Banking sector concentration, competition, and financial stability: The case of the Baltic countries

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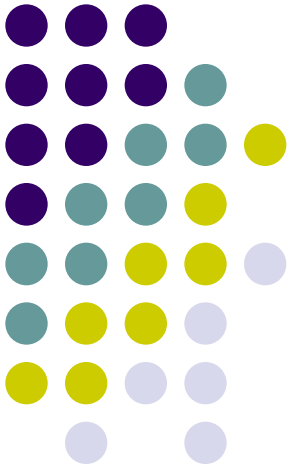


Presentation Outline

1) Introduction and motivation
2) Data and descriptive statistics
3) Methodology and results
4) Robustness checks
5) Conclusion and policy implications

Introduction & motivation

- The key role of banks makes the issue of banking competition extremely important

- In particular, the recent financial crisis demonstrates the need to address the effect of bank competition on the risk-taking behavior of financial institutions, and then on financial stability

- A large theoretical and empirical literature investigated the impact of bank competition on financial soundness: bank competition-stability trade-off?

→ No consensus…

→ “competition-fragility” vs. “competition-stability” view

Introduction & motivation

- 3 different views in the literature:

1) In the traditional view, bank competition is seen as detrimental to financial stability:

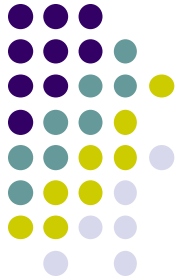
- competition erodes bank profits and thus the banks' franchise value → banks' incentives to take risk increase because the opportunity costs of bankruptcy for shareholders decrease
- trade-off between competition and stability can also be explained by higher ability to monitor borrowers when banks earn rents, greater diversification and better regulators' monitoring in concentrated markets

2) "Competition-stability" view:

- market power increases bank portfolio risks → low competition increases loan rates, borrowers tend to shift to riskier projects
- *"Too Big To Fail"* subsidies as a result of implicit or explicit government bailout insurances
- lack of diversity of bank portfolios

3) The third view reconciles the two strands of the literature by theoretically and empirically demonstrating the existence of a nonlinear relationship between competition and risk

