

# Chapter 13

## Damping Systemic Risk. The Role of Cooperative Banks



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**Abstract** This chapter focuses on the countercyclical potentialities linked to the bank's relational business model. We prove that cooperative banks are less involved in the mechanisms underlying systemic risk, thus verifying that their presence somehow contributes to mitigating this risk's spread in a financial system. Referring to a group of Italian banks, an innovative methodological approach is proposed, with relative empirical implementation, based on some variables—available for all banks—considered in the literature as proxies of the systemic risk propagation speed and capacity and the banks' health managerial status.

**Keywords** Systemic risk · Systemic risk propagation · Propagation speed and capacity · Cooperative Banks

### Introduction

This chapter focuses on the countercyclical potentialities linked to the relational business model, which enhances the competitive advantage typical of smaller local cooperative banks related to geographical proximity and, therefore, to the availability of qualitative and privileged information on customers. An important stream of the literature is inclined to believe that cooperative banks can play a fundamental role in mitigating the mechanisms of systemic risk propagation, as opposed to larger banks characterised by national or international exposure (among others, EACB 2010, 2016; Demma 2015; Barone et al. 2016; Berton et al. 2017; Pacelli et al. 2020).

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Alongside studies that acknowledge the ability of cooperative banks to contribute positively to the achievement of greater stability of the entire banking system in which they operate, there is no lack of contributions in the literature that highlight precisely the contrary effects; from these, it emerges how the presence of cooperative banks tends, instead, to aggravate the conditions of fragility of the financial system (among others, Brunner et al. 2004; Goodhart 2004; Fonteyne 2007).

This study, therefore, is part of an extremely topical debate that is sometimes controversial due to the presence of contrasting results regarding the effective contribution of mutual banks to the stability of the banking system. To the best of our knowledge, there are no contributions in the literature that use a methodology similar to the one used in this chapter to analyse the role played by these banks in the systemic risk transmission process. Therefore, in this chapter, an innovative approach is adopted in an attempt to provide empirical evidence to the debate on the countercyclical role of local cooperative banks.

The main purpose is to understand whether these banks are actually less involved than others in the mechanisms underlying the propagation and accentuation of systemic risk, thus verifying whether their presence somehow manages to mitigate the overall magnitude of this risk in a financial system.

Given the difficulties in identifying a single definition of systemic risk, it should be noted that in this study, the term refers to the risk that the crisis, the failure or the mere perception by the market of the risk of insolvency of one or more major players in an economic system—essentially, large companies, financial intermediaries or governments—may lead to generalised phenomena of crisis, insolvency or chain failures of other operators in the same economic system. Therefore, systemic risk will be considered as the risk associated with the manifestation of an event capable of causing, through mechanisms of contagion and propagation of the crisis, structural effects on an entire economic system.

On the basis of this definition, in order to pursue the aim of the research, an innovative methodological approach is proposed, with relative empirical application, aimed at operating the clustering of a group of banks that adopt different business models, starting from the values assumed by some variables considered as proxies both of the speed and capacity of propagation of the systemic risk and of the state of managerial health of the banks analysed.

As is shown later in the discussion, the variables used for the clustering of the banks analysed will be ten and deduced from the most authoritative literature that has dealt with systemic risk over the years.

The methodology proposed in this chapter is, therefore, substantially different from what is currently found in the literature in relation to the methods of measuring systemic risk.

In fact, the study focuses on variables, however, chosen on the basis of the criteria most widely used in the literature, which have the advantage of being available for all categories of banking intermediaries (and therefore not only for the systemic ones); these variables are also able to provide information on risk propagation dynamics rather than exclusively on the valuation of the risk itself.

Finally, in order to guarantee homogeneity in the empirical analysis, only the Italian banking system is analysed, since it is characterised by a massive presence of cooperative credit banks and, more generally, of small local banks that, as is known, are particularly focused on their territory needs.

The chapter is structured as follows: in section “Literature Review” a Literature Review. Section “Data and Methodology” presents the description of the dataset used and the methodology employed. Section “Empirical Results” presents the results obtained and their discussion, while section “Conclusions” concludes.

