Can Financial Cycle Dynamics Predict Bank Distress?

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ABSTRACT

- Recent experience has emphasized the importance of the financial cycle in contributing to bank failures but the early warning literature has placed less weight on this.
- We use a traditional z-score EWS model for Europe that incorporates bank-specific, banking sector and macroeconomic variables to which we add a financial cycle indicator.
- We find that incorporating the financial cycle adds noticeably to the ability to predict bank distress up to two years into the future. However, the effect is asymmetric across the cycle.
- The impact of the financial cycle tends to be stronger for large banks.

INTRODUCTION / MOTIVATION

- Financial crises and associated bank failures are a common but unwelcome feature of economic life. While individual banks can fail for idiosyncratic reasons at any time, common bank failures are associated with problems in the banking system or in the whole economy.
- Existing literature suggests that models are capable of picking up half of the potential failures a year in advance (see Männasoo and Mayes (2009), Mayes and Stremmel (2014)). However, the recent experience showed that supervisor have ignored signals (Garcia, 2012).
- Moreover, a feature of the global financial crisis was that it illustrated a major swing in the financial cycle. One might, therefore, expect the cycle to lie at the heart of predictive models. However, prior early-warning models have placed less weight on variables relating to the financial cycle. In this paper, we seek to expand the strand of literature by adding financial cycle indicators to the traditional model.
- The high costs of the recent crisis have refocused attention on both reducing the chance of future crises and reducing their costs if a crisis does occur. Action has taken place on a number of fronts such as on individual banking level (capital buffers, liquidity provisions, increasing resilience) and on the institutional set-up (recovery and resolution plans).
- This paper touches on the ability to detect problems in individual banks and act upon them before the problems and their associated losses mount. An early intervention in banks is likely to reduce the losses as well as increasing the chance to recover a bank and hence avoiding the costs of resolution will be higher. Of course there is always a chance that some failures will be missed and some banks will be mistakenly described as being at risk.

APPROACH

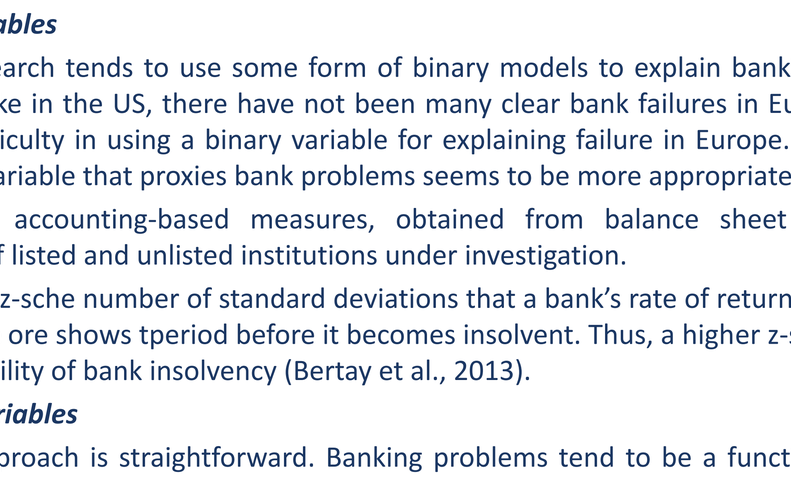
- We characterize the individual banking problems with the dependent variable and use a wide set of explanatory variables to explain the state of the individual bank.

Dependent Variables

- Previous research tends to use some form of binary models to explain banking failures or distress. Unlike in the US, there have not been many clear bank failures in Europe and this creates a difficulty in using a binary variable for explaining failure in Europe. Thus, using a continuous variable that proxies bank problems seems to be more appropriate.
- z-scores are accounting-based measures, obtained from balance sheet and income statements of listed and unlisted institutions under investigation.
- In essence, a z-sche number of standard deviations that a bank's rate of return on assets can fall in a single ore shows tperiod before it becomes insolvent. Thus, a higher z-score signals a lower probability of bank insolvency (Bertay et al., 2013).

Independent Variables

- Our basic approach is straightforward. Banking problems tend to be a function of various influences such as:
  - Bank-specific (drawn from accounting data): CAMELS variables and size.
  - Banking sector: national market concentration, aggregate banking sector z-score.
  - Macro-economic: GDP growth and inflation.
  - Macro-financial: debt service ratio of non-financial corporations and households, market capitalization to GDP ratio and nominal M3 money supply to GDP ratio.
- Financial cycle phase: dummy (1 if cycle moves down and 0 otherwise) based on the phase of the financial cycle metric by Stremmel (2015).



ANALYSIS

Sample Characteristics

- Our sample comprises annual data on 2239 banks from EU-15 countries from 1999 to 2014.
- We source variables from standard databases such as Bankscope (accounting data), IMF IFS (macro-economic variables) and BIS data (banking sector and macro-financial indicators).
- Descriptive statistics and correlation tables of the variables do not suggest any abnormality.

Estimation Technique

- We use an unbalanced panel data model with robust errors and employ standards OLS/GLS estimation techniques. We incorporate both fixed time and country effects.
- We employ a one year lag on bank-specific and banking sector variables.
- We employ a two year lag on macro-economic and macro-financial variables plus the financial cycle indicator (but we cross checked with other lags) to avoid simultaneity problems in the estimation.

Results

- Since the public information we use here is inferior to information available to banks and supervisory authorities, the actual ability to act early should be greater than that indicated by our model.