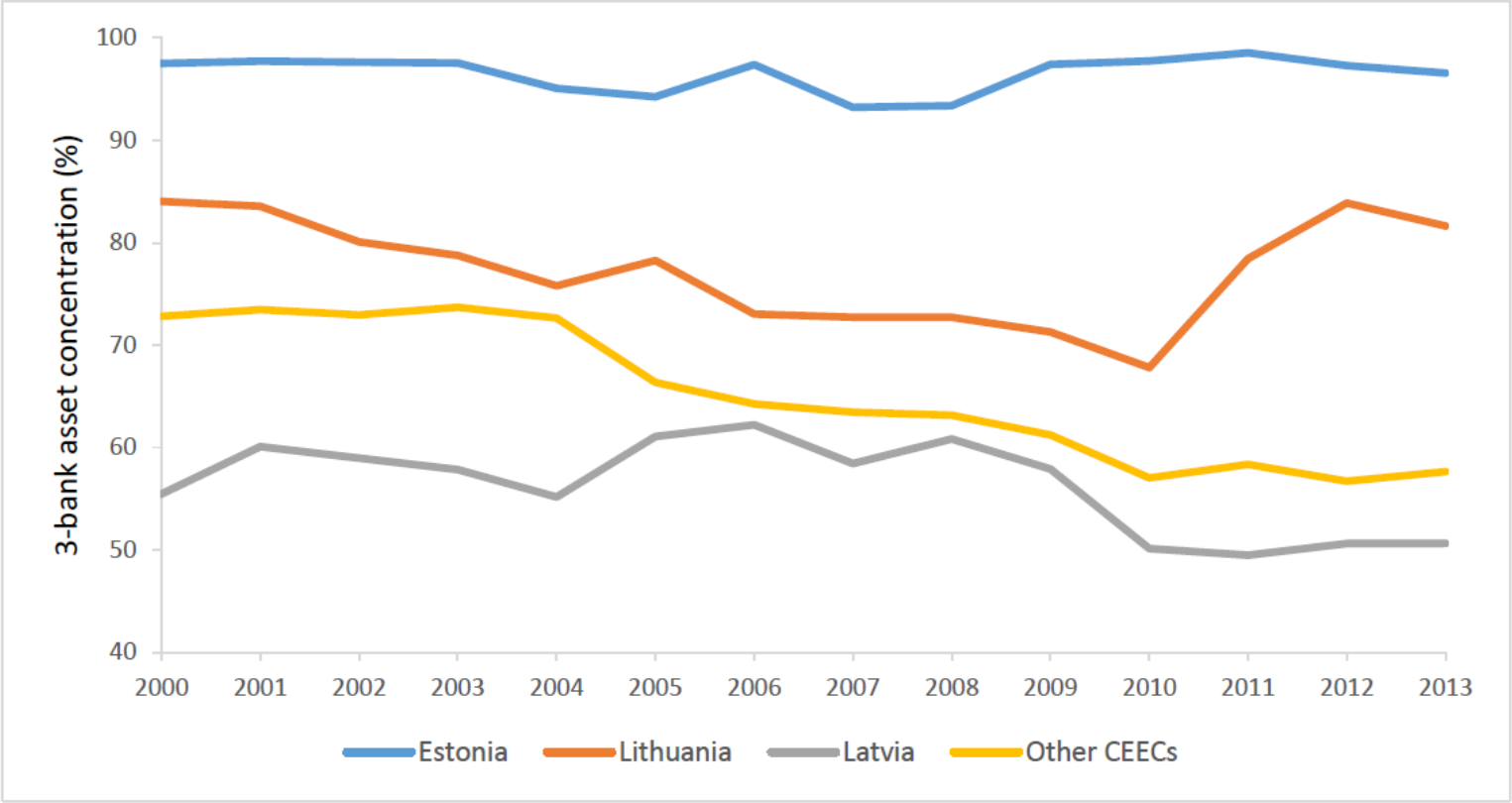
Introduction & motivation



- According to Martinez-Miera and Repullo (2010), the U-shaped relationship between competition and financial stability is explained by two effects:
  1) "Risk-shifting effect": Competition reduces risk → negative correlation between loan interest rates and competition, which reduces the risk of loan defaults
  2) "Margin effect": Competition increases risk → greater bank competition reduces interest payments, reducing then the buffer in cases of losses

- In less competitive banking markets the risk-shifting effect dominates, so the marginal effect of a new bank entry is negative for financial stability, whereas in more competitive markets the margin effect overwhelms the risk-shifting effect, and hence a new entry increases financial risk

Introduction & motivation



Source: Global Financial Development Database.
Other CEECs: Albania, Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Slovak Republic, Slovenia.

Data & descriptive statistics

- Commercial banks located in Baltic countries over the period 2000-2014: 40 banks (Latvia 21, Lithuania 10, Estonia 9)

Bank Name	Country code	Period	Bank Name	Country code	Period
Swedbank AS	LV	2001-2014	Swedbank AS	EE	2000-2014
ABLV Bank AS	LV	2002-2014	SEB Pank	EE	2000-2014
SEB banka AS	LV	2000-2014	Danske Bank A/S Estonia Branch	EE	2000-2007
Rietumu Bank Group-Rietumu Banka	LV	2000-2014	DNB Pank AS	EE	2011-2014
AS Citadele Banka	LV	2010-2014	AS LHV Pank	EE	2012-2014
AS DnB Banka	LV	2004-2014	BIGBANK AS	EE	2006-2014
Norvik Banka AS	LV	2006-2014	Estonian Credit Bank-Eesti Krediiidipank	EE	2000-2014
Latvijas Kraj Banka AS-Latvian Savings Bank	LV	2005-2010	Versobank AS	EE	2011-2014
As PrivatBank	LV	2004-2014	Tallinn Business Bank Ltd-Tallinna Äripanga AS	EE	2010-2013
Baltikum Bank AS	LV	2005-2014	AB SEB Bankas	LT	2000-2014
Regionala investiciju banka-Regional Investment Bank	LV	2003-2014	Swedbank AB	LT	2003-2014
Trasta Komercbanka-Trust Commercial Bank	LV	2000-2014	AB DNB Bankas	LT	2000-2014
Baltic International Bank- Baltijas Starptautiska Banka	LV	2009-2014	AB Bankas Snoras	LT	2000-2010
AS Expobank	LV	2012-2014	Danske Bank A/S	LT	2000-2014
Danske Bank A/S	LV	2000-2007	Siauliu Bankas	LT	2000-2014
Jsc Latvian Development Financial Institution Altum	LV	2003-2013	Citadele Bankas AB	LT	2006-2014
Meridian Trade Bank AS	LV	2003-2014	UAB Medicinos Bankas	LT	2000-2014
AS Reverta	LV	2000-2014	AB Bankas FINASTA	LT	2009-2014
Bank M2M Europe AS	LV	2005-2009, 2013-2014	Skandinaviska Enskilda Banken AB; Vilniaus Filialia	LT	2009-2014
JSC Latvijas Pasta banka	LV	2009-2014			
GE Capital Latvia	LV	2004-2012			

