Banking Sector Diversity and Bank Stability

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Quote

... excessive homogeneity within a financial system – all the banks doing the same thing – can minimize risk for each individual bank, but maximize the probability of the entire system collapsing.

Andrew G. Haldane
Robert M. May

Introduction

- The Lehman Collapse in 2008 and the successive global financial turmoil reminded us that individual banks and complete financial systems can turn from stable into unstable literally over night. The question of what makes banks and banking systems more resilient is thus ultimately important. There is an increasing interest in the role of institutional diversity in the bank sector, and how this affects bank stability.
- **However, we know surprisingly little about the importance of institutional banking sector diversity for the economy despite the prominent role that this issue plays in the economic-policy debate during the financial crisis.**

Introduction

- So far, the debate on financial systems' role in bank stability across countries revolves around the capability of market-vìs-à-vìs bank-based systems to absorb shocks, see e.g. Baum, Schäfer and Talavera (2011) and Levine (2002).
- Our main objective is to present data-driven evidence on the question of whether distinct levels of institutional diversity in EU countries' banking sectors matter for individual bank stability.
- **Does a diversity-bank stability nexus exist in the sense that higher institutional diversity in the banking sector shields the banks better from the adverse impact of an idiosyncratic shock?**

The Diversity-Stability Nexus: Internal diversification vrs. institutional diversity

- Bank-internal diversification: economies of scale and scope premium
- But: monitoring loss, banks become increasingly more similar.
- Diversity: An institutional diverse banking sector may have a better chance of remaining stable throughout turbulent times because less affected bank types may be able to compensate for the distorted deposit and credit flows in heavily affected bank types (see Ayadi et al 2009, 2010 and Haldane et al 2011).

The Diversity-Stability Nexus: Channel Competition

- A more competitive and less concentrated banking system is more fragile and less stable (Beck et al 2005, Berger et al 2008, Beck et al 2013).
- In contrast: threat of market entry and increased competition could stimulate bank efficiency, monotoring and screening - keeps loan default rates low, fosters innovation (e.g. Schaeck et al 2009). Both have beneficial effects for financial stability, while 'too big to fail'-banks, with implicit government guarantees, are likely to take excessive risk, thus potentially endangering stability.
- Despite the often assumed close link between diversity and competition we know little about their relationship.

Banking sector diversity: Is there a stability dividend in crisis times?

- We hypothesize that diversity is a kind of insurance mechanism particularly valuable in financial turmoil.
- It insures banks and the economy to some extend against the risk of all facing at the same time severe financial shortage which threatens to dry up the funding and the earning potential of the entire banking sector.
- Accordingly, when the crisis hits individual bank stability should benefit from a higher diversity in the local banking sector.
- **We examine the proposition of a stability dividend, focussing on banking sectors in the European Union.**

Data Sources

- Bankscope 1998-2014: bank-level variables, diversity indicators
- Global Financial Development Database (GFDD): country-level variables
- Eurostat: Inflation
- Acute Crisis Data from ECP Paper: Lo Duca et al (2017)
- Focus on commercial, cooperative and savings banks, which comprise more than 88% of all included banks.
- The final sample includes 38729 bank-year observations

Measuring bank sector diversity

- *Shannon* Index:

$$\text{FinStruct}_{c,t} = -\sum_{j=1}^{J} S_{j,c,t}\, ln\, S_{j,c,t} \quad \in [\mathbf{0}, ln(J)]$$

with S_{jct} as the share of group j's total assets over the country's c total banking sector assets in year t. *FinStruct* quantifies the uncertainty in predicting the group identity of a bank that is taken at random from the dataset. This uncertainty is maximal **(minimal)** if each bank type has the same chance of appearing, that is, if the country's banking sector assets are equally distributed across the J distinct bank types (**if all assets are concentrated in one group**).

