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Evaluating measures of adverse financial conditions☆

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ABSTRACT

Timely identification and anticipation of adverse conditions in the financial system are critical for macroprudential policy. However, there is no consensus on how to evaluate the quality of systemic measures. This paper provides a framework to compare measures of systemic conditions. We illustrate the proposed tests with a case study of US measures from 1976 to 2013. We find that measures which include information from multiple markets improve identification of critical system states. However, tested measures show limited capacity to anticipate critical episodes.

1. Introduction

The complexity of the financial system continues to challenge supervisors and policymakers.[1] Such challenges include not only concerns about the safety and soundness of individual institutions, but also systemwide risks. Policymakers agree that control of systemwide risks must identify changes in the system (examples of financial system transformations are highlighted in Fig. 1). Implementations of dynamic macroprudential policy have been

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[1] The concept of the economy as a complex and adaptive system was pioneered by Holland (1975, 1988) in his work on adaptive nonlinear networks. Brock and Hommes (1997, 1998) study financial markets as adaptive belief systems. Hommes (2001) extends this approach to markets as nonlinear adaptive evolutionary systems. See Arthur (1995) and Farmer and Lo (1999) for an analysis of heterogeneity in financial markets, Hollingsworth et al. (2005) for the socioeconomic implications and Judge (2012) for analysis of complexity caused by the fragmentation of financial markets.

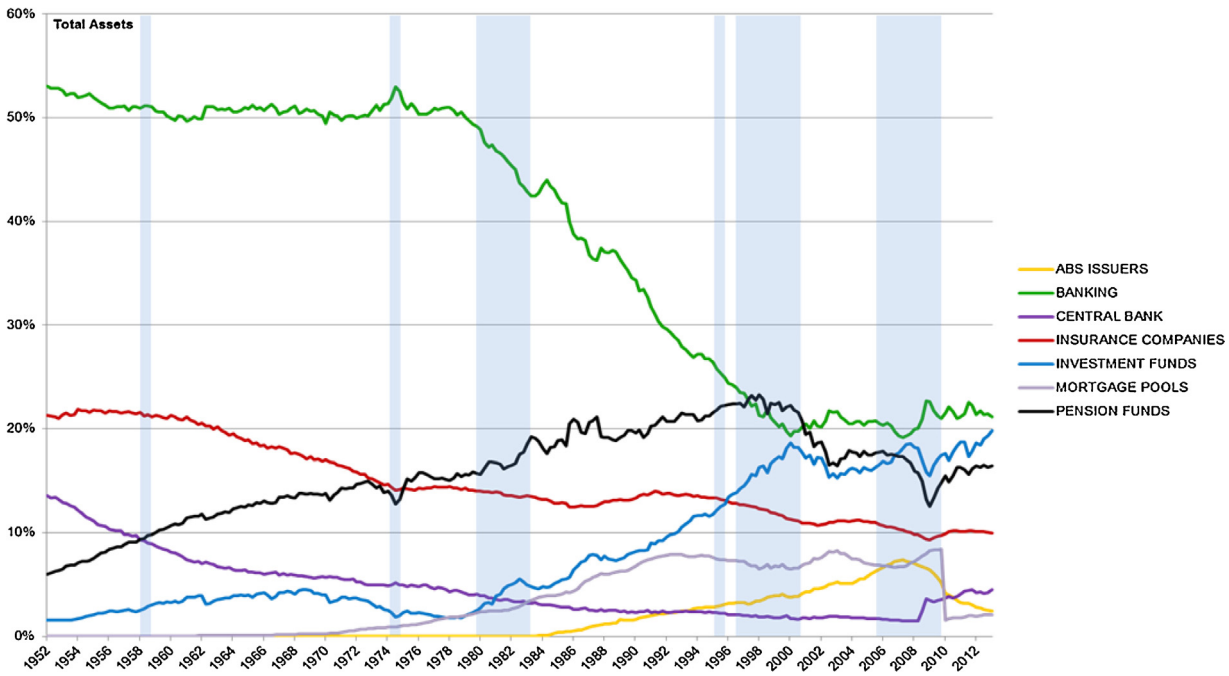

Fig. 1. Percentage of total financial assets held by each financial sector: US data, 1952–2013.
Source: Board of Governors of the Federal Reserve System (2014).

suggested by the Bank of England (BoE, 2011) and the IMF (Lim et al., 2011).[2] To efficiently implement prudential policies, regulators need measures that are able to identify and anticipate adverse conditions in the financial system (Borio, 2003). The problem we confront in this study is the evaluation of these measures.