Data & descriptive statistics

- **Competition measure**: Lerner index (Lerner, 1934):
  - Inverse proxy for competition: measure the market power of banks
  - A low index indicates a high (low) degree of competition (market power), and conversely
  - Efficiency-adjusted Lerner index (Koetter, 2012): takes into account banks' cost inefficiency, defined as the distance of a bank from a cost frontier accepted as the benchmark

- **Concentration measure**: bank market share (% of total assets)
  - inverse proxy for competition
  - a concentrated market structure is associated with higher prices and profits, reflecting an uncompetitive behavior

Data & descriptive statistics

Measures of risk:

- Bank-individual risk: Z-score
  - Accounting-based risk measure
  - Measures the distance from insolvency (inverse proxy for risk)
  - Generally viewed in the banking literature as a measure of bank soundness
  - Calculated as follows:

$$Z - score_{it} = \frac{E_{it}/A_{it} + ROA_{it}}{\sigma ROA_{it}}$$

with E_{it}/A_{it} the equity to total assets ratio, ROA_{it} the return on assets, and σROA_{it} the standard deviation of return on assets (computed by considering a 3-year rolling time window, see, e.g., Beck et al., 2013)

- Bank credit risk: Loan loss reserves (% gross loans)

Methodology & results

- The following regression specification is considered:

$$Risk_{it} = \alpha + \beta_1 Comp_{it-1} + \beta_2 (Comp_{it-1})^2 + \beta_3 Crisis_t + \sum_{k=4}^{n} \beta_k X_{it-1} + \mu_i + \gamma_t + \epsilon_{it}$$

- Control variables:
  - Economic environment: annual inflation rate, annual GDP growth
  - Bank-specific factors: bank size (log of total assets), ratio of non-interest income on total income, ratio of fixed assets to total assets, share of loans in total assets, liquidity ratio

- Estimators: Fixed effects (FE) + 2SLS: three instrumental variables (1st lag market power proxy, and two variables proxying cost inefficiency, the ratio of overhead expenses to total assets and the cost-to-income ratio)

- U-shape test and conf. interval for the turning point (Lind and Mehlum, 2010)

Methodology & results

Table 8: Market power and bank risk-taking: The nonlinear relationship between the Lerner index and the Z-score