Measuring bank sector diversity

- *Gini-Simpson* Index

$$\text{FinDivers}_{c,t} = 1 - \sum_{i=1}^{N} \left(S_{i,c,t} \right)^2 = 1 - \textit{Herfindahl Index}$$

where S_{ict} is the individual bank i's share in the domestic banking sector assets. *FinDivers* is zero if the country's banking sector comprises only one bank. The maximal value is $(N-1)/N$ so that *FinDivers* increases with the number N of banks in a country, and, for a given N, with a more even size distribution.

Shannon Index versus *Gini-Simpson* Index

- The *Shannon* Index is calculated on the basis of the three bankings groups ($J = 3$). The *Gini-Simpson* Index is calculated using market shares of single banks (without grouping them into banking groups).
- Everything else equal, the *Shannon* index values the occurrence of "small players" higher than the *Gini-Simpson* Index since the logarithm of small fractions becomes very high in absolute values.

Measuring bank stability

- As many others (e.g. Leroy et al 2017, Goetz 2018, Beck et al 2013, Schaeck et al 2012, Berger et al 2009) we use:

$$Z\text{-}Score_{i,t} = \frac{\left(ROA_{i,t} + \frac{Equity_{i,t}}{Assets_{i,t}} \right)}{\sigma(ROA)}, \text{ where}$$

  $\sigma(ROA)$ is the SD of ROA over a rolling window of 3 years.

- The *Z-Score* indicates how much variability in returns can be absorbed by capital plus current net profits without the bank becoming insolvent. A higher Z-score implies a larger distance to insolvency and a greater financial stability for the individual bank.

