

# Measuring and Forecasting Financial Stability

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**Tigran Poghosyan**  
University of Groningen

„Distress in European Banks: An Analysis Based on a New Data Set“

# Distress in European Banks: An Analysis Based on a New Data Set

Tigran Poghosyan<sup>1</sup>    Martin Čihák<sup>2</sup>

<sup>1</sup>Department of Economics and Business  
University of Groningen

<sup>2</sup>European Department  
International Monetary Fund

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# Motivation

- The recent financial crisis highlights importance of early identification of problem banks
  - Need to establish suitable "benchmarks" helping to distinguish banks vulnerable to financial distress
- While many studies have analyzed determinants of bank distress in the U.S., no study analyzes bank failures in the EU
- We try to fill this gap by addressing the following questions
  - What are the determinants of bank distress in the EU?
  - Is it possible to flag problem EU banks based on a publicly available information?
  - Are there systematic differences among EU members in terms of bank stability?

# Who Cares?

- Public/depositors, who stand to lose financially if a bank fails
- Rating agencies, aiming to rank banks based on their financial soundness
- EU regulators/prudential supervision authorities
  - Need to identify problem EU banks sufficiently early
  - While EU financial system is integrated, prudential supervision framework is still country-specific
  - Quest for transition to a uniform (rules-based) supervisory framework, with more transparency and less supervisory discretion and forbearance

# Types of Early Warning Indicators

- Financial ratios (CAMEL)
  - No agreement on weights, need for backtesting
  - Not sufficient *per se*, need to be complemented by other indicators (Rojas-Suarez, 2001)
- Market information (stocks, subordinated debt)
  - Useful predictors in the U.S. (Flannery, 1998; Curry et al., 2001)
  - Less conclusive outcomes for other countries (Bongini et al., 2002; Čihák, 2007)
- Other leading indicators
  - Deposit rates (Rojas-Suarez, 2001; Kraft and Galac, 2007)
  - Macro variables/economic environment (Demirguc-Kunt and Detragiache, 2005; Čihák and Schaeck, 2007)

# Methodology

- Two approaches (Shumway, 2001)
  - Static ratios (e.g. z-score, Moody's KMV)
  - Hazard rate models (e.g. logit)
- Logistic regression
  - $\log \frac{P_{ijt}}{1-P_{ijt}} = \beta_0 + \sum_{k=1}^K \beta_k X_{k,ijt-1}$
  - Relaxing assumption of independence across banks (heteroskedasticity robust variance-covariance matrix)
  - Random effects model
    - Banks:  $\beta_0 + u_i$ , where  $u_i \sim N(0, \sigma_{u_i}^2)$
    - Countries:  $\beta_0 + u_j$ , where  $u_j \sim N(0, \sigma_{u_j}^2)$
  - Measure of fit: pseudo  $R^2 = 1 - \frac{\log L_{full}}{\log L_{intercept}}$

# Data

- Bank distress
  - Hand-collected information from FACTIVE/NewsPlus
  - Combination of the bank name and the following keywords: “rescue”, “bailout”, “financial support”, “liquidity support”, “government guarantee”, and “distressed merger”
  - Bank distress dummy (0/1) for 1997–2008
- Financial ratios for individual banks
  - Bankscope (Bureau Van Dijk): balance sheets and income statements of 5,708 banks for 1996-2007

# Quick Overview

	Bank-Year Observations			Banks		
	Distressed	Total	Non-hitters	Distressed	Total	Non-hitters
Austria	3	1,733	325	1	286	58
Belgium	4	505	94	4	100	23
Cyprus	0	99	8	0	18	2
Czech Republic	7	138	15	7	29	3
Denmark	1	795	569	1	115	81
Estonia	0	39	0	0	5	0
Finland	0	74	7	0	18	2
France	7	2,918	2,147	6	534	404
Germany	37	15,938	3,388	20	2623	631
Greece	0	117	34	0	31	10
Hungary	0	132	71	0	25	16
Ireland	0	173	96	0	45	21
Italy	2	2,720	2,358	2	876	765
Latvia	0	164	17	0	22	3
Lithuania	3	87	9	2	12	1
Luxembourg	2	764	626	2	148	124
Malta	0	49	31	0	7	5
Netherlands	1	286	176	1	72	44
Poland	6	241	11	3	45	3
Portugal	0	99	55	0	30	18
Slovakia	1	124	0	1	21	0
Slovenia	0	107	34	0	19	8
Spain	0	744	503	0	237	175
Sweden	0	597	506	0	118	101
United Kingdom	5	1,219	618	4	272	141
Total	79	29,862	11,698	54	5,708	2,639

Source: authors, based on BankScope and NewsPlus/Factiva.



