

Faculty of World Economy and International Affairs

World Economy

A Bachelor's Thesis on the Topic of

Determinants of Systemic Risk in Italy's Banking System in 2000-2023

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Relevance

- **Systemic risk**
 - Increase in systemic risk equals threat to financial stability
 - Systemic failures lead to wider economic consequences
- **Italy's banking system**
 - One of the largest in the euro zone
 - Remarkable evolution to strengthen itself
 - Strong relationship with both the government and the private sector
- **2000-2023**
 - Covering major economic and banking crises
 - Data availability

Determinants of Systemic Risk in Italy's Banking System in 2000-2023

INTRODUCTION

Literature

- 3 strands: definitions, measures, and sources
- Lack of research on a country level, including Italy

Novelty

- Supplement to the only paper on systemic risk in Italy in the last 12 years
- Analysis of the relationship between Italy's banking sector and economy
- Inclusion of unconventional monetary policies' effects on systemic risk

Object

Systemic risk

Subject

Italy's banking sector in 2000 - 2023

Purpose

To identify and measure the degree of influence of potential determinants on systemic risk in Italy's banking sector in 2000-2023 across three categories:

Macroeconomic
dynamics

Banking-system
characteristics

Unconventional
monetary policies

Determinants of Systemic Risk in Italy's Banking System in 2000-2023

INTRODUCTION

Objectives

1. To identify potential determinants
2. To analyze dynamics of Italy's banking sector and macroeconomic indicators, and ECB's UMPs
3. To measure the influence of prospective factors in multiple linear regression models

Structure

Chapter 1: Systemic risk and the search for its determinants

- 1.1. Emergence and measurement of systemic risk
- 1.2. Literature review on determinants and their transmission to systemic risk

Chapter 2: Overview of Italy's economy and banking sector and the ECB's (un)conventional monetary policy

- 2.1. The ECB's implementation of (un)conventional monetary policy in 2014 – 2023
- 2.2. Characteristics and evolution of Italy's economy and banking sector in 2000 – 2023
 - 2.2.1. Characteristics and correlation between Italy's economy and banking sector
 - 2.2.2. Dynamics of systemic risk against the backgrounds of fluctuations in Italy's economy and banking sector

Chapter 3: Assessment of determinants' influence on systemic risk in Italy's banking sector

- 3.1. Description of data and methodology
- 3.2. Results and analysis of multiple linear regression models
- 3.3. Comparison, conclusion, and recommendation

Hypotheses

Hypothesis 1: The strong intercorrelation between Italy's banking sector and the real economy is a catalyst for increase in systemic risk.

Hypothesis 2: The ECB's unconventional monetary measures have positive effects on systemic risk in the Italian banking sector.

Definition

Systemic risk can be understood as the probability of which the fall of a single financial institution causes the collapse of other institutions, which ultimately leads to the breakdown of the entire financial system, and thus, the economy.

Measurement

Measures	Symbols	Authors
Delta Conditional Value-at-Risk	ΔCoVaR	Adrian & Brunnermeier (2014, 2016)
Marginal Expected Shortfall	MES	Acharya et. al. (2010)
Systemic Expected Shortfall	SES	Acharya et al. (2017)
Systemic Risk Measure (SRISK)	SRISK	Brownlees & Engle (2017)

Table 1: Most frequently used measures of systemic risk

Determinants of Systemic Risk in Italy’s Banking System in 2000-2023																	
Chapter 1: Systemic risk and the search for its determinants																	
LITERATURE	CATEGORIES OF DETERMINANTS																
	Bank-specific characteristics									Macroeconomic indicators				(Un)conventional monetary policy			
	Size	Concentration	Banks' loans to government	Interbank loans	NPLs	Leverage	Loan / Asset	Deposit ratio	Liquidity	Government debts	Government debts held by banks	GDP	Inflation	Asset purchase programmes	NIRP / ZIRP	Signaling effect	(U)MPs
Kleinow & Nell (2014)																	
Haq &Heaney (2012)																	
Black et al. (2016)																	
Varotto & Zhao (2014)																	
Hautsch et al. (2014)																	
Knaup and Wagner (2010)																	
González-Hermosillo (1997)																	
Brana et al. (2019)																	
Borri et al. (2012, 2014)																	
Acharya & Steffen (2013)																	
Vallascas & Keasey (2012)																	
Stolbov (2017)																	
Demirgüç-Kunt & Detragiache (1998)																	
Angeloni & Faia (2009)																	
Lambert & Ueda (2014)																	
Brana et al. (2019)																	
Deev & Hodula (2016)																	
Colletaz et al. (2018)																	
Kapinos (2017)																	
Verhelst (2017)																	
Fratzscher & Reith (2019)																	
Dzhagityan & Mukhametov (2023)																	
Kabundi & De Simone (2020)																	
Peersman (2011)																	