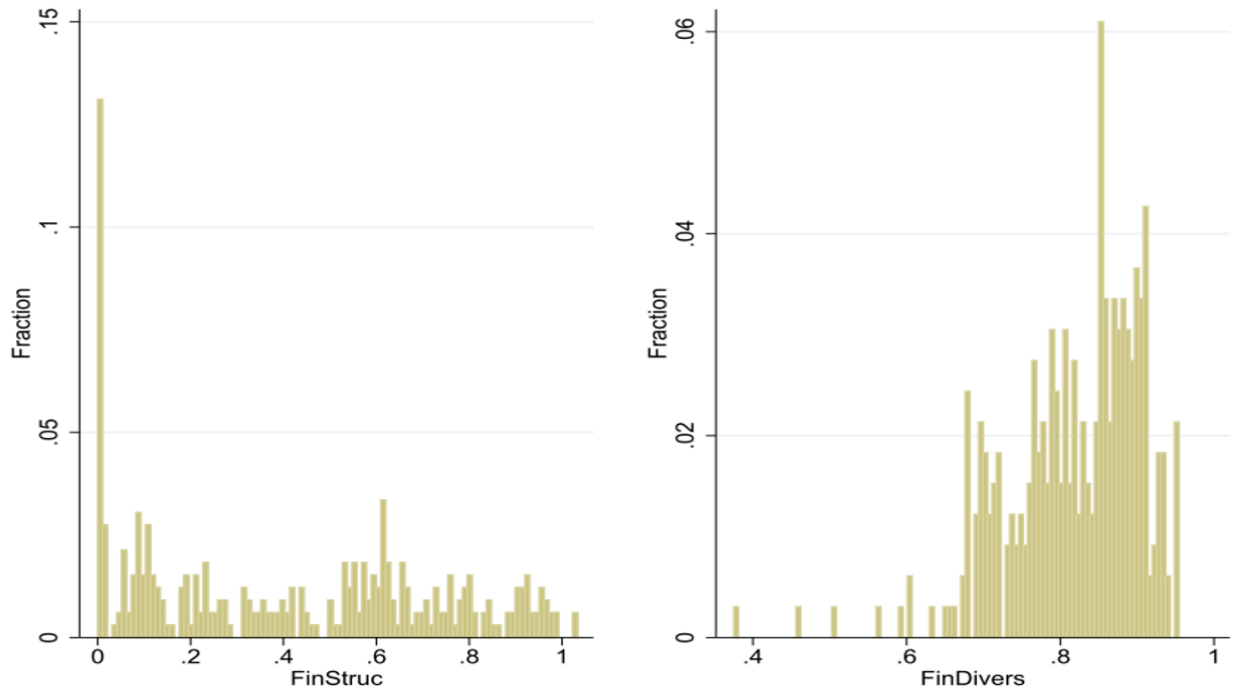
Measuring market power

- $$Lerner\ Index_{i,t} = \frac{P_{i,t} - MC_{i,t}}{P_{i,t}}.$$

  The index captures the bank's price setting power (the deviation of the price charged by a firm in a normal market from the price that would emerge in case of perfect competition).
- Further covariates: Internal diversification, efficiency, size, size growth, wholesale funding, liquidity, leverage. Country level: sector size, financial depth, financial structure, inflation

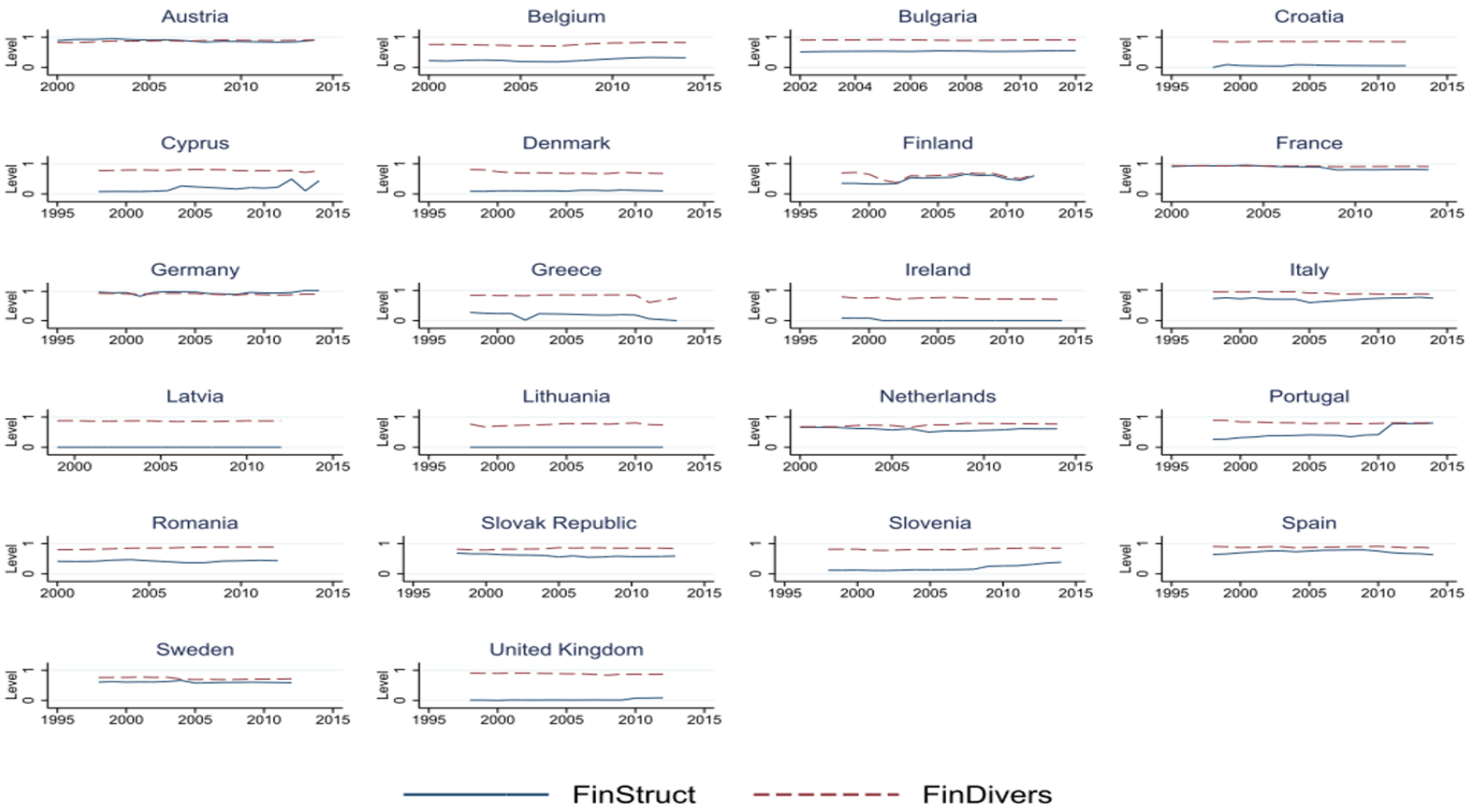
Distribution of Diversity Indicators over Years 1998-2014

