Journal of Banking & Finance 37 (2013) 2183–2195

Contents lists available at SciVerse ScienceDirect

Journal of Banking & Finance

journal homepage: www.elsevier.com/locate/jbf

Assessing systemic risks and predicting systemic events

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ARTICLE INFO

Article history:
Available online 7 July 2012

JEL classification:
E44
E58
F01
F37
G01

Keywords:
Early warning system
Systemic risk
Financial stress
Financial crisis
Macro-prudential policy

ABSTRACT

The paper develops a framework for assessing systemic risks and for predicting systemic events, i.e. periods of extreme financial instability with potential real costs. It contributes to the literature on the prediction of financial crises mainly in two ways: first, it uses a Financial Stress Index for identifying the starting date of systemic financial crises. Second, it uses discrete choice models that combine both domestic and global indicators of macro-financial vulnerabilities to predict systemic financial crises. The performance of the models is evaluated in a framework that takes into account policy maker's preferences between missing crises and issuing false alarms. Our analysis shows that combining indicators of domestic and global macro-financial vulnerabilities substantially improves the models' ability to forecast systemic financial crises. Our framework also displays a good out-of-sample performance in predicting the ongoing Global Financial Crisis.

1. Introduction

The Global Financial Crisis that started in the United States in 2007 has demonstrated the importance of understanding and measuring systemic risks and predicting systemic events, i.e. events *when financial instability becomes so widespread that it impairs the functioning of the financial system to the extent that economic growth and welfare suffer materially*.[1]

This paper develops a framework for assessing systemic risks and for predicting (out-of-sample) systemic events, i.e. periods of extreme financial instability with potential real costs.

The prediction of financial crises has been the subject of a large number of studies since the mid 1990s. In one of the earliest contributions, Frankel and Rose (1996) study the determinants of currency crashes in 100 developing countries from 1971 to 1992. They evaluate the predictive power of several indicators by looking at each indicator separately and at set of indicators jointly using a probit model. Their findings suggest that currency crashes tend to occur when FDI inflows dry up, when foreign exchange reserves are low, when domestic credit growth is elevated, when the real exchange rate is overvalued and when the "northern" interest rate rise.[2]

While the paper of Frankel and Rose (1996) is an important contribution to the early warning system (EWS) literature, it has two limitations. First, it focuses on currency crises only. Second, the paper lacks a clear framework to assess the leading properties of the indicators and to issue early warning signals.[3] These limitations are taken care of in Kaminsky and Reinhart (1999) who extend the analysis of Frankel and Rose to a wider set of crises, including banking and balance of payment crises that occurred in the 1990s. Kaminsky and Reinhart find that both types of crises are closely linked to the aftermath of financial liberalisation, which activates boom/bust cycles with banking crises preceding a currency collapse. An important contribution of the paper is the introduction of the so-called "signal" approach to evaluate the leading properties of indicators. In the approach, a variable signals an incoming crisis when it exceeds a predefined threshold. Correct signals (signals followed by a crisis) and wrong signals (signals not followed by a crisis or "noise") are collected and thresholds assigning signals to classes are optimised by

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[1] See the definition of the concept of systemic risk in the ECB Financial Stability Review, December 2009 (ECB, 2009b). For a review of the concept of systemic risk see De Bandt and Hartmann (2000).

[2] Other papers document the "anomalous" behaviour of a number of variables in the periods preceding financial crises. See for example, Gavin and Hausmann (1996), Sachs et al. (1996), Mishkin (1996), Calvo (1996) and Honohan (2000).

[3] The paper simply presents a graphical analysis of the indicators in a time interval around crisis periods, while, regarding the probit model, it simply evaluates the significance of the coefficients.

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http://dx.doi.org/10.1016/j.jbankfin.2012.06.010