

THE ECONOMICS OF CROSS-BORDER COOPERATION IN BANKING SUPERVISION

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External costs of bank failure

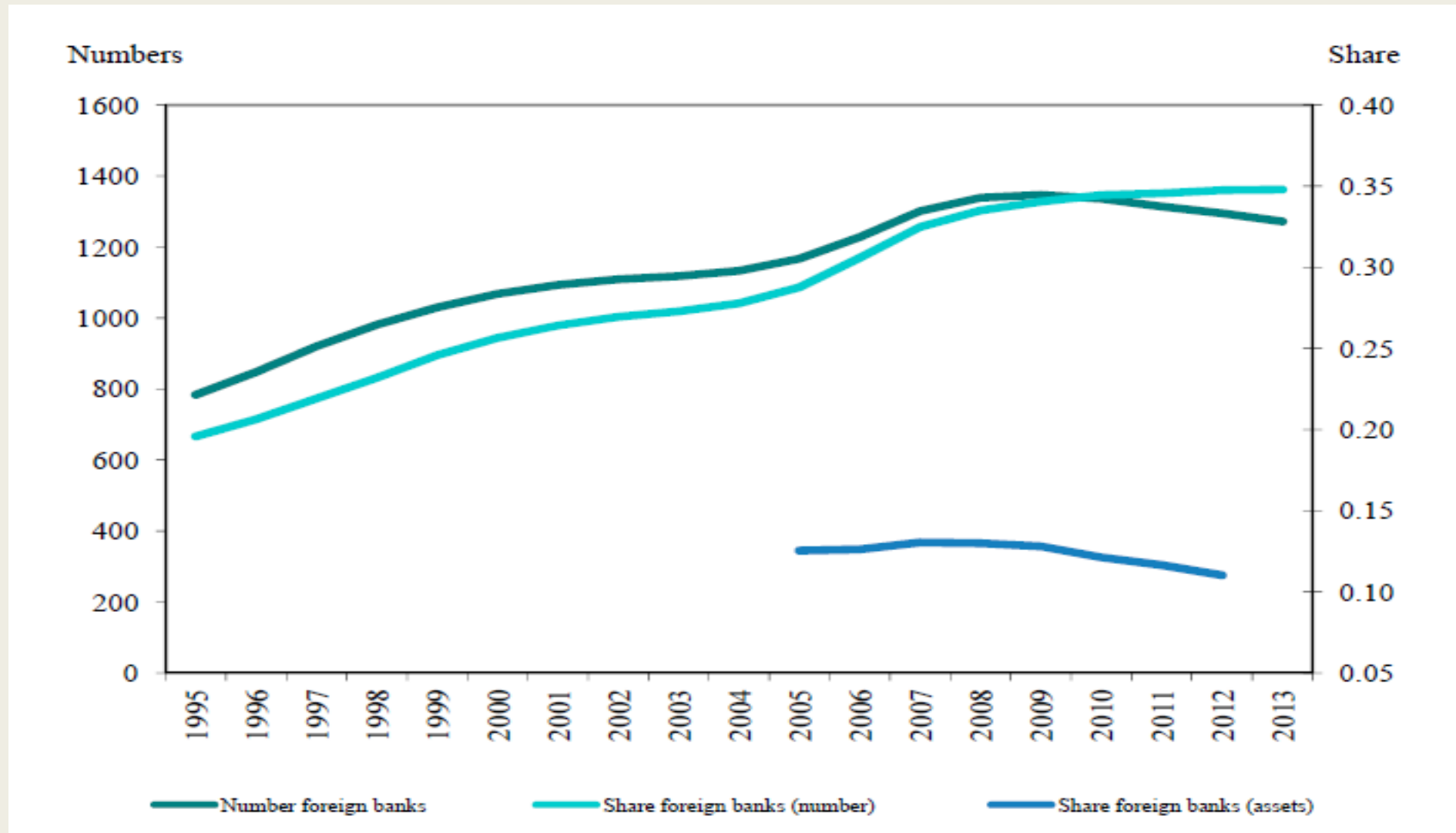
- Domino problem
 - *Network, interconnectedness*
- Hostage problem
 - *Depositors panic*
 - *Contagion through payment system*
- Fridge problem
 - *Destruction of lending relationship, soft information*
- How to overcome them?
 - *Efficient and swift resolution regime, using merger and acquisition, purchase and assumption, good bank-bad bank etc.*

But diverging interests of different players

- Bankers
 - *Equity as put option; participate more in up-side risk; tend to aggressive risk taking*
- Depositors
 - *Care about safety of their savings*
 - *Large depositors might exert market discipline*
- Safety net managers (regulators)
 - *Have “official” task to avoid aggressive risk-taking*
 - *Risk of political or regulatory capture*
- Safety net owners (ultimately tax payers)
 - *Care about costs*
 - *Have often no say*

What if we move from national to cross-border level?

Increase in cross-border banking over time

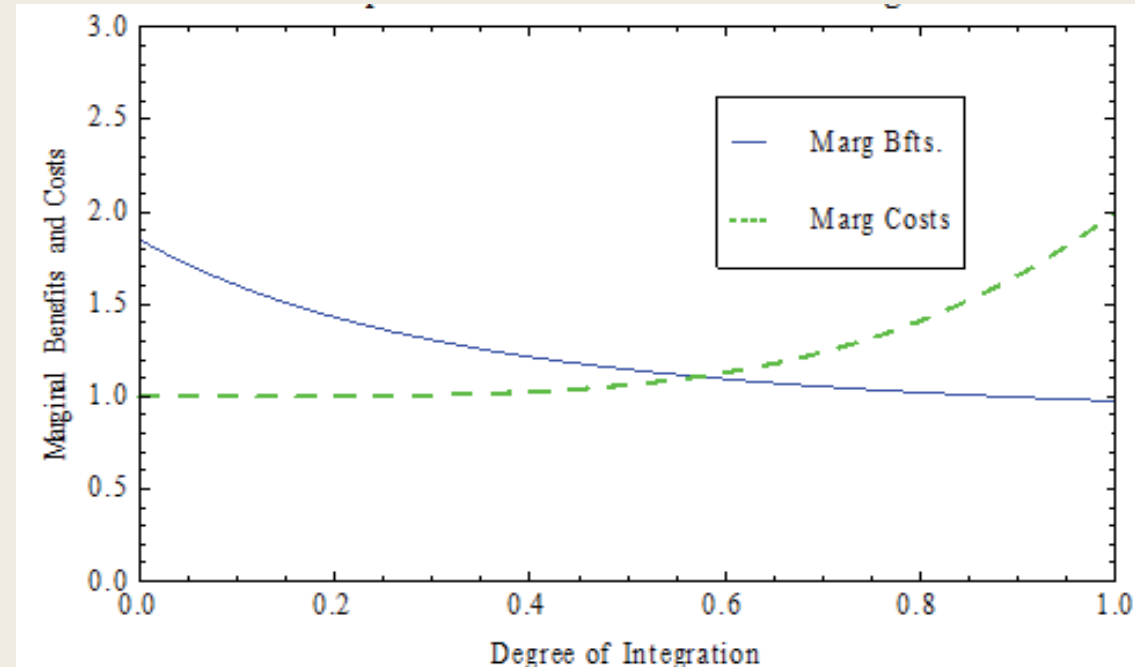


Source: Claessens and van Horen (2015)

