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The Winner's Curse

Evidence on the Danger of Aggressive Credit Growth in Banking

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Introduction
Setting the Stage

Basel III

"*As witnessed during the financial crisis, losses incurred by the banking sector during a downturn preceded by a period of* **excess credit growth** *can be extremely large. Such losses can destabilize the banking sector, which can bring about or exacerbate a downturn in the real economy.*" (BCBS, 2011)

Macro and micro prudential regulation

Excessive credit growth as a driver of the financial crisis

Macroprudential: countercyclical capital buffer to curb excessive lending

Microprudential: Pillar 2 Supervisory Review Process

capital charges in excess of the minimum requirements of Pillar 1 when a bank engages in too much risk taking

BCBS (2015) *"Guidelines for identifying and dealing with weak banks"*

Research questions

Can we **theoretically** explain why banks engage in excessive lending, ending up in a Winner's Curse situation?

Can we **identify weak banks** (BCBS, 2015) that engage in excessive lending?

Is there **empirical support** a Winner's Curse using our proposed identification in German **micro level lending and industry loan portfolio** data?

Introduction
Contribution to the Literature

Regulation on lending

Microprudential bank-specific capital levels (Aiyar et al., 2014)

Macroprudential regulation: Countercyclical capital buffer (Jiménez et al., 2014) and countercyclical loan loss provisioning (Jiménez & Saurina, 2006)

Lending growth on loan write-offs

Micro level: abnormal credit growth increases bank risk (Jiménez & Saurina, 2006; Foos et al., 2010)

Macro level: **credit growth is procyclically** related to the macro economy (Laeven & Majnoni, 2003; Berger & Udell, 2004)

Contri-bution

We provide a theoretical argument for these findings based on **banking and auction theory**

Empirical analysis on the industry portfolio level additionally to the bank level

Identification of weak banks with excessive credit growth on a **microprudential level**

Metho-dology

Combination of macro and micro approaches based on **HP-filter methodology of Mendoza & Terrones** (2008 & 2012) to **real credit growth**

Controls for credit growth through mergers (Dell'Ariccia & Garibaldi, 2005)

Theoretical Argument
Loan Contracts and Loan Supply

$$R(x) = \begin{cases} x - \gamma & \text{if } x < R \\ \\ R & \text{if } x \geq R \end{cases}$$

Recovery after default

Full Redemption

$$L \equiv L\left(\mathrm{E}(\pi(x|s))\right) \text{ with } L'(\cdot) \equiv \frac{d}{d\mathrm{E}(\cdot)} L\left(\mathrm{E}(\pi(x|s))\right) > 0$$

$$\mathrm{E}(\pi(x|s)) = \int_0^R (x - \gamma)\, dF(x|s) + R\left(1 - F(R|s)\right)$$

Theoretical Argument
Private Information and Winner's Curse

Auction theory

Uncertainty about the **true risk level** s in the credit market

Each individual bank i privately observes a **noisy signal** s_i with

and iid noise terms ε_i with
$$s_i = s + \varepsilon_i$$
$$\mathrm{E}(\varepsilon_i) = 0 \;\forall i$$

Winner's Curse

Banks with very **low (i.e. strongly negative) private signals** s_i **underestimate the general risk level** and end up at a loan supply function above the optimal one

