Catharsis –
The Real Effects of
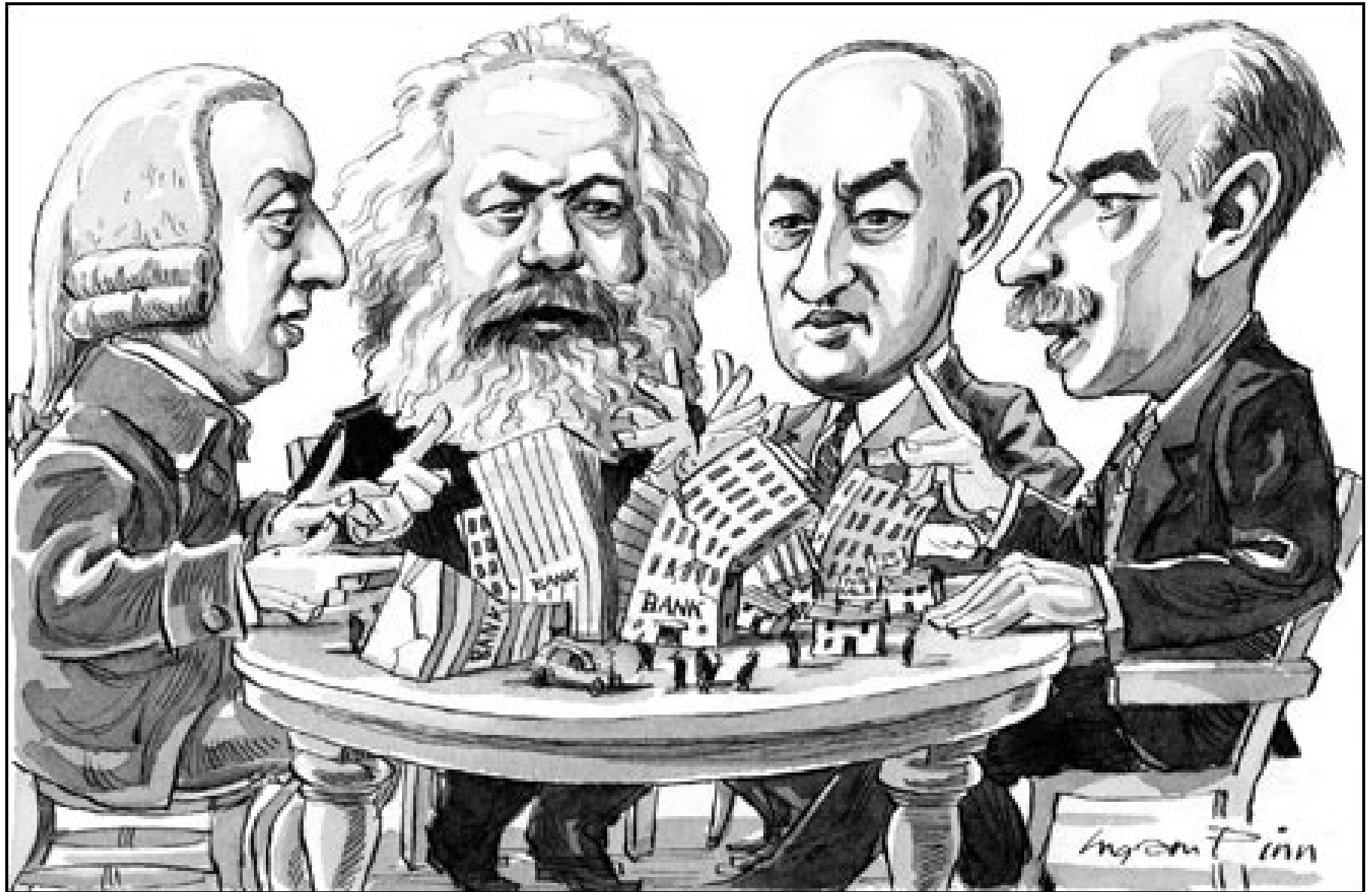# Bank Insolvency and Resolution

Josef Korte
Goethe University Frankfurt, Germany

Banks, Markets and Financial Innovation
Efficiency, Systemic Risk and the Role of Regulation
CONSOB / CAREFIN Università Bocconi

May 24, 2013

What to do with broke banks?

