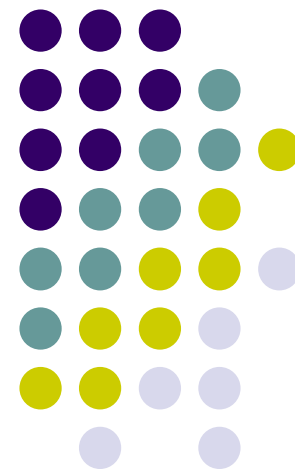


Competition and credit procyclicality in European banking

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Agenda

- 1) Introduction and motivation
- 2) Literature overview
- 3) Macro-level analysis
- 4) Bank-level analysis
- 5) Extensions
- 6) Concluding remarks

Introduction & motivation



- The **vital role of banks** makes the issue of banking competition extremely important
- This issue is at the center of an **active academic and policy debate**
 - how measuring banking competition?
 - are pro-competitive policies relevant?
 - does banking competition matter for credit availability, investment and economic growth?
 - does banking competition matter for monetary policy transmission? (see, e.g., Leroy and Lucotte, 2015, 2016)
 - what are its impacts on the banking sector? Efficiency? Innovation?

Introduction & motivation

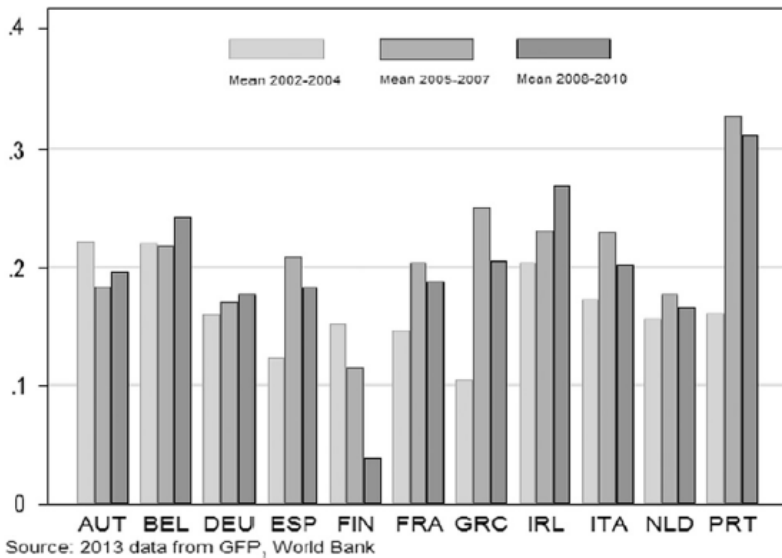
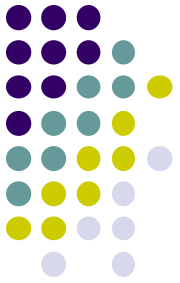


Fig. 1. The evolution of banking competition in Eurozone.

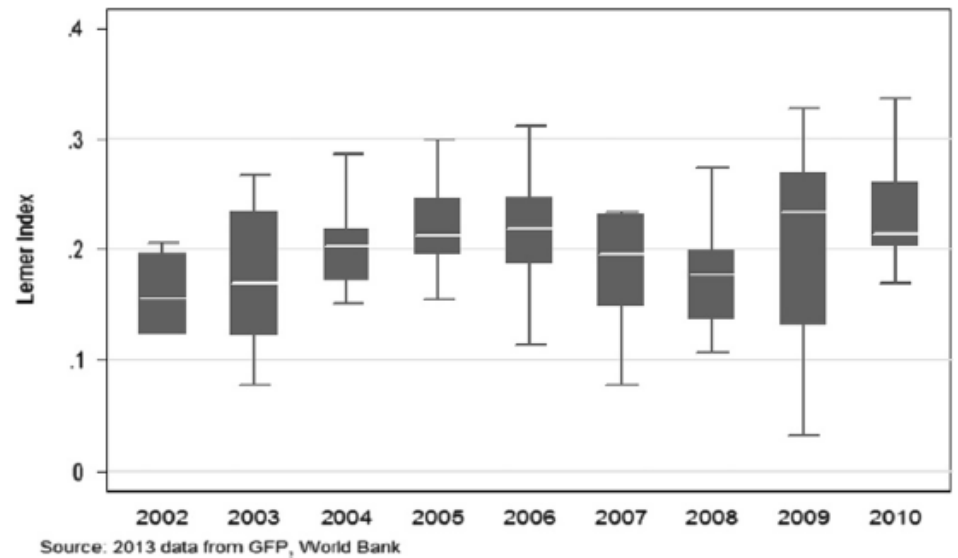


Fig. 2. Dispersion of banking competition.

Source: Leroy & Lucotte (2015)

Introduction & motivation



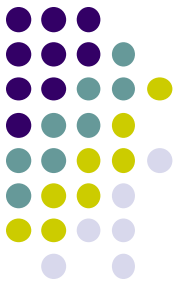
- This debate about the **economic outcomes of bank competition** has been intensified in the aftermath of the financial crisis for two main reasons:
 - 1) Because academics and policy makers wondered whether the deregulation process and the “excessive” bank competition were responsible for the crisis
 - 2) Because the banking sector has experienced numerous structural changes that can be expected to impact the level of competition on the financial sphere

Introduction & motivation



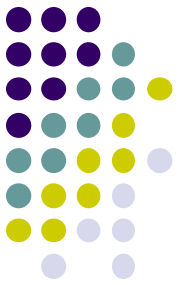
- Most of the existing empirical literature on the nexus between bank competition and economic outcomes focused on the **link between bank competition and financial (in)stability** (see, e.g., Leroy and Lucotte, 2017)
 - no consensus: “*competition-fragility*” vs. “*competition-stability*” views
- However, bank competition may also affect the real sphere by making the system more efficient, both in normal time and in response to a crisis
 - some contributions focused on the **aggregate effects of bank competition on economic growth** in the medium-run (see, e.g., Claessens and Laeven, 2005; de Guevara and Maudos, 2011)