$$L_i\left(\mathrm{E}(\pi(x|s_i))\right) > L_j\left(\mathrm{E}(\pi(x|s_j))\right) \text{ because } \mathrm{E}(\pi(x|s_i)) > \mathrm{E}(\pi(x|s_j)) \;\forall\; s_i < s_j, \; i \neq j$$
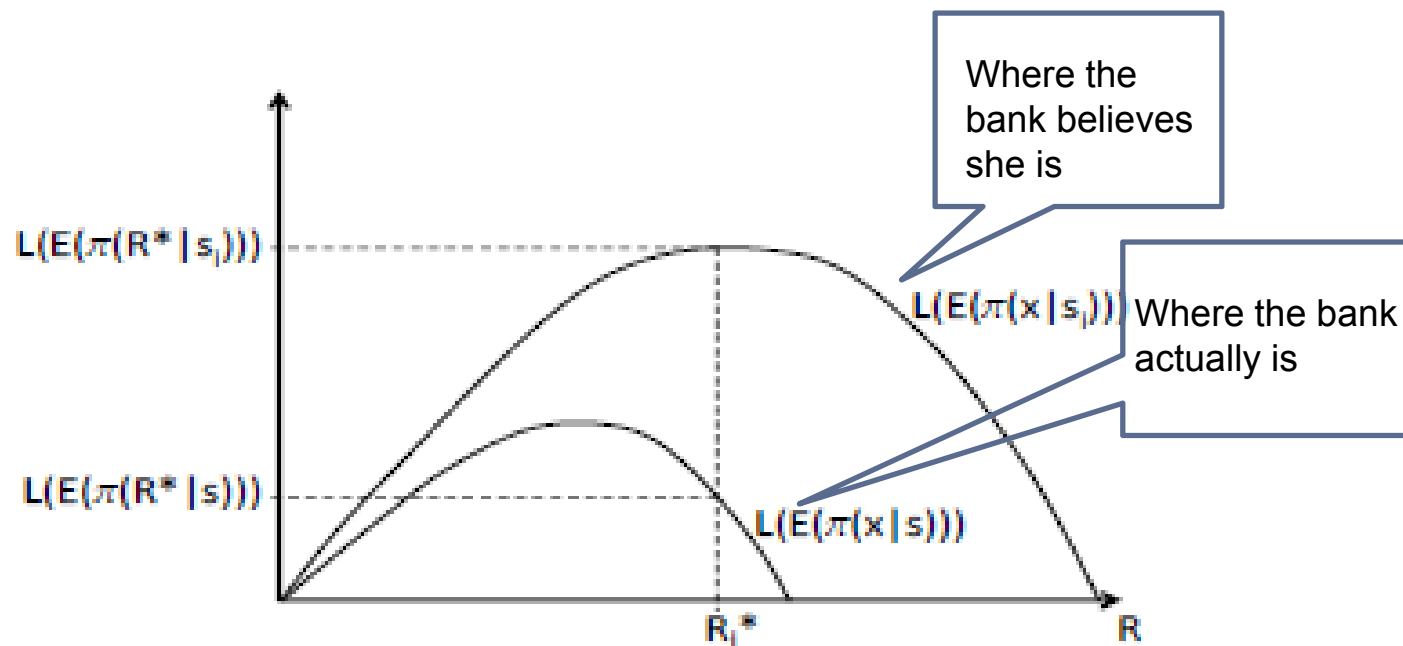
In other words: banks with very low risk signals s_i lend too much given the riskiness of loans

Theoretical Argument
Common risk level and loan supply

− Risk level *s* **shifts cumulative risk distribution** *F(x/s)* in the sense of FSD:

$$\frac{d}{ds}F(x|s) > 0 \ \forall x$$

Empirical Analysis
Definitions: Adequate vs. excessive credit growth

Adequate credit growth
prevailing risk characteristics allow for loan extension without negative impact on risk exposure and earnings

Excessive credit growth
lending beyond the optimal level (à la Williamson, 1987)
banks understate the general risk level in the economy and make too many loans

Metho-dology
Excessive credit growth measured by standard **HP filter** to isolate the long-term trend in credit growth (Mendoza & Terrones, 2008 & 2012)

Demand or supply?
Control for 415 **county dummies** or 38 **adm. district dummies interacted with time dummies** (Mian & Sufi, 2009)

Empirical Analysis
Main Findings

Theory

Uncertainty w.r.t. general level of credit risk *s* may cause Winner's Curse

Single bank's assessment of the general risk level may turn out too optimistic, resulting in excessive lending and high loan loss provisions

