XII Annual Seminar on
Risk, Financial Stability and Banking

The Rise of Risk: From Science to Regulation

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BANCO CENTRAL DO BRASIL

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Agenda

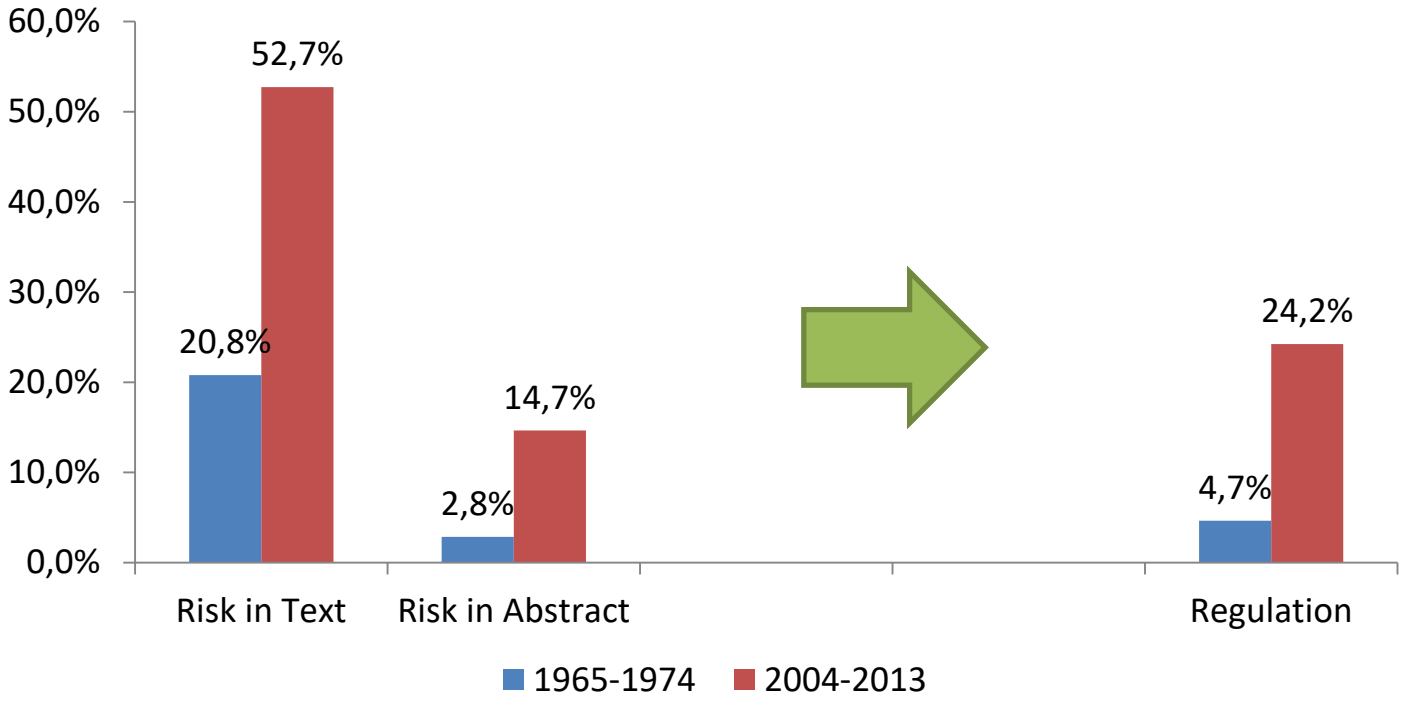
Motivation

Data and Methodology

Preliminary Results

Motivation

- "Observing Shocks" (Duarte and Hoover, 2012)
- Observing Risks



Motivation

- Research question

  - How does academic knowledge about ‘risk’ impact financial regulation?

  - Is there any feedback effect?

Motivation

- Why “risk” ?

  - Financial intermediaries “transform the **risk**” of financial assets

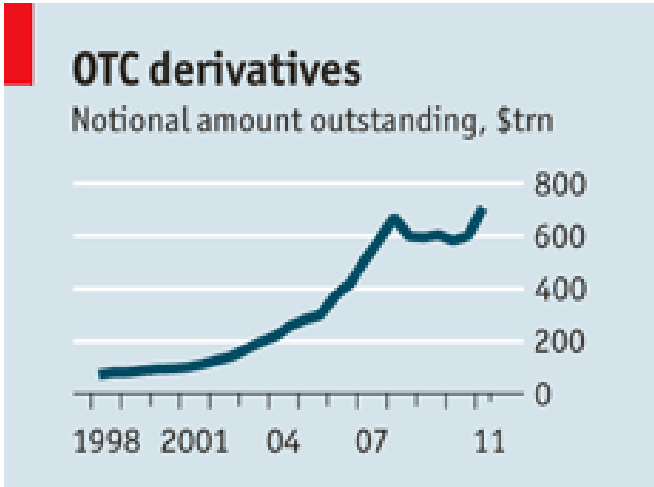
  - Financial markets provide efficient “allocation of **risk**” in the economy