Table 2: Literature review on determinants of systemic risk

Determinants of Systemic Risk in Italy's Banking System in 2000-2023

Chapter 2: Overview of Italy's economy and banking sector and the ECB's (un)conventional monetary policy

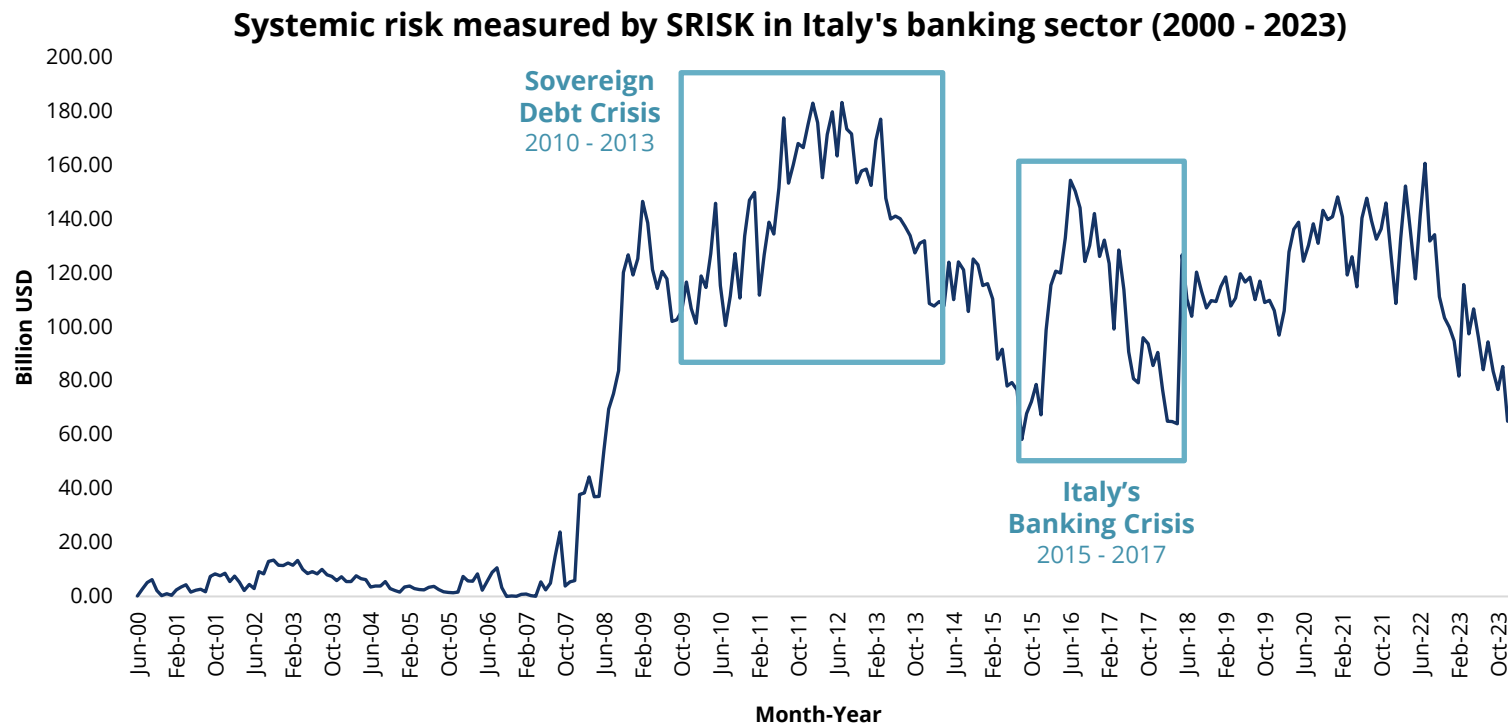


Figure 1

Source: Volatility Lab

Determinants of Systemic Risk in Italy's Banking System in 2000-2023

Chapter 2: Overview of Italy's economy and banking sector and the ECB's (un)conventional monetary policy