# Determinants of Bank Distress

Determinant	Measure	Median value		Difference
		No Distress	Distress	
Capitalization	Total equity/Total assets	0.0583	0.0350	-0.0233***
Asset quality	Loan loss provisions/Total loans	0.0058	0.0047	-0.0010
Managerial quality	Total costs/Total income	0.8068	0.8919	0.0851***
Earnings	Profit before taxes/Total equity	0.1034	0.0245	-0.0789***
Liquidity	Liquid assets/Total assets	0.2288	0.1908	-0.0380
Market discipline	Interest expenses/Deposits	0.0330	0.0730	0.0401***
Contagion dummy	± 200 mln Euro in total assets (banks in the same country)	-	-	-

Note: median equality is tested using the Wilcoxon test. \*\*\* denotes significance at the 1% level.

# Estimation Results (I)

## The Baseline Model

	Baseline	Excluding non-hitters	First distress only	Excluding Germany
Capitalization	-26.578**	-25.085**	-21.218**	-26.259***
Asset quality	20.443**	18.737**	14.875**	10.054
Managerial quality	-0.109	-0.105	0.000	0.192
Earnings	-1.911***	-1.790**	-1.101**	-0.698**
Liquidity	-0.405	-0.526	-0.351	-1.099
Market discipline	4.957***	5.082***	5.057***	4.476***
Contagion dummy	6.072***	5.829***	6.011***	5.750***
Intercept	-5.494***	-5.173***	-6.285***	-7.447***
Number of obs.	29,862	18,164	29,837	13,924
Pseudo R-squared	0.48	0.47	0.46	0.52
Log likelihood	-284.6	-270.2	-212.5	-138.3

Notes: \*, \*\* and \*\*\* denote significance at 10, 5 and 1% levels, respectively. Standard errors are clustered at the bank level.

# Estimation Results (II)

## The Baseline Model with Additional Control Variables

	Macro var-s	Market con- centration	Z-score	Stock prices	Wholesale financing
Capitalization	-17.449	-28.551**	-14.820**	-27.466**	-30.268**
Asset quality	19.426**	18.950**	2.339	20.609**	18.187**
Managerial quality	0.061	-0.107	-0.313*	-0.11	0.049
Earnings	-1.653**	-2.377***	-6.099***	-1.957***	-1.868**
Liquidity	0.157	-0.246	-0.348	-0.413	-0.264
Market discipline	3.885***	4.649***	4.000***	4.974***	4.932***
Contagion dummy	6.834***	5.956***	5.798***	6.086***	6.348***
Inflation	0.000				
GDP (per capita)	0.129				
Domestic credit/GDP	-0.496				
Concentration		5.136**			
Z-score			-203.95		
Stock prices				4.965***	
Wholesale liabilities					0.163***
Intercept	-6.068	-5.709***	-4.756***	-5.469***	-5.809***
Number of obs.	29,155	29,862	29,417	29,862	27,800
Pseudo R-squared	0.61	0.49	0.50	0.49	0.51
Log likelihood	-166.7	-279.3	-257.0	-282.3	-211.6

Notes: \*, \*\* and \*\*\* indicate significance at 10, 5 and 1% levels, respectively. Standard errors are clustered at the bank level.

# Estimation Results (III)

## Panel Data Analysis of the Baseline Model

	Random intercept for banks	Random intercept for countries
Capitalization	-37.059***	-29.239***
Asset quality	29.513***	19.368**
Managerial quality	-0.119	-0.121*
Earnings	-2.360**	-2.125***
Liquidity	-0.886	-0.6
Market discipline	7.724***	5.082***
Contagion dummy	8.756***	6.388***
Intercept	-8.862***	-5.423***
Random error (log of st. dev.)	2.077***	-0.263
Number of obs.	29,862	29,862
Pseudo R-squared	0.49	0.52
Log likelihood	-247.8	-282.1

Notes: \*, \*\* and \*\*\* indicate significance at 10, 5 and 1% levels, respectively.