Let's see what Aristotle and Schumpeter have to say…

Great thoughts …

> " *Tragedy, is […] serious, complete, and of a certain magnitude; **through pity and fear** effecting the **proper catharsis** [=purgation].* "

Aristotle

> " *The problem [is not] how capitalism administers existing structures, [but] how it creates and destroys them. This **creative destruction** causes continuous progress. Situations emerge […] in which many firms may have to perish.* "

Joseph Schumpeter

… and their application to failed bank treatment

▶ Bank insolvency resolution can be thought of as a **process of catharsis**: Resolving failed banks in a **rules-based and prompt way** increases **real economic performance**

- **Cleans** out existing **moral hazard** (=purgation from corrupted incentives)
- **Improves** functioning of the banking system, e.g. its **credit allocation**
- Prevents **regulatory forbearance**

Contents

- **Why is insufficient bank insolvency resolution problematic and what are the solutions?**

- How can this be tested empirically?

- What are the results?

Literature (1/2) – What are the problems with insolvent banks if not resolved?

Bank incentive distortions	Individual moral hazard (ex ante)	▪ Anticipation of bailout, excessive risk or complexity taking, unsound balance sheet blow-up, insufficient screening/monitoring (*Beltratti/Stulz, 2009; Dell'Ariccia/Marquez, 2006; DeYoung et al., 2011; Fortin et al., 2010; Marin/Vlahu, 2011*) → **Suboptimal credit allocation**
	Individual moral hazard (ex post)	▪ **Gambling for resurrection**: Insolvent bank seen as out-of-the-money option, values high volatility over expected NPV (*Igan/Tamirisa, 2008*) ▪ Financial **zombies** create real zombies: Roll-over NPL (*Caballero et al., 2008; Peek/Rosengren, 2005*) ▪ Looting/private rent seeking (*Akerlof/Romer, 1993; LaPorta et al., 2003*)
	Collective moral hazard	▪ Herding into asset classes to create '**too-many-to-fail**' (*Acharya, 2009; Brown/Dinc, 2011; Kasa/Spiegel, 2008; Stever/Wilcox, 2007*) ▪ Rolling-over NPL and collective disclosure to avoid blame (*Rajan, 1994*)
Banks' monitors incentive distortions	Depositors	▪ **No incentive for monitoring**: small, dispersed, insured (*Calomiris/Kahn, 1991; Kaufman, 2006; Marin/Vlahu, 2011*) ▪ Potential **collusion** of insured depositors if rents are shared (*Detragiache/Demirgüc-Kunt, 2005; Demirgüc-Kunt et al., 2008*)
	Regulators	▪ **Time-inconsistency/inability** of bank-closure decision, no commitment (*Acharya/Yorulmazer, 2007; DeYoung et al., 2011; Mailath/Mester, 1994*) ▪ **Political economy**: rent-seeking, regulatory capture (*Kane, 1987; Brown/Dinc, 2005; Imai, 2009; Kane, 1987*)