Figure 1: The Distribution of Countries' Banking Sector Diversity

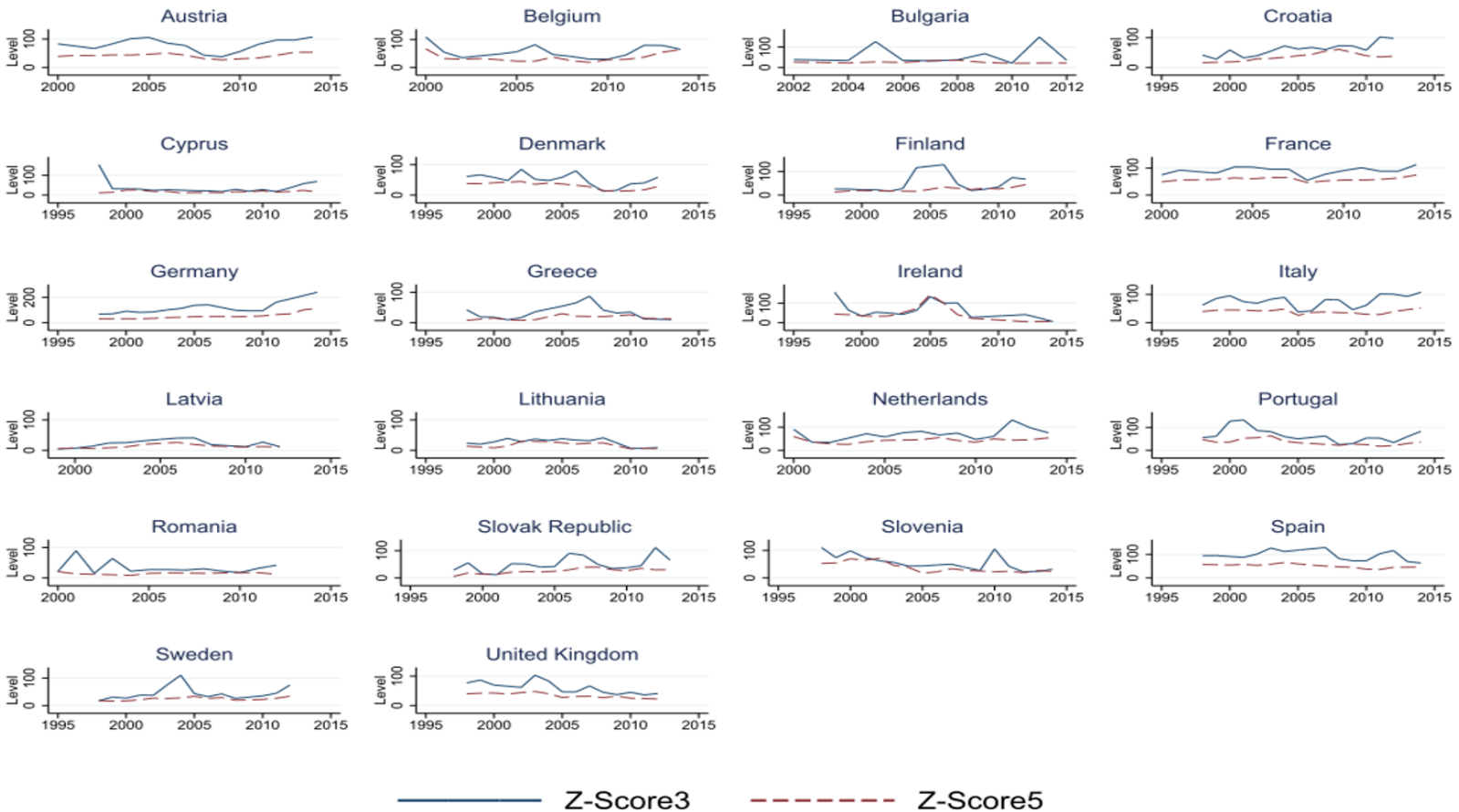


Note: The Figure shows the distribution between 1998 and 2014 of our variables of interest: the two measures of banking sector diversity. The first measure, *FinStruct*, is calculated as the Shannon Index and it quantifies the uncertainty in predicting the group identity of a bank that is taken at random from the dataset. *FinDivers* is calculated as 1-HHI, where HHI is the *Herfindahl Index*. For a detailed explanation of the construction of the two measures, please refer to Section 3.2.

Banking Sector Diversity by Country over the Years 1998-2014



Bank stability by Country over the Years 1998-2014



Estimation model

Difference-in-Difference analysis

$$\begin{aligned} \text{Z-Score3}_{i,c,t} &= \alpha_i + (\beta_1 DIV_{c,t} + \beta_2 X_{i,c,t-1} + \beta_3 Z_{c,t}) * \text{BankType} * \text{Post2007} \\ &\quad + \gamma_t + \epsilon_{i,c,t}. \end{aligned}$$

The estimated average marginal effects (AME) represent for each subgroup

$$\frac{\partial\, \text{Z-Score3}_{i,c,t}}{\partial\, V} \text{ with } V \in [DIV_{c,t}, X_{i,c,t-1}, Z_{c,t}].$$

Baseline Results

Banking Sector Diversity Effects on Bank Stability, Baseline Results