## Literature Review

For several years, a wide strand of literature highlighted the fundamental role played by local banks with a mutualistic nature in promoting local development as well as the growth of the national economy (Boscia et al. 2010; EACB 2010; Bülbül et al. 2013; Fiordelisi and Mare 2013; Chiaramonte et al. 2015; Demma 2015; Clark et al. 2018; Pacelli et al. 2019). These studies highlight how the historical success of cooperative banks is not derived exclusively from their specific business model, but also from their peculiar and distinctive governance model. These characteristics have arguably allowed local banks to bear the financial crisis’s negative effects and to play the countercyclical role that the predominant literature acknowledges to them and enabled the financing of local economies in the crisis characterised by credit restriction (EACB 2010). So, these banks were able to strengthen their roots and their local commitment based on trust, reputation and mutualistic values and, therefore, to enhance their competitive information advantage. This fact allows them to benefit from quantitative and qualitative information on customers and local operators thanks to sedimented relationships that have grown up over time.

Considering, therefore, the countercyclical potential linked to the relational business model, a large part of the literature agrees that local banks can play a fundamental role in mitigating the mechanisms of systemic risk propagation thanks to their countercyclical potential deriving from their specific relational business model.

The strong attention paid by researchers and international supervisory authorities to banks is justified because they represent the main vehicle for the propagation of a systemic crisis due to their role as financial intermediaries in an economic system (Iyer et al. 2013). In fact, it is well known that two channels for the propagation of a systemic crisis operate through banks. The first takes the form of a domino effect that comes from the direct relationships that characterise the interbank market or the banks’ sovereign exposures. The second is an information channel, as banks are a key information provider for the financial markets.

For several years, the literature has focused on the study of the systemic impact of large international banks, analysing the interconnections between the banking system and the other microcosms that populate the economic system, both from a microprudential and macroeconomic perspective (Acharya 2011; Hanson et al. 2011; Claessens et al. 2014). These studies highlight the strong systemic impact that large

banks exert on markets due to their interconnections, both in terms of value and frequency, with other economic players (Beirne and Fratzscher 2013; De Bruyckere et al. 2013; Buch and Goldberg 2016; Constâncio 2017).

A large part of these studies focuses on the construction of a quantitative model able to provide a measurement of the level of systemic risk both with reference to the whole economic system and to the contribution of each systemic bank and this is based on a series of economic-financial variables. All these works, based on advanced mathematical-statistical models, require many inputs based on market variables, therefore they can only be used in the case of listed banks.

The present work focuses, instead, on variables available for all categories of banking intermediaries (not only listed ones) that are able to provide information on the dynamics of risk propagation rather than on the evaluation of the risk level itself. These variables have been chosen on the basis of the criteria most widely used in the literature; in particular, a study by the International Monetary Fund (Blancher et al. 2013) proposes to use the financial statements of intermediaries, especially balance sheets, from which it is possible to deduce a series of information (the so-called Financial Soundness Indicators) useful for analysing the health of banks and their interaction dynamics with the system. The variables suggested by this study and by several other empirical contributions concern capital adequacy and risk coverage as measured by the Tier 1 ratio (Hoque et al. 2015), the weight of non-performing loans on total credit exposures, profitability, liquidity, the degree of interconnectedness with the system, measured through the value of loans and debts to other intermediaries (Acharya 2011; Blundell-Wignall 2012; Glasserman and Young 2015) and the weight of sovereign risk measured through the value of public securities held in the portfolio (Blundell-Wignall 2012). Another variable that is particularly popular in the systemic risk literature, is the z-score, which is an indicator of distance-to-default, (Acharya 2011; Blundell-Wignall 2012; Blancher et al. 2013; Hoque et al. 2015), i.e. how close (or far) the intermediary under scrutiny is from a financial situation that may portend imminent failure, has also been used.

As well illustrated by the International Monetary Fund (Blancher et al. 2013), systemic risk tends to arise through sequential events that start from one or more economic/financial shocks and then propagate with a chain effect.