Desirable Cross-Border Banking

A “healthy” amount of cross-border banking is likely to be beneficial

- *Diversification benefits for domestic banks and domestic borrowers*
- *Effect on efficiency and inclusion highly context-specific*
- *Critical role of foreign banks in transformation of banking systems in CEE*
- *But: higher volatility of flows*
- *But: contagion costs*



Resolution was the weak point

- Bank failure resolution turned out weak point in 2007/2008 crisis, especially in case of cross-border banks
- “Banks are global in life, national in death”
- Fortis, Dexia, Iceland banks etc.
- Memorandums of Understanding and Colleges of Supervisors turned out to be not sufficient

- What are interests of different stakeholders in a cross-border (as opposed to domestic) bank?
- How can we address such divergent interests?
- Do theoretical predictions match reality?

This presentation

- Beck, Todorov and Wagner (2013): Supervising Cross-Border Banks: Theory, Evidence and Policy, *Economic Policy*
- Beck and Wagner (2016): Supranational regulation: how much and for whom, *International Journal of Central Banking*
- Beck, Silva Buston, Wagner (2018): The economics of supranational bank supervision, working paper

Why regulate cross-border banking?

- Failure of cross-border bank imposes costs on foreign stakeholders that are not taken into account by home country supervisor (Beck, Todorov and Wagner, 2013)
- Contagion effects through common asset exposures, fire sale externalities, informational contagion, interbank exposures etc.
 - *Does not depend on direct cross-border engagements by banks and – on bank-level – not even on direct exposures to international markets*
 - *More prominently as banks move towards market finance*
- Regulatory arbitrage
- Within-in monetary union: additional externalities
 - *Close link between monetary and financial stability*
 - *Lack of exchange rate tool exacerbates impact of asymmetric shock*
 - *Common lender of last resort leads to tragedy of commons problem*

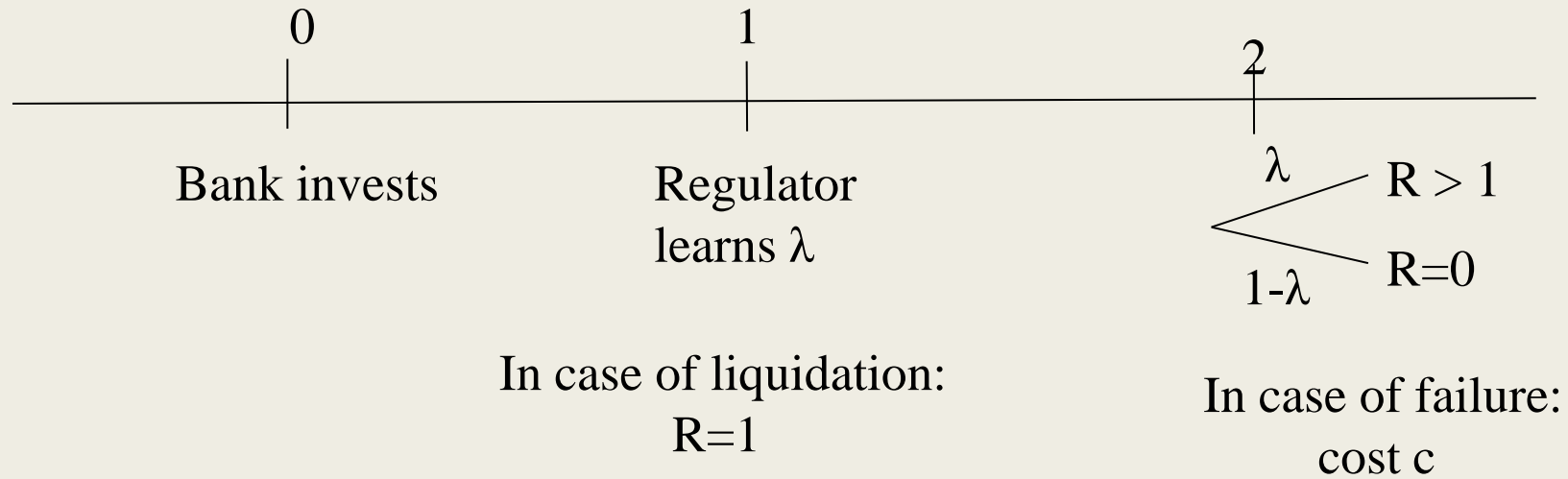
Beck, Todorov and Wagner (2013)

- Does national supervision of international banks distort supervisory decision?
- Theory: YES, though in somewhat unexpected ways
- Empirical: can show these distortions by looking at bank interventions in 2009/9
- Common theme (across all papers): cross-border supervisory cooperation matters most during the resolution phase!

A simple model

- Single bank, three periods (0,1,2);
- balance sheet normalized to 1 of which d are deposits and $1-d$ is equity
- Interest rate on deposits is zero
- Date 0: Bank invests in an illiquid asset that matures at date 2 with either return $R > 1$ or 0
- Date 1: Supervisor learns success probability λ
 - *Can decide to liquidate bank in which case 1 is obtained*
- Date 2: asset (if continued) returns R with prob. λ and zero with prob. $1 - \lambda$
 - *In the latter case there also external costs c to the economy (e.g., costs of firms that were financed by the bank)*

Model Timeline



Intervention in purely domestic bank

- Supervisor maximizes welfare (return to domestic equity, depositors and asset owners)
- Date 1 payoff: 1
- Expected date 2 payoff: $\lambda R - (1-\lambda)c$
- Cutoff point (critical success probability): $\lambda^* = [1+c]/[R+c]$
- Above cut-off λ^* : do not intervene
- Below cut-off: liquidate bank

Cross-border bank and domestic supervisor

- Cross-border bank:
 - γ_D - share of domestic deposits
 - γ_E - share of domestic equity
 - γ_A - share of domestic assets
- Domestic supervisor cares about domestic welfare, which now differs from world welfare

Decision of home country supervisor

$$\lambda(\gamma_D d + \gamma_E (R-d)) - (1-\lambda) \gamma_A c = \gamma_D d + \gamma_E (1-d)$$

Cutoff point:

$$\lambda^{**} = [\gamma_D d + \gamma_E (1-d) + \gamma_A c] / [\gamma_D d + \gamma_E (R-d) + \gamma_A c]$$

Comparative statics for intervention threshold of domestic regulator

The intervention threshold λ^{**} :

1. Increases in share of foreign equity
2. Decreases in share of foreign deposits
3. Decreases in share of foreign assets

Intuition

- equity tends to benefit from continuation of bank (option value of equity)
- Thus, a higher share of foreign equity increases incentives of domestic regulator to intervene (regulator becomes stricter)
- Vice versa for deposits and assets