Absence of a rules-based bank insolvency resolution regime can entail moral hazard, lead to suboptimal credit allocation and negatively affect real output
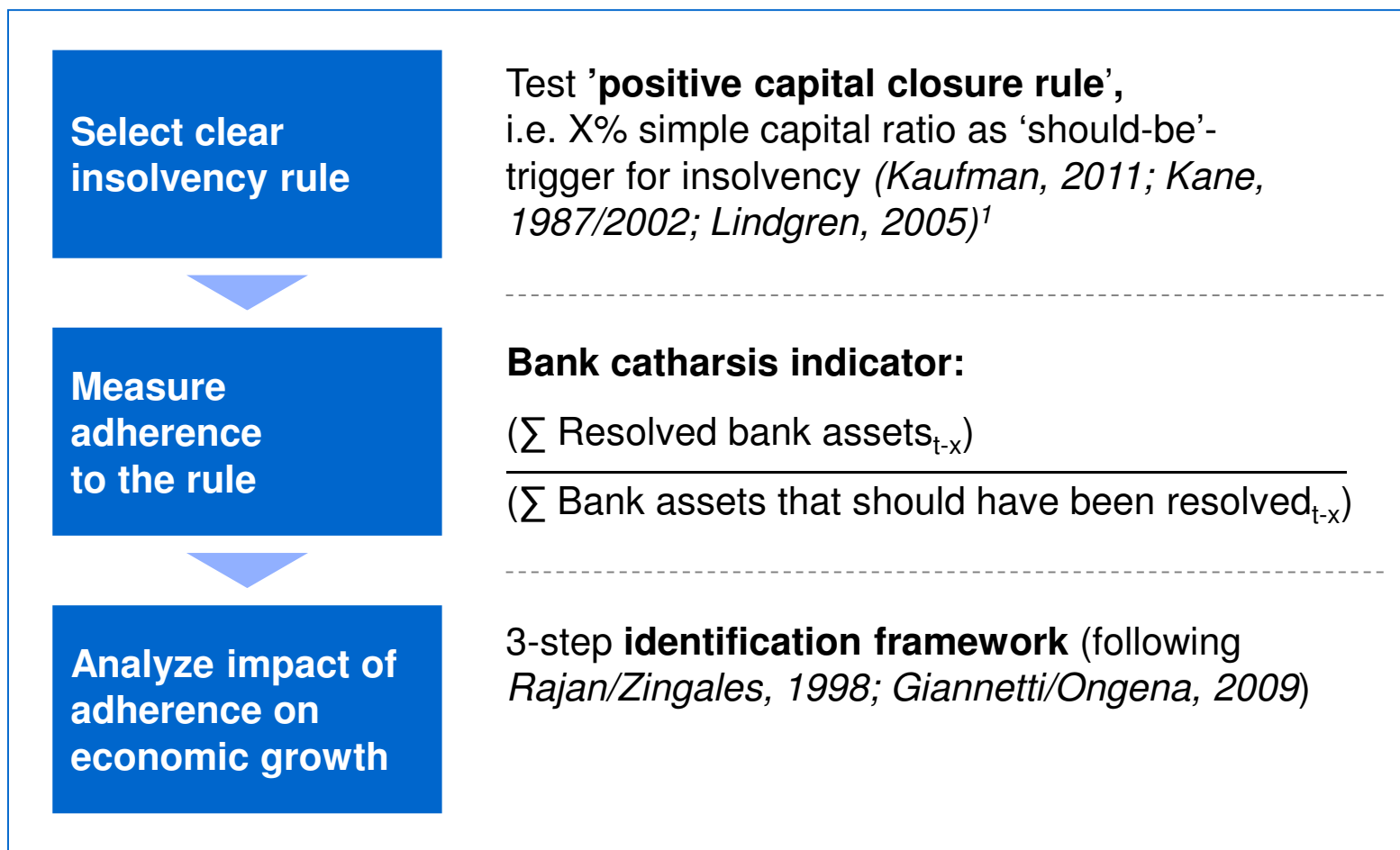
Literature (2/2) – Bailout vs. Catharsis, which resolution policies are most effective to (re)establish incentives in financial intermediation?

	'Accommodating' policies – The bailout effect	**'Cleansing' policies – The catharsis effect**
What is it?	▪ **Aim:** Sustain financial intermediary as legal entity ▪ **Instruments:** (blanket) guarantees, open liquidity assistance, recapitalization, regulatory forbearance	▪ **Aim:** End of existence of financial intermediary as legal entity (incl. equity wipeout, ousting of management) ▪ **Instruments:** purchase and assumption, closure and liquidation
How does it tackle the problem?	▪ Create or sustain **incentive dis-tortions** (*Kane/Klingebiel, 2004*) ▪ Do not speed recovery, do not mitigate output loss, but increase cost of crises and moral hazard in the long-run (*Giannetti/Simonov, 2009; Honohan/Klingebiel, 2003; Dell'Ariccia et al., 2008*)	▪ **Reestablish incentives** (*Acharya, 2009; Caprio et al., 2010; DeYoung et al., 2011; Kane, 2002; Panyagometh/Roberts, 2009; Perotti/Suarez, 2002; Rancière et al., 2008*) ▪ More pronounced if not discretionary (*Demirgüc-Kunt/Serven, 2010; Kaufman, 2011/2006*)

Rules-based resolution of failed banks reestablished incentives and improves the functioning of banking and economic performance

Contents

- Why is insufficient bank insolvency resolution problematic and what are the solutions?

- **How can this be tested empirically?**

- What are the results?

Nice story – but: Is it true? How can we test this?