The initial shocks that can generate a propagation mechanism and, therefore, lead to the onset of a systemic crisis are different and are classified by the literature as follows:

- a crisis of one or more financial intermediaries (Nelson and Katzenstein 2014) or of a government (Beirne and Fratzscher 2013), or the mere perception of the insolvency risk of these players;
- fall in the price of specific real or financial assets, including—in particular—residential real estate properties (Cerutti et al. 2017);
- liquidity crisis in financial markets followed by deleveraging, which fuels the fall of financial and real assets prices. This phenomenon triggers the deflationary spiral that, through the depreciation of collaterals, feeds the vicious circle of credit rationing (Reinhart and Rogoff 2013).

The causes that, according to the literature, can foster the propagation of an initial shock to an entire economic system are:

- high interconnection between the main players of the economic and financial system, in particular, high exposure of banks to sovereign debt and to interbank markets (Blundell-Wignall 2012; Hoque et al. 2015);
- savers confidence crisis and, in the most severe cases panic, leading to a domino effect characterised by generalised sales, fall in prices, credit rationing, bankruptcy and bank runs (Calvo 2012);
- strong information asymmetries in financial markets due to the increasing complexity of financial engineering, the information scarcity and the limited financial culture (Flannery et al. 2013);
- high level of indebtedness and, therefore, high dependence of borrowers on creditors, which enhances system vulnerability in times of crisis.

Above all, it is important to underline that starting from 2008, after the burst of the financial crisis, studies on systemic risk have overall increased significantly, together with the growing attention of international supervisory authorities and governments, mainly focused on strengthening the capital solidity of financial intermediaries to ensure the stability of an economic system (Acharya and Richardson 2009; Bengtsson 2013; Lane 2012; Brunnermeier 2009; Brunnermeier and Oehmke 2013).

## Data and Methodology

### *Description of the Dataset*

The dataset used for the analysis is composed of banks characterised by different business models, specifically, the set of cooperative banks, commercial banks, savings banks and investment banks active in Italy in the period 2018–2022. The data regarding the balance sheets of each intermediary come from Orbis Bank Focus (Bureau Van Dijk).

The dataset only includes those intermediaries for whom it was possible to find the values of all ten variables that are described below, as they are considered fundamental for the purposes of the study; this is because the results of the multivariate analysis, in particular those related to the grouping techniques employed, are significant only in the absence of missing data.

The number of the considered banks varies from year to year, not only due to the elimination of missing data, but also due to the Merger and Acquisition (M&A) operations that have affected the financial sector, as well as the exit of several banks from the market.

Table 13.1 shows the composition of the dataset<sup>1</sup> during the period analysed.

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<sup>1</sup> In the discussion, reference is always made to the dataset under analysis, avoiding the definition of “sample” since, as it is known, from a statistical point of view, a “sample” is such when it is

**Table 13.1** Dataset composition in terms of specialisation

Year	Commercial banks	Cooperative banks	Investment banks	Saving banks	Total
2018	61	245	13	9	328
2019	66	241	12	9	328
2020	63	234	11	9	317
2021	59	231	11	9	310
2022	58	226	9	9	302

It is clear from Table 13.1 that cooperative banks represent the largest group in the dataset analysed. Table 13.2 shows the subdivision of banks analysed in the various years that make up the period under investigation, with reference to Total Assets. The data presented in this table offers a clear vision of the structural tendencies underway in the Italian banking system, which see an increase in the volume of activity of cooperative banks together with a substantial resizing of the weight of investment banks.

Before proceeding with the construction of the indices necessary for grouping the banks belonging to the dataset, it is opportune to observe its composition with even greater attention in order to offer some micro-economic considerations on the peculiar characteristics of the units that are analysed. This focus also makes it possible to better illustrate the variables which are considered fundamental for the study of the contagion propagation dynamics and systemic risk within the banking sector considered as a whole. Table 13.3 therefore shows the main descriptive statistics,