Welfare losses arising from domestic supervision

- Cross-border activities do not change (global) welfare maximizing cut-off
- If only foreign equity ($\gamma_E < 1$, $\gamma_D = \gamma_A = 1$): domestic regulator is *too strict* (there is a range of success probabilities for which it is inefficient to liquidate but domestic regulator liquidates)
- If only foreign deposits or assets: domestic regulator is *too lenient*

Importantly, when cross-border activity across all three dimensions, balance of activities matters

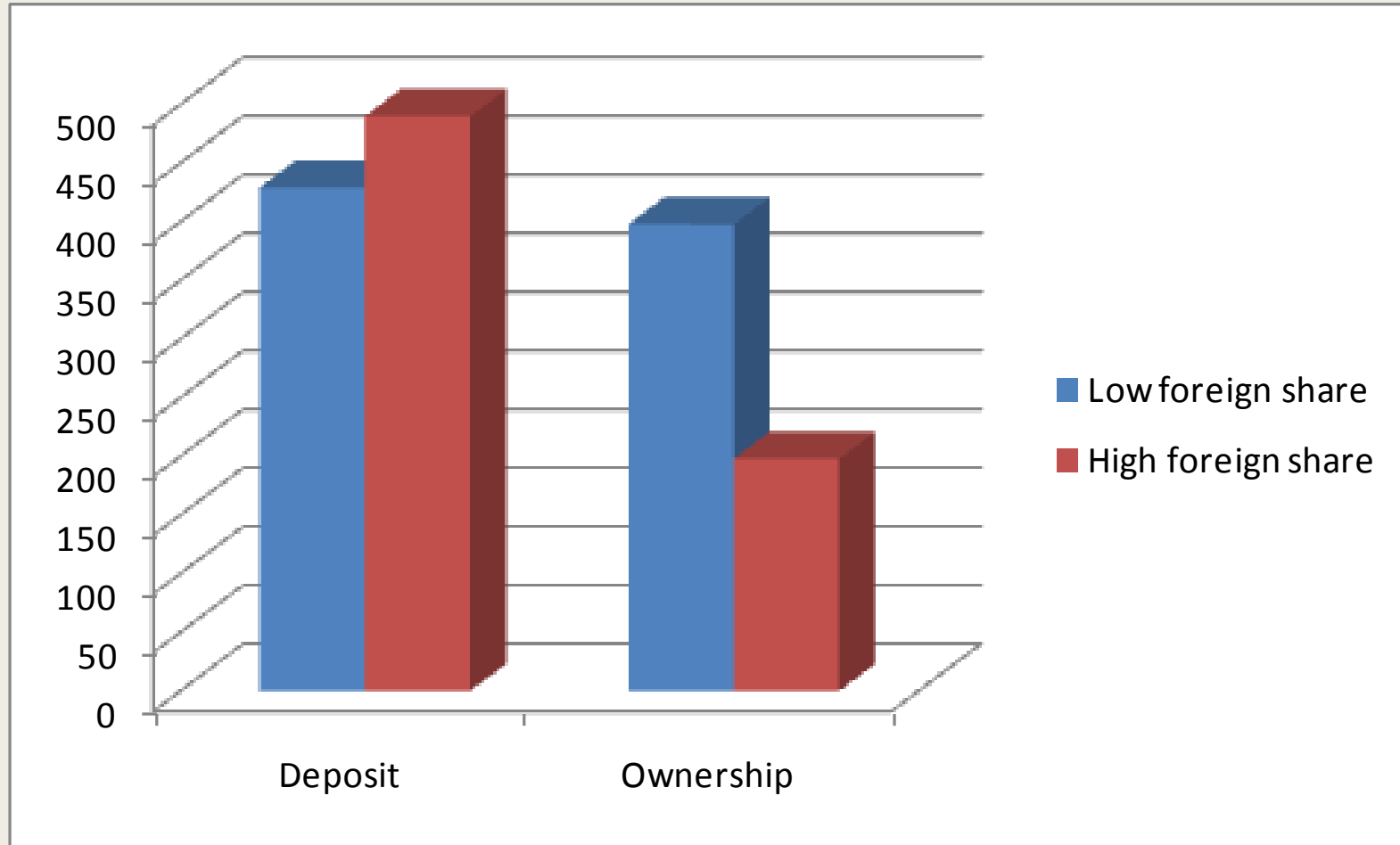
- If bank is balanced across all dimensions, then potentially low inefficiencies even though cross border bank
- In particular, when $\gamma_D = \gamma_E = \gamma_A$ then no bias in intervention decision

Taking theory to data

- Test predictions of theory using sample of intervened banks during crisis
- In reality (in contrast to model), bank health (success probability λ) will evolve continuously
- Regulator should intervene when bank health has deteriorated to the point where it reaches a critical level
- Bank health (at time of intervention) is thus measure of regulatory strictness
- Model predicts that bank health (at intervention) is i) increasing in foreign equity and ii) decreasing in foreign deposits and assets
- Inverse measure of bank health (probability of survival): CDS spread of bank prior to intervention
 - *CDS spread at intervention is measure of regulatory leniency*

Empirical strategy: We will regress CDS spread of intervened banks prior to intervention on foreign activity shares (and control variables)

Biased supervisory incentives to intervene in cross-border banks



CDS spreads of large (mostly cross-border) banks three days before intervention during 2008/9 crisis; Source: Beck, Todorov and Wagner (2013)

Beck and Wagner (2016)

- So far: positive analysis – mis-match between geographic footprint of bank and regulatory perimeter causes inefficient supervisory interventions
- Next: normative analysis – when is supra-national supervision efficient? What other forms of cooperation are feasible?

Cross-border externalities are important, but one size does not fit all

- Countries differ in their legal systems (and culture). This makes it hard to specify a common set of rules and standards, forcing cumbersome adaptation of general principles to local circumstances.
- Differences in preferences. Countries may differ in how they view the role of the government in the economy (one consequence being differences in state ownership), focus on fiscal independence or with respect to their risk tolerance.
- Countries differ in their dependence on banks and their market structures in general. This influences the ease with which banks can be resolved and costs which bank failure impose on economy

A simple theoretical model

- 2 countries, $i=A,B$; one bank each
- Balance sheet normalized to 1
- No discount factor, interest rate zero, no equity
- Date 0: Bank invests in illiquid assets
- Date 2: assets mature, with prob. λ_i payoff is $R>1$, with prob. $1-\lambda_i$ payoff is zero and external costs c_i
- Date 1: supervisor learns prob. λ_i ; bank can be liquidated with return 1
- Assume: $c_A \leq c_B$

Efficient and decentralized solutions

- Date 1 payoff: 1
- Expected date 2 payoff: $\lambda_i R - (1-\lambda_i) c_i$
- Cutoff point: $\lambda^* = [1+c_i]/[R+c_i]$

- Does not take into account externalities β

- Date 1 payoff: 1
- Expected date 2 payoff: $\lambda_i R - (1-\lambda_i)(1-\beta)c_i$
- Cutoff point: $\lambda^D = [1+(1-\beta)c_i]/[R+c_i(1-\beta)]$