Select clear insolvency rule

Test '**positive capital closure rule**', i.e. X% simple capital ratio as 'should-be'-trigger for insolvency *(Kaufman, 2011; Kane, 1987/2002; Lindgren, 2005)*[1]

Measure adherence to the rule

Bank catharsis indicator:

$$\frac{(\sum \text{Resolved bank assets}_{t-x})}{(\sum \text{Bank assets that should have been resolved}_{t-x})}$$

Analyze impact of adherence on economic growth

3-step **identification framework** (following *Rajan/Zingales, 1998; Giannetti/Ongena, 2009*)

---

1 Kaufman and Kane, e.g., explicitly relate the phenomenon of "undercapitalized zombies"
   to moral hazard and insufficient insolvency regimes for financial institutions and advocate a simple trigger

Identification strategy to prove causal relation between bank catharsis effect and real economic performance

1 $\triangle ln(output_{i,t}) = \alpha + \beta * bank\ catharsis\ indicator_{k,t} + FE + X_{i,t} + Z_{k,t} + \varepsilon_{i,t}$

Growth of individual firms, as measured, e.g. by Δln(revenue)

Core variable of interest, captures how rules-based banks are resolved

Firm FE
Year FE

Set of country-level control variables

Set of firm-level control variables

OLS

2 **Identification problem:**
Endogeneity due to omitted variables and simultaneity (not all captured by FE & controls)

Solution: Instrumental variable for bank resolution
- IVs: two bank insolvency law variables
  - Existence of separate bank insolvency law
  - Insolvency declaration power of a public agency
- Allows for diagnostic overID tests
- Cp/contrast *Jayaratne/Strahan, 1996; Giannetti/Ongena, 2009*)

IV/ GMM

3 **Identification problem:**
- So far, we proved correlation, but how to prove causation?
- Still endogeneity in IV?

Solution: Interaction, using dependence on bank finance in an interaction term (cp. *Rajan/Zingales, 1998; Giannetti/Ongena, 2009* and others)

$\triangle ln(output_{i,t}) = \alpha + \beta_1 * bankdep_i + \beta_2 * bank\ catharsis\ indicator_{k,t}$
$+ \beta_3 * (bankdep_i * bank\ catharsis\ indicator_{k,t})$
$+ X_{i,t} + bankdep_i * Z_{k,t} + \sum_i \gamma_i * firm_i + \sum_{k,t} \delta_{k,t} * country\ year_{k,t} + \varepsilon_{i,t}$

Contents

- Why is insufficient bank insolvency resolution problematic and what are the solutions?

- How can this be tested empirically?

- **What are the results?**

Identification strategy to prove causal relation between bank catharsis effect and real economic performance

1 $\triangle ln(output_{i,t}) = \alpha + \beta * bank\,catharsis\,indicator_{k,t} + FE + X_{i,t} + Z_{k,t} + \varepsilon_{i,t}$

Growth of individual firms, as measured, e.g. by Δln(revenue)

Core variable of interest, captures how rules-based banks are resolved

Firm FE
Year FE

Set of country-level control variables

Set of firm-level control variables

OLS

2 **Identification problem:** Endogeneity due to omitted variables and simultaneity (not all captured by FE & controls)

Solution: Instrumental variable for bank resolution
- IVs: two bank insolvency law variables
  - Existence of separate bank insolvency law
  - Insolvency declaration power of a public agency
- Allows for diagnostic overID tests
- Cp/contrast *Jayaratne/Strahan, 1996; Giannetti/Ongena, 2009*)

IV/ GMM

3 **Identification problem:**
- So far, we proved correlation, but how to prove causation?
- Still endogeneity in IV?

Solution: Interaction, using dependence on bank finance in an interaction term (cp. *Rajan/Zingales, 1998; Giannetti/Ongena, 2009* and others)
- Core idea: Even if firm growth and bank catharsis experience correlation due to endogeneity, it is extremely unlikely to do so in a systematic way for firms with different bank dependence
- Allows additional fixed effects filters (e.g. country-year)