## Overview of Main Findings

- Capitalization, asset quality and earnings are significant factors driving bank distress
- Robust evidence for market discipline and contagion effects
- The impact of managerial quality and liquidity is insignificant
- No significant variation of baseline hazard among EU members

## Classification Table: Baseline Model

Cut-off point = 0.1 (10%)

		Actual distress		
		Yes	No	Total
Classified distress	Yes	44	77	121
	No	35	29,706	29,741
Total		79	29,783	29,862

- Type I error: 35 out of 79 (44.3%)
- Type II error: 77 out of 29,783 (0.3%)

## Classification Table: Baseline Model

Cut-off point = 0.01 (1%)

		Actual distress		
		Yes	No	Total
Classified distress	Yes	50	258	308
	No	29	29,525	29,554
Total		79	29,783	29,862

- Type I error: 29 out of 79 (36.7%)
- Type II error: 258 out of 29,783 (0.9%)

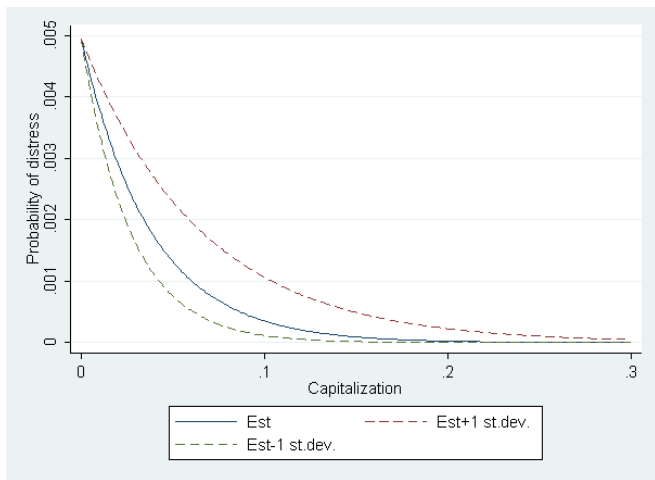
## Classification Table: Baseline Model

Cut-off point = 0.005 (0.5%)

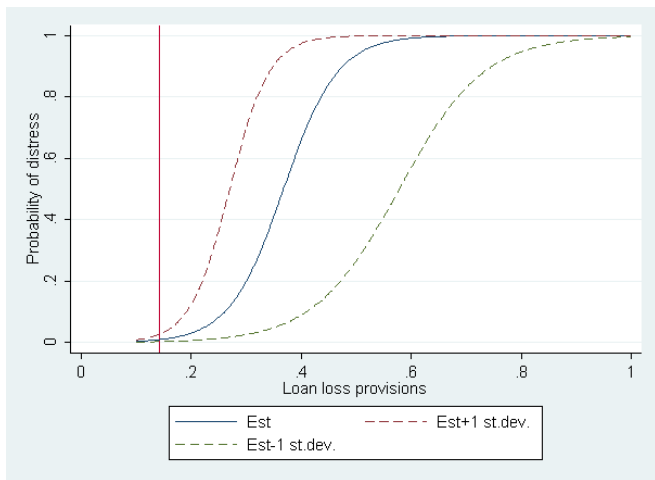
		Actual distress		
		Yes	No	Total
Classified distress	Yes	54	417	471
	No	25	29,366	29,391
Total		79	29,783	29,862

- Type I error: 25 out of 79 (31.6%)
- Type II error: 417 out of 29,783 (1.4%)