Decentralized solution implies inefficiency

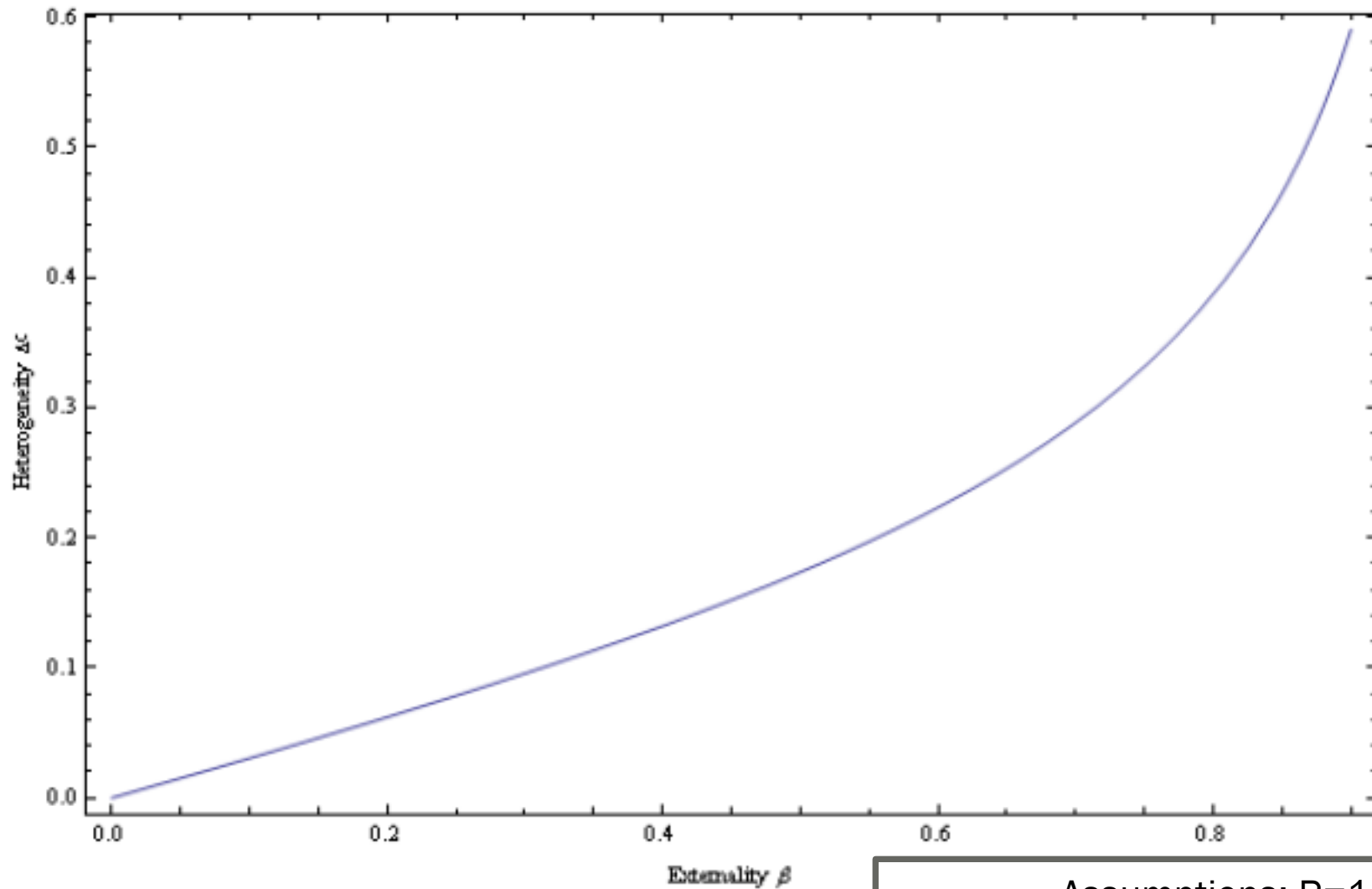
- The higher cross-border externalities, the more lenient domestic supervisors under national supervision
- What about a supranational supervisor?

Supranational supervisor

$$\lambda^S = \frac{1 + \frac{c_A + c_B}{2}}{R + \frac{c_A + c_B}{2}}$$

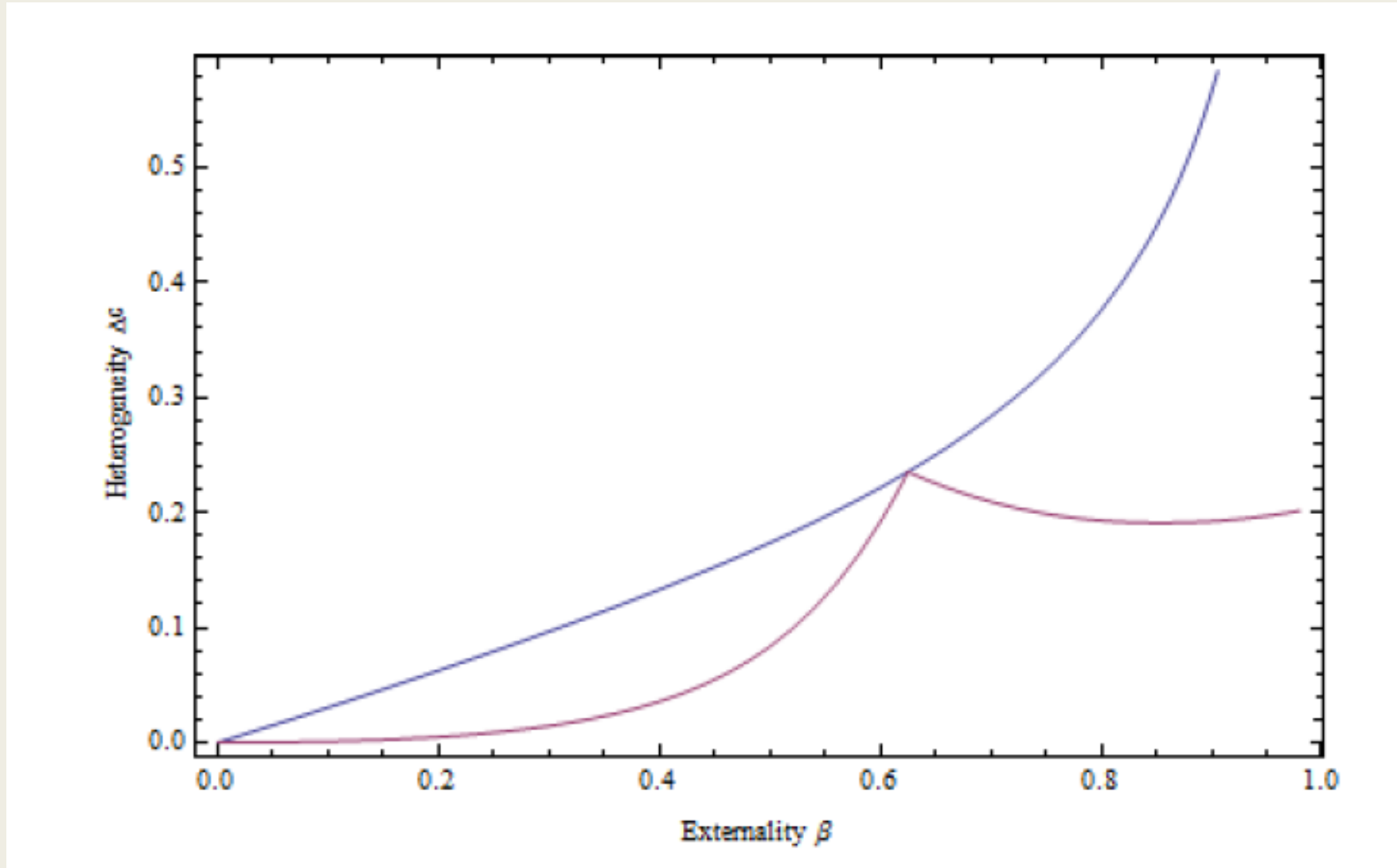
- Supranational supervisor internalizes cross-border externalities
- BUT: takes average of failure costs; inefficiency