X

1

Model	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS
Dependent variable	Δ ln(OpRev)	Δ ln(OpRev)	Δ ln(OpRev)	Δ ln(OpRev)	Δ ln(OpRev)
Catharsis indicator (8% CR)	0.344***	0.441***	0.310***	0.398***	0.0620***
	(0.00564)	(0.00511)	(0.00664)	(0.00624)	(0.00721)
Firm-level controls					
Bank dependence		0.0730***		0.129***	
		(0.00614)		(0.00693)	
Firm age (log)		-0.0733***		-0.0695***	-0.294***
		(0.000468)		(0.000520)	(0.00456)
Lagged share of total assets		0.310**		0.127	-0.187
		(0.126)		(0.124)	(0.405)
Profitability		0.459***		0.445***	0.802***
		(0.00338)		(0.00376)	(0.00677)
Country-level controls					
Financial development			-0.0759***	-0.0725***	-0.0556***
			(0.00112)	(0.00106)	(0.00428)
Bank undercapitalization			0.00630***	0.0509***	0.0166***
			(0.00237)	(0.00234)	(0.00379)
Bank concentration CR3			-0.0137***	-0.0157***	0.00615
			(0.00222)	(0.00204)	(0.00520)
GNI per capita			-0.00175***	-0.00159***	-0.0126***
			(0.000065)	(0.000066)	(0.00090)
Political openness			0.00233***	0.0111***	0.0302***
			(0.000397)	(0.000364)	(0.00110)
Constant	0.118***	0.246***	0.214***	0.204***	0.882***
	(0.000393)	(0.00183)	(0.00304)	(0.00338)	(0.0231)
Firm FE	NO	NO	NO	NO	YES
Year FE	NO	NO	NO	NO	YES
Observations	1,792,558	1,555,980	1,440,787	1,252,126	1,252,126
R-squared	0.002	0.040	0.012	0.045	0.164
Growth rate differential (additional % of firm growth)[1]	1.8	2.3	1.6	2.1	0.3

Robust clustered standard errors in parentheses   *** p<0.01, ** p<0.05, * p<0.1

There seems to be a **statistically and economically significant** effect of bank catharsis on real firm performance, but can we **exclude endogeneity concerns?**

Identification strategy to prove causal relation between bank catharsis effect and real economic performance

① $\triangle ln(output_{i,t}) = \alpha + \beta * bank\ catharsis\ indicator_{k,t} + FE + X_{i,t} + Z_{k,t} + \varepsilon_{i,t}$

Growth of individual firms, as measured, e.g. by Δln(revenue)

Core variable of interest, captures how rules-based banks are resolved

Firm FE
Year FE

Set of country-level control variables

Set of firm-level control variables

OLS

---

2 **Identification problem:**
Endogeneity due to omitted variables and simultaneity (not all captured by FE & controls)

Solution: Instrumental variable for bank resolution
- IVs: two bank insolvency law variables
  – Existence of separate bank insolvency law
  – Insolvency declaration power of a public agency
- Allows for diagnostic overID tests
- Cp/contrast *Jayaratne/Strahan, 1996; Giannetti/Ongena, 2009*)

IV/ GMM

---

③ **Identification problem:**
- So far, we proved correlation, but how to prove causation?
- Still endogeneity in IV?

Solution: Interaction, using dependence on bank finance in an interaction term (cp. *Rajan/Zingales, 1998; Giannetti/Ongena, 2009* and others)
- Core idea: Even if firm growth and bank catharsis experience correlation due to endogeneity, it is extremely unlikely to do so in a systematic way for firms with different bank dependence
- Allows additional fixed effects filters (e.g. country-year)

X

Indicators: firm i, industry j, country k, year t

2

Model	(1) IV GMM	(2) IV GMM
Dependent variable	$\Delta \ln(\text{OpRev})$	$\Delta \ln(\text{OpRev})$
Catharsis indicator (8% CR)	1.146*** (0.0281)	0.828*** (0.0497)
Firm-level controls		
Bank dependence		0.0684*** (0.00982)
Firm age (log)		-0.0647*** (0.000706)
Lagged share of total assets		-0.679** (0.299)
Profitability		0.341*** (0.00512)
Country-level controls		
Financial development		0.0204*** (0.00191)
Bank undercapitalization		-0.0158*** (0.00405)
Bank concentration CR3		0.175*** (0.00867)
GNI per capita		0.00371*** (0.000118)
Political openness		-0.0183*** (0.00102)
Constant	0.162*** (0.000862)	0.482*** (0.00519)
Year FE	NO	YES
Observations	717,211	606,588
R-squared	0.01	0.108
Weak instrument test (F)[1]	7700	4500
Hansen test (p-value)[2]	0.567	0.218
Endogeneity test (p-value)[3]	0.000	0.000