(1) Italy's banking sector and its high exposure to government debt

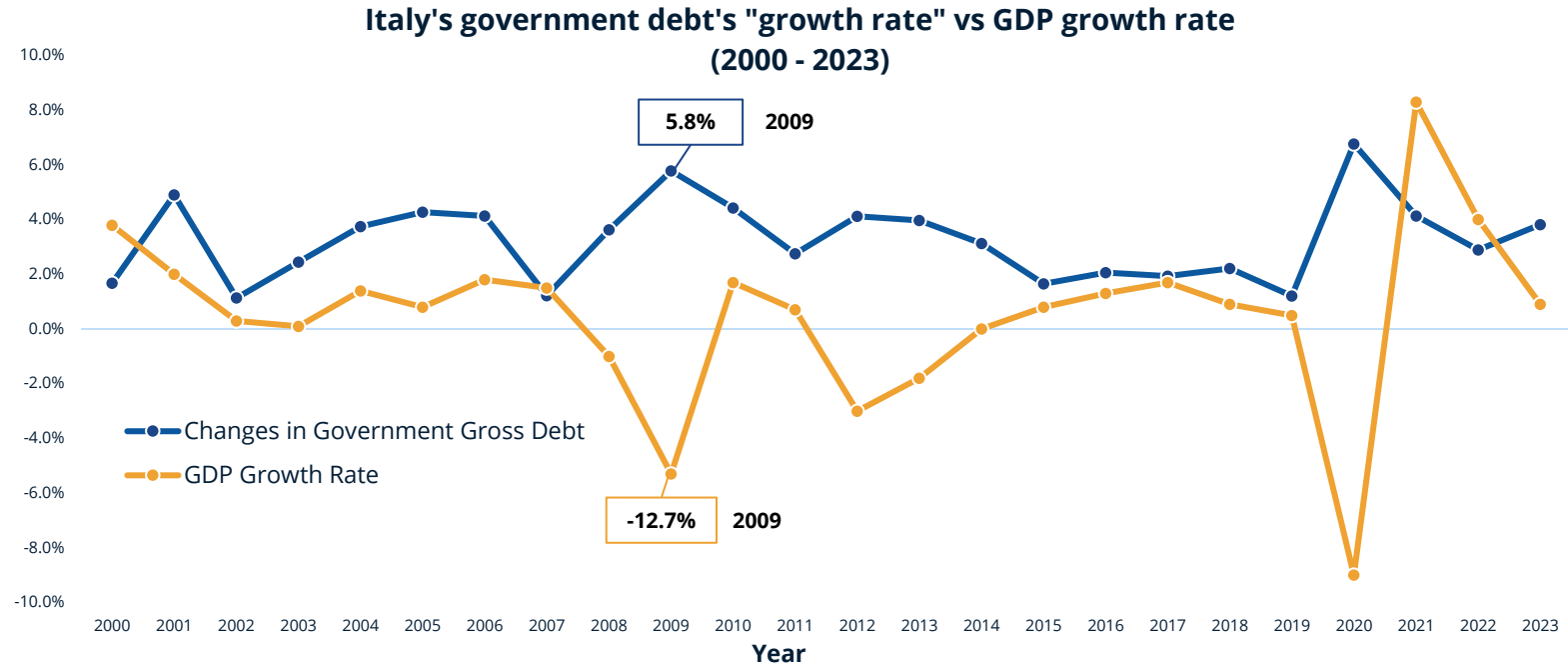


Figure 2

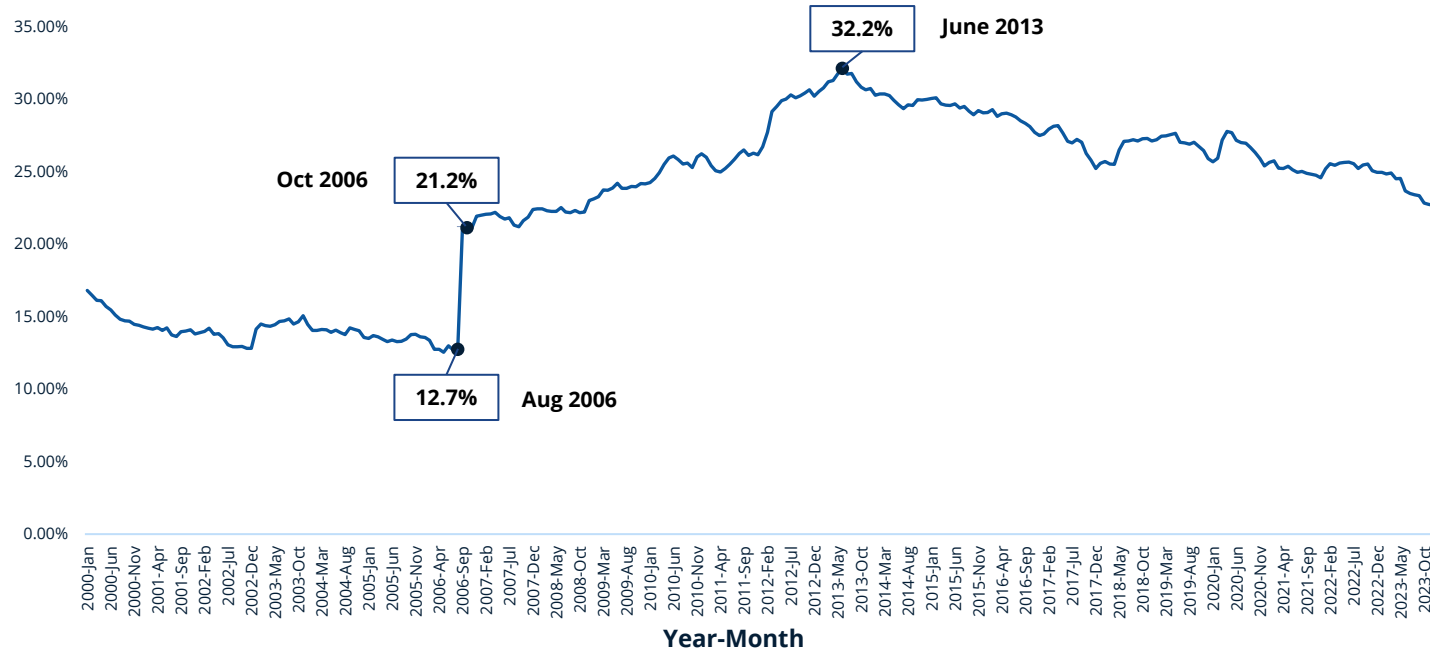
Source: Bank of Italy, IMF

Determinants of Systemic Risk in Italy's Banking System in 2000-2023

Chapter 2: Overview of Italy's economy and banking sector and the ECB's (un)conventional monetary policy

(1) Italy's banking sector and its high exposure to government debt

Share of government debt held by Italy's banking sector (2000 - 2023)



Year-Month

Figure 3

Source: Bank of Italy

Determinants of Systemic Risk in Italy's Banking System in 2000-2023

Chapter 2: Overview of Italy's economy and banking sector and the ECB's (un)conventional monetary policy

(2) Italy's banking sector and its strong connection with domestic SMEs via NPLs (bad debts)

Structure of banks' loans to residents by sector (2000 – 2023)