National vs. supranational supervision



Assumptions: $R=1.1$, $c=0.3$

Optimality vs. incentive compatibility



In reality: Lots of variation across countries

Heterogeneity

Supervisory colleges, MoUs

Closer cooperation, especially on G-SIFIs, regulatory convergence

Asymmetric home-host country interests: stand-alone subsidiaries

Strong ex-ante agreements on resolution and burden-sharing

Broader cooperation among stakeholders; regulatory convergence

Legal commitments
– e.g., Trans-Tasman

Joint regulatory and supervisory authority

Externalities

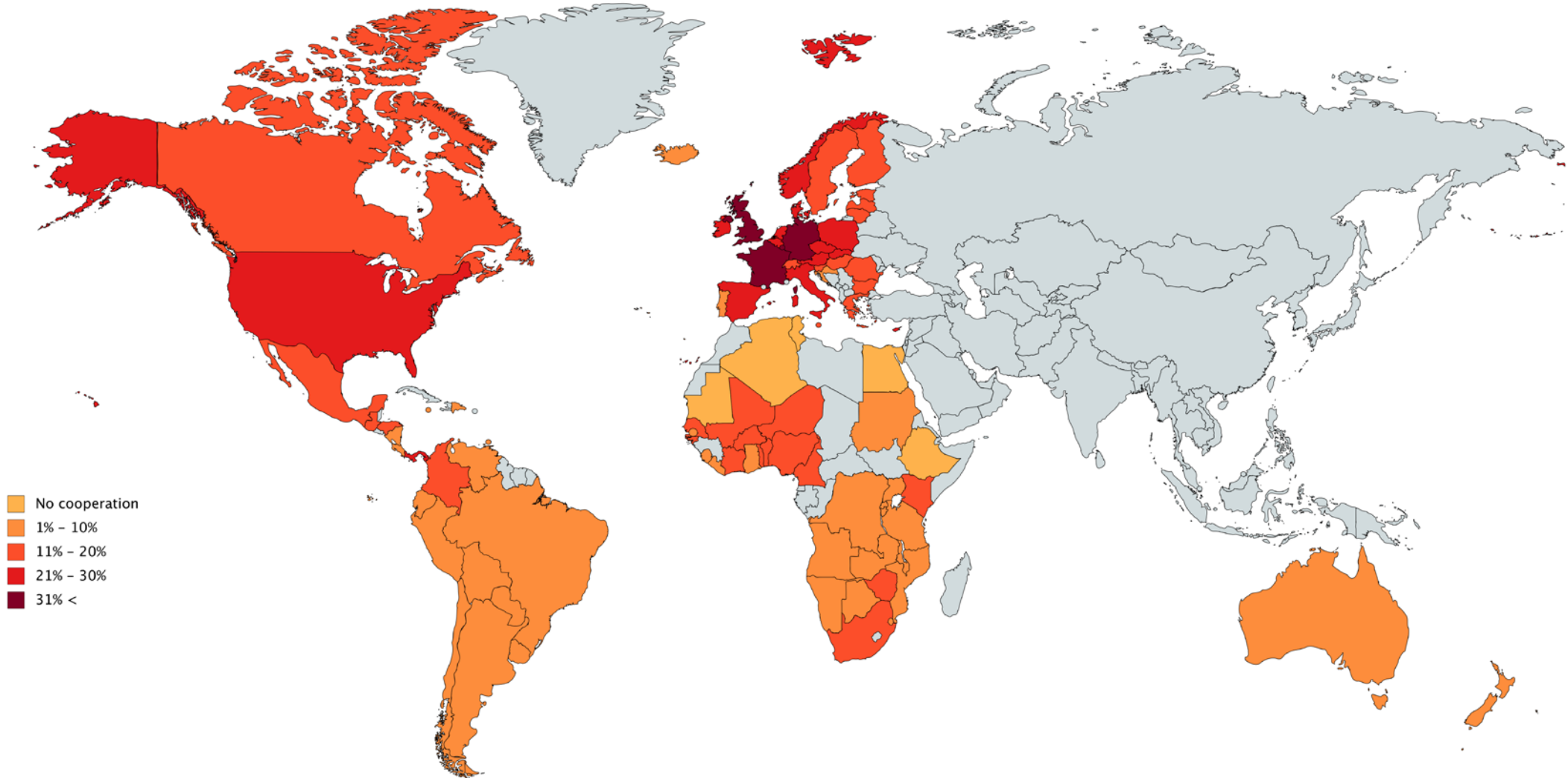
Beck, Silva Buston and Wagner (2018)

- Taking theory to the data
- What determines whether and how countries cooperate in their supervision of banks?
- Are political constraints and historical reasons behind this, possibly also explaining why the overall degree of cooperation is fairly low?
- Or is it the economics?
- Hand-collected data on cross-border supervisory cooperation?

Data

- 93 countries and 4,278 country pairs during the period 1995-2013
- Limited to EU, Latin America, Africa and AUS/NZL
- Hand-collected data on existence of cooperation agreements as well as intensity
 - *Memorandum of Understanding*
 - *College of Supervisors*
 - *MoU on crisis management and resolution*
 - *Supra-national supervisor*
- Data for heterogeneity and externality measures' calculations from different sources.