Introduction & motivation



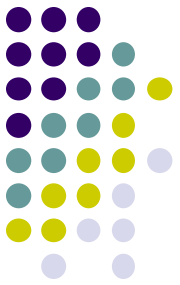
- The effects of bank competition on stability should also be considered through the global effects on macroeconomic volatility, i.e. the occurrence and intensity of economic booms and busts
- The fact that financial systems can be a source of real economic activity fluctuations is at the heart of the **financial accelerator theory** (Bernanke and Gertler, 1989; Kiyotaki and Moore, 1997; Bernanke et al., 1999)
- The fact that credit is more (less) expensive and has a reduced (increased) availability during a recession (expansion) tends to **amplify the real economic cycle** (i.e. macroeconomic volatility), due to the weakening (expanding) of investment and consumption
- No previous study has tried to empirically investigate the **relationship between bank competition and credit procyclicality**

Introduction & motivation



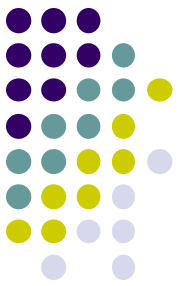
- **Bank competition may reduce credit procyclicality through two channels** (even if there is no consensus in the theoretical literature...):
 - 1) **Low competition** can lead banks to a “quiet life” (Berger and Hannan, 1998), reducing banks’ efficiency and therefore increasing the cost of gathering information necessary to mitigate lender-borrower problems (Chen, 2007).
 - in a low competitive environment, the less incentive to reduce information asymmetries and build long-run relationships with borrowers could exacerbate credit procyclicality
 - 2) Inversely, **high competition** may intensify risk-taking by eroding the franchise value and diminishing incentives to monitor loans
 - competitive markets tend to oversupply credit by relaxing lending standards and extending it to both good and bad borrowers, implying that bank competition could reduce credit procyclicality

Introduction & motivation

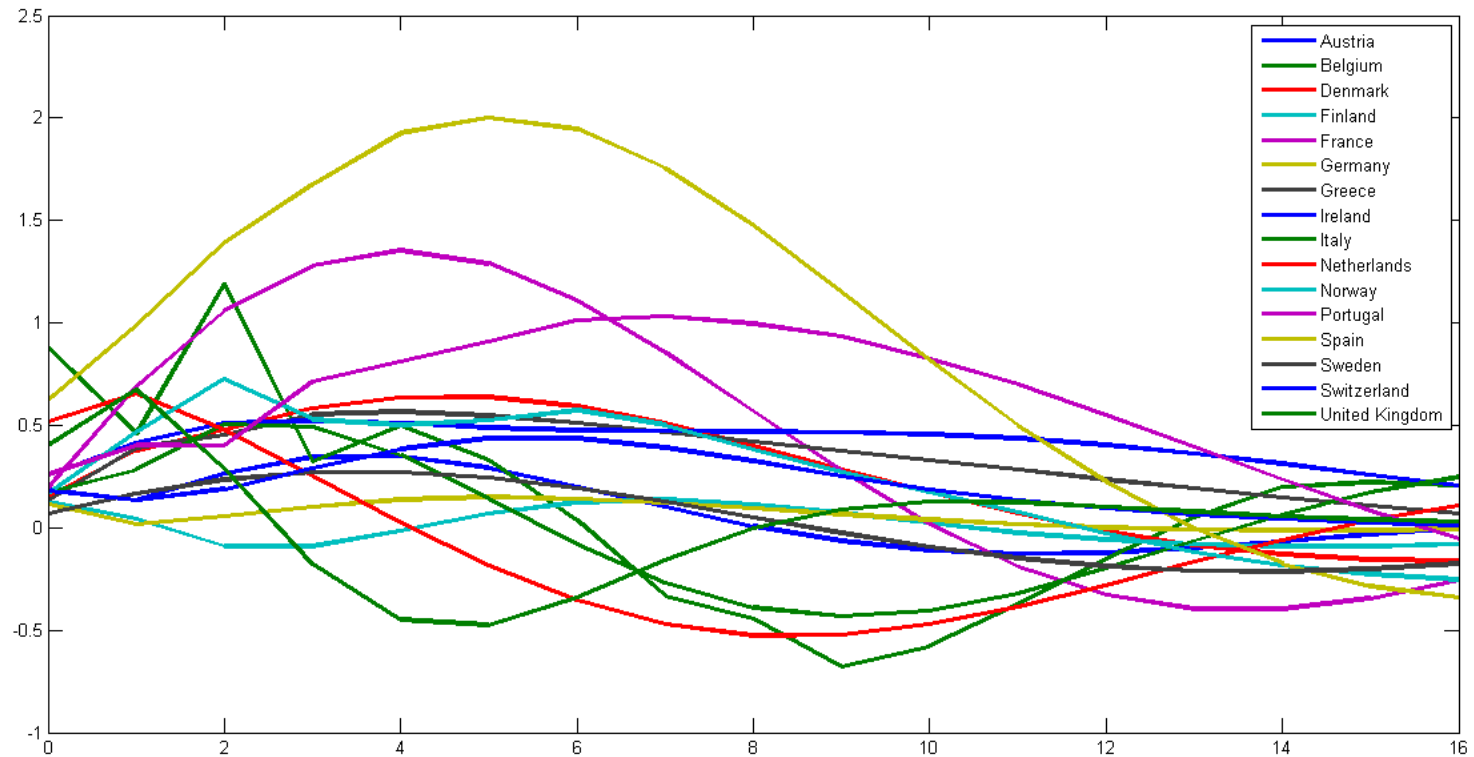


- Against this background and given the lack of empirical evidence on this issue, our study empirically investigates the relationship between bank competition and credit procyclicality for European banking
- does bank competition reduce or exacerbate credit procyclicality?
- does bank competition explain differences of credit procyclicality between European economies?