Empirical evidence

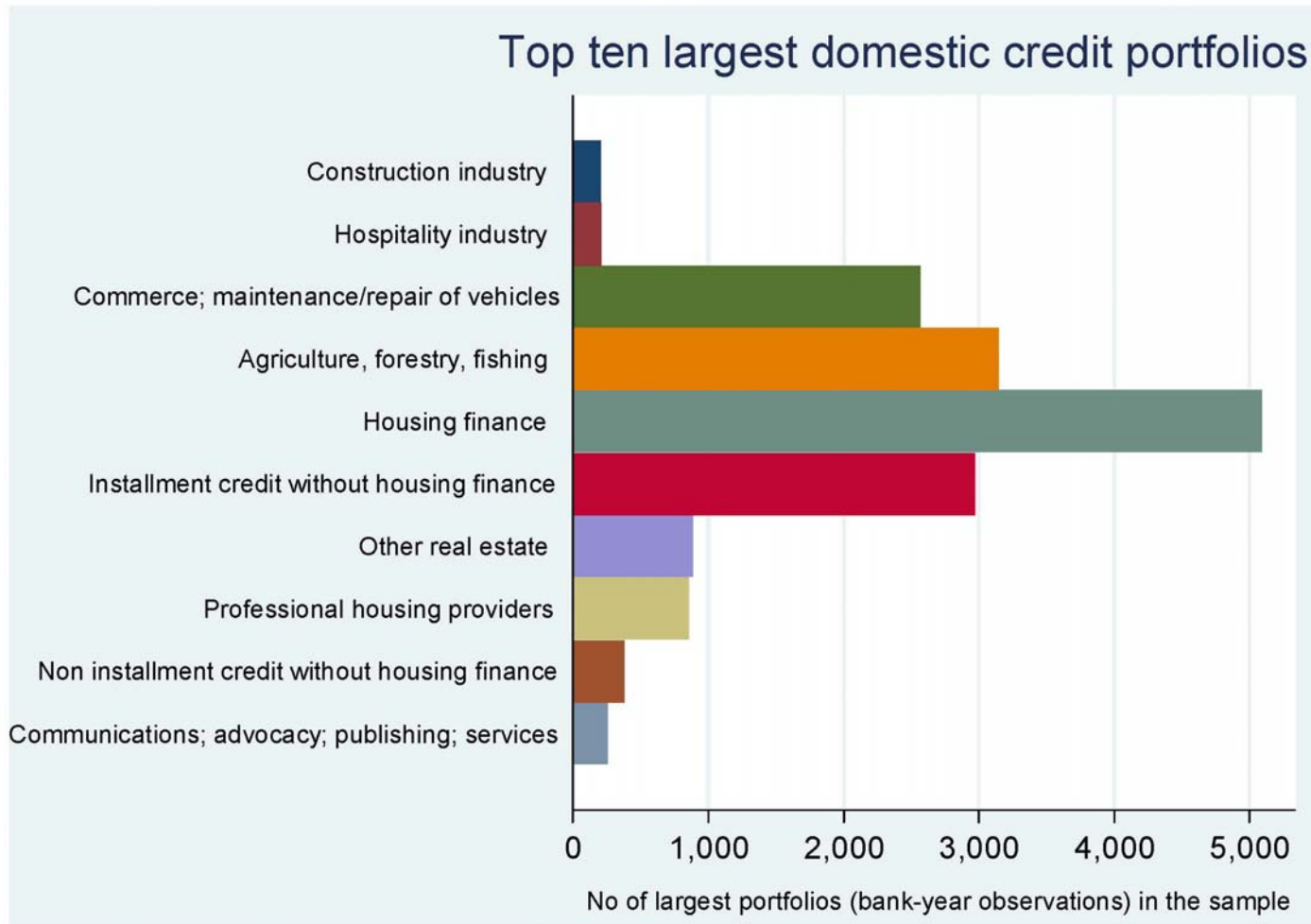$\beta < 0$: **adequate credit supply extension**

$\beta > 0$: **excessive credit growth** leads to disproportionally large write-offs in subsequent years