Multiple coincident and early-warning measures are available to assess systemwide risks.[3] A substantial research effort has also focused on the problem of evaluating early-warning measures (Edison, 2003; Davis and Karim, 2008; Drehmann and Juselius, 2014; Holopainen and Sarlin, 2015). However, few papers address the practical issue of evaluating coincident measures and how they might be used by policymakers.[4] The following questions are addressed in this paper: First, how can the suitability of systemic measures for policy be assessed? Second, what are the empirical findings from such evaluation?

This paper proposes a methodology to evaluate both coincident and early-warning measures of systemic conditions. We then apply this methodology in a case study of US data from 1976 to 2013. We show how the strength and consistency of association between volatility and alternative measures of US financial conditions varies. However, few of the measures considered provide reliable early-warning out of sample. Hence the available US data appears more suitable for monitoring adverse conditions than for anticipating them.

The paper is organized as follows. Section 2 traces the development of evaluation methods for the binary classification problem across the literature. Section 3 proposes three methodological contributions to support the assessment of systemic condition measures. First, multidimensional signal extraction enables the search for optimal systemic measurement. Second, the classification of system states is improved by considering the severity, persistence, and pervasiveness of volatility. Third, an information value statistic is used to assess the quality of systemic measures across a diverse range of system states. Section 4 applies the proposed evaluation framework to US systemic measures from 1976 to 2013. In this case study, we confirm that measures based on multiple markets identify critical states better than more narrowly constructed alternatives. In addition, we find that considerations of level and change in system conditions are relevant to policymakers' decisions. Section 5 concludes with a discussion of this study's implications.

2. Literature review

The literature offers many measures of financial system conditions. Coincident measures seek to identify current system conditions. Early-warning measures seek to anticipate potentially adverse conditions. Coincident measures include financial condition indexes (FCIs) and financial stress indexes (FSIs). FCIs assess the impact of deviations of asset prices from long-term trends (Bordo et al., 2000; Swiston, 2008; *inter alia*). The notion of FSIs varies widely from systemic excitation (Korinek, 2011) to measurement of the demand-supply imbalance for financial goods (Borio and Lowe, 2002; Lo Duca and Peltonen, 2013), to force exerted on economic agents by changing expectations (Illing and Liu, 2006).

There is little consensus on the choice of these measures. This is particularly evident in coincident measures, where both policy goals and conceptual definitions vary widely. Policy goals include *inter alia* identification of adverse conditions (Carlson et al., 2012), differentiation from cyclical activity (Hatzius et al., 2010; Brave and Butters, 2012), guiding monetary policy (Hakkio and Keeton, 2009), and detection of system instability (Holló et al., 2012).

Early-warning measures (EWMs) include macroeconomic and institutional indicators of exuberance, excessive changes, and overall build-up of imbalances. Macroeconomic EWMs detail the systemwide imbalances which lead the financial cycle toward

[2] Similarly, the Basel Accords continually enhance the flexibility of banking regulation to keep pace with financial system changes.

[3] These include measures intended to continually monitor the cyclical buildup of widespread imbalances, as well as early-warning indicators of exuberance, excessive change, and misalignments. Overviews are given by Davis and Karim (2008), Gramlich et al. (2010), Babecký et al. (2013), and Holopainen and Sarlin (2015).

[4] Kliesen et al. (2012) survey the composition of available coincident measures. Gallegati (2014) applies wavelet analysis to compare the early-warning properties of several coincident measures.

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