	(1) Z-Score3 Full Sample	(2) Z-Score3 1998-2006	(3) Z-Score3 2007-2014	(4) Z-Score3 Full Sample	(5) Z-Score3 1998-2006	(6) Z-Score3 2007-2014
FinStruct	0.195***	0.141**	0.247***			
	(4.01)	(2.56)	(4.99)			
FinDivers				0.0480	0.0170	0.0781*
				(1.53)	(0.55)	(1.85)
Internal Divers	-0.180*	-0.0754	-0.281**	-0.188*	-0.0699	-0.302**
	(-1.91)	(-0.75)	(-2.17)	(-1.96)	(-0.69)	(-2.26)
Lerner Index	0.0291*	0.0158	0.0420**	0.0286*	0.0113	0.0454**
	(1.94)	(1.05)	(2.07)	(1.88)	(0.75)	(2.19)

Baseline Results

Other Covariates' Effects on Bank Stability, Baseline Results

Asset Growth	-0.629***	-0.654***	-0.605***	-0.605***	-0.634***	-0.577***
	(-12.26)	(-10.99)	(-7.46)	(-11.17)	(-10.47)	(-6.66)
Sector Size	-0.0147***	-0.0156***	-0.0138***	-0.0153***	-0.0171***	-0.0135***
	(-4.20)	(-2.94)	(-4.35)	(-3.93)	(-3.32)	(-3.12)
Financial Depth	0.0140***	0.0148**	0.0131***	0.0131***	0.0150**	0.0113**
	(3.28)	(2.36)	(3.56)	(2.75)	(2.43)	(2.24)
Credit to MarkCap	-0.0315***	-0.00918	-0.0531***	-0.0187*	0.00450	-0.0411**
	(-2.60)	(-0.81)	(-2.84)	(-1.80)	(0.49)	(-2.36)
Inflation	0.0325**	0.0156	0.0489***	0.0282**	0.00580	0.0499***
	(2.41)	(0.71)	(3.37)	(2.05)	(0.28)	(2.99)
Bank FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Observations	38729	19059	19670	38729	19059	19670

Is the diversity-stability relationship homogeneous across bank type?