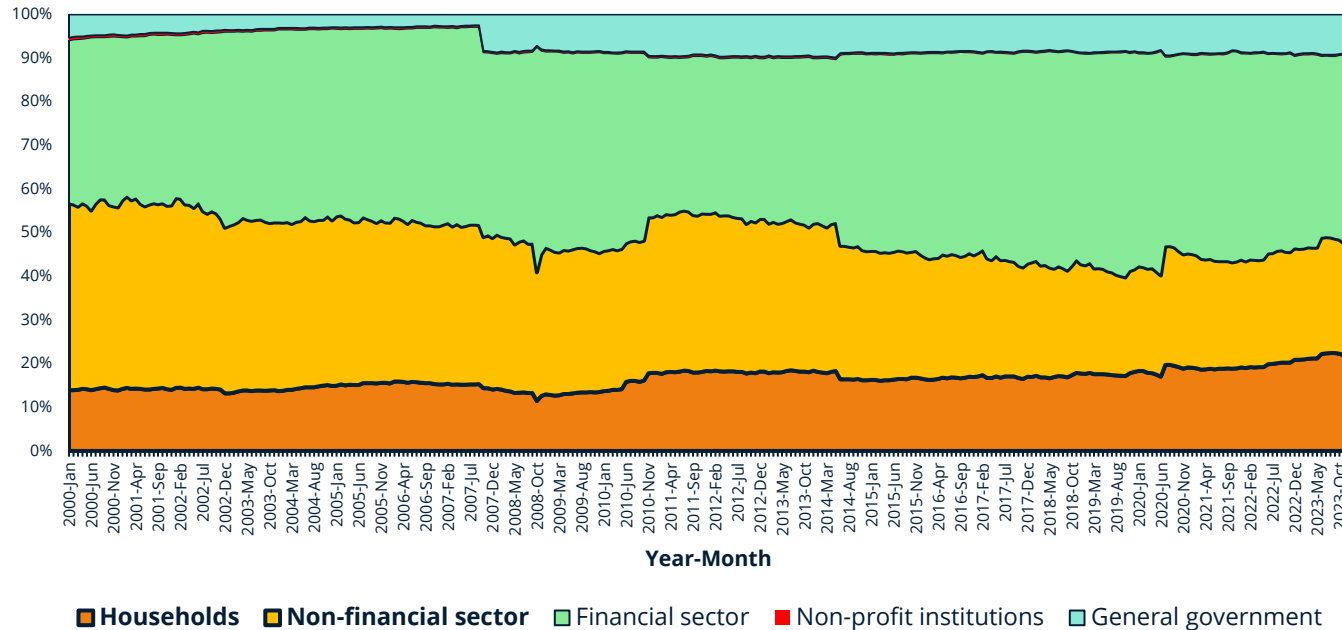


Figure 4

Source: Bank of Italy

Determinants of Systemic Risk in Italy's Banking System in 2000-2023

Chapter 2: Overview of Italy's economy and banking sector and the ECB's (un)conventional monetary policy

(2) Italy's banking sector and its strong connection with domestic SMEs via NPLs (bad debts)

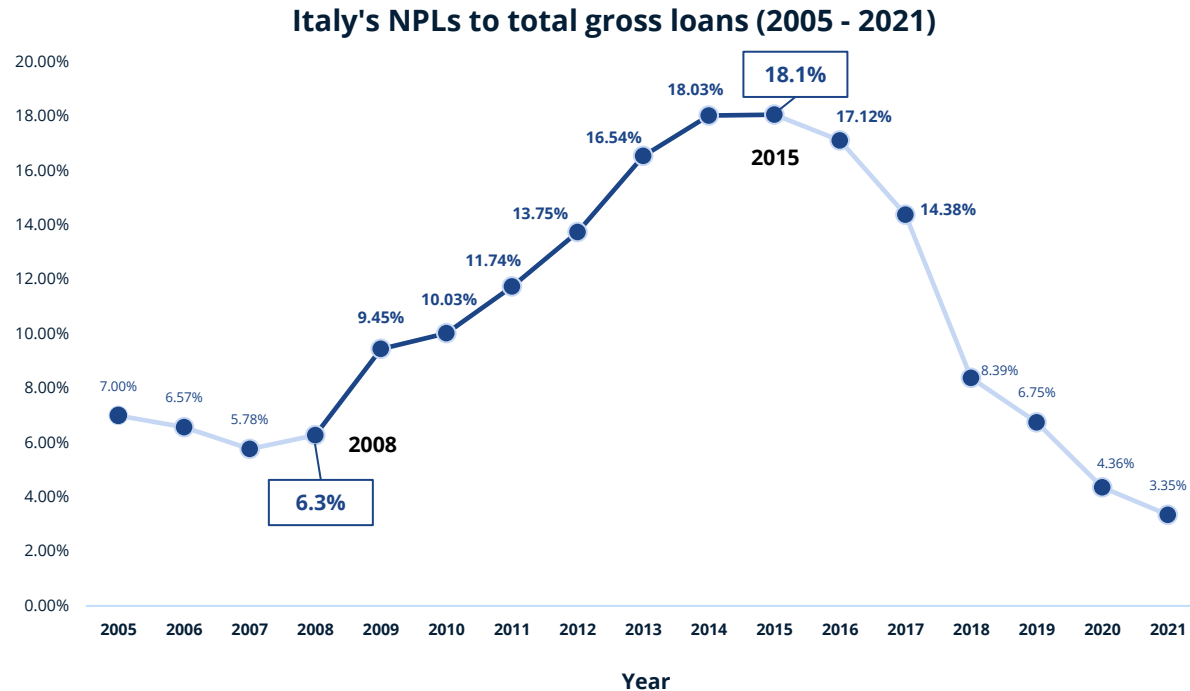


Figure 5

Source: Bank of Italy

Determinants of Systemic Risk in Italy's Banking System in 2000-2023

Chapter 2: Overview of Italy's economy and banking sector and the ECB's (un)conventional monetary policy

(2) Italy's banking sector and its strong connection with domestic SMEs via NPLs (bad debts)

Structure of NPLs in Italy's banking system by sector
(2015 - 2023)