Motivation

- Knowledge about “risk”
  - Management tools
  - Asset pricing
  - Financial innovation
  - Portfolio diversification

Motivation

- Knowledge about “risk”



Source: The Economist (2012)

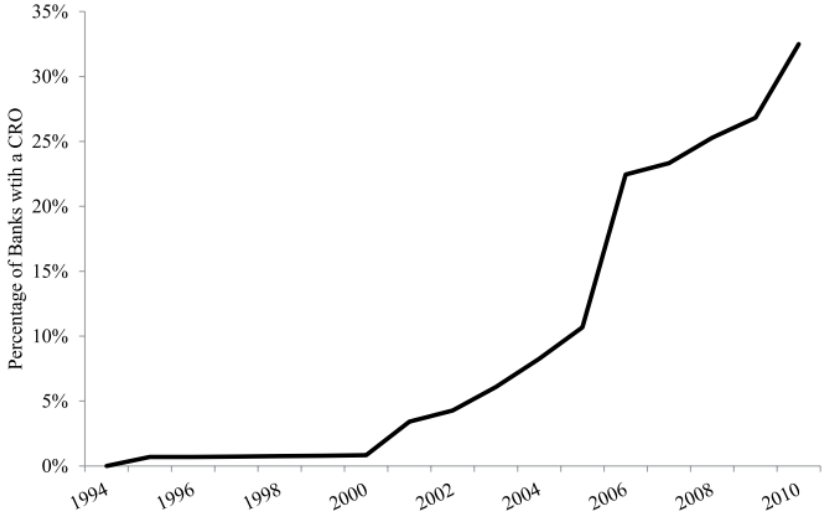


Figure 1. Percentage of Banks with a Chief Risk Officer, 1994 to 2010

Pernell et al. (2017) The American Sociological Review

Motivation

- Regulatory Issues

Motivation

➢ Regulatory Issues

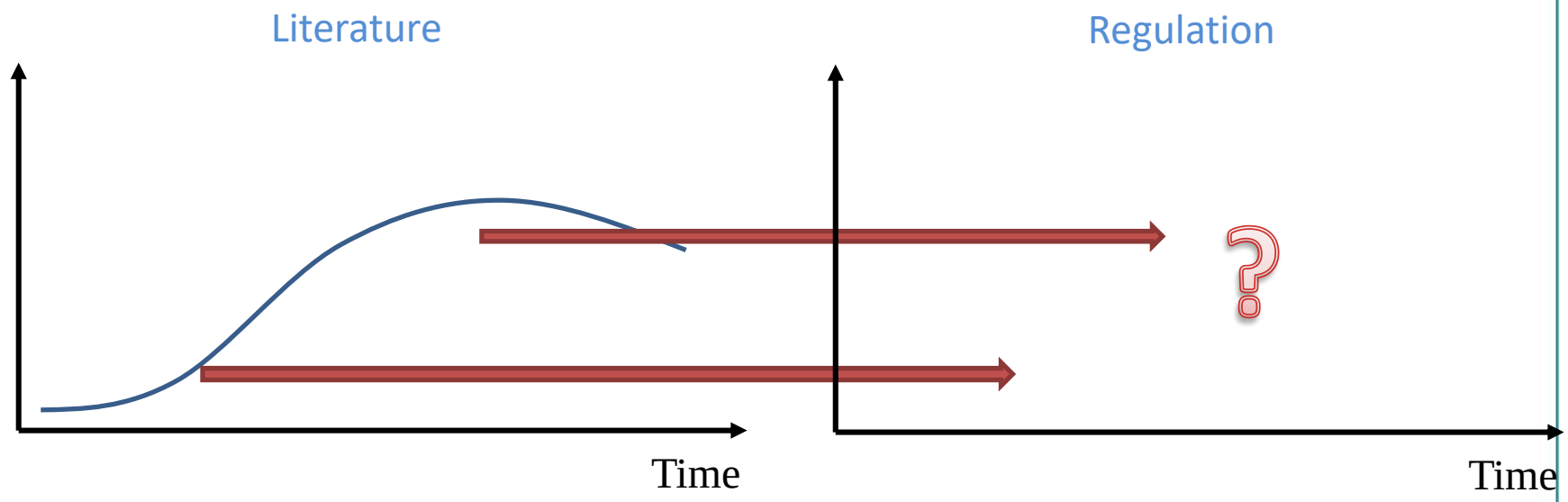
- ❑ Incorporate new/appropriate risk management techniques
- ❑ Preserve the benefits of financial innovation without compromising policy objectives (financial stability and market efficiency)
- ❑ Avoid socially inefficient behavior of financial intermediaries (eg. negative externalities, moral hazard)

Motivation

- Regulatory Issues (Examples)
  - Basel Framework
  - Financial Instruments (eg. Structured Notes)
  - Trade Repositories
  - Credit Origination