Non Crisis Times

	1998-2006					
	(1)	(2)	(3)	(4)	(5)	(6)
	Z-Score3	Z-Score3	Z-Score3	Z-Score3	Z-Score3	Z-Score3
	Coop Banks	Sav Banks	Comm Banks	Coop Banks	Sav Banks	Comm Banks
FinStruct	0.214***	0.156**	-0.0716**			
	(2.59)	(2.56)	(-2.08)			
FinDivers				0.0666	-0.0583	0.0123
				(1.35)	(-1.46)	(0.75)
Covariates	yes	yes	yes	yes	yes	yes
Bank FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Observations	9422	5985	3652	9422	5985	3652

Is the diversity-stability relationship homogeneous across bank type?

Crisis Times

2007-2014

	(7) Z-Score3 Coop Banks	(8) Z-Score3 Sav Banks	(9) Z-Score3 Comm Banks	(10) Z-Score3 Coop Banks	(11) Z-Score3 Sav Banks	(12) Z-Score3 Comm Banks
FinStruct	0.328***	0.257***	-0.0632*			
	(4.78)	(3.43)	(-1.69)			
FinDivers				0.119*	0.0127	0.0410**
				(1.80)	(0.29)	(2.13)
Covariates	yes	yes	yes	yes	yes	yes
Bank FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Observations	11267	5284	3119	11267	5284	3119

Is Diversity associated with Risk Smoothing ?

Diversity Effects on the Volatility of ROA (ROA Risk)

Non Crisis and Crisis Times

	(1) ROA Risk Full Sample	(2) ROA Risk 1998-2006	(3) ROA Risk 2007-2014	(4) ROA Risk Full Sample	(5) ROA Risk 1998-2006	(6) ROA Risk 2007-2014
FinStruct	-0.0646	0.0438	-0.170***			
	(-1.28)	(0.74)	(-2.62)			
FinDivers				-0.100*	-0.0146	-0.183***
				(-1.90)	(-0.27)	(-2.70)
Internal Divers	0.246**	0.0970	0.391**	0.241*	0.0681	0.408**
	(1.98)	(0.79)	(2.21)	(1.92)	(0.56)	(2.28)
Lerner Index	-0.0556***	-0.0659**	-0.0457**	-0.0564***	-0.0603**	-0.0525***
	(-2.93)	(-2.43)	(-2.44)	(-3.01)	(-2.28)	(-2.80)

Summary

- Positive and significant relationship between diversity and stability. In crisis times consistent over both diversity measures.
- Effects are stronger in the crisis period, suggesting that diversity is especially important in period of crisis.
- 2007-2014: A one standard deviation increase in *FinStruct* and *FinDivers* produces an average marginal increase of 0.247 and 0.0781 standard deviations in the *Z-score3*, respectively.
- Diversity effect depends on bank type.
- Diversity reduces the ROA risk.

Conclusions

By disentangling the diversity-stability relationship across non crisis and crisis periods we find that **in crisis times** banks in more diverse banking systems are more stable (see Haldane and May's proposition). Cooperative banks seem to benefit in general but the diversity-stability relationship for savings and commercial banks is sensitive to the "nature" of diversity. A more even distribution of bank specializations increases the savings banks' stability while commercial banks gain in crisis' years from a more even bank size distribution. Furthermore, inspecting different points of bank size and asset growth distributions reveals that diversity promotes the stability of smaller and slowly-growing banks more than that of large and fast growing ones. The findings call for caution when designing capital markets and banking regulation to avoid unintended side effects that could endanger banking sector diversity.

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