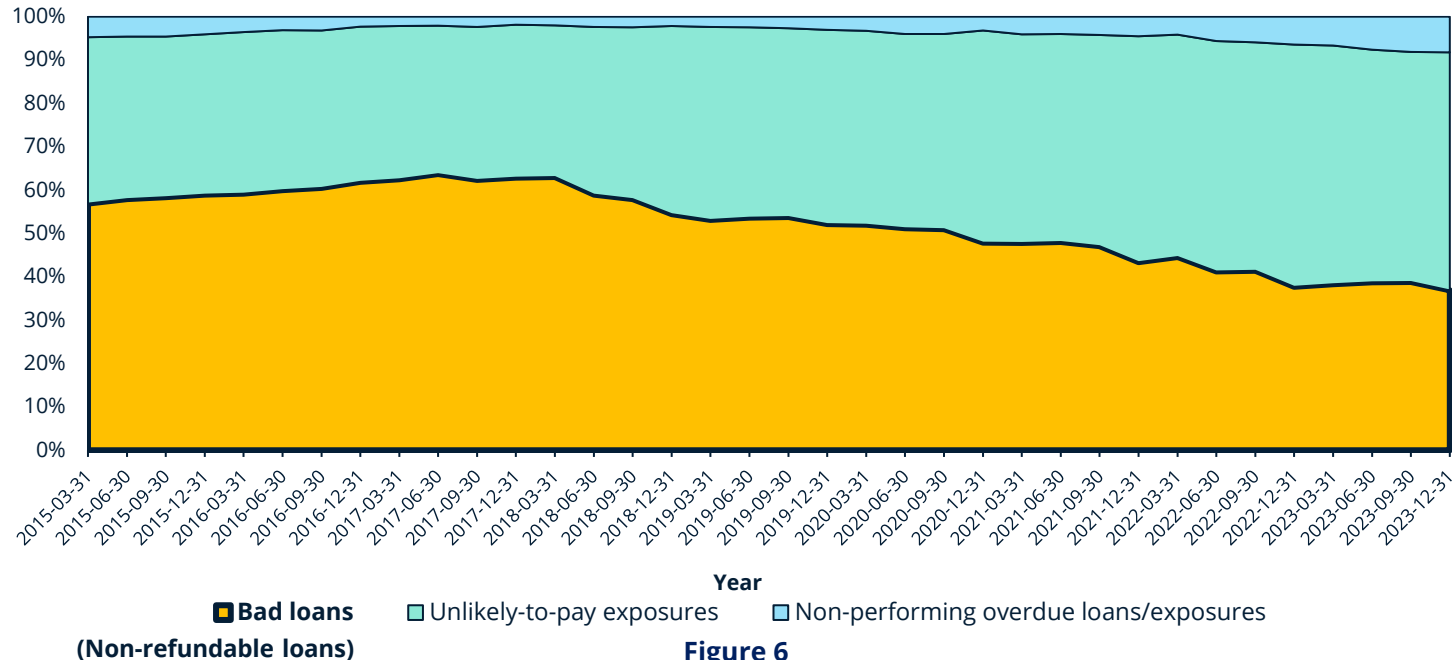


Figure 6

Source: Bank of Italy

Determinants of Systemic Risk in Italy's Banking System in 2000-2023

Chapter 2: Overview of Italy's economy and banking sector and the ECB's (un)conventional monetary policy

(2) Italy's banking sector and its strong connection with domestic SMEs via NPLs (bad debts)

Structure of bad loans in Italy's banking system by sector (2000 – 2023)