Data and Methodology

- Proxies: Knowledge x No. Published Documents



Data and Methodology

➢ Related Literature

❑ **Economic Theory of Regulation**

Stigler(1971), Posner(1974), Peltzman(1976), Becker (1983), Laffont e Tirole (1993)

❑ **Text Mining**

Baker, Bloom and Davis (2015) - **News**

Rosa & Verga (2007); Lucca and Trebbi (2011) - **Policy Communication**

Choi and Varian (2012) - **Google Trends**

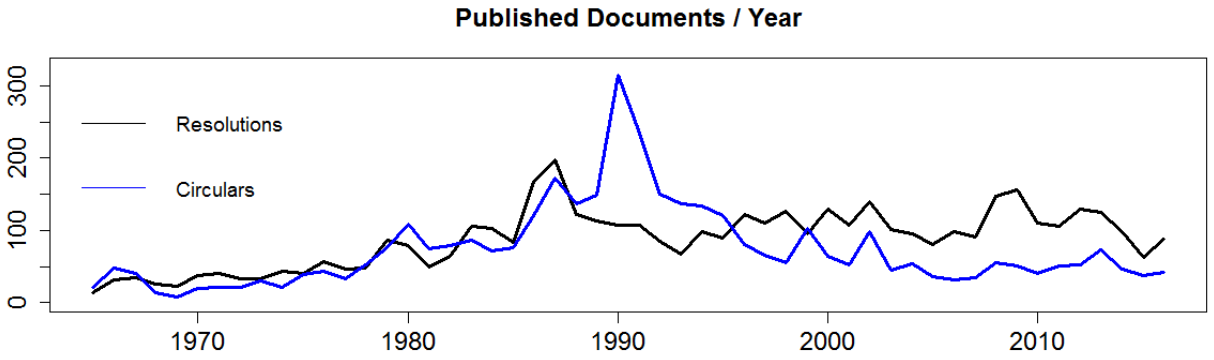
Data and Methodology

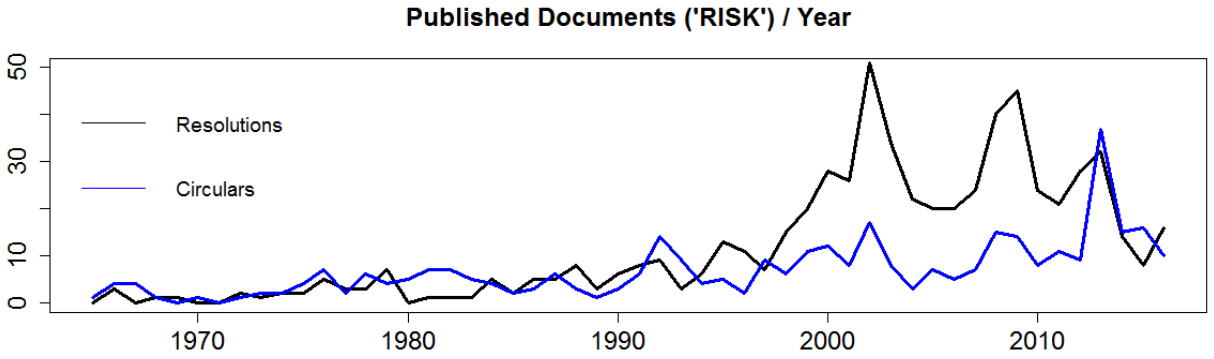
- Regulation:
  - Sample period: from 1965 to 2016
  - "Risco" ("risk") in the text

Regulatory Instrument	Risk	Total	(%)
Resolution (CMN)	612	4,548	13.5%
Circular (BCB)	353	3,820	9.2%
TOTAL	965	8,368	11.5%

Data and Methodology

➢ Regulation:





Data and Methodology

- Classification of Regulation :
  - Experts' Evaluation
  - Graph Analysis
  - Latent Dirichlet Allocation

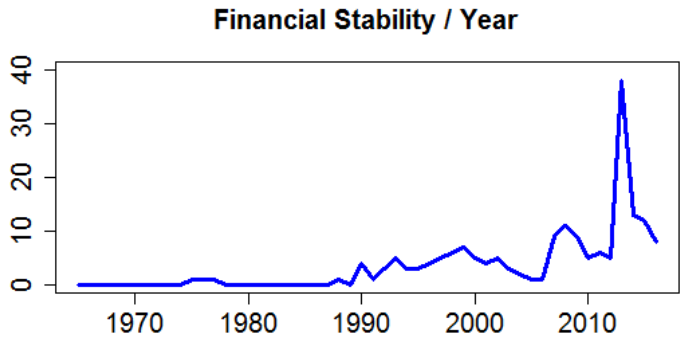
Data and Methodology

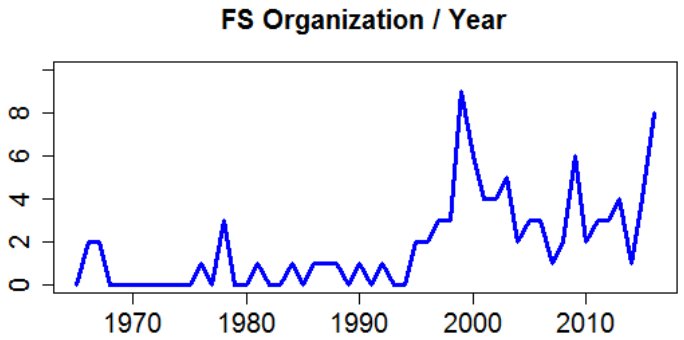
➢ Regulation Categories:

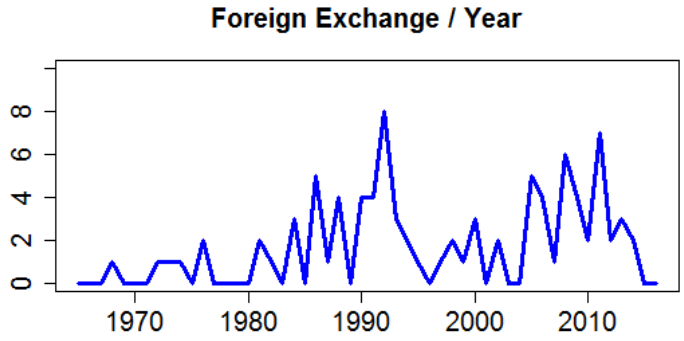
Categories	Resolutions	Circulars	Total
Sectoral Support Programs	381	63	444
Financial Stability	67	115	182
Financial System Organization	54	41	95
Foreign Exchange	27	62	89
Financial Instruments	41	22	63
Pension Funds and Insurance	33	1	34
Accounting	7	26	33
Financial Market Infrastructure	1	12	13
Monetary Policy	1	11	12
TOTAL	612	353	965

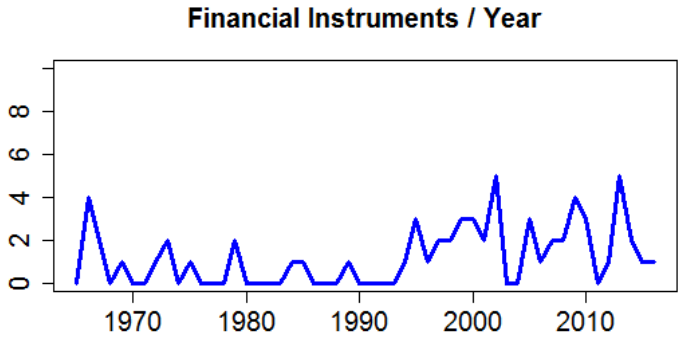
Data and Methodology

➢ Regulation:









Data and Methodology

Total Sample	Financial Stability	Organization	Support Program	Foreign Exchange
credit risk	credit risk	credit risk	operational risk	variations risk
operational risk	operational risl	isk bureau	climate risk	against the risk
risk mitigation	risk mitigation	isk management	operations risk	risk classification
market risk	market risk	social environment risk	credit risk	oil risk
risk classification	risk management	classified as risk	PROAGRO´s risk	risk contracts

Monetary Policy	Accounting	Financial Instruments	FMI	Pension Funds
main risks	risks and benefits	credit risk	credit risk	credit risk
risk fund	fiscal risks	risk receiver	issuer risk	low risk
risk declining	risk provisions	risk coverage	risk contention	risk agencies
risks from	co-obligations and risks	risk transferor	operational risk	high risk
risk with consequences	colateral risk	risk classification	risk management	risk factor

Data and Methodology

➢ Graph Analysis

Figure 4. Graphs of resolutions and circulars of all categories
Financial Stability (red), Support Programs (green), Organization (purple), Foreign Exchange (yellow), Monetary Policy (blue), Accounting (orange) Financial Instruments (gray), IMF (light blue), Pension Funds (pink)