- **Effect confirmed** in general
- **Validity of instrument:**
  - ☑ **IV condition 1:** Relevance of resolution law IVs for actual resolution (theory and confirmed in first stage)
  - ☑ **IV condition 2:** Exogeneity of instrument, i.e. exclusion of any causal effect of bank resolution law IVs on firm performance other than through actual resolution
    - □ Theory: Direct effect unlikely
    - □ Diagnostic: Hansen OID test does not reject, but drops
    - □ Potential problem of **reverse causality** (e.g. economic dev't or lobbying for laws)?
- → **Use additional strategy to overcome endogeneity concerns and prove causality**

Notes: **[1]** Uses the Kleibergen-Paap Wald F statistic **[2]** Tests the null hypothesis that the instruments are uncorrelated with the error **[3]** Tests the null hypothesis that the estimation results are not altered by using instrumental variables

Identification strategy to prove causal relation between bank catharsis effect and real economic performance

① $\Delta ln(output_{i,t}) = \alpha + \beta * bank\ catharsis\ indicator_{k,t} + FE + X_{i,t} + Z_{k,t} + \varepsilon_{i,t}$

Growth of individual firms, as measured, e.g. by Δln(revenue)

Core variable of interest, captures how rules-based banks are resolved

Firm FE
Year FE

Set of country-level control variables

Set of firm-level control variables

OLS

② **Identification problem:**
Endogeneity due to omitted variables and simultaneity (not all captured by FE & controls)

Solution: Instrumental variable for bank resolution
- IVs: two bank insolvency law variables
  - – Existence of separate bank insolvency law
  - – Insolvency declaration power of a public agency
- Allows for diagnostic overID tests
- Cp/contrast *Jayaratne/Strahan, 1996; Giannetti/Ongena, 2009*)

IV/ GMM

③ **Identification problem:**
- So far, we proved correlation, but how to prove causation?
- Still endogeneity in IV?

Solution: Interaction, using dependence on bank finance in an interaction term (cp. *Rajan/Zingales, 1998; Giannetti/Ongena, 2009* and others)
- Core idea: Even if firm growth and bank catharsis experience correlation due to endogeneity, it is extremely unlikely to do so in a systematic way for firms with different bank dependence
- Allows additional fixed effects filters (e.g. country-year)

X

Model	(1)	(2)	(3)
Dependent variable	$\Delta \ln(\text{OpRev})$	$\Delta \ln(\text{OpRev})$	$\Delta \ln(\text{OpRev})$
Catharsis indicator (8% CR)	0.298*** (0.0250)		
Catharsis indicator x bank dependence	0.496*** (0.132)	0.691*** (0.149)	0.530*** (0.163)
Firm-level controls	YES	NO	YES
Country-level controls	YES	NO	YES
Constant	YES	YES	YES
Country-Year FE	NO	YES	YES
Firm FE	NO	YES	YES
Observations	1,252,126	1,792,441	1,252,126
R-squared	0.046	0.398	0.432
Growth rate differential (additional % of firm growth)[1]	2.1	0.8	0.6

Robust clustered standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

- Particularly firms **more dependent on bank financing** benefit from the bank catharsis effect
- Model controls for **all sorts of fixed effects**, even country-year trend and firm FE (more detailed than industry fixed effects used in literature!)
- **Endogeneity unlikely:** Even if firm growth and bank resolution might experience correlation due to omitted variables/reverse causation, it is extremely unlikely to do so in a systematic way for firms with different bank dependence (everything else is captured by fixed effects/trends)

Extensions – Nice effect, but can we get a bit more of a 'smoking gun'? What is the channel of transmission for the catharsis effect? (1/2)

Model	(1)	(2)	(3)	(4)	(5)
Dependent variable	Δ ln(OpRev)	Δ ln(OpRev)	Δ ln(OpRev)	Δ ln(OpRev)	Δ ln(OpRev)
	Panel A	**Panel B: Split sample**		**Panel C: Split sample**	
				High profitabil-ity firms[1]	Low profitabil-ity firms[1]
	Full sample	Active firms	Insolvent firms		
Catharsis indicator x bank dependence	0.530***	0.587***	-0.305	0.762**	-0.513
	(0.163)	(0.167)	(0.753)	(0.366)	(0.488)
Firm-level controls	YES	YES	YES	YES	YES
Country-level controls	YES	YES	YES	YES	YES
Constant	YES	YES	YES	YES	YES
Country-Year FE	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES
Observations	1,252,126	1,179,171	72,955	368,498	314,340
R-squared	0.432	0.428	0.480	0.653	0.616
Growth rate differential (additional % of firm growth)[2]	0.6	0.7	N/A	0.9	N/A