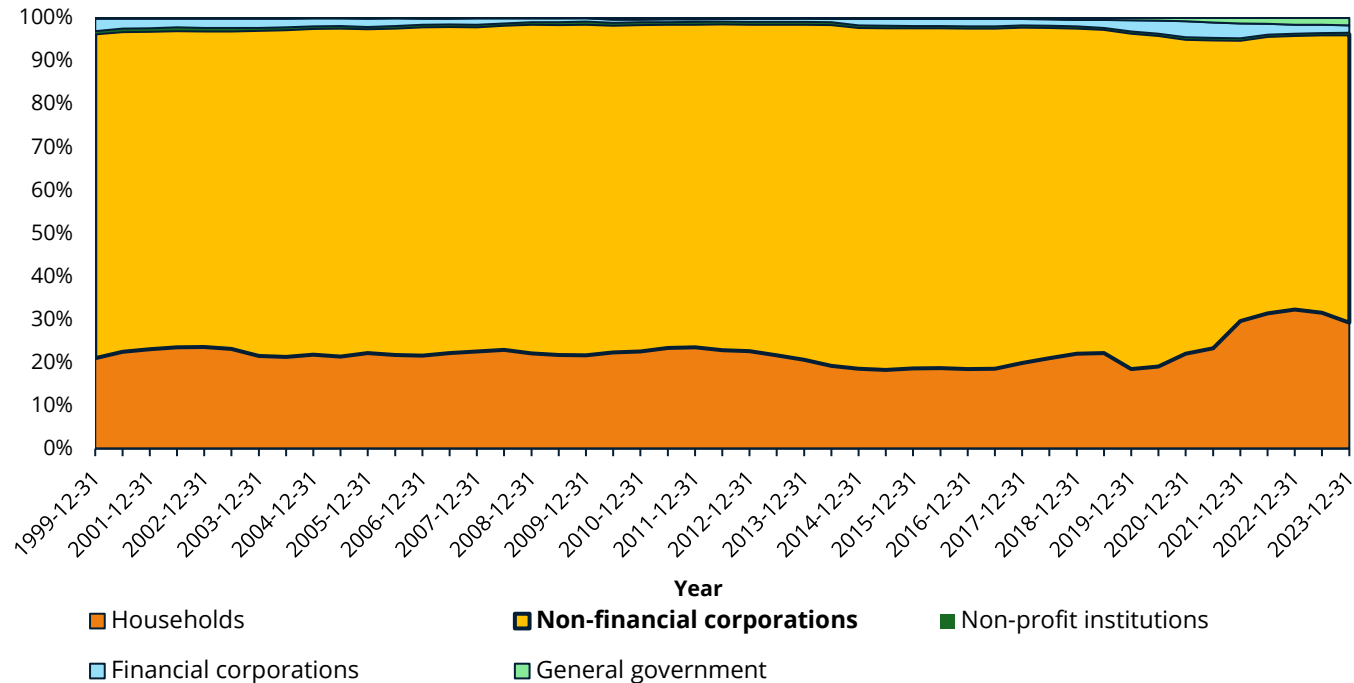


Figure 7

Source: Bank of Italy

METHODOLOGY

1 Data selection

- **Variables:**
SRISK & 32 potential determinants (3 categories)
- **Sources:**
VLab, Bol, Istat, ECB

2 Data processing

- **Stationarity:**
 - Augmented Dickey-Fuller (ADF) test
 - Resolution: Differencing

3 Preliminary preparation

- Summary of statistics
- Correlation heatmap
- Mini-hypotheses

4 Multiple linear regression models

- **Generalized Least Square (GLS)**

$$Y = \beta_0 + \beta_1 * x_1 + \beta_2 * x_2 + ... + \beta_n * x_n + \varepsilon$$

5 Quality assessment

- **Heteroskedasticity:** Breusch-Pagan test
- **Multicollinearity:** Variance Total Factor (VIF)

6 Robustness check

- Addition, substitution or removal of non-core variables for different specifications

Determinants of Systemic Risk in Italy's Banking System in 2000-2023

Chapter 3: Systemic risk and the search for its determinants

SETS OF BASELINE MODELS	Number of observations	Frequency	Period
BASELINE MODEL <u>M</u>	281	Monthly	June 2006 - Dec 2023
BASELINE MODEL <u>SHADOW M</u>	214	Monthly	Sep 2004 - Aug 2022
BASELINE MODEL <u>Q</u>	68	Quarterly	Q2 2006 - Q4 2023

SETS OF BASELINE MODELS	M1, SHADOW M1, Q1	M2, SHADOW M2, Q2	M3, SHADOW M3, Q3
BASELINE MODEL <u>M</u>			core variables
BASELINE MODEL <u>SHADOW M</u>	core variables	core variables + sectoral variables	+ sectoral variables + economic activities- related variables
BASELINE MODEL <u>Q</u>			