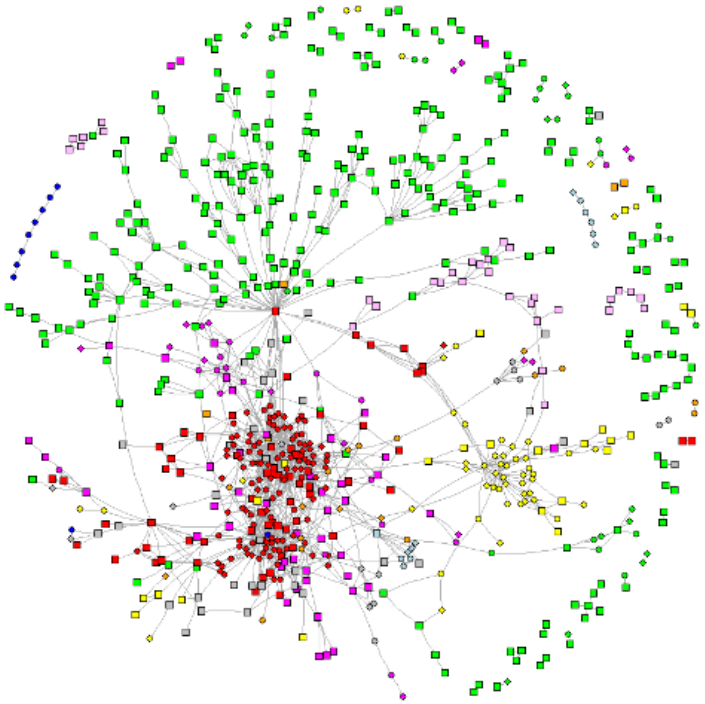
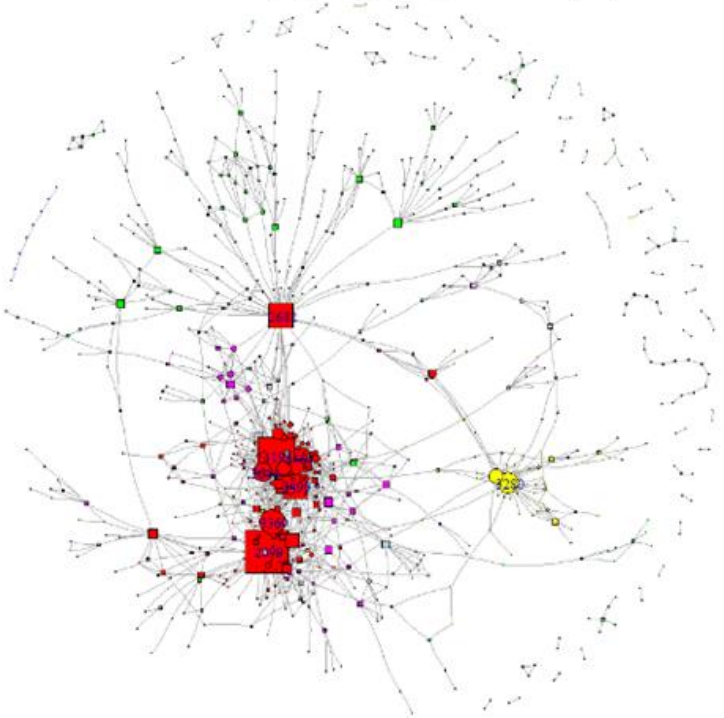


Figure 5. Graphs of resolutions and circulars of all categories (Size of the vertices proportional to the number of edges)
Financial Stability (red), Support Programs (green), Organization (purple), Foreign Exchange (yellow), Monetary Policy (blue), Accounting (orange) Financial Instruments (gray), IMF (light blue), Pension Funds (pink)



Data and Methodology

➢ LDA

	Topic 1	Topic 2	Topic 3	Topic 4	Topic 5	Topic 6	Topic 7	Topic 8	Topic 9	Topic 10
1	credit	investment	institutions	capital	institutons	operations	risk	Reais	count	exchange
2	rural	values	institution	operations	financial	operation	value	financing	plan	market
3	program	funds	credit	banks	system	settlement	credit	resources	function	foreign
4	costing	securities	financial	term	operations	count	institution	rates	security	operations
5	resources	fund	authorization	principal	value	colateral	information	rate	values	contract
6	agente	securities	services	companies	expenses	system	installment	credit	expenses	payment
7	production	resoruces	unions	development	institution	object	assets	financial	register	regulation
8	activity	issue	unique	resources	credit	financial	according	charges	balance	operation
9	credits	regulation	management	company	liabilities	sell	values	financing	society	value
10	value	income	payment	limit	security	register	calculation	maturity	classification	credit

Data and Methodology

Resolutions	Topics									
Categories	1	2	3	4	5	6	7	8	9	10
Foreign Exchange	0%	0%	13%	11%	17%	0%	0%	0%	0%	78%
Accounting	0%	0%	4%	0%	0%	5%	4%	0%	0%	11%
Financial Stability	0%	7%	33%	8%	0%	16%	84%	0%	0%	11%
Financial Market Infrastructure	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Financial System Organization	1%	12%	34%	17%	0%	0%	4%	0%	50%	0%
Monetary Policy	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
Pension Funds and Insurance	0%	52%	0%	0%	17%	0%	4%	0%	0%	0%
Financial Instruments	0%	18%	10%	13%	33%	47%	0%	0%	50%	0%
Sectoral Support Programs	99%	12%	6%	49%	33%	32%	4%	100%	0%	0%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