	Baseline	EURO Area		Size		
		Yes	No	Small	Medium	Large
Constant	10.318***	9.944***	11.139***	12.813***	10.543***	10.227***
	(14.05)	(11.14)	(9.16)	(12.23)	(10.80)	(2.83)
Cost to income	-0.0016***	-0.0015***	-0.0016*	-0.0032***	-0.0011**	0.0020
	(-3.88)	(-3.04)	(-1.89)	(-4.34)	(-2.04)	(1.06)
Equity to customer & short term funding	0.0015***	0.0018***	0.0007	0.0018**	0.0013***	-0.0058***
	(3.58)	(3.93)	(0.94)	(2.54)	(3.17)	(-2.72)
Liquid assets to total assets	-0.0012	-0.0013	-0.0008	-0.0015	-0.0012	0.0056
	(-1.39)	(-1.29)	(-0.53)	(-1.19)	(-1.30)	(1.46)
Loan loss provisions to total assets	-0.0477***	-0.0480***	-0.0469***	-0.0518***	-0.0415***	-0.0926
	(-4.56)	(-3.70)	(-2.66)	(-4.04)	(-2.71)	(-0.74)
Non-interest income to gross revenues	-0.0004	-0.0006	-0.0006	-0.0004	0.0002	0.0025
	(-0.80)	(-0.91)	(-0.64)	(-0.44)	(0.23)	(1.33)
Net interest margin	0.0502***	0.0429***	0.0578*	-0.0029	0.0781***	0.2657***
	(3.65)	(2.87)	(1.70)	(-0.21)	(4.65)	(3.09)
Total assets	-0.3145***	-0.2874***	-0.4100***	-0.4636***	-0.3146***	-0.2809**
	(-9.26)	(-7.00)	(-8.86)	(-8.75)	(-7.07)	(-2.11)
Bank concentration	-0.0118***	-0.0096**	0.0720	-0.0084	-0.0189***	-0.0558***
	(-3.24)	(-2.09)	(1.52)	(-1.53)	(-4.02)	(-3.38)
Bank concentration squared	0.0001***	0.0001*	-0.0006	0.0001	0.0002***	0.0004***
	(3.03)	(1.86)	(-1.47)	(1.43)	(3.57)	(2.92)
Banking sector z-score	-0.0392*	-0.0694***	-0.0472	-0.0584*	0.0189	0.0504
	(-1.80)	(-2.58)	(-0.40)	(-1.68)	(0.80)	(0.57)
Annual GDP growth	0.0062	0.0062	0.0128	0.0167**	0.0001	-0.0003
	(1.39)	(1.12)	(1.16)	(2.18)	(0.15)	(-0.02)
Annual change in CPI	-0.0354***	-0.0421***	-0.0620	0.0084	0.0172	0.0162
	(-2.74)	(-2.81)	(-1.14)	(0.61)	(1.40)	(0.41)
Debt service ratio of non-financial corporations	0.0001	0.0056*	-0.0002	-0.0011	0.0006	-0.0071
	(0.07)	(1.91)	(-0.01)	(-0.32)	(0.24)	(-1.21)
Debt service ratio of households	-0.0231***	-0.0164**	-0.0557	-0.0248***	-0.0169***	0.0446
	(-5.14)	(-2.25)	(-1.26)	(-2.87)	(-2.96)	(1.52)
Market capitalization to GDP	0.0003	0.0008	-0.0011	0.0001	0.0001	-0.0003
	(0.81)	(1.52)	(-0.68)	(0.14)	(0.11)	(-0.18)
Nominal M3 to GDP	0.0029***	-0.0029	0.0063**	0.0017	0.0017	0.0035
	(3.48)	(-1.43)	(2.12)	(1.36)	(1.55)	(1.06)
Financial cycle dummy	-0.0192**	-0.0281***	0.1052	-0.0025	-0.0332***	-0.0818*
	(-2.20)	(-2.67)	(0.81)	(-0.15)	(-3.37)	(-1.76)
Number of observations	9385	7704	1681	2910	5490	523
Number of banks	1521	1249	272	506	982	102
R^2 (within)	0.1912	0.1657	0.3499	0.2754	0.2398	0.3539

Note: This table shows the slope coefficients of the panel regression estimates using country and time fixed-effects estimators. In each regression, the dependent variable is the z score and the t statistics are shown in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

- We find a modest ability of our model to explain banks' individual z-score in Europe – country and time fixed effects are important.
- In detail, bank-specific and banking system variables have the expected signs and plausible magnitudes. The model offers a clear impact of the financial cycle phase but the role of macro-economic variables appears to be rather limited.
- The impact of the indicators tends to vary throughout the financial cycle phases. This can be interpreted that banks become asymmetrically weak in the down phase.
- We conduct a number of robustness exercises and checks (Euro/non-Euro; listed/non-listed; size). Our model suggests that listed banks are better explained but less influenced by the financial cycle; our explanatory power is best for large banks.

CONCLUSIONS / IMPLICATIONS

- Examining EU-15 banks from 1999-2014, we find that financial cycle dynamics can provide additional useful forecasts of weaknesses and problems in banks at least a year ahead.
- We show that there is a clear variation among banks according to their size and origin. But most importantly, the determination of weaknesses seems to vary strongly with respect to the phase of the financial cycle. Banks become asymmetrically weak in the down phase.
- Strong asymmetry emphasizes the importance of early actions and the need for resolution/public confidence boosting guarantees
- BUT we are not very optimistic about early warning ability for individual banks in general.

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