



Bank fundamentals, economic conditions, and bank failures in East Asian countries



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ABSTRACT

In this study, a fixed effect panel logit regression model and a split population survival time model are used to investigate the impact of bank fundamentals and economic conditions on bank failures and survival time from 1999 to 2011 in 11 East Asian markets. The empirical results show that strong bank fundamentals, including capital adequacy, asset quality, management, and profitability and liquidity, as well as desirable economic conditions measured by GDP growth rates, inflation rates, and real interest rates, reduce the failure probability of East Asian banks. In addition, the survival time of banks is primarily described by the measures of economic conditions, and the bank fundamentals exerted marginal effects.

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1. Introduction

The relationship between the stability of financial institutions and economic performance has consistently been critical to policy makers and academics. Globalization and the liberalization of financial markets have caused interactions between countries to become more frequent and intense, creating a substantial spillover effect during financial crises. In the past two decades, investors have experienced major financial crises (Jorda et al., 2011; Kaminsky and Reinhart, 1998; Reinhart and Rogoff, 2009). Financial institutions have contended with difficult challenges during these crises, and the global economy remains in recovery from the financial disaster in 2008. In addition to the direct effects caused by financial turmoil, the subsequent recession has created, and will continue to create, operational difficulties for financial institutions, especially banks.

Systemic bank crises and failures incur large direct and indirect costs (Davis and Karim, 2008), and exert a negative impact on economic stability and investor wealth. Many researchers have proposed macroeconomic causes of bank crises for economic policymaking (Kindleberger and Aliber, 2005; Reinhart and Rogoff, 2009; Roy and Kemme, 2011). Roy and Kemme (2012) summarized the most frequently suggested causes, including lax regulations and oversight, risky financial innovations, excessive risk by financial institutions, a low interest rate policy, risky mortgage debts, and income inequality.

If systemic bank crises can be effectively predicted, financial supervision authorities can take direct policy actions to avoid the crisis or limit its effects. Establishing an early warning system may facilitate

identifying impending bank crises (see Barrell et al., 2010; Davis and Karim, 2008; Demirguc-Kunt and Detragiache, 2002; Kaminsky and Reinhart, 1999; Roy and Kemme, 2012). Ergungor and Thompson (2005) stated that risks related to interest rates, credit, liquidity, and the market are primary macroeconomic factors in such crises.

Past studies have shown evidences that macroeconomic factors have a significant impact on bank failures. Of course, like other corporations, the management ability of a bank could result in a different performance. To expand the depth of past works, this study uses individual bank-level variables and macroeconomic factors simultaneously in our model to investigate the effect of macroeconomic situations and bank-level performances on bank failure issues. Besides, many past works use the probability of bank failures as the dependent variable to identify the possible impact of macroeconomic factors on bank failures. To expand the width of past studies, this study also explores the issue of survival time of a bank, by using the panel logit regression model and the split population survival time model to investigate the determinants of survival time with consideration to differences between failed banks and surviving banks.

As the development of emerging markets, financial studies pay more attention on those areas and countries. East Asia has a crucial role in the international business chain and is becoming an integrated trade zone, a transformation that is attributable to the Regional Comprehensive Economic Partnership and the Trans-Pacific Partnership. To achieve a comprehensive analysis for East Asian area, this study includes a sample of 347 banks in 11 East Asian markets, including Mainland China, Hong Kong, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Taiwan, Thailand, and Vietnam, to analyze the determinants of bank failure in East Asian area.

This paper provides a comprehensive and in-depth study by (a) including both macroeconomic and bank-level variables to explore

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Table 1
Statistics of sample size and survival time.

Country	Number of banks			Survival time (year)			
	Survivor	Failure	Total	Average	St.D.	Min	Max
China	37	1 (2.6%)	38	21.92	22.12	9	101
Hong Kong	20	5 (20.0%)	25	60.55	17.93	25	97
Indonesia	30	7 (18.9%)	39	31.91	20.19	10	96
Japan	112	20 (15.2%)	132	77.62	27.08	7	136
Korea	14	3 (17.6%)	17	47.75	21.20	24	112
Malaysia	15	9 (37.5%)	24	50.03	32.17	8	134
Philippines	14	4 (22.2%)	19	52.48	31.69	10	158
Singapore	5	2 (28.6%)	7	56.79	13.40	39	77
Taiwan	28	4 (12.5%)	32	43.96	31.38	10	110
Thailand	12	1 (7.7%)	13	62.86	15.62	38	101
Vietnam	4	0 (0.0%)	4	55.35	19.66	42	89
Total	291	56 (16.1%)	347	56.26	25.04	7	158

Note: The figures in parentheses represent the failure percentage.

the influences of external and internal factors on the probability of bank failure, (b) using of the panel logit regression model and the split population survival time model to investigate the determinants of survival time with consideration to differences between failed banks and surviving banks, and (c) including 11 major East Asian markets to achieve a cross-country analysis.