**Table 13.2** Banks distribution in terms of total assets (thousands of euros). Years 2018–2022

Year	Commercial banks	Cooperative banks	Investment banks	Saving banks	Total
2018	2,459,006,981	304,422,682	84,912,407	101,076,340	2,949,418,410
	83%	10%	3%	3%	100%
2019	2,593,934,623	417,284,070	39,007,599	104,570,389	3,154,796,681
	82%	13%	1%	3%	100%
2020	2,964,063,629	481,106,453	38,294,545	118,583,505	3,602,048,132
	82%	13%	1%	3%	100%
2021	3,114,188,200	516,328,830	32,144,141	150,397,369	3,813,058,540
	82%	14%	1%	4%	100%
2022	2,940,142,759	509,889,339	32,139,000	147,879,396	3,630,050,494
	81%	14%	1%	4%	100%

constructed following particular probabilistic procedures, while in our case, the data simply refers to the universe of all banking intermediaries for which it was possible to obtain the values of the variables that act as a proxy for the speed and capacity of propagation of systemic risk and the state of health of a bank.

**Table 13.3** Descriptive statistics of some characteristic variables. Year 2022

	Mean	Standard deviation	Skewness	Variation coefficient
<i>In thousands of euros</i>				
Total assets (thousands)	10,843,354	69,845,278	10.85	6.44
Equity (thousands)	783,966	4,943,981	10.81	6.31
<i>In percentage</i>				
Equity/total assets	9.42	4.10	2.53	0.44
Securities/total assets	13.26	9.76	2.48	0.74
Loans/total assets	72.53	13.33	-2.01	0.18
Liquidity/total assets	23.43	12.43	1.97	0.53
Total liabilities/total assets	91.58	4.10	-2.53	0.04

referred to 2022, of some variables which are useful for the qualitative framing of the units under investigation.

The heterogeneity of the considered group of banks in terms of size is particularly evident: in fact, the value assumed by the variability indices referring to Total Assets and Capital is very high. This is quite normal, given that the dataset includes both local banks of smaller dimensions and large intermediaries operating at an international level. The presence of banks of various sizes and characterised by business models that are very different from one another is particularly useful for the purposes of our investigation in that it allows us to offer various considerations on the aptitude of each banking model to amplify or, on the contrary, mitigate the propagation of systemic phenomena within the financial sector.

## ***Methodology***

In order to analyse the contribution of each intermediary to the systemic risk propagation dynamics, it was necessary to group banks into homogeneous clusters starting from the values given by ten variables which, according to the literature on systemic risk, are capable of (i) providing information on the attitude of each bank to contribute, more or less quickly, to the phenomena propagation mechanisms that generate systemic risk (the first three variables) and (ii) providing a multidimensional representation of each bank's health status (the remaining seven variables).

The ten variables used for clustering the banks analysed were deduced from the most authoritative literature that has dealt with systemic risk over the years. These variables are—as already mentioned—divided according to their informative power into two groups. The first group is made up of three indicators, which quantify amounts of deposits and interbank loans and amounts of government securities held by each bank. These variables are widely used in the literature (Blancher et al. 2013;

Acharya 2011; Blundell-Wignall 2012; Glasserman and Young 2015) to assess the degree of interconnectedness of each bank with the rest of the banking sector and with the public sector. In fact, these variables, respectively, manage to determine the risk of potential contagion arising from each individual bank's greater or lesser exposure in the interbank market and each bank's greater or lesser interconnectedness with the public sector, and thus its exposure to country risk.

The second group of variables consists of seven indicators that provide a multi-dimensional representation of each bank's health status (Acharya 2011; Blundell-Wignall 2012; Blancher et al. 2013; Hoque et al. 2015). The information provided by these variables is, like the information provided by the variables in the first group, very important for this study, as it is assumed that a bank in good health can exert a braking effect against the propagation of a systemic crisis, and thus represents a stabilising factor for a financial system.

From the methodological point of view, after having divided the banks under observation into an adequate number of groups, we proceeded to analyse the composition and characteristics of each of them in terms of specialisation and business model.

The aim of this second analysis is, in fact, to verify whether the presence of cooperative banks is actually greater in those groups for which the indicators of systemic risk propagation speed and capacity and those that explain a bank's status of health assume better values.

The methodology of analysis proposed in this chapter is, therefore, substantially different from what is currently found in the literature in relation to the methods of measuring systemic risk.

In fact, this work focuses on variables, however chosen on the basis of the criteria most widely used in the literature, which have the advantage of being available for all categories of banking intermediaries (and therefore not only for those considered systemic) while providing information on the dynamics of risk propagation rather than exclusively on the evaluation of the risk itself.