Cooperation intensity across countries



Variable	Source
Private Credit/GDP	World Bank
Bank concentration	World Bank
GDP per capita	World Bank
Government expenditures/GDP	World Bank
Federalism	Database for Political Institutions
Political structure	Database for Political Institutions
Legal origin	La Porta et al.
Colonizing country	Klerman et al. (2011)
Latitude/Longitude	Nationmaster
Language	CIA Factbook
Central Bank supervisor?	Bank Regulation and Supervision Database
Bank insolvency framework	Bank Regulation and Supervision Database
Stock correlation	MSCI market index
Currency	IMF
Foreign bank share	Claessens and van Horen (2016)
Share GSIB	FSB

Methodology: Externalities

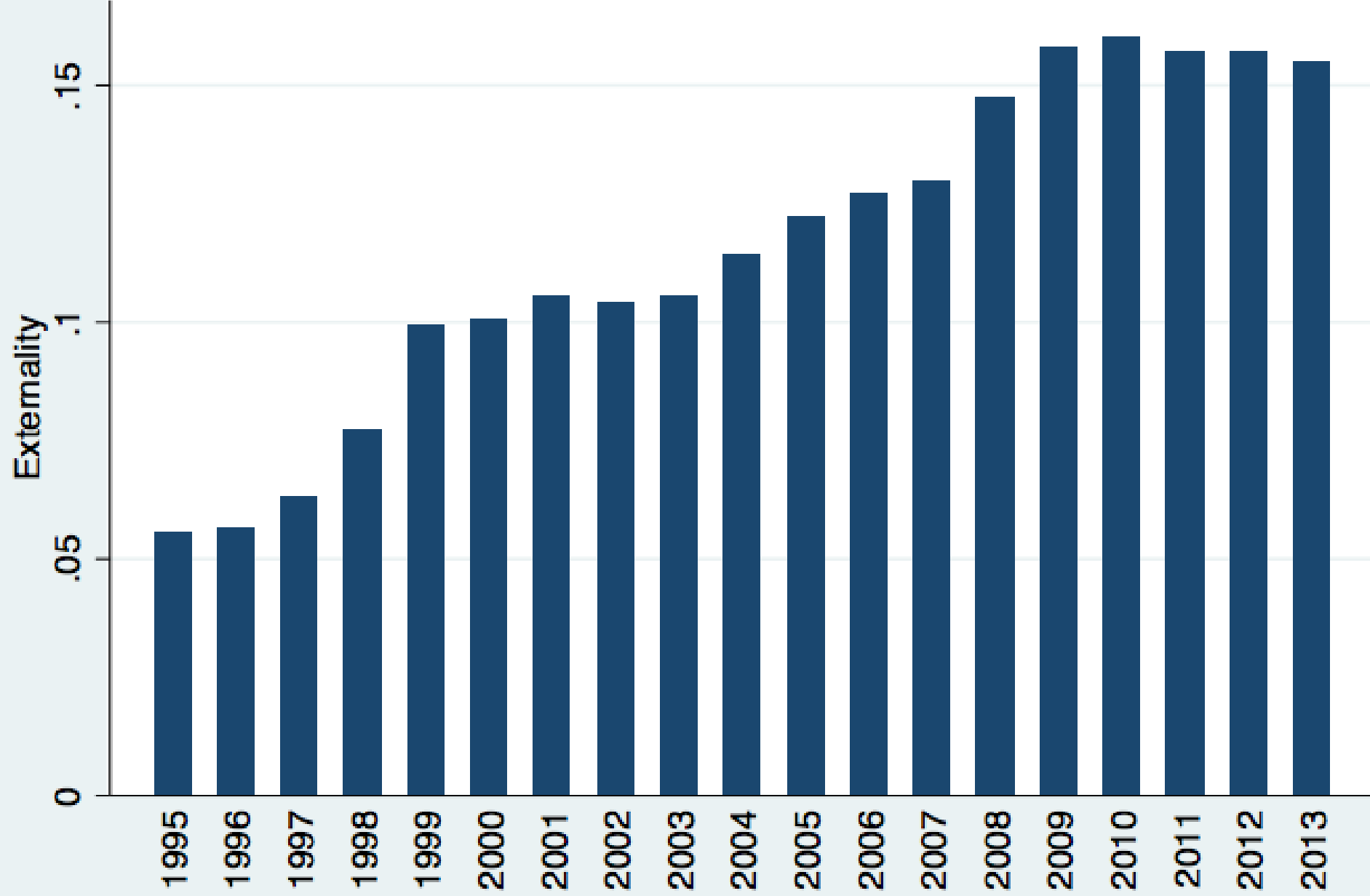
- We define:

$$E_{ij} = \frac{\sum_v \delta_{ijv} d_{ijv}}{\sum_v \delta_{ijv}}$$

- where δ_{ijv} is an indicator equal to 1 whenever the observation is not missing for a given country-pair, and zero otherwise, and d_{ijv} ($d_{ijv} \in [0, 1]$) equals

$$d_{ijv} = \frac{x_{ijv} - \min_k(x_{kv})}{\max_k(x_{kv}) - \min_k(x_{kv})}$$

All regions



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Private Credit/GDP	World Bank
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Methodology: Heterogeneity

- We calculate an aggregated heterogeneity measure using a set of variables at the country-pair level.
- The distance between country i and country j is defined as follows:

$$H_{ij} = \frac{\sum_v \delta_{ijv} d_{ijv}}{\sum_v \delta_{ijv}}$$

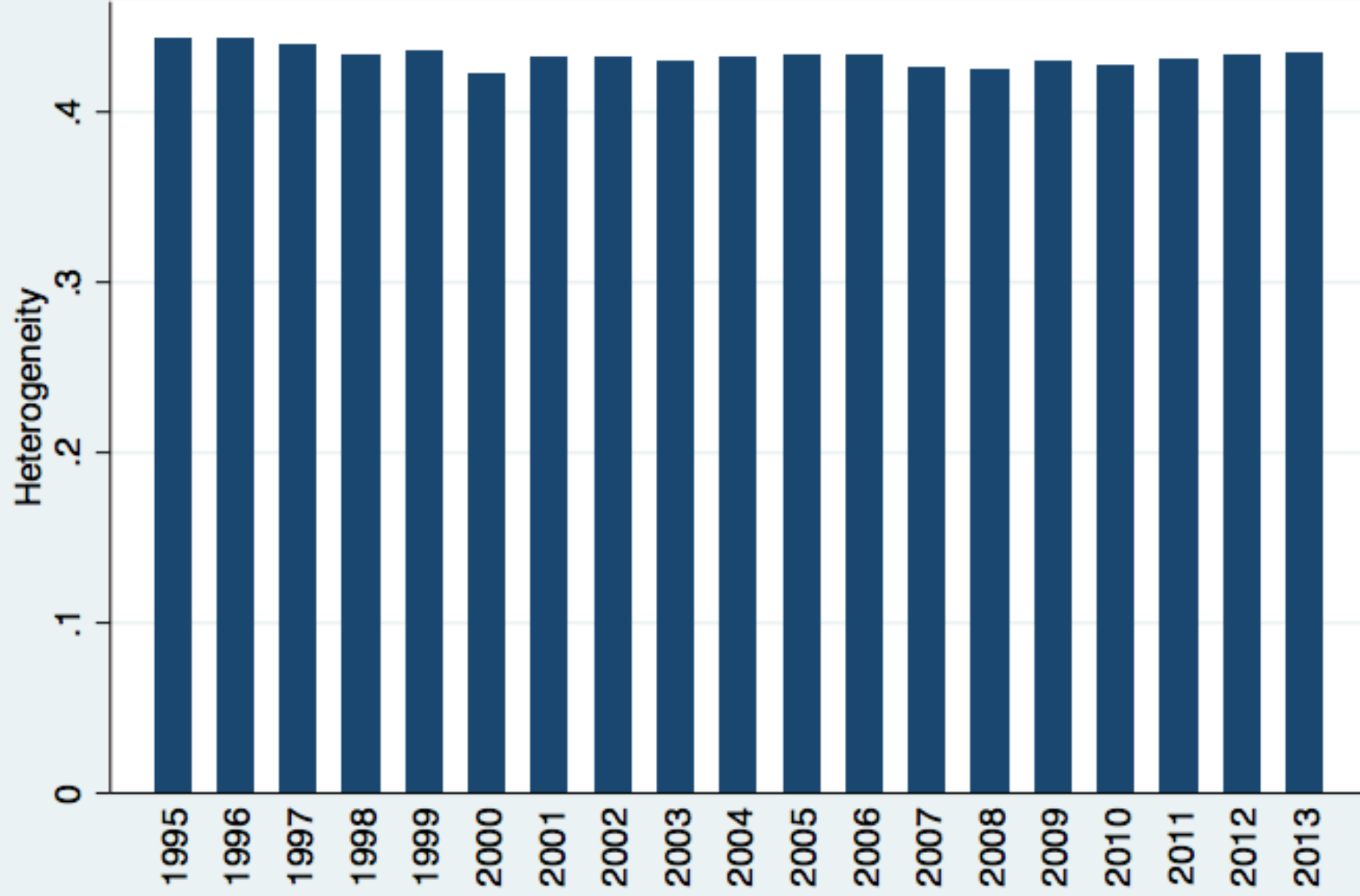
- where δ_{ijv}^{TM} is an indicator equal to 1 whenever both observations are not missing for both countries, and zero otherwise, and d_{ijv} ($d_{ijv} \in (0, 1)$) is:
- For binary variables v ,

