Firms' Capital Structure under Banking Market Consolidation

Empirical evidence from Europe

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Research question

How does the market power **concentration in the banking sector** affects the **capital structure** of non-financial firms in Europe?

Macroeconomic motivation

Rajan and Zingales (1998): financial development facilitates economic growth by mitigating the problems of asymmetric information (moral hazard and adverse selection).
$\hookrightarrow$ We expect **concentration in the banking sector** to impact asymmetric information problems and thus economic growth.

Two contradictory hypotheses:

- **Market power hypothesis**: more concentration and market power $\rightarrow$ higher price for lending $\rightarrow$ less lending
  See review by Degryse and Ongena (2008) for supporters.
- **Information-based hypothesis**: monopolistic creditor $\rightarrow$ incentive to invest in relationship (exchange of soft info) $\rightarrow$ overcome info asymmetries $\rightarrow$ more lending
  Introduced by Petersen and Rajan (1995).

Microeconomic motivation

Pirrong (2014): firms' capital structure affects firms' performance and firms' ability to withstand economic shocks.
$\hookrightarrow$ We expect **concentration in the banking sector** to impact the way firms finance themselves and thus their performance and ability to withstand crises.

Data

Data Set: unbalanced panel data of 2,098 random European listed companies over the period of 2006-2013.

Data Source: Amadeus Database, World Bank, Federal Reserve Bank of St. Louis.

Base model

Pooled OLS model:

$$leverage_{i,j,t} = \beta_0 + \beta_1 * lerner.index_{j,t} + \beta_2 * X_{i,j,t} + \beta_3 * W_{j,t} + u_{i,j,t}$$

Where:

- $X_{i,j,t}$: firm-level control variables
- $W_{j,t}$: country-level control variables
- i: index for firms
- j: index for countries
- t: index for periods

Variable definitions

- **leverage**: $\frac{debt}{debt + equity}$. Range = [0,1]
- **lerner.index**: $\frac{P-MC}{P}$. Range = [0,1] with 0=perfect competition, 1=monopoly
- **ln(total.assets)**: proxy for firms' size
- **assets.tangibility**: $\frac{tangible\ assets}{total\ assets}$. Tangible assets can be used as collateral
- **sales.growth**: growth rate in sales revenues
- **profit.margin**: $\frac{net\ profit\ after\ tax}{sales}$
- **private.bond**: size of the bond market as % of countries' GDP
- **ln(gdp)**: log of countries' GDP in millions EUR

Descriptive statistics

	Observations	Mean	Median	Std.Dev	Min	Max
leverage	8,470	0.372	0.364	0.255	0	0.909
ln.total.assets	8,470	10.561	10.209	2.219	2.833	19.387
tangibility.pct	8,470	23.796	15.027	24.400	0.0001	99.908
sales.growth	8,470	0.086	0.051	0.482	-5.743	7.042
profit.margin.pct	8,470	4.267	3.380	17.128	-99.710	100
private.bond	65	0.313	0.119	0.464	0.0004	1.929
ln.gdp	65	13.302	13.241	1.369	10.443	15.139
lerner.index	65	0.216	0.226	0.085	0.045	0.384
bank.entry	65	7.631	8	0.698	5	8
bank.deny	65	0.126	0	0.291	0	1
HHI.index	65	0.090	0.073	0.054	0.018	0.217
CR5.index	65	55.434	51.840	17.500	22.004	86.732

Firm and time fixed effect model

Problem: unobservable firms' characteristics and time effects.
$\hookrightarrow$ Error terms are decomposed into:

$$u_{i,j,t} = \underbrace{\alpha_i}_{\substack{\text{time-invariant} \\ \text{firm effect}}} + \underbrace{\gamma_t}_{\substack{\text{time-variant} \\ \text{time effect}}} + \underbrace{\epsilon_{i,j,t}}_{\substack{\text{new} \\ \text{error term}}}$$

Fixed effect model:

$$leverage_{i,j,t} - \overline{leverage}_{i,j} = \beta_1 * (lerner.index_{j,t} - \overline{lerner.index}_j)$$

$$+ \beta_2 * (X_{i,j,t} - \overline{X}_{i,j}) + \beta_3 * (W_{j,t} - \overline{W}_j) + \sum_{t=2007}^{2013} \gamma_t + \epsilon_{i,j,t}$$

Instrumental variables

Problem: endogeneity of Lerner index due to simultaneous causality between banking industry's concentration level and firms' aggregate capital structure decisions.
$\hookrightarrow$ Instrumental variables:

- bank.entry: index (from 0 to 8) of legal requirements needed for new entrants in banking industry
- bank.deny: percentage of denied applications to join the banking industry

Instruments are **relevant** since correlated with Lerner index, and **exogenous** since dictated by laws and imposed to the market participants.
Pitfall: regulatory authorities base their policy on the situation in the lending-borrowing market.