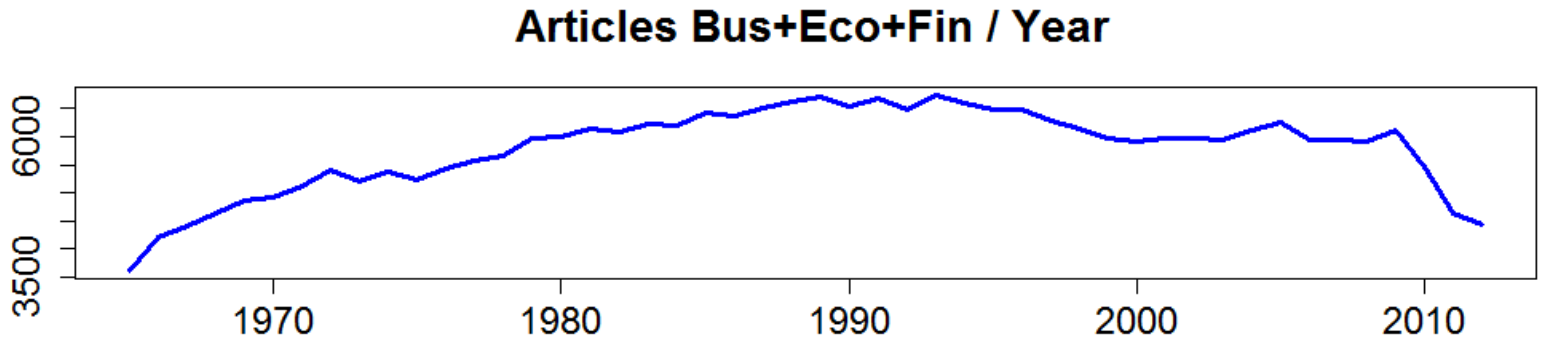
Circulars	Topics									
Categories	1	2	3	4	5	6	7	8	9	10
Foreign Exchange	0%	0%	2%	30%	0%	22%	2%	0%	14%	71%
Accounting	0%	0%	15%	7%	38%	4%	4%	0%	71%	0%
Financial Stability	0%	41%	20%	11%	44%	30%	84%	17%	0%	3%
Financial Market Infrastructure	0%	6%	0%	0%	6%	33%	1%	0%	0%	0%
Financial System Organization	2%	12%	45%	11%	6%	0%	7%	0%	0%	5%
Monetary Policy	0%	0%	0%	4%	0%	4%	0%	0%	0%	15%
Pension Funds and Insurance	0%	0%	0%	0%	0%	0%	0%	0%	14%	0%
Financial Instruments	0%	35%	18%	15%	0%	0%	1%	0%	0%	2%
Sectoral Support Programs	98%	6%	0%	22%	6%	7%	1%	83%	0%	5%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

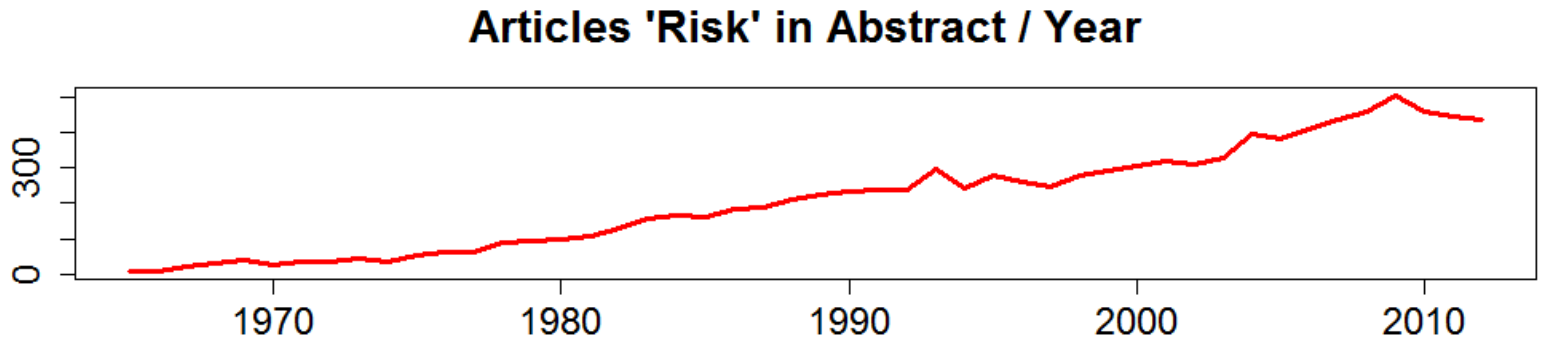
Data and Methodology

➢ Articles

- ❑ Sample period: from 1965 to 2013
  - Journals have different date ranges
- ❑ Journals: JSTOR
  - Business: 208
  - Economics: 177
  - Finance: 29
- ❑ Articles
  - Total (Bus+Eco+Fin): 278,716
  - 'Risk' in the Text: 98,383
  - 'Risk' in the Abstract: 10,136