Introduction & motivation



Country-specific impulse response functions of bank credit cycle to a 1 p.p. shock to the GDP cycle (16 quarters)



Introduction & motivation



- Two levels of analysis considered:
 - 1) **Macro-level analysis:** Interacted panel VAR (IPVAR), 16 European countries, 1997Q1-2014Q4
 - impulse responses of bank credit to an activity shock are conditioned by the level of bank competition, proxied by the **macro Lerner index**
 - 2) **Bank-level analysis:** panel framework (FE estimator), + 3600 banks, 2005-2014
 - analyzing whether the reaction of bank loan supply to the output gap depends on the level of bank competition (i.e. the individual degree of market power): interaction term between output gap and the Lerner index
- Results suggest that **credit procyclicality is higher in a low bank competitive environment:**
 - credit booms and busts are less pronounced when competition is fiercer
 - better shock-absorbing ability of the competitive banking markets

Literature overview



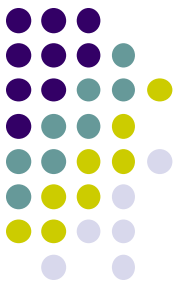
- A large empirical literature have explored several aspects of the procyclicality of the banking sector:

What is the impact that procyclicality has on the real economy, but also on the banking sector itself?

For example, some studies analyse the behavior of demand and supply of loans and their role in economic fluctuations (see, e.g., Lown and Morgan, 2006; Bassett et al., 2014), and the procyclical behavior of bank profitability (see, e.g., Albertazzi and Gambacorta, 2009).

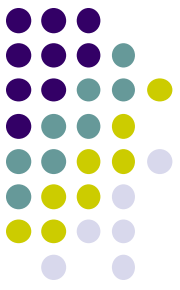
What are the factors that can contribute to strengthening or mitigating the procyclicality of the banking industry?

As discussed by Athanasoglou et al. (2014), these factors include the regulatory and supervisory framework, the monetary policy, the practices of financial firms, such as leverage and remuneration policies, and some other factors such as credit rating agencies reports or the use of automated risk management systems.



Literature overview

- However, only Bouvatier et al. (2012) previously investigated for a sample of OECD countries the relationship between the **banking sector structure and credit procyclicality**
 - Bouvatier et al. (2012) proceed in two steps:
 - 1) Cluster analysis to evaluate the degree of similarity in the banking industry structures, and then split their sample of countries in different clusters
 - 2) Estimation of a panel VAR on cyclical components for each of the clusters, and comparison of the impulse-response functions of credit to a shock in GDP
 - Results that they obtain suggest that credit significantly responds to shocks to GDP, but they do not find that banking sectors with various characteristics do not exhibit differences in terms of credit procyclicality
- **Bouvatier et al. (2012) conclude that the banking sector structure is not an important cause of credit procyclicality**



Macro-level analysis

- **Multivariate approach: IPVAR** (Towbin and Weber, 2013):

$$\begin{pmatrix} 1 & 0 & 0 & 0 \\ \alpha_{0,it}^{21} & 1 & 0 & 0 \\ \alpha_{0,it}^{31} & \alpha_{0,it}^{32} & 1 & 0 \\ \alpha_{0,it}^{41} & \alpha_{0,it}^{42} & \alpha_{0,it}^{43} & 1 \end{pmatrix} \begin{pmatrix} CPI_{i,t} \\ GDP_{i,t} \\ Cred_{i,t} \\ r_{i,t} \end{pmatrix} = \sum_{l=1}^L \begin{pmatrix} \alpha_{l,it}^{11} & \alpha_{l,it}^{12} & \alpha_{l,it}^{13} & \alpha_{l,it}^{14} \\ \alpha_{l,it}^{21} & \alpha_{l,it}^{22} & \alpha_{l,it}^{23} & \alpha_{l,it}^{24} \\ \alpha_{l,it}^{31} & \alpha_{l,it}^{32} & \alpha_{l,it}^{33} & \alpha_{l,it}^{34} \\ \alpha_{l,it}^{41} & \alpha_{l,it}^{42} & \alpha_{l,it}^{43} & \alpha_{l,it}^{44} \end{pmatrix} \begin{pmatrix} CPI_{i,t-l} \\ GDP_{i,t-l} \\ Cred_{i,t-l} \\ r_{i,t-l} \end{pmatrix} + \begin{pmatrix} \delta^{11} & \delta^{12} \\ \delta^{11} & \delta^{12} \\ \delta^{11} & \delta^{12} \\ \delta^{11} & \delta^{12} \end{pmatrix} \begin{pmatrix} I_i \\ Z_{i,t-4} \end{pmatrix} + \varepsilon_{i,t}$$

with $\alpha_{l,it} = \beta_{l,it} + \gamma_l Z_{i,t-4}$.