U-shaped relation ($\beta < 0$ and β on squared term > 0): market power (Lerner index) leads to less write-offs, however for large levels the relationship reverses

Empirical Analysis
Data and methodology (1/5)

Top ten largest domestic credit portfolios

Construction industry
Hospitality industry
Commerce; maintenance/repair of vehicles
Agriculture, forestry, fishing
Housing finance
Installment credit without housing finance
Other real estate
Professional housing providers
Non installment credit without housing finance
Communications; advocacy; publishing; services

0   1,000   2,000   3,000   4,000   5,000

No of largest portfolios (bank-year observations) in the sample

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Empirical Analysis
Data and methodology (2/5)

Empirical Analysis
Data and Methodology (3/5)

Variable	Description
Dependent variables	
Loss rate (sector)	Total write-offs to total domestic credit (per industry sector)
Deviation loss rate (sector)	Deviation of loss rate per bank (per industry sector) to overall loss rate in the respective year and banking group (per industry sector)
Credit growth variables	
Credit growth	Difference in ln(credit) (if change is positive)
Dummy large credit growth	1 if threshold 2 sd above the mean growth rate is exceeded
Gap excessive CG	Deviation from long-run trend in % (measured by HP-filter)
Rel. gap excessive CG	Deviation from long-run trend in % (measured by HP-filter) adjusted by the industry aggregate

Empirical Analysis
Data and methodology (4/5)

Variable	Description
Equity capital ratio	Tier 1-capital to RWA
Customer loans ratio	Customer loans to total assets
Share fee income	Fee income to total operative income
Loan portfolio concentration	HHI of the domestic loan portfolio
Lerner index	Efficiency-adjusted Lerner index (reflecting pricing power); $(p - mc) / p$
Squared Lerner index	Squared efficiency-adjusted Lerner index

Empirical Analysis
Data and methodology (5/5)

Variable	Description
Personnel intensity	No. of bank employees to deflated total assets
Regional GDP	Growth of real regional GDP per capita per county
State dummies*	Identifying the 16 German states
Year dummies*	Controlling for temporal developments
Banking group dummies	Identifying savings, cooperative and private banks

* For robustness year dummies are replaced with (415) county dummies or (38) adm. district dummies and interactions of adm. district dummies and time dummies.

Empirical results (1/5)
The Competition-Risk-Taking Nexus

Theory
Martinez-Miera & Repullo, 2010: **U-shaped relationship between competition and bank failure**

Margin channel
higher market power allows banks to extract rents from high quality borrowers leading to lower charge-off rates
→ **Lerner index coefficient < 0**

Risk-shifting channel
banks that try to extract too high rates from their borrowers will observe **moral hazard** and thus higher charge-off rates
→ **squared Lerner index coefficient > 0**

Empirical results
Margin channel dominates risk-shifting channel
only for extreme values of the Lerner index (> 0.85) the risk-shifting channel dominates (U-shaped relationship)

Empirical Results (2/5)
Pooled OLS with Dummy Large Credit Growth (industry mean + 2 sd)

Variable	Total domestic credit				Three largest portfolios of domestic credit			
	All	Private	Savings	Coops	All	Private	Savings	Coops
L1.Dummy large CG	-0.0877***	-0.2272***	-0.1020*	-0.0947***	-0.1150***	-0.2299**	-0.1756***	-0.1087***
L2.Dummy large CG	-0.0528	-0.2663***	-0.0685	0.0011	-0.0799***	-0.1356	-0.1230***	-0.0692**
L3.Dummy large CG	0.0445*	0.0198	0.0137	0.0440*	-0.0643**	-0.1509*	-0.0634	-0.0770**
Lerner index	-0.1499	-0.0291	-5.1155**	-2.9098***	-0.5287**	-0.2177	-4.7509	-5.1401***
Squared Lerner index	0.1469	-0.1792	5.7221**	3.2480***	-0.0603	-0.0905	4.8623	5.1569***
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
Obs.	17.590	1.302	4.621	11.667	52.314	3.538	13.863	34.913
Adjusted R-squared	0.082	0.058	0.143	0.094	0.039	0.031	0.072	0.050
L1.-3. DUMMY larde CG (F stat)	5.823	6.723	1.485	4.931	12.238	2.447	6.714	7.062
L1.-3. DUMMY large CG (p value)	0.001	0.000	0.218	0.002	0.000	0.063	0.000	0.000