The empirical findings are as follows. First, preliminary statistics show that Malaysia has the highest failure percentage of 37.5%, and Japan has the longest average survival time of 77.62 years. Second, the results of the panel logit regression model indicate that the macroeconomic variables of GDP growth rates, foreign reserves levels, inflation, real interest rates, and exports, as well as all the bank-level CAMELS¹ variables, significantly affect the bank failure probability of East Asian banks. Finally, regarding the determinants of the bank survival duration, the GDP growth rate, real interest rate, and inflation play a more critical role than do bank fundamentals. Cole and Gunther (1995), DeYoung (1999), and Wheelock and Wilson (2000) find that the factors for bank failure and survival time may differ. Our finding follows their argument. While macroeconomic situations have significant impacts on bank failure and survival time, bank-level variables only affect the probability of bank failure.

This remainder of this paper is organized as follows. Section 2 reviews past works and findings, and Section 3 introduces the methodology employed in this study. Section 4 explains the source of the data and the sample structure. Section 5 reports the empirical findings, and Section 6 concludes the paper.

2. Literature review

To empirically investigate the causes of individual bank failures, numerous studies have focused on macroeconomic determinants (e.g., Cebula, 2010; Cebula et al., 2011; Roy and Kemme, 2012). Arena (2008), Daley et al. (2008), Bongini et al. (2001), and Cole and Gunther (1995) primarily used bank-level data to explore the role of a bank's financial performance in its failures. Although macroeconomic factors enable identifying systemic banking crises, microeconomic variables play a critical role in the occurrence of bank failures. However, while all banks experience similar macroeconomic impacts, not all of them experience distress or eventual failure, suggesting that all macroeconomic factors and bank-level situations play an essential role in determining bank failures (Bongini et al., 2001).

¹ The U.S. Federal Financial Institutions Examination Council developed the Uniform Financial Institution Rating System, which uses the CAMELS components to evaluate the financial stability of financial institutions. CAMELS stands for capital adequacy, asset quality, management ability, earnings, liquidity, and sensitivity.

Table 2
Definition of explanatory variable.

Variable	CAMELS category	Definition	Expected impact on bank failure
<i>Panel A: Macroeconomic variables</i>			
RGG		Real GDP growth	–
M2FR		M2/foreign reserves	–
INF		Inflation rate	+
RI		Real interest rate	+
NEC		Change in nominal foreign exchange rate	+
DPCG		Domestic private credit growth rate	+
CGR		Current account balance/GDP	–
EXGR		Exports/GDP	–
<i>Panel B: Bank-level fundamentals</i>			
ETAR	Capital adequacy	Equity total assets	–
BDSBR	Asset quality	Bad loan allowance/ (equity + bad loan allowance)	+
CIR	Management	Cost/income	+
OEAR	Management	Operating expenses/ assets	+
NIETAR	Management	Non-interest expense/ average assets	+
ROA	Earning	Return on assets	–
CAR	Liquidity	Current assets/total assets	–
LTAR	Liquidity	Loan/total assets	+
DG	Sensitivity	Deposit growth rate	–

Data source: World Development Indicators (WDI) and Bankscope.

Previous studies have primarily involved multivariate statistical analyses (for example, discriminant analysis) for investigating the causes of bank crises and failures (Pettway and Sinkey, 1980; Sinkey, 1975, 1978). Some researchers have used the logit or probit regression models to improve bank failure predictions (see Bongini et al., 2001; Daley et al., 2008; Davis and Karim, 2008). Compared with the multivariate model, the logit or probit regression models have fewer limitations on model assumptions and result in more accurate cross-country predictions (Davis and Karim, 2008). In view of the contagion effect between global financial markets, the logit or probit regression models are superior at analyzing topics related to bank crises. Because the data of macroeconomic factors and bank-level fundamentals have the characteristics of panel data, in this study, the panel logit regression model is used initially to investigate the probability of and the factors relating to bank failure.

However, the panel logit model can analyze only the impacts of bank fundamentals and economic conditions on the probability of bank failure, and is unable to predict when bank failure will happen and how long a bank can survive. To examine the timing of a bank crisis or failure, and to analyze the determinants thereof, Lane et al. (1986) are the first to apply the survival model to predict a bank crisis. They employ the proportional hazards model to estimate the time of bank failure by using American bank data from 1979 to 1984. Whalen (1991) and Braga et al. (2006) also employed the survival time model to examine bank failures. However, the survival time model assumes that all samples ultimately fail, an assumption that may not suit real situations. Considering the different conditions of subsamples, Schmidt and Witte (1989) developed the split population survival time model to comprehensively investigate possible impacts of explanatory variables on survival time. Cole and Gunther (1995), DeYoung (1999), and Wheelock and Wilson (2000) examined the time and determinants of U.S. bank failures by separating the samples of survived banks and failed banks. They find that the factors for bank failure and survival time may differ.

As a result of globalization and liberalization, interdependence between countries and regions is increasing. Thus, the effect of a financial crisis in one major market can quickly spill over to other markets.

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