Regression results

	Dependent variable:		
	leverage		
	Pooled OLS	*Fixed Effect Models*	
		Without IVs	*With IVs*
	(1)	(2)	(3)
lerner.index	0.208^{***}	-0.018	0.695^{**}
	(0.036)	(0.036)	(0.296)
ln.total.assets	0.024^{***}	0.074^{***}	0.074^{***}
	(0.001)	(0.005)	(0.005)
tangibility.pct	0.002^{***}	0.001^{***}	0.001^{***}
	(0.0001)	(0.0002)	(0.0002)
sales.growth	0.004	-0.001	-0.001
	(0.005)	(0.003)	(0.003)
profit.margin.pct	-0.002^{***}	-0.001^{***}	-0.001^{***}
	(0.0002)	(0.0001)	(0.0001)
private.bond	-0.062^{***}	0.006	-0.003
	(0.005)	(0.013)	(0.014)
ln.gdp	0.065^{***}	-0.012	0.067
	(0.003)	(0.034)	(0.048)

Regression results (cont.)

	Dependent variable:		
	leverage		
	Pooled OLS	*Fixed Effect Models*	
		Without IVs	*With IVs*
	(1)	(2)	(3)
YEAR2007		0.001	-0.018
		(0.011)	(0.014)
YEAR2008		-0.001	0.001
		(0.013)	(0.013)
YEAR2009		-0.012	-0.009
		(0.010)	(0.010)
YEAR2010		-0.018^{*}	-0.050^{***}
		(0.010)	(0.017)
YEAR2011		-0.025^{**}	-0.059^{***}
		(0.012)	(0.019)
YEAR2012		-0.021^{**}	-0.038^{***}
		(0.010)	(0.012)
YEAR2013		-0.026^{**}	-0.053^{***}
		(0.011)	(0.016)
Constant	-0.856^{***}		
	(0.044)		
Observations	8,470	8,470	8,470
R^2	0.152	0.056	0.026
Adjusted R^2	0.151	0.042	0.020
Residual Std. Error	0.235 (df = 8462)		
F Statistic	216.628^{***} (df = 7; 8462)	26.788^{***} (df = 14; 6358)	-1.324 (df = 14; 6358)
Note:			*p<0.1; **p<0.05; ***p<0.01

Results and interpretation

In the fixed effect model with IVs,

- control variables have the expected sign and
- coefficient for Lerner index is **positive** and **significant at 5% level**: Lerner index $+0.1 \rightarrow$ leverage ratio $+7$ pp (c.p.)

$\hookrightarrow$ Empirical support for the **information-based hypothesis**: monopolistic banks $\rightarrow$ invest in relationship $\rightarrow$ overcome info asymmetries $\rightarrow$ reduced cost of lending $\rightarrow$ higher leverage

Results and interpretation (cont.)

Baert and Vennet (2009) study same geographical region and same type of companies between 1996-2005 and find support for the market power hypothesis. **Why so?**

Financial crisis in 2008 created two simultaneous effects:

- Consolidation trend in banking sector accelerated during the crisis (ECB (2014))
- Due to lack of trust, banks preferred to lend money to solvent and verifiable companies (listed companies)

$\hookrightarrow$ Financial crisis, rather than the information-based hypothesis, is responsible for the positive relationship that we observed.

Conclusion

We analyzed a random sample of European listed companies over the period of 2006-2013 and found positive and significant relation between banks' market power and leverage ratio of non-financial firms.

The 2008 financial crisis might be held accountable for the result. This hypothesis could be further tested:

- We expect the positive relationship to vanish as soon as trust comes back in the credit market
- We expect a negative relationship by applying the same specification to a sample of SMEs, instead of listed corporations

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