$$d_{ijv} = \begin{cases} 0 & \text{if } x_{iv} = x_{jv} \\ 1 & \text{if otherwise} \end{cases}$$

- and for continuous variables v

$$d_{ijv} = \frac{|x_{iv} - x_{jv}|}{\max_k(x_{kv}) - \min_k(x_{kv})}$$

All regions



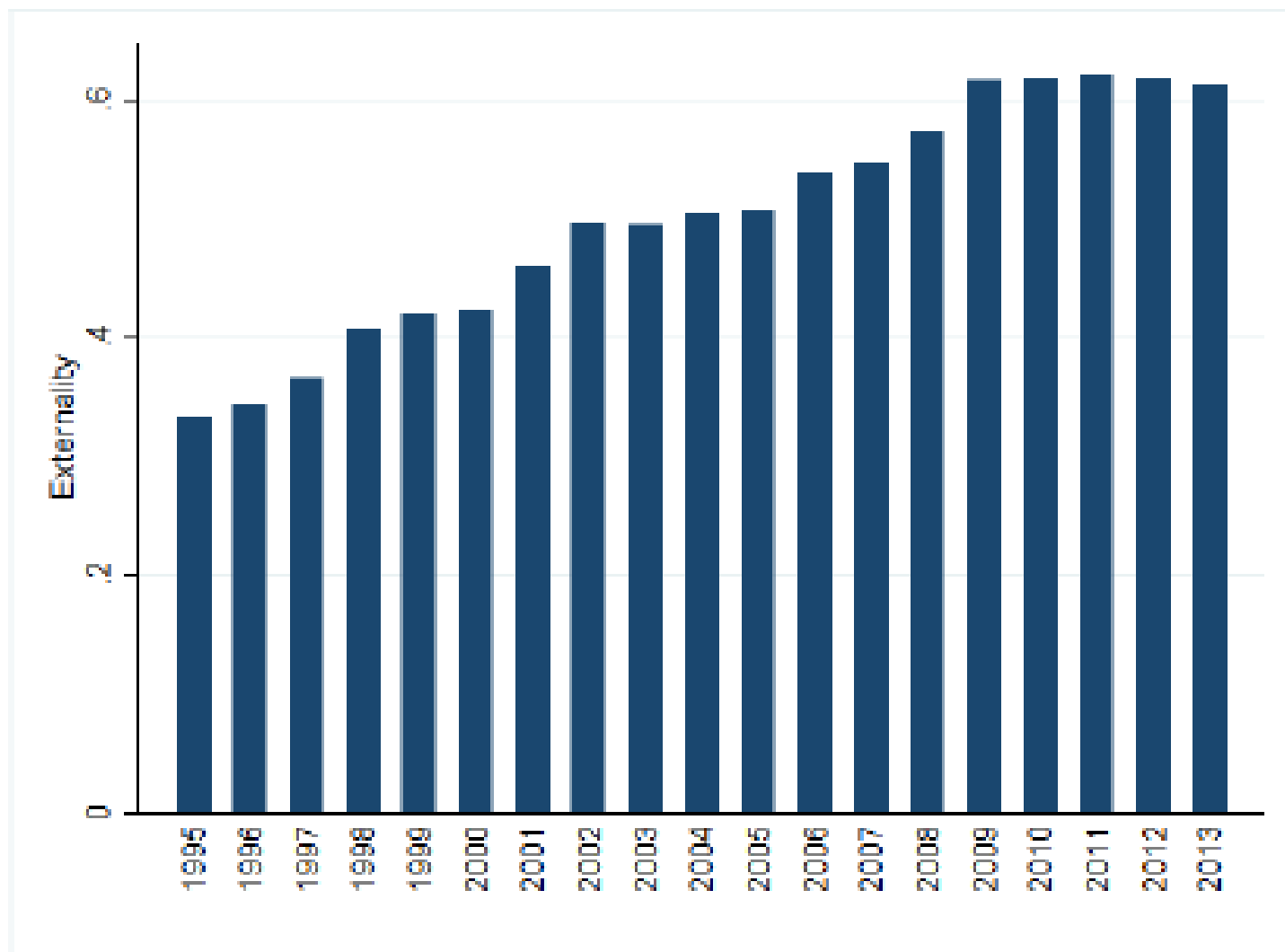
Methodology

$$P(\textit{cooperation}_{ij}) = \alpha + \sum_{k=1}^K \beta_k E_{k,ij} + \sum_{l=1}^L \phi_l H_{l,ij} + \epsilon_{ij}$$