Data and Methodology





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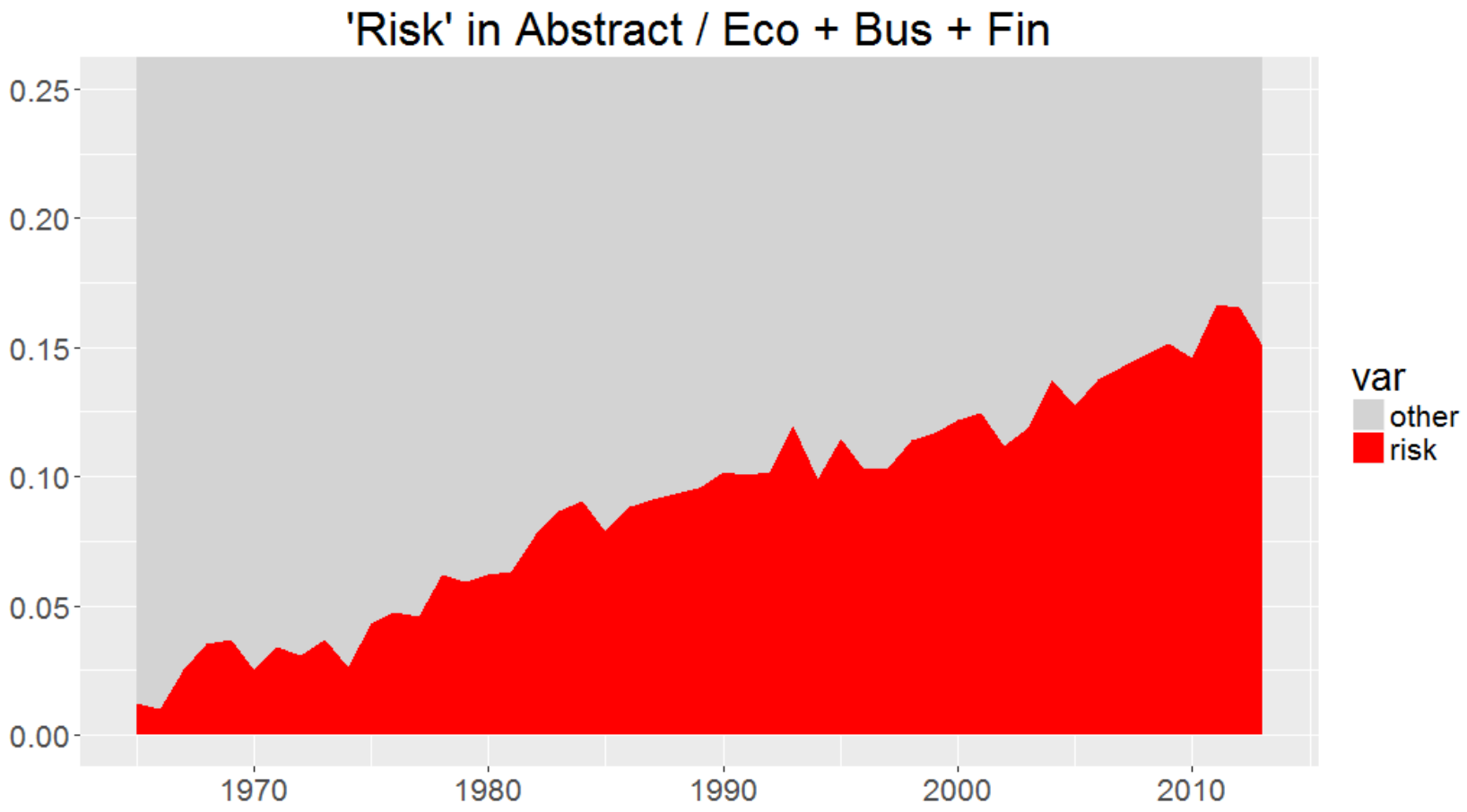
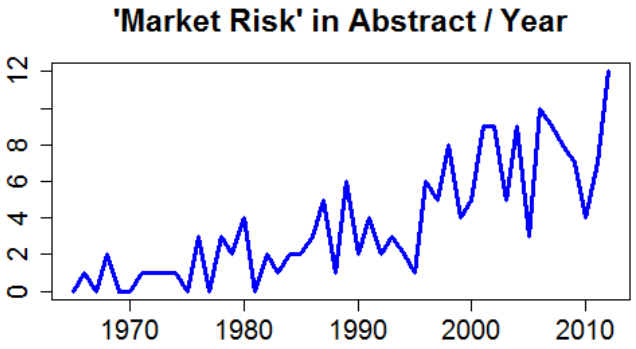
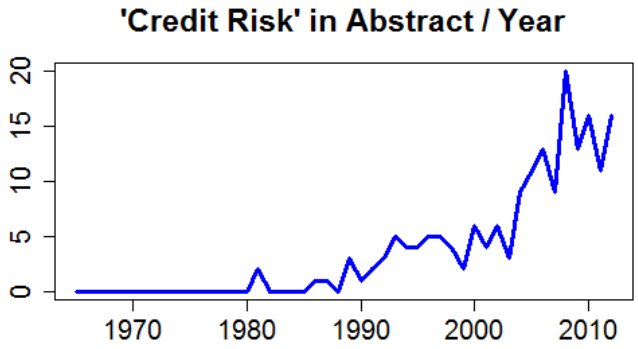
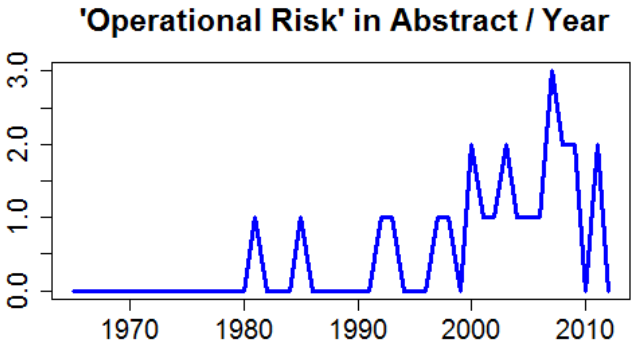