Table 3: Methodology: Division of different sets of baseline models

Determinants of Systemic Risk in Italy's Banking System in 2000-2023

Chapter 3: Systemic risk and the search for its determinants

VARIABLES	BASELINE MODELS								
	M1	SHADOW M1	Q1	M2	SHADOW M2	Q2	M3	SHADOW M3	Q3
BANKS									
b_INTERLOANS	-0.0006*	-0.0002***	-0.0004**	6.114e-05*	0.0009***	-0.0018*	0.0002***	0.0002***	0.0004***
b_LOANSNONRES_s	x	x	x	x	x	7.3960	4.6632*	x	12.4576
b_BADDEBTS_s	1.181758***	-2.7248*	14.9596	10.7854***	10.3307*	12.5560	11.9039*	4.5628*	14.5281**
b_BADDEBTSHHs_s	x	x	x	20.2938***	13.1344	0.0040**	2.3327*	4.4947	7.9959
b_BADDEBTSNFCs	x	x	x	0.0015***	0.0003*	3.2883***	0.0002*	0.0002*	0.0005**
b_LIQUIDITY	1838.0477**	1338.0067***	636.8943***	3315.2543***	2086.5062***	1426.5262***	922.7301**	195.5651***	858.5***
b_INTBANKRATE	-22.1336***	-67.9325	-45.4776	-81.8701***	-15.1742	-97.1978	-53.8753***	-5.6631	- 51.2324***
MACRO									
m_GOVDEBT	1.70e-06	1.70e-06***	0.0002***	x	8.75e-05	x	0.0003	0.0002**	0.0002
m_GOVDEBTBANKS_s	0.0007*	20.3274***	19.9874***	21.4355***	26.6471*	25.8572***	0.2836***	15.5632***	27.4979***
m_GDP	x	x	-0.0008**	x	x	0.0006	x	x	0.0072
m_IPI	7.4447**	-4.9022**	x	-0.7283*	-0.9030***	x	0.1284***	0.3177	x
m_IPICONSTR	x	x	x	x	x	x	0.1544***	0.2511	1.4129***
m_BCCONSTR	x	x	x	x	x	x	0.5643***	0.0248*	-0.2788
m_BCMANUF	x	x	x	x	x	x	0.4641***	0.6618	-0.3160***
m_INF	2.9102*	-0.8701*	-7.0284*	-2.0137***	-0.1169***	-8.2063***	-1.3097*	-1.7702	-17.5657***
m_CURRACC	0.0044***	-0.0015**	-0.0003	0.0097***	-0.0031***	0.0034**	0.0015*	-0.0023**	-0.0065***
m_HOUSE	x	x	x	0.0097***	-91.2901	x	-26.4799*	-13.8366	6.782e-05***
m/ump_SPREAD	53.0471***	-35.0570***	-7.2832**	94.8247***	-21.4209***	-9.9104***	19.8639***	-62.0204***	-68.9869***
UMP									
ump_SHADOW	x	-18.8101***	x	x	-22.9567***	x	x	-9.1507***	x
ump_ECBASSETS	1.36e-05***	x	x	7.034e-05***	x	x	9.166e-07*	x	x
ump_BOIASSETS	x	x	-0.003***	x	x	-0.0003***	x	x	-3.938e-05***
ump_DFR	-75.9660***	-16.7178 ***	-42.1760***	-78.3487***	-123.3202***	-89.7947***	-54.4209***	-63.8605***	-115.1282***

Table 4: Multiple linear regression models: Results

RESULTS OF EMPIRICAL MODELS

7 out of 32 independent variables demonstrated consistency:

VARIABLES	RESULTS
Banks' holdings of government debts (<i>share</i>)	+
Bad loans to domestic firms (<i>amount</i>)	+
Liquidity (<i>Cash & Securities / Deposits</i>)	+
ECB's total assets	+
Shadow rate	-
Bol's total assets	-
Deposit facility interest rate	-

Determinants of Systemic Risk in Italy's Banking System in 2000-2023

CONCLUSION

Results

Hypothesis 1: The strong intercorrelation between Italy's banking sector and the real economy is a catalyst for increase in systemic risk. *not confirmed*

Hypothesis 2: The ECB's unconventional monetary measures have positive effects on systemic risk in the Italian banking sector. *not confirmed*

CONCLUSION

Results

Hypothesis 1: The strong intercorrelation between Italy's banking sector and the real economy is a catalyst for increase in systemic risk. *not confirmed*

Hypothesis 2: The ECB's unconventional monetary measures have positive effects on systemic risk in the Italian banking sector. *not confirmed*

Implications and recommendations

- Measures to boost economic growth to lessen the burden of government debt and SMEs' bad debts
- Continuation of BoI's Countercyclical Capital Buffer with the consideration of efficiency in resources allocation
- Justification of consideration for systemic stability in monetary policies

Scope for further studies

- Complementary systemic risk measures
- Expansion of the search for variables in term of range and depth
- Use of Italian banks' balance-sheet data

**Thank you for
your attention!**

Pham Thu Trang