- $\beta_{l,it}$ and γ_l are two vectors of coefficients and $Z_{i,t-4}$ is a cross-time-varying measure of bank competition (macro Lerner index).
 → γ_l is the **interaction term** and indicates the supplement of effect of bank competition on credit procyclicality

Macro-level analysis

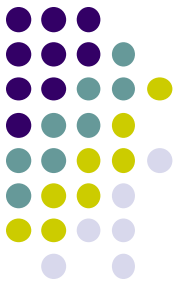
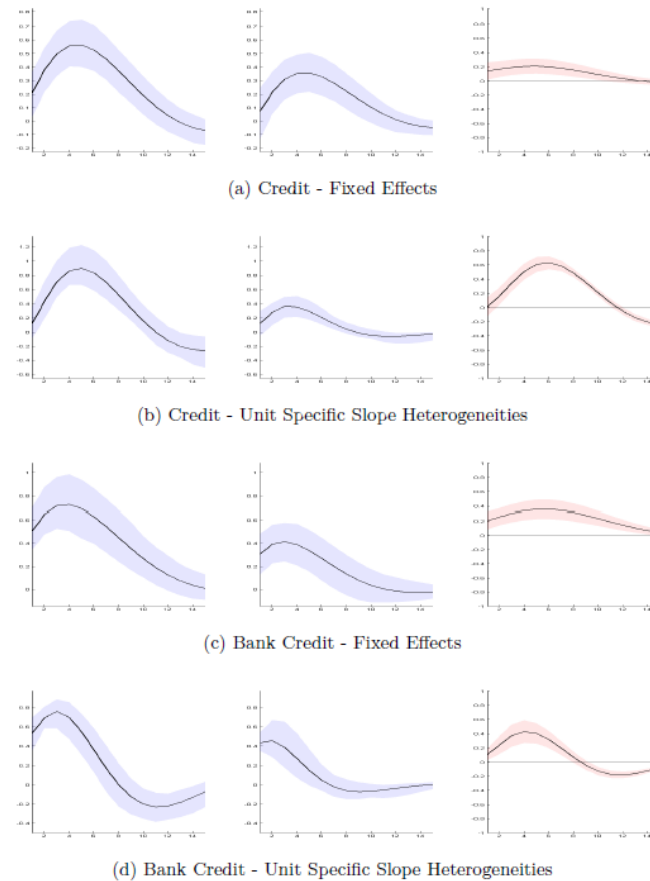


Figure 2: Impulse Response Functions of Credit to a GDP shock: Baseline model



Note: The figure shows the impulse responses of credit and bank credit to a one-percentage-point shock to the output cycle evaluated (from left to right) at the 80th (high level) and 20th (low level) percentiles of the Lerner index sample distribution. The charts on the right represent the differences between the two. The colored bands represent 5% error bands (two standard deviations) generated by bootstrapping (1000 draws).

Macro-level analysis



- Results robust to alternative specifications of the IPVAR model:
 - **Extension of the vector of endogenous variables** by including a variable reflecting the dynamics of assets prices: house price or stock price
 - **Bank credit ordered before the short-term interest rate** when we perform the Cholesky decomposition of the residual: the interest rate pass-through is potentially sluggish, justifying the fact that the supply and demand of credit react only with a lag to innovations in short-term interest rate
 - **Different lag lengths and samples of countries**: re-estimation of the model by dropping one country at a time
 - **Extension of the baseline model** to take into account that credit dynamics is also related to other financial characteristics. Inclusion of 3 additional interaction variables at same time: Z-score index, bank regulatory capital to risk-weighted assets ratio, and stock market capitalization to GDP ratio

Macro-level analysis

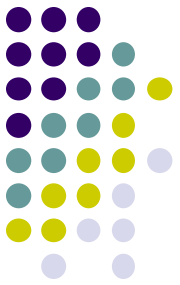
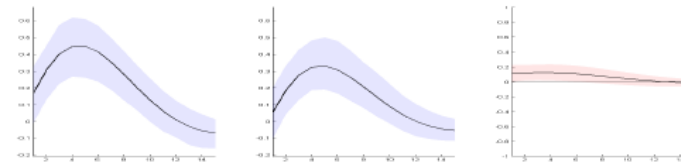
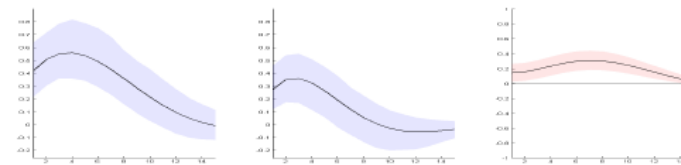


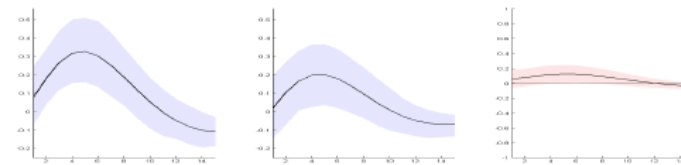
Figure 4: Impulse Response Functions of Credit to a GDP shock: 5-dimensional VAR
- Asset prices



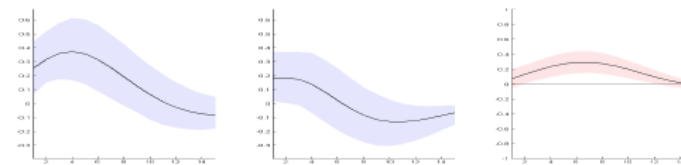
(a) Credit - House prices



(b) Bank Credit - House prices



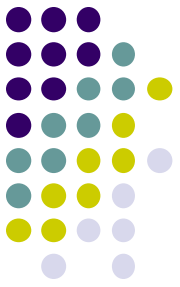
(c) Credit - Stock prices



(d) Bank Credit - Stock prices

Note: The figure shows the impulse responses of credit and bank credit to a one-percentage-point shock in the output cycle evaluated (from left to right) at the 80th (high level) and 20th (low level) percentiles of the Lerner index sample distribution. The charts on the right represent the difference between the two. The colored bands represent the 5% error band (two standard deviations) generated by bootstrapping (1000 draws).