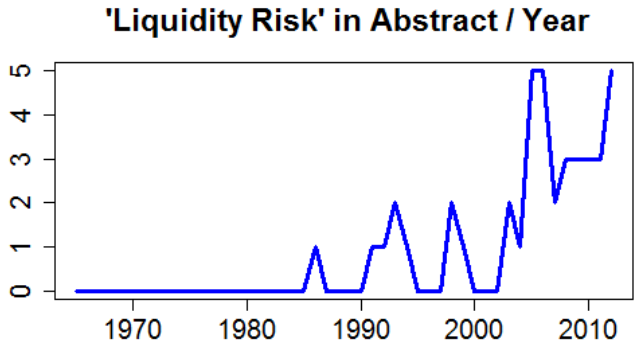
Data and Methodology

➢ Risk Types



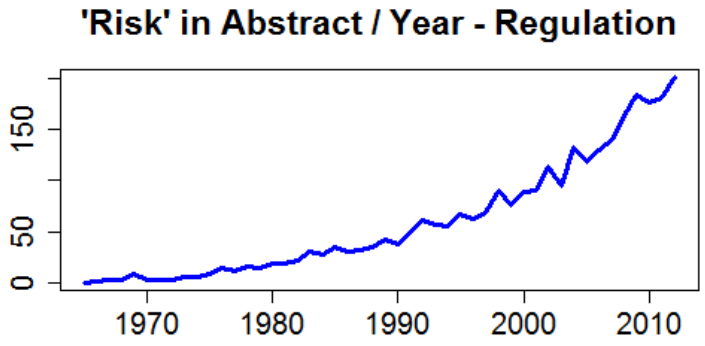


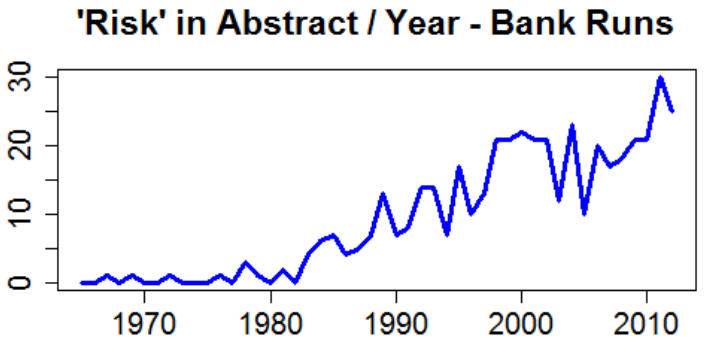


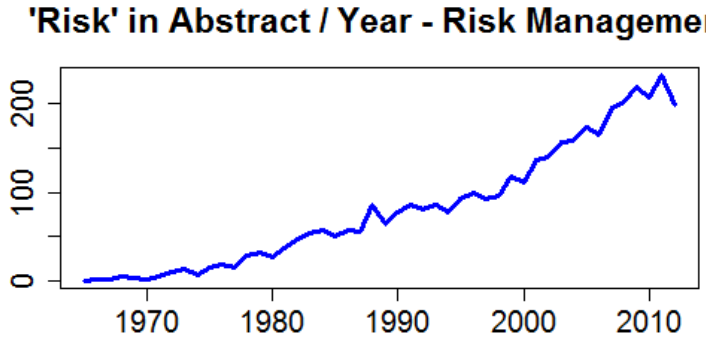


Data and Methodology

➢ Research Areas







Data and Methodology

- Granger-causality test
  - Series
    - Jstor: Articles with ‘risk’ in the abstract (% Articles in Eco+Bus+Fin)
    - Regulation: Resolutions and circulars with ‘risco’ in the text
  - Sample Period: from 1965 to 2013
  - 5 Categories

Preliminary Results

Table 9. Granger-causality test – Ratios (p-values)

46 Observations
2 df

Dependent Variable Excluded	Literature Regulations	Regulations Literature
Foreign Exchange	0.2210	0.3749
Accounting	0.3249	0.2523
Financial Stability	0.9676	0.0498
Financial Market Infrastructure	-	-
Financial System Organization	0.4593	0.4424
Monetary Policy	-	-
Pension Funds and Insurance	-	-
Financial Instruments	0.2925	0.1674
Sectoral Support Programs	-	-

Concluding Remarks

- New approach to study drivers of financial regulation
- Preliminary results show relationship between (variations in) the academic literature and financial stability regulation
- Improvements in the mining strategy to create better proxies from published documents

Thank You!

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