lead to a crisis. Both developing and developed countries have experienced these kinds of boom-bust cycles.

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## 1. Background

"This time is different", claims the title of the popular book by Reinhart and Rogoff (2009). The ironic tone implicitly suggests that most banking and financial crises are caused by a group of fairly similar factors. Excessive loan growth and asset price bubbles may have preceded crises in the past, but in a climate of general euphoria no one wants to believe that history could repeat itself. This paper presents an overview of the empirical literature on crisis-predicting early warning signs or "crystal balls", as named by Schwaab et al. (2010).

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The topic is highly relevant in terms of policy. Crises typically cause huge output losses and social costs. Hoggarth et al. (2002) estimated that the average crisis causes a production loss of 20% of annual GDP. A recent stimulus to this area of research is the countercyclical capital buffer (CCB) proposal by the Basle Committee (2010). Regulators will impose additional capital requirements on all banks if alarming signs are observed in the macrofinancial environment, but this is impossible unless they know what kinds of signs are alarming. Drehmann et al. (2011) explicitly motivate their analysis by the need to identify good triggers for countercyclical capital buffers. The CCB was recently implemented in the EU's capital requirements directive (2013/36/EU) and similar regulatory reforms are coming on stream in the rest of the world as well.

Unfortunately, the terminology usage has been somewhat ambiguous and the frequently used term "financial crisis" may refer to many kinds of jitters, not only banking crises. Many interesting contributions analyse the early warning signs of currency collapses and sovereign debt crises,[1] but these topics are beyond the scope of this survey. Here the focus is solely on large-scale banking crises, even though it is sometimes difficult to distinguish between banking and currency crises because they coincide in so-called twin crises. As pointed out by van den Berg et al. (2008), crisis predictors may differ depending on the kind of crisis to be predicted. We also exclude studies on bank-level early warning indicators (see e.g. Patro et al., 2013, or Arena, 2008). There are dozens of studies reviewed here despite our focus on narrowly defined large-scale banking crises.

During the Bretton Woods era, banking crises were exceptional or even non-existent (Reinhart and Rogoff, 2008b). Consequently, academic economists did not find the topic important, at least not after memories of the Great Depression had faded. Crises again started to occur more often in the 1980s. Keeley (1990) argued that for the United States, the weakening of financial stability was due to a decline in the franchise value of banks, which was caused by intensified competition in the newly deregulated environment. Banks had less to lose and so they consciously began to take more risks. It may not be coincidental that liberalisations in the 1980s were followed by crises in the 1990s in many countries (Kiander and Vartia, 2011). Simultaneous banking and currency crises occurred in many parts of the world in a liberalised environment, notably in emerging economies (Kaminsky and Reinhart, 1998).

In August 2013, there were 6020 hits for the search term "financial crisis" in the Econlit data base, counting only articles in academic journals; 4480 of these papers had been published after January 2009. For the search term "banking crisis" the respective figures were 497 and 270. Hence, it seems that a huge part of the crisis literature, probably most of it, has been published in the aftermath of the recent (and still ongoing) global crisis.

Manias, panics and crashes were discussed by Kindleberger (1978) before much econometric evidence on banking crises had been published. Minsky (1977) wrote about speculative euphoria and bubbles. In the late 1990s, a more empirical approach was taken and increasing numbers of econometric analyses of crisis predictors are now being published. As will be seen in the following sections, most of the systematic evidence is consistent with the boom-bust cycle narrative. Banking crises tend to be preceded by periods of excessive loan growth and surging asset prices. A large yet stable loan stock does not normally pose major problems, but if the loan stock grows excessively large relative to past levels, problems are likely to emerge within a couple of years. Accelerated house price inflation is often observed before a crisis, but perhaps signs of stock market bubbles have less predictive power. Because not enough deposits can be collected domestically, banks finance their increasing loan stocks during boom phases by borrowing from abroad. A nation's net foreign debt typically grows when banks borrow from abroad and grant loans domestically, thus enabling the public to spend more on imported goods. These boom-bust cycles have occurred in both developing and developed countries, even though this pattern is more typical for developed countries. Many developing country crises seem to be closely related to price instability and currency collapses.

The literature on banking crises is less closely related to mainstream macroeconomics than it might have been a few decades ago. At least before the global financial crisis, mainstream macroeconomists downplayed the role of money and banking in their models. In fact, financial intermediation was seen as so insignificant that completely abstracting from it in DSGE models seemed harmless. These models

[1] See e.g. Berg and Pattillo (1999a,b), van den Berg et al. (2008) and Frankel and Rose (1996).

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