Micro-level analysis



- Empirical specification designed to investigate at the bank-level whether the degree of bank competition impacts the reaction of banks (in terms of supply of loans) to an output-gap shock:

$$\Delta \ln(loans_{it}) = \beta_1 OG_{ct} + \beta_2 OG_{ct} * Lerner_{i,t-1/c,t-1} + \beta_3 Lerner_{i,t-1/c,t-1} + \sum_{j=4}^n \beta_j X_{j,i,t-1} + \mu_{i/c} + \lambda_t + \varepsilon_{it}$$

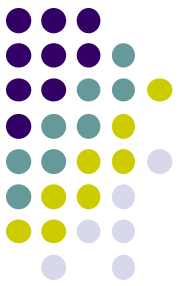
- **Sample of more than 3600 banks:** adjusted Lerner index (Koetter et al., 2012) estimated for each bank over the 2005-2014 period
- Individual control variables: log of total of assets, loans over total assets ratio, equity over total assets ratio and, also, in some specifications, the product term between the Lerner index and monetary policy shocks (Δ_{18} EONIA)

Micro-level analysis



Table A1: Number of banks by country

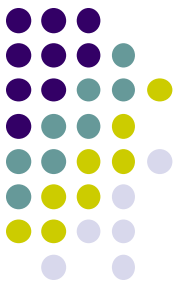
Austria	233	France	211	Italy	577	Sweden	89
Belgium	34	Germany	1711	Norway	128	Switzerland	356
Denmark	98	Greece	16	Portugal	21	the Netherlands	23
Finland	13	Ireland	10	Spain	126	United Kingdom	90



Micro-level analysis

- **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
- Measure used by a large number of papers in the banking literature: **better proxy for competition than concentration indexes** (see, e.g., Claessens & Laeven, 2004; Lapteacru, 2014)
- Formally, the Lerner index corresponds to the difference between price and marginal cost, as a % of price (price is equal to the ratio of total revenue – interest & non-interest revenue – to total assets):

$$Lerner_{it} = \frac{p_{it} - mc_{it}}{p_{it}}$$



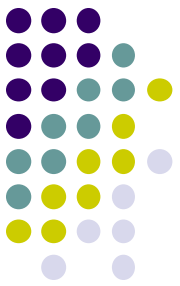
Micro-level analysis

- Marginal cost obtained by estimating a **translog cost function** with three inputs and one output:

$$\begin{aligned} \ln TC_{it} = & \beta_0 + \beta_1 \ln TA_{it} + \frac{\beta_2}{2} \ln TA_{it}^2 + \sum_{k=1}^3 \gamma_k \ln W_{k,it} + \sum_{k=1}^3 \phi_k \ln TA_{it} \ln W_{k,it} \\ & + \sum_{k=1}^3 \sum_{j=1}^3 \rho_k \ln W_{k,it} \ln W_{j,it} + \delta_1 T + \frac{\delta_2}{2} T^2 + \delta_3 T \ln TA_{it} + \sum_{k=4}^6 \delta_k T \ln W_{k,it} + \varepsilon_{it} \end{aligned}$$

- TC : total costs (sum of interest expenses, commissions and fee expenses, trading expenses, personnel and admin expenses, and other operating expenses)
- TA : quantity of output (total assets)
- $W1$, $W2$ and $W3$: prices of inputs (interest expenses, personnel expenses, and other operating expenses to total assets)
- T : time trend

Micro-level analysis



- Translog cost function **estimated separately for each country** to reflect differences in technology across European banking markets
- The coefficient estimates from the translog cost function are then used to calculate the marginal cost for each bank:

$$mc_{it} = \frac{TC_{it}}{TA_{it}} [\beta_1 + \beta_2 TA_{it} + \sum_{k=1}^3 \phi_k \ln W_{k,it} + \delta_3 T]$$

- **Efficiency-adjusted Lerner index** (Koetter et al., 2012): the translog cost function and the profit function estimated using a **Stochastic Frontier Analysis**

→ taking into account banks' cost inefficiency, defined as the distance of a bank from the cost frontier accepted as the benchmark.

$$Efficiency - adjusted\ Lerner_{it} = \frac{(\hat{\pi}_{it} + T\hat{C}_{it}) - \hat{m}c_{it}}{(\hat{\pi}_{it} + T\hat{C}_{it})}$$

Micro-level analysis

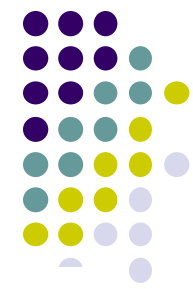


Table 1: Credit procyclicality and bank competition: Aggregated measures of bank competition