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Z-score FE	Z-score FE	Z-score FE	Z-score 2SLS	Z-score 2SLS	Z-score 2SLS
Lerner	5.014***	5.031***	5.056***	13.924***	14.067***	14.922***
	(1.102)	(1.135)	(1.212)	(3.490)	(3.523)	(3.310)
Lerner*Lerner	-4.306***	-4.368***	-4.344***	-10.916***	-10.906***	-12.088***
	(1.258)	(1.327)	(1.439)	(3.140)	(3.218)	(3.182)
Inflation		0.033	0.006		-0.027	-0.059
		(0.065)	(0.063)		(0.077)	(0.080)
GDP growth		-0.027	-0.025		-0.038	-0.021
		(0.049)	(0.050)		(0.056)	(0.055)
Crisis dummy	-2.743***	-1.263**	-1.367	-1.621***	-1.397**	-1.529***
	(0.438)	(0.551)	(0.858)	(0.462)	(0.597)	(0.529)
Size			0.023			-0.171
			(0.132)			(0.215)
Non-interest income/total income			-0.577			-0.566
			(0.600)			(0.919)
Fixed assets/total assets			4.767			3.974
			(8.028)			(6.083)
Loans/total assets			2.122			2.672
			(1.464)			(1.723)
Liquidity			0.005			0.007
			(0.011)			(0.011)
U-shape test	2.30	2.21	2.00	2.44	2.27	2.69
	[0.013]	[0.016]	[0.026]	[0.007]	[0.011]	[0.003]
Turning point	0.582	0.576	0.582	0.638	0.645	0.617
95% confidence interval, Fieller method	[0.485 ; 0.862]	[0.474 ; 0.889]	[0.478 ; 0.983]	[0.540 ; 0.838]	[0.541 ; 0.877]	[0.533 ; 0.789]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	350	350	346	343	343	339
R-squared	0.430	0.431	0.447	0.187	0.171	0.188
Number of banks	40	40	39	40	40	39
Hansen J-OverID test [p-value]	-	-	-	0.0980	0.130	0.162

Methodology & results

Table 9: Market power and bank risk-taking: The nonlinear relationship between the Lerner index and loan loss reserves

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Loan loss FE	Loan loss FE	Loan loss FE	Loan loss 2SLS	Loan loss 2SLS	Loan loss 2SLS
Lerner	-28.659	-29.232	-19.250**	-59.703***	-58.714***	-51.906***
	(17.547)	(17.495)	(8.709)	(21.534)	(20.474)	(15.712)
Lerner*Lerner	24.365	26.052	13.090	42.663**	42.568**	39.232**
	(18.393)	(18.689)	(9.821)	(19.790)	(19.187)	(15.614)
Inflation		-0.774*	-0.842*		-0.169	-0.102
		(0.398)	(0.419)		(0.309)	(0.280)
GDP growth		-0.116	-0.036		-0.185	-0.175
		(0.124)	(0.163)		(0.143)	(0.138)
Crisis dummy	4.666***	4.822	13.002	4.593***	5.824***	6.439***
	(1.391)	(4.095)	(8.514)	(1.608)	(2.256)	(1.888)
Size			-3.585			1.035
			(2.901)			(1.133)
Non-interest income/total income			-3.860*			4.861**
			(2.069)			(1.955)
Fixed assets/total assets			23.219			19.324
			(20.720)			(22.169)
Loans/total assets			6.614			-4.208
			(10.228)			(5.203)
Liquidity			0.036			-0.035
			(0.055)			(0.023)
U-shape test	1.00	1.11	0.53	1.29	1.33	1.56
	[0.162]	[0.137]	[0.301]	[0.099]	[0.091]	[0.060]
Turning point	-	-	-	0.699	0.689	0.661
95% confidence interval, Fieller method	-			[0.585 ; 2.478]	[0.571 ; 2.057]	[0.552 ; 1.321]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	349	349	349	341	341	341
R-squared	0.462	0.484	0.553	0.035	0.084	0.306
Number of banks	38	38	38	38	38	38
Hansen J-OverID test [p-value]	-	-	-	0.286	0.299	0.215

Methodology & results

Table 10: Market power and bank risk-taking: The nonlinear relationship between the market share and the Z-score

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Z-score FE	Z-score FE	Z-score FE	Z-score 2SLS	Z-score 2SLS	Z-score 2SLS
Market share	-0.006	-0.005	0.028	0.005	0.006	0.065
	(0.071)	(0.068)	(0.069)	(0.086)	(0.084)	(0.075)
Market share*Market share	0.000	0.000	0.000	0.000	0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Inflation		0.050	0.012		0.049	0.006
		(0.070)	(0.065)		(0.069)	(0.065)
GDP growth		-0.048	-0.042		-0.041	-0.037
		(0.047)	(0.048)		(0.044)	(0.045)
Crisis dummy	-2.121***	-0.263	-0.579	-1.038***	-1.061***	-1.108***
	(0.639)	(0.793)	(1.292)	(0.297)	(0.405)	(0.411)
Size			0.019			-0.070
			(0.162)			(0.180)
Non-interest income/total income			-0.504			-0.558
			(0.644)			(0.607)
Fixed assets/total assets			3.239			4.030
			(9.939)			(9.518)
Loans/total assets			3.616*			3.467*
			(1.865)			(1.796)
Liquidity			0.012			0.012
			(0.014)			(0.013)
U-shape test	0.09	0.08	Ext. outside	Ext. outside	Ext. outside	Ext. outside
	[0.464]	[0.47]	interval	interval	interval	interval
Turning point	-	-	-	-	-	-
95% confidence interval, Fieller method	-	-	-	-	-	-
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	370	370	366	369	369	365
R-squared	0.329	0.333	0.362	0.330	0.333	0.364
Number of banks	40	40	39	40	40	39
Hansen J-OverID test [p-value]	-	-	-	0.236	0.251	0.178