Notes: [1] Profitability is defined as ROA lagged by one year, sample is cut at the 33rd and 67th percentiles

▶ - **Quality channel:** If our initial hypothesis is correct, rules-based resolution will increase incentives for better credit allocation decisions, i.e. **banks will prefer high quality customers** rather than gambling with lending decisions for high volatility → High quality firms benefit more
- **Test using sample cuts[1]:** higher quality (e.g. profitability) firms receive particularly strong growth push, no/negative effect for low quality firms → **Quality of lending channel is reestablished**

Extensions – Nice effect, but can we get a bit more of a 'smoking gun'? What is the channel of transmission for the catharsis effect? (2/2)

Model	(1)	(2)	(3)
Dependent variable	Δdebt/assets	Δdebt/assets	Δdebt/assets
Catharsis indicator	0.00454 (0.00433)	-0.122*** (0.0138)	
Catharsis indicator x bank dependence		0.651*** (0.0709)	0.710*** (0.0840)
Firm-level controls	YES	YES	YES
Country-level controls	YES	YES	YES
Constant	YES	YES	YES
Firm FE	YES	YES	YES
Year FE	YES	YES	NO
Country-Year FE	NO	NO	YES
Observations	957,432	957,367	957,367
R-squared	0.041	0.042	0.312

Robust clustered standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

- **Quantity channel:** If our initial hypothesis is correct, rules-based resolution and the resulting realignment of incentives in credit allocation would not lead to more bank credit overall, but we could expect a **reallocation of credit to firms that need credit most**, i.e. are willing to pay optimal risk-adjusted rates
- → **Firms that need credit** (not all firms!) **are able to expand their debt ratio**[1]

Model	(1)	(2)	(3)
Dependent variable	$\Delta \ln(OpRev)$	$\Delta \ln(OpRev)$	$\Delta \ln(OpRev)$
	Panel A	**Panel B: Split sample**	
		High access to international finance[1]	Low access to international finance[1]
	Full sample		
Catharsis indicator x bank dependence	0.530***	1.253***	0.0305
	(0.163)	(0.388)	(0.246)
Firm-level controls	YES	YES	YES
Country-level controls	YES	YES	YES
Constant	YES	YES	YES
Country-Year FE	YES	YES	YES
Firm FE	YES	YES	YES
Observations	1,252,126	337,343	503,041
R-squared	0.432	0.530	0.530
Growth rate differential (additional % of firm growth)[2]	0.6	1.5	N/A

Notes: [1] Access to alternative funding/international finance is defined as (loans from non-resident banks + international debt issues)/GDP, sample is cut at the 33rd and 67th percentiles [2] The growth rate differential presents a measure (in %

- A priori, **direction of catharsis effect not necessarily positive**
- **Counterargument:** Positive effect outweighed by **negative effects/costs of bank insolvencies**
- Avoid myopic policy recommendations, test under which economic conditions catharsis works
- One such condition: **Openness to foreign competitors and credit supply** to avoid credit crunch
- → **High access to alternative funding** sources is catalytic: the **negative effects of closures** (potential of credit supply shock) **are milder, the positive catharsis effect more pronounced**

Robustness tests try to overcome potential concerns with our results

Potential concern	Robustness test
Results driven by particular countries or outliers	- Exclude **largest economies** (all together and each at once) - Exclude **all countries with <10,000** observations - Employ sample that is **not censored in dependent variable** **Censor explanatory variable** (1/99)
Results driven by definition or cutoff of catharsis indicator	- Use catharsis indicator computed around **alternative cutoffs** (e.g. 7% and 9%) for tests - Use **yearly averages in capital and assets** for computing the catharsis indicator - Use **tier 1 capital** ratio (also with varying cutoffs) - Exclude **M&A banks** from the definition of resolved banks
Results driven by definition of bank dependence	Use **alternative bank dependence index**, calculated using US SIC sector classification with less subsectors ('rough cut') than NACE-4 (in reference model)
Results driven by other model specifications	- Run models **including/excluding controls and fixed effects**, run random effects - Use **alternative control variable** definitions