	Lerner index from the GFD data set				Conventional Lerner index (own estimates)				Efficiency-adjusted Lerner index (own estimates)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Output Gap	1.064*** (0.095)	1.082*** (0.100)	1.094*** (0.098)	1.086*** (0.097)	-0.801*** (0.261)	-0.464* (0.245)	-0.832*** (0.233)	-0.996*** (0.271)	-0.455*** (0.156)	-0.247 (0.161)	-0.299* (0.160)	-0.346** (0.159)
Lerner index	-19.619*** (1.995)	-21.031*** (2.091)	-18.394*** (2.046)	-16.331*** (2.231)	15.567*** (5.396)	-2.525 (5.826)	-1.060 (5.906)	9.931** (4.609)	17.100*** (1.888)	13.573*** (1.976)	14.680*** (2.040)	18.468*** (1.776)
Output Gap*Lerner index	3.713*** (0.487)	3.079*** (0.503)	2.908*** (0.501)	3.185*** (0.530)	10.895*** (1.113)	9.712*** (1.071)	11.082*** (1.007)	11.491*** (1.129)	8.256*** (0.674)	7.362*** (0.724)	7.433*** (0.725)	7.363*** (0.621)
Total assets		-13.416*** (1.493)	-13.496*** (1.489)	-0.502*** (0.070)		-13.025*** (1.500)	-13.073*** (1.493)	-0.508*** (0.070)		-12.154*** (1.391)	-12.256*** (1.392)	-0.494*** (0.070)
Loans / Total assets		-28.359*** (2.472)	-26.845*** (2.489)	-6.142*** (0.731)		-30.735*** (2.555)	-29.647*** (2.569)	-6.859*** (0.739)		-28.272*** (2.345)	-27.610*** (2.363)	-6.801*** (0.740)
Equity / Total assets		-13.108 (9.337)	-13.882 (9.353)	-0.783 (2.586)		-20.004** (8.901)	-21.966** (8.909)	-2.771 (2.604)		-20.673** (8.925)	-21.801** (8.936)	-2.869 (2.604)
Δ MP			-2.194*** (0.233)	-2.574*** (0.255)			-2.148*** (0.805)	-1.896** (0.774)			-1.730*** (0.523)	-1.840*** (0.457)
Δ MP * Lerner index			8.220*** (1.301)	8.902*** (1.741)			3.789 (3.380)	1.486 (3.338)			4.690*** (1.774)	4.257** (1.683)
Constant	17.980*** (0.378)	214.188*** (20.894)	213.475*** (20.828)	28.501*** (1.260)	11.868*** (1.049)	208.321*** (21.232)	207.302*** (21.137)	22.319*** (1.503)	9.464*** (0.562)	190.398*** (19.607)	190.884*** (19.641)	193.24*** (1.233)
Average Lerner index	0.119	0.119	0.119	0.119	0.22	0.22	0.22	0.22	0.243	0.243	0.243	0.243
Low Lerner index	0.069	0.069	0.069	0.069	0.174	0.174	0.174	0.174	0.2	0.2	0.2	0.2
High Lerner index	0.181	0.181	0.181	0.181	0.239	0.239	0.239	0.239	0.268	0.268	0.268	0.268
Procyclicality: Average	1.508	1.45	1.442	1.467	1.6	1.677	1.611	1.537	1.551	1.542	1.507	1.443
Procyclicality: Low Lerner index	1.322	1.296	1.296	1.307	1.097	1.228	1.099	1.006	1.196	1.225	1.188	1.127
Procyclicality: High Lerner index	1.737	1.64	1.621	1.663	1.808	1.862	1.822	1.756	1.763	1.731	1.698	1.632
Difference between High and low	0.415	0.344	0.325	0.356	0.711	0.633	0.723	0.749	0.566	0.505	0.51	0.505
Observations	24,719	24,719	24,719	24,719	24,771	24,771	24,771	24,771	24,771	24,771	24,771	24,771
R-squared	0.529	0.558	0.560		0.528	0.556	0.558		0.539	0.563	0.565	
Number of banks	3,736	3,736	3,736	3,736	3,736	3,736	3,736	3,736	3,736	3,736	3,736	3,736
F	1816	1470	1304	.	1711	1408	1295	.	1724	1408	1282	.

Note: 'Low' and 'High' Lerner index refer to the 20th and the 80th percentiles of the sample distribution of the Lerner index, respectively. Robust standard errors are reported below their coefficient estimates. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Micro-level analysis



Table 2: Credit procyclicality and bank competition: Bank-level measures of bank competition

	Conventional Lerner Index (bank level)				Efficiency-adjusted Lerner index (bank level)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Output Gap	0.933*** (0.128)	0.866*** (0.141)	0.807*** (0.138)	0.959*** (0.112)	1.054*** (0.110)	1.174*** (0.114)	1.100*** (0.118)	1.053*** (0.107)
Lerner index	5.592*** (1.681)	6.400*** (1.778)	5.914*** (1.809)	3.751*** (1.281)	8.777*** (0.975)	7.951*** (1.037)	7.874*** (1.079)	5.941*** (0.904)
Output Gap*Lerner index	3.493*** (0.440)	3.527*** (0.483)	3.589*** (0.481)	3.074*** (0.385)	2.440*** (0.325)	1.746*** (0.308)	1.857*** (0.325)	2.204*** (0.307)
Total assets		-13.660*** (1.527)	-13.736*** (1.516)	-0.439*** (0.059)		-14.299*** (1.682)	-14.369*** (1.671)	-0.250*** (0.065)
Loans / Total assets		-29.748*** (2.508)	-28.617*** (2.521)	-6.279*** (0.664)		-28.942*** (2.649)	-27.817*** (2.660)	-5.785*** (0.679)
Equity / Total assets		-19.345** (9.328)	-20.078** (9.336)	-1.606 (2.609)		-21.327** (10.257)	-22.413** (10.249)	-0.085 (3.019)
Δ MP			-0.618** (0.292)	-0.898** (0.352)			-0.931*** (0.350)	-1.217*** (0.400)
Δ MP * Lerner index			-2.247** (0.923)	-1.902* (1.062)			-0.511 (0.909)	-0.213 (0.959)
Constant	13.824*** (0.354)	213.870*** (21.281)	213.664*** (21.135)	22.637*** (1.042)	12.159*** (0.357)	221.074*** (23.616)	220.733*** (23.501)	18.741*** (1.216)
Average Lerner index	0.209	0.209	0.209	0.209	0.241	0.241	0.241	0.241
Low Lerner index	0.146	0.146	0.146	0.146	0.163	0.163	0.163	0.163
High Lerner index	0.275	0.275	0.275	0.275	0.313	0.313	0.313	0.313
Procyclicality: Average	1.663	1.604	1.558	1.602	1.643	1.596	1.548	1.585
Procyclicality: Low Lerner index	1.443	1.381	1.331	1.408	1.453	1.459	1.403	1.413
Procyclicality: High Lerner index	1.896	1.838	1.797	1.807	1.819	1.721	1.682	1.744
Difference between High and Low	0.453	0.457	0.465	0.399	0.366	0.262	0.278	0.3308
Observations	24,194	24,194	24,194	24,194	23,765	23,765	23,765	23,765
R-squared	0.529	0.559	0.561		0.538	0.568	0.569	
Number of banks	3,661	3,661	3,661	3,661	3,622	3,622	3,622	3,622
F	1721	1404	1256	.	1722	1416	1284	.

