Dating banking crises using incidence and size of bank failures: Four crises reconsidered

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A B S T R A C T

We analyze three databases of banking crises and investigate their consistency in the identification and timing of crises. We find that there are large and statistically significant discrepancies between the datasets. We also compare the dating of banking crises according to these databases using information on the number and size of bank failures for four crises for which the timing strongly differs across these databases. We conclude that information on these variables allows determining the timing of banking crises more precisely. Our dating of the four crises corresponds closely with that of Laeven and Valencia.

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1. Introduction

Due to the worldwide financial crisis there is renewed interest in the causes and consequences of banking crises. A serious methodological challenge which researchers face is the identification of (systemic) banking crises. Most recent research on banking crises uses the following three sources for dating banking crises: Caprio et al. (2005), Reinhart and Rogoff (2009) and Laeven and Valencia (2008, 2013). These databases identify a (systemic) banking crisis based on exceptional events or policy interventions, such as bank closures, deposit freezes and government rescues. Although they are all based on what Von Hagen and Ho (2007) refer to as 'events methodology', these databases employ different definitions of a banking crisis. In contrast to economic recessions for which a precise definition exists (i.e. two consecutive quarters of negative growth in real GDP), a widely accepted definition of a (systemic)

banking crisis is lacking. Consequently, there are large and statistically significant differences between these sets of crises dates. The databases provide different start and/or end dates and as a consequence come up with different lengths of the crises. Events identified as a crisis by one database are frequently not considered a banking crisis by another database. Also the concordance with economic cycles differs considerably. Low GDP growth sometimes precedes the crisis, sometimes follows the crisis or coincides with the crisis. Even though the crisis dates of Reinhart and Rogoff are to a large extent based on those of Caprio et al. there are large differences between both datasets. An example is the dating of the savings and loan crisis in the US, which we will analyze in more detail in this paper (along with three other banking crises). Caprio et al. date this crisis from 1988 to 1991. According to Reinhart and Rogoff, this crisis runs from 1984 to 1991, while Laeven and Valencia limit the crisis to 1988.

These differences in identifying and dating banking crises have potentially significant consequences. The timing of crises is, for instance, instrumental in estimating output losses caused by banking crises. It may also cause ambiguity in determining the causes of crises. For instance, differences in timing may lead to different conclusions regarding the question of whether a crisis was caused

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by factors within the financial sector or by factors external to it (e.g. a worsening of general economic conditions). Another possible consequence is that early warning models to predict crises may provide unreliable signals if imprecise and inconsistent dates are used.

Authors rely on multiple criteria to determine the occurrence of a banking crisis often in combination with expert judgment. Classifying and dating (systemic) banking crises is inherently subjective (Frydle, 1999). Authors rely on expert judgment in the absence of an independent arbiter, a role the National Bureau of Economic Research plays in identifying economic recessions. When comparing the main databases referred to above, it becomes clear that these expert judgments differ considerably.

The fact that definitions and dates of banking crises differ across studies has been discussed before (cf. Frydle, 1999; Boyd et al., 2009; Babecký et al., 2012). However, most empirical studies on banking crises have merely noted the differences and opted for one or the other database. Alternatively, some authors avoid relying on existing indicators of banking crises altogether and introduce alternatives. For instance, Boyd et al. (2009) construct systemic bank shock indicators derived from a theoretical model. Von Hagen and Ho (2007) propose an index based on money market pressure to identify banking crises. Money market pressure indexes yield many more banking crises than the events method as shown by Jing et al. (2014) who have expanded the sample of Von Hagen and Ho (2007), both in terms of the number of countries and the sample period covered. Although Jing et al. (2014) can relate some of these crises to turbulent developments in the financial system of the countries concerned the very high number of crises should make us worry about the reliability of the von Hagen-Ho approach.[1] The purpose of our paper is therefore to improve upon existing databases based on the events methodology by introducing new information on the number of bank failures and the size of bank losses, which has generally not been used in identifying crises. Von Hagen and Ho (2007, p. 1038) mention a number of shortcomings of the events methodology: (1) interventions can occur in the absence of an acute crisis, (2) deciding whether an intervention is large enough to be called a crisis involves subjective judgment, (3) interventions happen when the crisis is already on-going, and (4) crises may be averted due to central bank policy interventions so that they will not be included if crises are identified based on interventions by government authorities. We believe that at least the first two objections can be remedied using our approach.