Methodology & results

Table 11: Market power and bank risk-taking: The nonlinear relationship between the market share and loan loss reserves

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Loan loss FE	Loan loss FE	Loan loss FE	Loan loss 2SLS	Loan loss 2SLS	Loan loss 2SLS
Market share	-1.649**	-1.611**	-1.557***	-0.798**	-0.752**	-0.694***
	(0.686)	(0.676)	(0.568)	(0.317)	(0.310)	(0.204)
Market share*Market share	0.016**	0.016**	0.015***	0.009***	0.008***	0.007***
	(0.007)	(0.007)	(0.006)	(0.003)	(0.003)	(0.002)
Inflation		-0.604**	-0.679**		-0.396*	-0.276
		(0.286)	(0.332)		(0.215)	(0.203)
GDP growth		0.072	0.053		-0.058	-0.026
		(0.158)	(0.143)		(0.108)	(0.098)
Crisis dummy	-1.699	-4.874	-1.811	2.296*	3.897**	4.407***
	(3.032)	(3.352)	(4.072)	(1.302)	(1.602)	(1.513)
Size			-0.583			0.730
			(1.180)			(0.687)
Non-interest income/total income			-4.438*			5.093**
			(2.560)			(2.350)
Fixed assets/total assets			16.946			30.684*
			(33.153)			(16.915)
Loans/total assets			-3.592			-4.805
			(5.070)			(4.134)
Liquidity			-0.041			-0.047**
			(0.029)			(0.022)
U-shape test	2.40	2.36	2.66	2.52	2.43	3.40
	[0.010]	[0.011]	[0.005]	[0.006]	[0.007]	[0.000]
Turning point	50.90	51.58	51.50	45.69	47.15	47.21
95% confidence interval, Fieller method	[44.48 ; 57.35]	[44.68 ; 59.89]	[46.16 ; 58.70]	[31.89 ; 50.88]	[31.54 ; 52.58]	[38.04 ; 53.08]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	368	368	368	365	365	365
R-squared	0.583	0.594	0.608	0.582	0.593	0.633
Number of banks	38	38	38	38	38	38
Hansen J-OverID test [p-value]	-	-	-	0.196	0.194	0.0799

Robustness checks

- Two additional proxies for bank risk:
  - Z-score measure based on the return on equity (Soedarmono et al., 2011)
  - Impaired loans (% gross loans)

- Three alternative measures of the Lerner index:
  - 3-year moving average to smooth cyclical fluctuations of the Lerner index: market power not expected to change dramatically at the short-run
  - Funding costs not included in the translog cost function (two-input cost function) to estimate the marginal cost: “clean” proxy for pricing power that is not distorted by deposit market power (Maudos & de Guevara, 2007; Turk-Ariss, 2010)
  - Left-censored Lerner index

- Robust regression approach

- Lerner index and market share included in the same regression

Conclusion and policy implications

- Our study aims to empirically investigate the potential nonlinear relationship between bank competition and financial (in)stability in the case of Baltic countries

- Alternative proxies for banking competition considered, and two different measures of bank "risk-taking"