Cross-sectional analysis

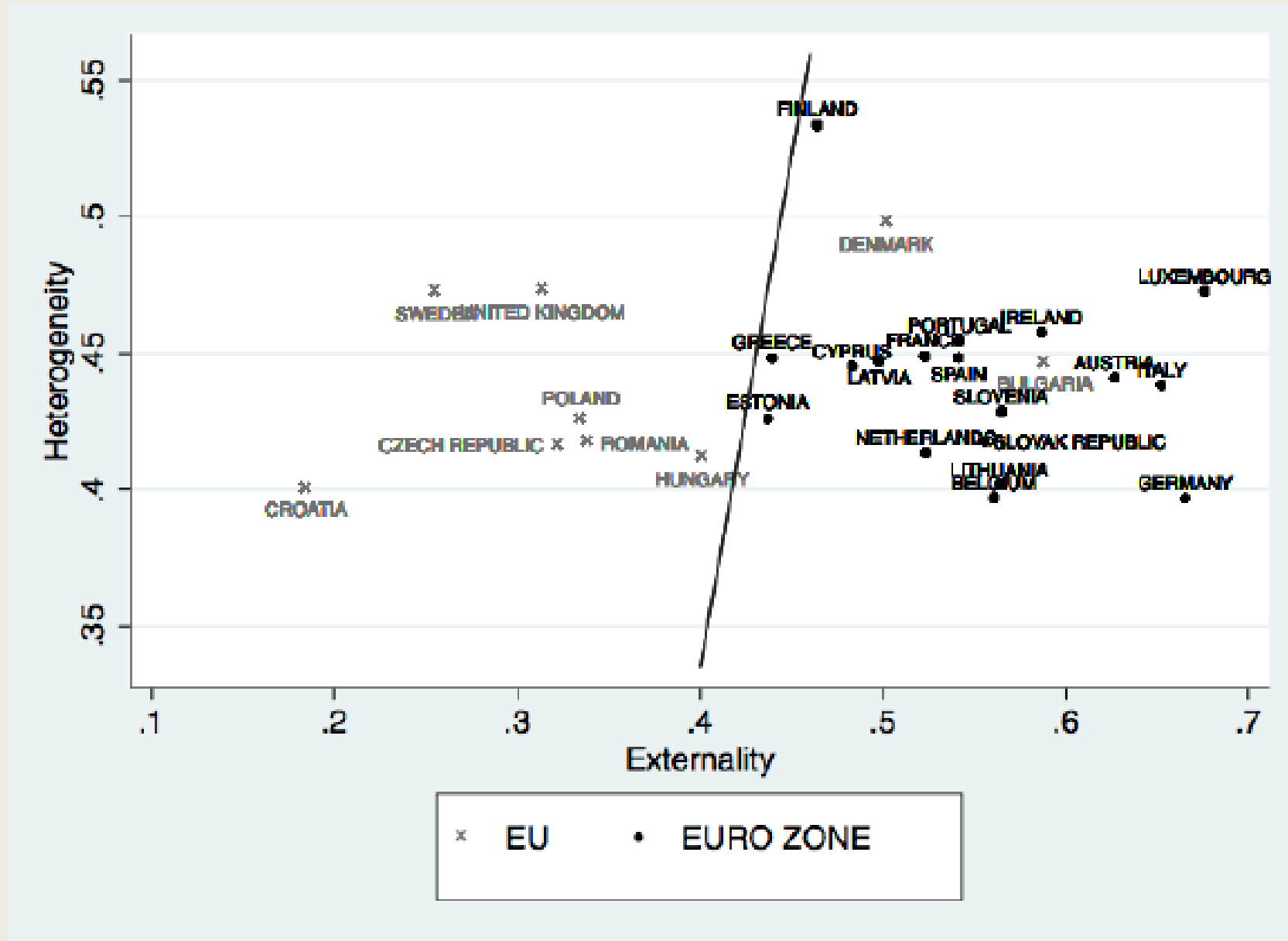
	All regions			EU & Nordic Baltic			Africa		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Externality _{ij}	0.523*** (0.020)			0.644*** (0.025)			0.135*** (0.019)		
Heterogeneity _{ij}	-0.317*** (0.033)			-0.281*** (0.059)			-0.267*** (0.030)		
Avg. foreign share _{ij}		3.196*** (0.696)			4.835*** (0.770)			2.058*** (0.572)	
Correlation _{ij}		0.586*** (0.039)			0.633*** (0.053)			0.124** (0.050)	
Currency _{ij}		0.195*** (0.022)			0.205*** (0.025)			-0.051 (0.037)	
G-SIB _{ij}		0.105*** (0.020)			0.119*** (0.023)			-0.001 (0.028)	
ΔBank concentration _{ij}			-0.046** (0.022)			0.015 (0.030)			0.0222 (0.016)
ΔForeign share _{ij}			0.548*** (0.123)			1.176*** (0.197)			0.274*** (0.055)
ΔFederalism _{ij}			0.046*** (0.011)			0.018 (0.014)			-0.0057 (0.009)
ΔGovernment exp./GDP _{ij}			-0.121*** (0.031)			-0.142*** (0.043)			0.014 (0.019)
ΔLegal origin _{ij}			0.024* (0.013)			0.012 (0.018)			0.032** (0.015)
ΔGDP per cap _{ij}			0.122*** (0.023)			0.036 (0.031)			-0.065*** (0.017)
ΔLatitude _{ij}			-0.386*** (0.048)			-0.176*** (0.0609)			-0.199*** (0.035)
ΔLongitude _{ij}			-0.466*** (0.038)			-0.627*** (0.044)			-0.058** (0.027)
ΔLanguage _{ij}			-0.036** (0.014)			-0.085*** (0.027)			-0.040*** (0.009)
ΔInsolvency framew. _{ij}			0.021** (0.010)			0.014 (0.013)			-0.003 (0.008)
ΔColonizer _{ij}			-0.078*** (0.016)			-0.054** (0.026)			-0.069*** (0.013)
Observations	3,828	1,184	3,160	2,117	939	1,834	2,288	374	1,782
Pseudo- <i>R</i> ²	0.25	0.33	0.32	0.32	0.36	0.40	0.20	0.22	0.39
%-Predicted	73.6	65.6	76.2	76.8	69	80.9	76.8	83.4	85.3
M-D test	149.2	149.85	163.7	154.7	152.2	170.6	146.9	168.3	166.2

Evolution of externalities in the Eurozone



- 1992 - Single Market
- 1998 onward - FSAP
- 1999 - Euro
- 2004 - CEPS
- 2011 - EBA
- 2014 - SSM

Country contribution: Banking union



Looking beyond the research

- Should non-Euro EU member states join the banking union?
 - *Benefits vs. costs*
 - *Participation in SSM/SRM but not lender of last resort*
 - *Case: Nordea – SSM will be home supervisor, (significant) branch in Sweden*
- What is the relationship non-EU members (host countries) and SSM/SRM (home countries)?
 - *Asymmetries in interest and technical capacity*
- Resolution of cross-border banks – single point of entry vs. multiple points of entry
 - *Repercussions for MREL (external vs. internal) and for degree of integration*

Conclusions

- Crisis has been a wake-up call for regulatory cooperation in cross-border cooperation
- Distortion in national supervision in financially integrated world becomes obvious in failure/resolution phase
- We can observe lots of variation in cross-border supervisory cooperation
- Cooperation varies with externalities and country heterogeneity, as predicted by theory
- Optimal degree of cooperation: One Size Does Not Fit All!
- Important: dynamic approach (e.g., East Africa)
- Research challenges: how to model the different cooperation forms; need for more empirical work

THANK YOU

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