For this purpose we use data sources, which have not been widely employed in the literature: data on bank failures and information on support measures in combination with either financial accounts, monetary or supervisory statistics. From these sources we construct time series for what we consider the most important characteristics of banking crises, namely the number of bank failures and the relative size of bank losses. Using this information may shed new light on the differences between the most widely used databases of banking crises and enable to date banking crises more precisely. To illustrate our argument, we analyze four important and widely researched banking crises for which the timing strongly differs across these databases. We believe that our method for investigating these crises shows that much of the subjective judgment, for which the events methodology has been criticized, can be eliminated. Data availability has limited our work. While most countries publish fairly long time series for either financial accounts, monetary or supervisory statistics from which the size of the banking sector can be assessed, only few countries publish

a complete and systematic overview of measures which have been taken to support banks. Nevertheless, while these four crises may not be representative, they are important and major crises. A lot of information on these crises is available which has been taken into account in constructing the databases examined here. What we show is (1) that even for these well-researched crises periods the databases come up with a very different dating of these crises (in line with the outcomes of our comparison of the dating of all crises in the databases); (2) taking information on bank failures and costs of banking crises into account may be useful to better identify the timing of banking crises. We therefore advise to apply the suggested approach to a larger set of countries.

The remainder of this paper is structured as follows. Section 2 summarizes the definitions used in the literature on banking crises and compares three widely used databases. The crises dates from these three databases are also compared with the crises dates of Jing et al. (2014) who followed Von Hagen and Ho (2007) using a money market pressure indicator to identify banking crises. Section 3 confronts these sets of crises dates with data on bank failures and bank losses for four crises: the savings and loan crisis in the United States, the banking crisis during the 1990s in Japan, the banking crisis in Norway, and the crisis in Turkey during the late 1990s. The final section offers our conclusions.

2. Comparing databases of banking crises

The definition of a systemic banking crisis varies considerably across studies. There are common elements to most definitions, such as widespread bank insolvency, but there is no agreement on a precise definition. Caprio and Klingebiel (1996) define a banking crisis as a situation of "... financial distress, in which the banking system has negative net worth." This is a somewhat restrictive definition as most crises rarely affect all banks to the same extent. Their list of banking crises ultimately takes into account the extent of the crisis to distinguish between systemic and non-systemic crises. But it relies very much on expert judgment, in particular with respect to the timing of bank insolvency. No specific measure for the proportion of the banks' equity that is destroyed is used to make this distinction. Caprio and Klingebiel (1996) point to a lack of information in general and specifically on the mark-to-market balance sheets of banks for this. These authors do not provide a specific criterion to determine the end of a crisis.

Reinhart and Rogoff (2009) base their identification of banking crises on certain events. Similar to Caprio and Klingebiel (1996), they point to a lack of data which prevents the use of a formal definition.[2] Relative stock prices of banks cannot be used as not all banks are listed. Using changes in deposits would miss crises which do not involve bank-runs, while non-performing loans are deemed too unreliable for lack of harmonized accounting rules. Reinhart and Rogoff (2009, p. 10) therefore settle on two events: "(1) bank runs that lead to the closure, merging or takeover by the public sector of one or more financial institutions ... and (2) if there are no runs, the closure, merging, takeover or large-scale government assistance of an important financial institution (or group of institutions) that marks the start of a string of similar outcomes for other financial institutions." They denote these banking crises by type I (systemic) and type II (financial distress), respectively. However, they do not use this distinction in their classification of crises nor do they indicate what an important financial institution is.

Laeven and Valencia (2008, p. 5) state that "... in a systemic banking crisis, a country's corporate and financial sectors

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[1] It is therefore perhaps not surprising that most research on banking crises is still based on crises identified by the events methodology.

[2] See Reinhart and Rogoff (2009), p. 8.