All results are comparable in economic and statistical significance

Robustness (1/2): Restricted/lifted samples

Model	(1)	(2)	(3)	(4)	(5)
Robustness test	Reference case	Excluding top 3 countries	Excluding countries with few observations	No cleaning in dep. variable	Cleaning (1/99) in expl. variable
Dependent variable	$\Delta \ln(\text{OpRev})$	$\Delta \ln(\text{OpRev})$	$\Delta \ln(\text{OpRev})$	$\Delta \ln(\text{OpRev})$	$\Delta \ln(\text{OpRev})$
Catharsis indicator x bank dependence	0.530*** (0.163)	0.527*** (0.175)	0.554*** (0.163)	0.761** (0.356)	0.590*** (0.219)
Firm-level controls	YES	YES	YES	YES	YES
Country-level controls	YES	YES	YES	YES	YES
Constant	YES	YES	YES	YES	YES
Country-Year FE	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES
Observations	1,252,126	890,227	1,221,023	1,272,329	854,737
R-squared	0.432	0.433	0.429	0.348	0.477
Growth rate differential (additional % of firm growth)[1]	0.6	0.6	0.7	0.9	0.7

Notes: [1] The growth rate differential presents a measure (in % growth) of the difference in the growth rate between a firm located half a standard deviation above the mean of financial dependence as compared to a firm with a financial dependence measure half a standard deviation below the mean, if located in a country half a standard deviation above the mean of the bank catharsis indicator rather than in a country half a standard deviation below the mean

Robust clustered standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Robustness (2/2): Alternative variable definitions

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Robustness test	Reference case	Alternative cutoff (7%)	Alternative cutoff (9%)	Resolution w/o M&A	Average capital ratio (8%)	Tier 1 ratio (8%)	SIC-level bank dependence
Dependent variable	$\Delta \ln(OpRev)$	$\Delta \ln(OpRev)$	$\Delta \ln(OpRev)$	$\Delta \ln(OpRev)$	$\Delta \ln(OpRev)$	$\Delta \ln(OpRev)$	$\Delta \ln(OpRev)$
Catharsis indicator x bank dependence	0.530***	0.344***	0.621***	0.595***	0.272**	0.332***	0.373**
	(0.163)	(0.128)	(0.173)	(0.171)	(0.130)	(0.0668)	(0.171)
Firm-level controls	YES	YES	YES	YES	YES	YES	YES
Country-level controls	YES	YES	YES	YES	YES	YES	YES
Constant	YES	YES	YES	YES	YES	YES	YES
Country-Year FE	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES
Observations	1,252,126	1,252,126	1,252,126	1,252,126	812,358	1,183,467	1,272,625
R-squared	0.432	0.432	0.432	0.432	0.476	0.436	0.412
Growth rate differential (additional % of firm growth)[1]	0.6	0.5	0.7	0.7	0.5	1.1	0.4

Notes: [1] The growth rate differential presents a measure (in % growth) of the difference in the growth rate between a firm located half a standard deviation above the mean of financial dependence as compared to a firm with a financial dependence measure half a standard deviation below the mean, if located in a country half a standard deviation above the mean of the bank catharsis indicator rather than in a country half a standard deviation below the mean

Robust clustered standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Summary and potential policy implications

Catharsis in the financial sector?! **?**	**YES!**	▪ We find a significant effect of bank catharsis on firm performance: Firms grow stronger under a more rules-based resolution regime for failed banks
Is that causal, not endo-geneity? **?**	**YES!**	▪ Trying to overcome endogeneity concerns by using IV and interaction with bank dependence ▪ Robustness checks for alternative samples / variables
How does this work? **?**	**QUALITY & QUANTITY**	▪ Quality: Improved credit allocation (to high quality firms) instead of gambling ▪ Quantity: Reallocation of credit to firms that need it
Any conditions or limitations? **?**	**YES!**	▪ High access to alternative funding sources ensures milder negative effects of credit crunch (and vice versa!) ▪ Closure rule is hypothetical, with 0-50% implementation

What are the policy Implications? **?**	▪ We need **incentive compatible bank insolvency regulation** to make catharsis work! ▪ **Careful** about conditions and limitations of catharsis effect!