Empirical Results (3/5)
Pooled OLS with Gap Excessive Credit Growth

Variable	Total domestic credit				Three largest portfolios of domestic credit			
	All	Private	Savings	Coops	All	Private	Savings	Coops
L1.Gap excessive CG	0.0249***	0.0101	0.0564***	0.0386***	0.0015**	0.0030	-0.0042**	0.0019**
L2.Gap excessive CG	0.0162***	0.0095	0.0269**	0.0215***	0.0013*	0.0005	0.0018	0.0016*
L3.Gap excessive CG	0.0196***	0.0247***	0.0236**	0.0162***	0.0034***	0.0051*	0.0044**	0.0022**
Lerner index	-0.1168	0.0171	-4.4307*	-2.7771***	-0.5190**	-0.2059	-4.6379	-5.1049***
Squared Lerner index	0.1932	-0.0900	4.9999*	3.1165***	-0.0571	-0.0854	4.7538	5.1202***
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
Obs.	17.590	1.302	4.621	11.667	52.314	3.538	13.863	34.913
Adjusted R-squared	0.099	0.070	0.159	0.116	0.039	0.030	0.072	0.050
L1.-3. Gap excessive CG (F stat)	23.694	5.087	13.170	17.694	6.711	1.426	4.996	3.617
L1.-3. Gap excessive CG (p value)	0.000	0.002	0.000	0.000	0.000	0.234	0.002	0.013

Empirical Results (4/5)
Control Variables

Variable	Pooled OLS with Dummy Large Credit Growth		Pooled OLS with Gap Excessive Credit Growth	
	Sign	Significance	Sign	Significance
Equity capital ratio	+		+	
Customer loans ratio	+	***	+	***
Share fee income	+		+	
Loan portfolio concentration	-	***	-	***
Personnel intensity	-		-	**
Regional GDP	+		+	
Dummy savings banks	-	***	-	***
Dummy cooperative banks	-	***	-	***

Pos. Coeff. indicate lower fin. stab.

Neg. Coeff. indicate lower fin. stab.

Variable	(1) Credit growth			(2) Dummy large CG			(3) Gap excessive CG			(4) Rel. gap excessive CG		
	DISTRESS	DEFAULT	ZSCORE	DISTRESS	DEFAULT	ZSCORE	DISTRESS	DEFAULT	ZSCORE	DISTRESS	DEFAULT	ZSCORE
L1.(1) (2) (3) (4)	-0.0203*	-0.0319	0.0007	-0.1365	-0.4784	-0.0522*	0.0723***	0.0555***	-0.0206***	0.0740***	0.0530***	-0.0169***
L2.(1) (2) (3) (4)	-0.0046	0.0057	-0.0000	0.1451	0.1900	-0.0636**	0.0106	0.0214	-0.0073***	0.0070	0.0268	-0.0051*
L3.(1) (2) (3) (4)	0.0057	0.0011	-0.0048***	0.1192	0.0812	-0.1078***	0.0455***	0.0090	-0.0169***	0.0517***	0.0090	-0.0168***
Lerner index	-1.8985***	4.8207	1.1866***	-1.6352***	5.1167	1.1642***	-1.5800***	6.9175	1.1815***	-1.5341***	7.0106	1.1796***
Squared Lerner index	-1.9674**	-8.3036	0.0640	-2.3077***	-8.7058	0.0702	-2.2362***	-11.0824*	0.0262	-2.2553***	-11.1243*	0.0396
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Obs.	17,590	17,590	17,024	17,590	17,590	17,024	17,590	17,590	17,024	17,590	17,590	17,024
Adj. / Pseudo R-squared	0.132	0.158	0.169	0.130	0.155	0.170	0.157	0.168	0.176	0.159	0.169	0.174
L1.-3. (1) (2) (3) (4) (F stat)	4.608	2.808	7.286	2.451	1.751	9.403	50.050	25.838	17.996	52.774	25.992	16.095
L1.-3. (1) (2) (3) (4) (p value)	0.203	0.422	0.000	0.484	0.626	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Conclusion