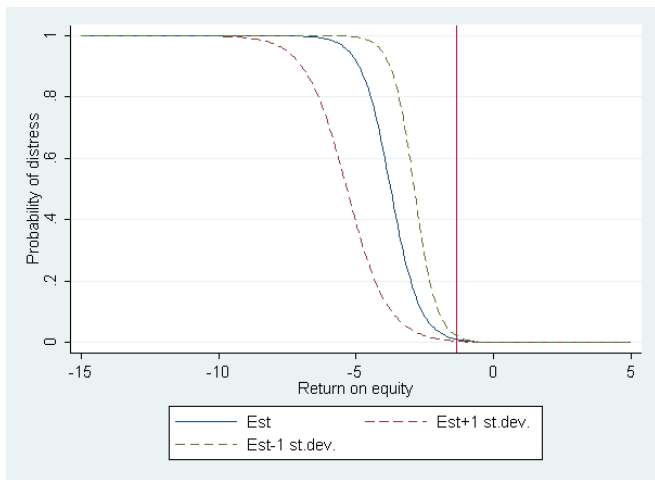
# Marginal Effect of Capitalization



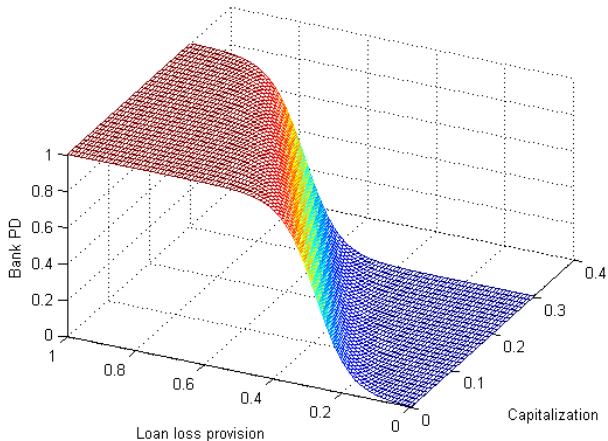
# Marginal Effect of Asset Quality



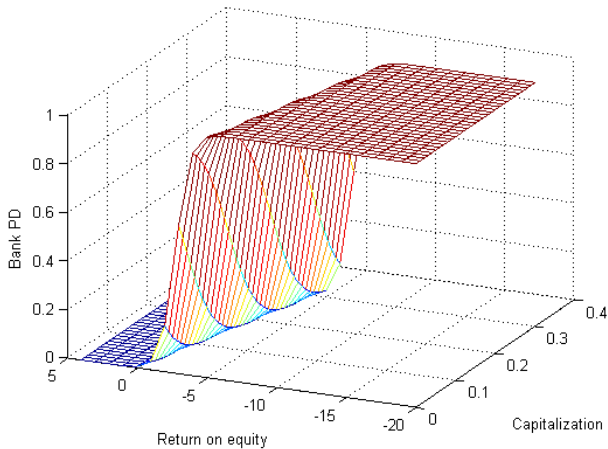
# Marginal Effect of Earnings



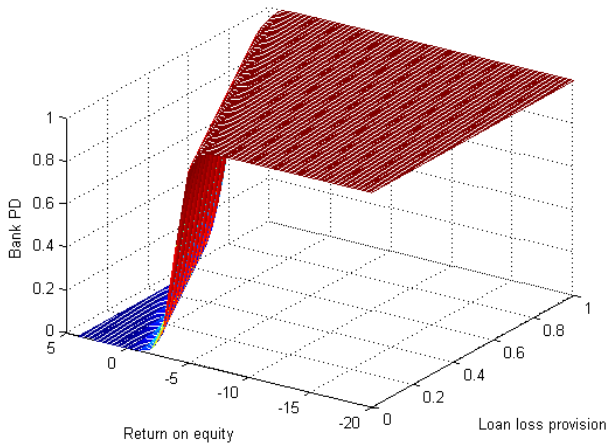
# Capitalization-Asset Quality Tradeoff



# Capitalization-Earnings Tradeoff



# Asset Quality-Earnings Tradeoff



# Conclusions

- First evidence on the determinants of bank distress in EU using parsimonious model and a new data set
- Support is found for the following hypotheses
  - CAMEL
  - Contagion effects
  - Market discipline
  - Concentration-fragility
  - Predictive power of stock prices
  - Increase in risk exposure due to wholesale funding
- We reject the following hypotheses
  - Importance of macro factors for bank distress in EU
  - Systematic differences in baseline PDs among EU countries

## Policy Recommendations

- Benchmark criteria of sound banking should cover not only capitalization, but also asset quality and earnings
- Public disclosure of such criteria can increase transparency and foster more prudent bank conduct, given the significant impact of market discipline
- These benchmark criteria can serve as a basis for establishment of EU-wide rules-based supervisory framework

Discussion

Thank you!