Note: "Low" and "High" Lerner index refer to the 20th and the 80th percentiles of the sample distribution of the Lerner index, respectively. Robust standard errors are reported below their coefficient estimates. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Extensions



- One important extension of our analysis to the existing literature is that we do not just focus on competition among banks, but we also consider **competition from direct finance** as a potential driver of credit procyclicality
 - Indeed, all financial systems combine bank-based and market-based intermediation
 - But financial structure, i.e. the particular blend of the intermediation channels, varies across countries
 - Then, in line with previous results, **one can expect that countries characterized by a relatively high degree of competition between banks and financial markets exhibit a lower credit procyclicality than bank-based economies**

Extensions

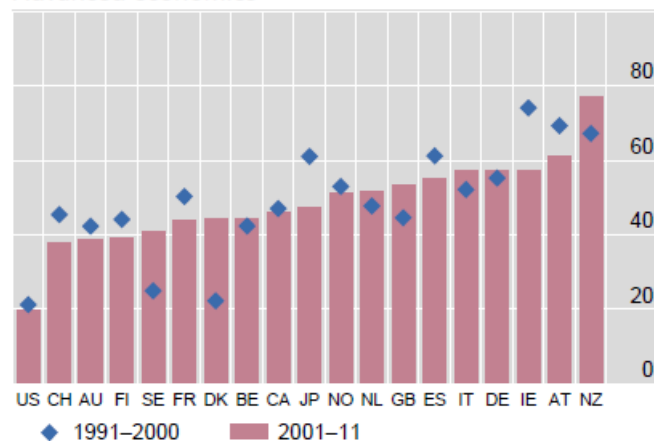


Ratio of bank credit to total private sector funding

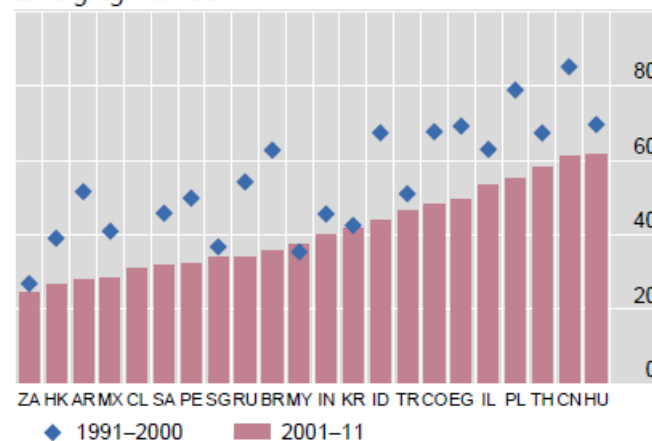
In per cent

Graph 1

Advanced economies



Emerging markets



AR = Argentina; AT = Austria; AU = Australia; BE = Belgium; BR = Brazil; CA = Canada; CH = Switzerland; CL = Chile; CN = China; CO = Colombia; DE = Germany; DK = Denmark; EG = Egypt; ES = Spain; FI = Finland; FR = France; GB = United Kingdom; HK = Hong Kong SAR; HU = Hungary; ID = Indonesia; IE = Ireland; IL = Israel; IN = India; IT = Italy; JP = Japan; KR = Korea; MX = Mexico; MY = Malaysia; NL = Netherlands; NO = Norway; NZ = New Zealand; PE = Peru; PL = Poland; RU = Russia; SA = Saudi Arabia; SE = Sweden; SG = Singapore; TH = Thailand; TR = Turkey; US = United States; ZA = South Africa.

The ratio of bank credit to the private sector is expressed as a percentage of the sum of bank credit plus bond and equity market capitalisation. A higher value of the indicator suggests a financial structure that is more bank-oriented. For four countries (Egypt, Israel, New Zealand and Saudi Arabia) data for outstanding bonds issued by the private sector are not available. However, the bond markets in these countries are modest in size and the ordering of the countries in the graphs does not change even in the light of proxies obtained from other sources. A blue diamond above (below) the bar indicates that a particular system became more (less) market-oriented during the 2000s than it was during the 1990s.

Source: Gambacorta et al. (2014)

Extensions



- Moreover, investigating the link between financial structure and credit procyclicality is in line with some recent studies (Allard and Blavy, 2011; Gambacorta et al., 2014; Grjebine et al., 2014) that **assessed whether a bank-based system, or on the contrary a market-based system, is more resilient to crisis**, and then better to moderate business cycle fluctuations
- In line with Levine (2002) and Langfield and Pagano (2016), financial structure is proxied by considering a bank-market ratio, defined as bank credit divided by stock and private bond market capitalization: **larger values of the ratio indicate a more bank-based financial system**
- Results confirm previous findings: **competition from direct finance reduces credit procyclicality**

Extensions

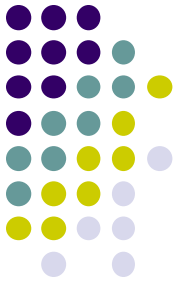
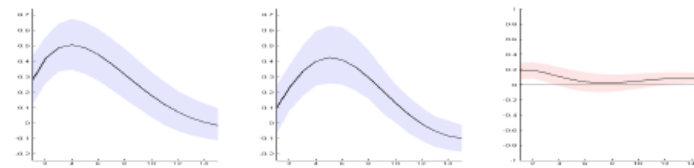
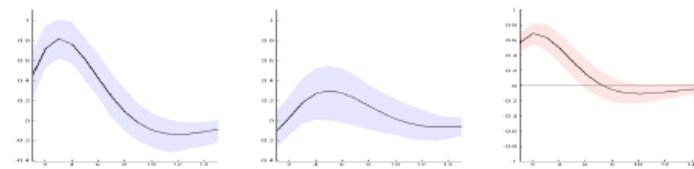