The choice of analysing Italian banks derived—as stated—from reasons of analysis homogeneity as well as from the fact that the Italian banking system has a particular morphology and structure characterised by a massive presence of cooperative credit banks and, more generally, of small local banks particularly focused on their territory needs.

Among the indicators that are considered most useful for studying the ability of financial intermediaries to contribute to systemic risk propagation, there is the percentage incidence of total loans granted to public and governmental bodies on the total activity carried out by each bank. Unfortunately, none of the providers currently available is able to give this information, especially in the case of banks not listed on regulated markets which, as already pointed out, represent almost all of the dataset being studied. This is the reason why this information was excluded from the analysis.

Table 13.4 shows the main descriptive statistics, referred to 2022, of the ten variables on which the initial part of the analysis is based.

**Table 13.4** Descriptive statistics of the clustering variables. Year 2022

	Mean	Standard deviation	Skewness	Variation coefficient
<i>In percentage</i>				
I1 = Net loans & advances to banks/total assets	8.74	6.31	1.73	0.72
I2 = Deposit from banks/total assets	15.01	9.86	2.29	0.66
I3 = Government securities/total assets	23.84	12.61	0.10	0.53
I4 = Common equity/core tier 1 ratio	20.73	8.32	2.57	0.40
I5 = NPLs ratio	7.67	6.58	7.06	0.86
I6 = Liquidity ratio	37.26	124.52	16.29	3.34
I7 = ROAE	3.72	6.62	-2.34	1.78
I8 = ROAA	0.35	0.52	-1.37	1.50
I9 = Cost to income ratio	71.38	13.99	1.37	0.20
I10 = Z-score	127.38	162.43	4.46	1.28

As mentioned earlier, the first three indicators (I1, I2 and I3) provide useful information on the degree of interconnection of each intermediary analysed, in that they measure the absolute and relative transactions of each bank in the interbank market and the banks' exposure to the public sector (government securities and sovereign debt). The quantities used as proxies (divided by Total Assets in order to be able to compare intermediaries of different sizes) are the value of loans to the interbank system (I1), the value of deposits on the interbank market (I2) and the value of government securities held in the portfolio (I3). The Orbis Bank Focus Provider defines these indicators respectively as: Net Loans and Advances to Banks (I1), Deposits from Banks (I2) and Government Securities (I3). As already argued above and in line with what has been supported by the prevailing literature on the subject, it is believed that these variables are able to provide particularly significant information on the attitude of banks towards contributing to the propagation mechanisms of the problems that lead to systemic risk. In particular, lower values of these variables lead to the belief that the bank in question is less exposed and interconnected and, therefore, can contribute only marginally to increasing the level of systemic risk. In fact, it is well known that the more limited the active and passive relationships with the interbank market, the less likely it is that a bank can be infected by particularly critical situations involving other banks in the system and, likewise, the less likely it is that the bank itself can, in turn, be a vehicle for contagion, and therefore for the worsening of the overall level of systemic risk, due to its own specific problems. It is also well known that the smaller the value of government securities present in the portfolio of an intermediary, the less likely it is to suffer the negative effects deriving

from the default, or simple downgrading, of a sovereign State and, therefore, the less likely it is to contribute to amplifying the effects of systemic risk.

The other seven indicators shown in Table 13.4 and used for the construction of the homogeneous groups of banks are the Tier1 Ratio (I4), the Non-Performing Loans Ratio (I5), the Liquidity Ratio (I6), the ROAE (I7), the ROAA (I8), the Cost to Income Ratio (I9) and finally the Z-score (I10). These variables correspond, respectively, to the following data provided by the Provider: Common Equity/Core Tier 1 Ratio, Impaired Loans/Gross Customer Loans & Advances, Liquid Assets/Deposits & Short-Term Funding, Return on Average Equity, Return on Average Assets and Cost to Income Ratio. Finally, as is well known, the Z-score is a risk variable commonly used in the literature to indicate by how many standard deviations a bank's return must fall from its average value for the value of capital to be zero. As per usual practice, it was calculated by dividing the sum of ROAA and equity by the standard deviation of ROAA itself (referring to the last three years).