Theory
Combining **auction and banking theory**, we link credit growth to the Winner's Curse:
overly optimistic expectations induce excessive lending and lead to disproportionate loan write-offs

Empirical evidence
Generally, **adequate** credit growth with negative impact on write-offs, even (seemingly) large credit growth (2 sd above the industry mean)

Excessive credit growth leads to **higher loan write-offs** and a **higher likelihood** of receiving **capital support** and going into a **restructuring merger**

=> Credit growth measures derived from the cyclical component of the **HP-filter identify weak banks with excessive credit growth**

Market power
U-shaped pattern related to loan losses and bank default; supports Martinez-Miera & Repullo, 2010

Appendix 1/2
Pooled OLS with Credit Growth

Variable	Total domestic credit				Three largest portfolios of domestic credit			
	All	Private	Savings	Coops	All	Private	Savings	Coops
L1.Credit growth	-0.0105***	-0.0094***	-0.0160**	-0.0157***	-0.0018***	-0.0025*	-0.0040***	-0.0017***
L2.Credit growth	-0.0060***	-0.0094***	-0.0087*	-0.0029	-0.0011***	-0.0011	-0.0023***	-0.0009***
L3.Credit growth	0.0030**	0.0025	-0.0004	0.0022	-0.0007***	-0.0014*	-0.0002	-0.0008***
Lerner index	-0.1643	-0.0078	-5.2876**	-3.1018***	-0.5247**	-0.2343	-4.8329	-5.1450***
Squared Lerner index	0.1759	-0.1645	6.0162**	3.5352***	-0.0588	-0.0957	4.9792	5.1910***
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
Obs.	17,590	1,302	4,621	11,667	52,314	3,538	13,863	34,913
Adjusted R-squared	0.088	0.065	0.147	0.102	0.040	0.033	0.074	0.051
L1.-3. Credit growth (F stat)	20.553	8.815	3.845	23.481	19.891	3.027	15.436	15.211
L1.-3. Credit growth (p value)	0.000	0.000	0.01	0.000	0.000	0.029	0.000	0.000

Pooled OLS with Relative Gap Excessive Credit Growth

Variable	Total domestic credit				Three largest portfolios of domestic credit			
	All	Private	Savings	Coops	All	Private	Savings	Coops
L1. Rel. gap excessive CG	0.0234***	0.0100	0.0494***	0.0331***	0.0015*	0.0030	-0.0034*	0.0022**
L2. Rel. gap excessive CG	0.0132***	0.0069	0.0211*	0.0194***	0.0014*	-0.0010	0.0033*	0.0017*
L3. Rel. gap excessive CG	0.0191***	0.0239***	0.0194**	0.0162***	0.0029***	0.0050*	0.0033*	0.0022**
Lerner index	-0.1141	0.0218	-4.5944*	-2.7646***	-0.5197**	-0.2058	-4.6542	-5.1075***
Squared Lerner index	0.1759	-0.1086	5.1358*	3.0916***	-0.0582	-0.0877	4.7638	5.1172***
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
Obs.	17,590	1,302	4,621	11,667	52,314	3,538	13,863	34,913
Adjusted R-squared	0.096	0.065	0.153	0.113	0.039	0.030	0.071	0.050
L1.-3. Rel. gap excessive CG (F stat)	22.368	4.608	10.804	17.744	5.443	1.363	3.946	3.932
L1.-3. Rel. gap Excessive CG (p value)	0.000	0.004	0.000	0.000	0.001	0.253	0.008	0.008