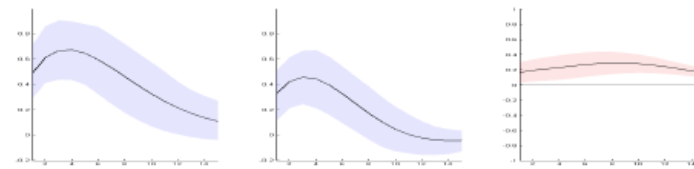
Figure 8: Impulse Response Functions of Credit to a GDP shock: Financial structure



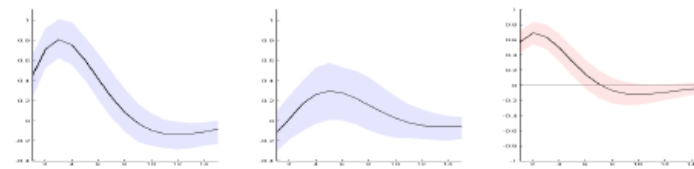
(a) Credit - Fixed effects



(b) Credit - Unit Specific Slope Heterogeneities



(c) Bank Credit - Fixed effects



(d) Bank Credit - Unit Specific Slope Heterogeneities

Note: The figure shows impulse responses of credit and bank credit to a one-percentage-point shock in the output cycle evaluated (from left to right) at the 80th (high level) and 20th (low level) percentiles of the indicator of financial structure. The charts on the right represent the differences between the two. The colored bands represent the 5% error band (two standard deviations) generated by bootstrapping (1000 draws).

Extensions

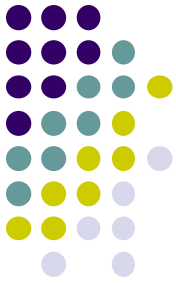
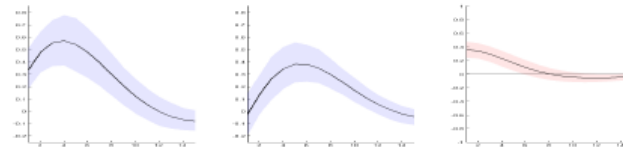
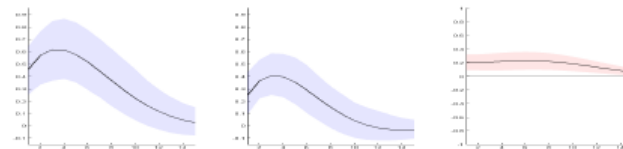


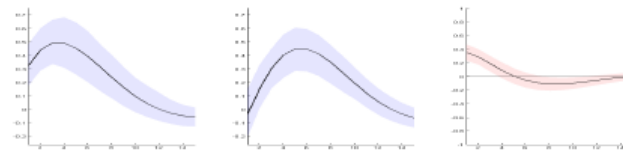
Figure A1: Impulse Response Functions of Credit to a GDP shock: Sample split



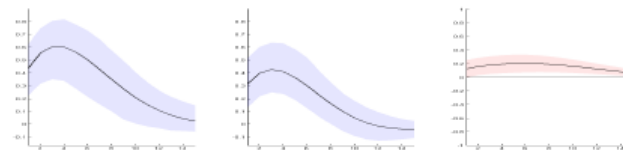
(a) Total Credit - Bank competition



(b) Bank Credit - Bank competition

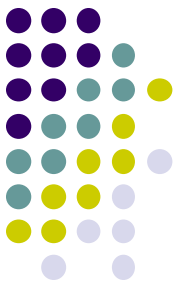


(c) Total Credit - Financial structure (Global structure)



(d) Bank Credit - Financial structure (Global structure)

Note: This figure compares the impulse response functions of credit/bank credit to a one-unit shock in GDP for economies characterized by a low and a high level of competition in the financial sphere. Competition refers to both competition among banks and competition from financial markets. In order to split our initial sample into two groups, we rank the countries according to the country average Lerner index value and our measure of financial structure. The credit responses depicted on the left correspond to economies where competition in the financial system is weaker, i.e., characterized by low bank competition or bank-based financial intermediation. The low bank competition sub-sample comprises Austria, Denmark, Greece, Ireland, Norway, Spain, Sweden and the United Kingdom, while the bank-based sub-sample includes Austria, Denmark, Germany, Greece, Ireland, Italy, Portugal and Spain. Obviously, the credit responses depicted in the center correspond to the average reaction of countries where banking markets are more competitive (Belgium, Finland, France, Germany, the Netherlands, Portugal, Sweden and Switzerland) and where the market-based intermediation is more developed (Belgium, Finland, France, the Netherlands, Norway, Sweden, Switzerland and the United Kingdom).



Concluding remarks

- **First paper in the literature** that empirically investigates the role of banking competition on credit procyclicality
- Panel framework for a large sample of European countries and two levels of analysis considered: **macro-level and bank-level**
- **Bank competition matters for credit procyclicality!**
 - higher credit procyclicality in a low competitive environment
- **Fostering banking competition?**
 - reduces credit procyclicality and macroeconomic volatility, helps monetary policy transmission, but what are the implications in terms of financial stability?
 - no consensus in the empirical literature (see, e.g., Zigraiova and Havranek, 2015) and different impact of bank competition on individual and systemic risks (Leroy and Lucotte, 2017)



Thank you for your attention

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