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**Conference Paper**

## A Global Early Warning System of Financial Crises

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# **A Global Early Warning System of Financial Crises**

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## **Extended Abstract**

The current financial turmoil has demonstrated the importance of understanding, measuring and predicting financial stress. This is because, financial stress and financial crises can have significant real costs, i.e. they can lead to a slowdown or even a decline in the level of economic activity. Recently, Cardarelli et al. (2009) show, using data for 17 main advanced economies that since 1980 out of 113 financial stress episodes identified, 29 were followed by an economic slowdown, and an equal number by recessions. The remaining 55 financial stress episodes were not followed by an economic downturn<sup>1</sup>.

Financial stress can impact economic activity through various channels. First, shocks that affect the creditworthiness of borrowers tend to strengthen the output fluctuations through the financial accelerator, as changes in the values of collateral impact the willingness of the financial system to provide credit to the economy (Bernanke and Gertler, 1995, and Bernanke et al., 1999, Kiyotaki and Moore, 1997). Second, factors that impact lenders' balance sheets can magnify economic downturns as if banks' capital is weakened, banks may become more reluctant to provide capital to the real sector or can even be forced to deleverage, leading to sharper economic downturns (Bernanke and Lown, 1991, Kashyap and Stein, 1995). Thirdly, the type of the financial system affects how large is the interconnection between real and financial sectors in the economy (IMF, 2006, Rajan and Zingales, 2003).

Borio and Lowe (2002) show that widespread financial distress typically arise from the unwinding of financial imbalances that build up disguised by benign economic conditions, such as low inflation. In particular, the authors show, using annual data for 34 countries (13 emerging economies) for 1960-1999 that sustained rapid credit growth combined with large

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<sup>1</sup> The authors find that on average, the time lag between the onset of financial stress and the slowdown or recession that follows was about seven months. More importantly, the median cumulative output losses (relative to trend or until recovery) in downturns that follow financial stresses were about 2.8 percent of GDP for slowdowns and about 4.4 percent of GDP for recessions, significantly larger than in episodes of slowdowns and recessions that were not preceded by financial stress (about 1.6 and 2.3 percent, respectively). One should note, however, that the authors do not control for the economic policy responses, while calculating the output losses. Moreover, it is difficult to assess the causality whether financial stress "causes" economic downturns, or whether financial stress is simply an outcome of shock impacting e.g. future economic fundamentals.

increases in asset prices (equity) appear to increase the probability of episodes of financial instability. Recently, Alessi and Detken (2009) show that aggregate measures of monetary and credit conditions performs well in predicting costly asset price booms.

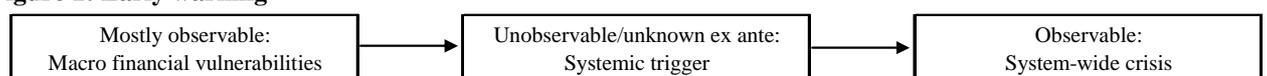
There is however a second strand of the literature which argues that early warning of financial crises is an almost impossible task to do. Most recently, Rose and Spiegel (2010a) fail to find any lag-lead relationship between more than sixty potential causes of the global financial crisis (including indicators of financial system policies and conditions, asset price booms, international financial imbalances, macroeconomic policies, and institutional and geographic features) and the outburst of the crisis in 2008–09. In a companion paper, Rose and Spiegel (2010b) argue that not only the incidence of financial crisis is almost impossible to predict but also its propagation through the international financial system can hardly be modelled.

This paper builds upon the above mentioned studies to investigate whether financial imbalances and building up of vulnerabilities can predict financial stress in the framework of a Global Early Warning System. Importantly, our framework is truly “global” in several dimensions:

*First*, we consider a large set of 25 advanced and 42 emerging economies.<sup>2</sup> The rich sample of advanced and emerging economies (i) allows us to explore global factors as well as international linkages in both the emergence of and the propagation of crises and (ii) enables us to include a large set of different financial crises.

*Second*, our approach also takes a “global” dimension in that it aims at covering the largest possible set of financial sector crises that goes beyond the traditionally most studied incidents of currency crises, banking crises and sovereign debt crises. In particular, we consider *financial stress* as a manifestation of systemic *financial crises*. While the trigger and the channels through which financial crises evolve are manifold, and only identifiable *ex post*, the consequences of *any type of* financial crises are directly observable in that they trigger an unusual amount of *financial stress*. This allows us to take an agnostic perspective on financial crises (and their potential causes) while at the same time we can identify financial stress by observing conditions in the major financial markets and relate this to the underlying macro-financial vulnerabilities, as exemplified in Figure 1.

**Figure 1: Early warning**



Source: Authors’ representation.

*Third*, we follow a comprehensive approach in that we consider a large set of more than 80 leading indicators covering conditions the real economy, price and quantity based measures of financial market conditions, institutional variables, as well as aggregate microprudential indicators and synthetic measures of financial stability.

*Fourth*, we do not restrict ourselves to a particular early warning model but consider a broad range of alternative models from the traditional early warning literature, i.e. binary choice models based on either (i) probit or logit type estimation strategies (as in Bussière and Fratzscher, 2006) or (ii) a signalling approach (as in Alessi and Detken, 2009, Kaminsky and

<sup>2</sup> Our sample covers all individual euro area economies, except Malta, all other EU member countries, all other OECD countries, and all major emerging economies including the G20.

Reinhardt) in which signals are extracted subject to minimising a loss function; as well as alternative forecasting models including factor analysis that we borrow from the business cycle literature which aim at forecasting continuous measures of financial stress.