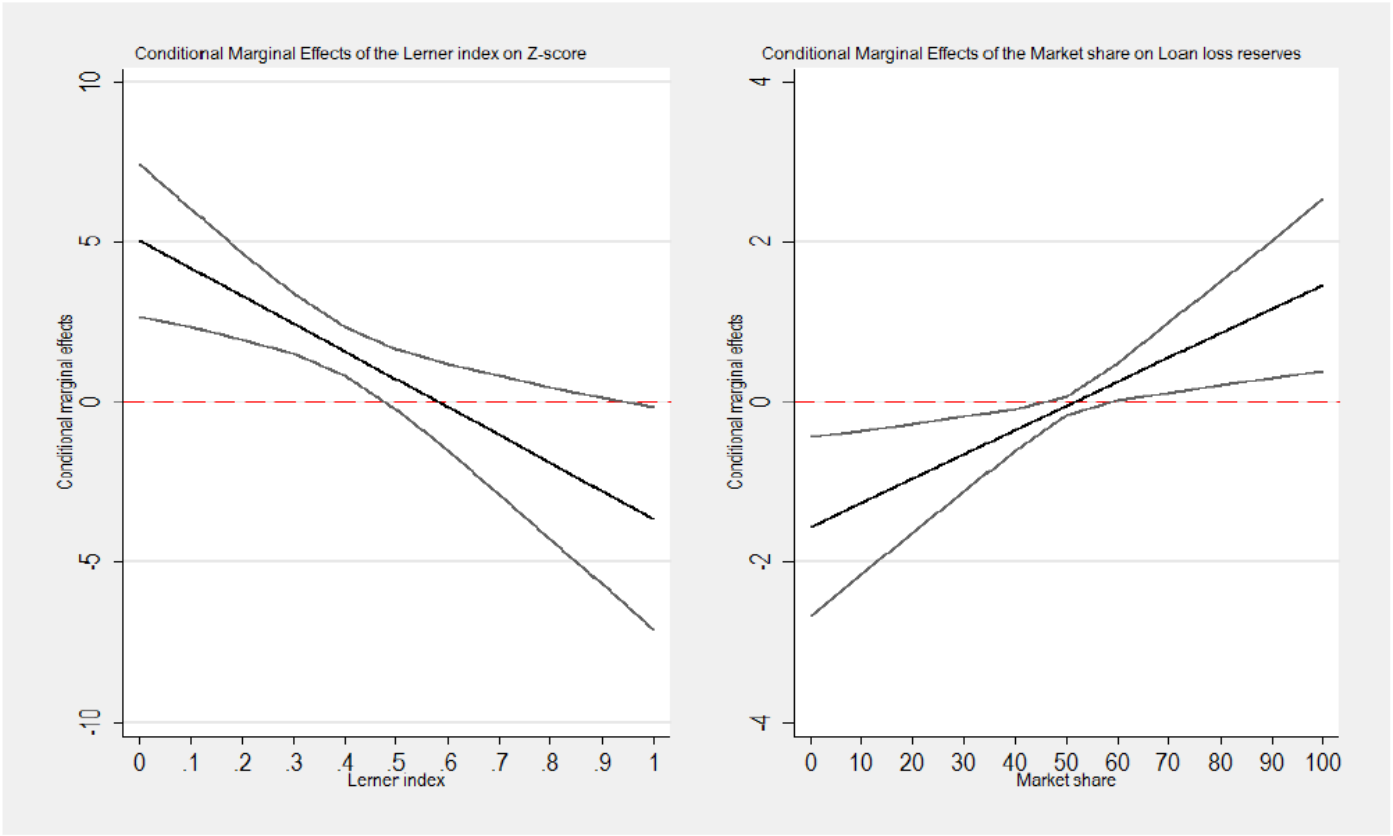
→ in line with the traditional view, we find a positive relationship between competition and bank risk

→ but… this relationship is non-linear

- In particular, we observe that bank market power significantly influences bank soundness (i.e. Z-score), while bank market share is a significant driver of bank risk-taking in terms of credit activity

Conclusion and policy implications

Figure A5: Conditional marginal effects



Note: The conditional marginal effects are computed by considering our benchmark non-linear specification estimated using the fixed effects (FE) estimator, i.e. the specification (3) in table 4 for the Lerner index, and the specification (3) in table 7 for the market share. The Lerner index refers to the adjusted Lerner index proposed by Koetter et al. (2012). The grey lines correspond to the 95% confidence interval.