As already mentioned, these seven indicators are considered useful in providing information on the health status of each bank since they represent a good proxy, respectively, for the level of capitalisation, the quality of the credit portfolio, liquidity, profitability, the level of operating efficiency and the risk of insolvency (and therefore of instability).

From a purely theoretical point of view, a healthy intermediary does not contribute to aggravating the overall level of systemic risk in the banking sector (or, at most, it could contribute to a very limited extent and certainly dependent on other causes); therefore, banks that present somewhat contained levels of indicators I5 and I9, as well as relatively high levels of indicators I4, I6, I7, I8 and I10, should be characterised by a lower probability of acting as amplifiers of the systemic risk propagation effects in the financial sector.

As noted above, the generally high values of all the relative variability indices are justified by the presence in the dataset of banks of very different sizes, some extremely large and others particularly small.

Before proceeding to the clustering of the dataset units, the classic preliminary operations with respect to the implementation of the procedures of multivariate analysis were carried out, that is, the check for lack of outliers and for any collinearity between the variables as well as the standardisation of all the values. In particular, the multi-collinearity analysis not only included the study of the values contained in the variance-covariance matrix (and therefore of correlation), but also the calculation of the tolerance index and of the VIF (Variance Inflation Factor). In the latter case, however, reference was made to a particularly cautious threshold of 5.

Different cluster analyses (Everitt et al. 2011) of both hierarchical and non-hierarchical type (K-means) were implemented for each year considered. With reference to the hierarchical methods, various combinations of clustering algorithms and distance measures were tested. The clusters obtained with the different approaches adopted were shown to be scarcely overlapping; their composition appeared dissimilar and strongly dependent on the type of procedure used. Therefore, the groups of banks thus obtained showed such differences that no valid conclusions can be drawn in a general sense.

To overcome this problem, the aggregations between banks were carried out referring to some criteria deriving from the evidence common to the various cluster analysis approaches implemented and, therefore, taking into account results that are more robust from a methodological point of view. First of all, it was deduced that the correct number of clusters to be considered is six; this evidence is based on the results from the hierarchical method dendrograms as well as from the tests relating to them. Secondly, it emerged that all the clustering methods assigned greater importance to the first three variables (I1, I2 and I3). Therefore, separately for each year, the banks were first divided into three groups, taking into account those of the first three indicators that presented a value lower than their respective median (calculated considering all the units in the dataset). The choice of the median (rather than the mean) as the threshold for discriminating between sets of units was made since the variable's value distributions were strongly skewed. Applying this criterion, the first group of banks was identified, including all the units for which at least two indicators (one of which necessarily had to be I3) had a value lower than the respective median. The second group was identified by aggregating those units for which only one of the indicators showed a value lower than the median. Finally, the third group was obtained by aggregating the remaining units, that is, all the banks for which none of the three indicators showed a value lower than the median.

Subsequently, each of the three groups previously identified was divided into two parts based on the values of the other seven indicators previously mentioned. In particular, the first subset was formed by aggregating the units for which at least four of the remaining seven indicators (I4, I5, I6, I7, I8, I9 and I10) had a value better than their median value. By difference, units for which fewer than four indicators were better than their median were grouped together in the second subset.

## Empirical Results

Table 13.5 shows, separately for each group, the main descriptive statistics—referred to 2022—of the ten indicators that drove the clusterisation procedure. To further increase the robustness of the procedure adopted to divide the units into six homogeneous groups, the differences between the mean value assumed by each of the ten variables in each of the different clusters were analysed with an ANOVA test and were found to be robust and statistically significant.

As already pointed out, the empirical investigation conducted aims to answer the research question introduced in Sect. 13.1, that is, to understand whether cooperative banks are really less involved than other types of banks in the mechanisms underlying the propagation and accentuation of systemic risk and, therefore, indirectly, this study seeks to verify whether their presence can prove useful in mitigating contagion phenomena and, therefore, the spread of systemic risk in a financial system.

In order to answer this question, we distinguished the different banks in the dataset on the basis of their propensity to generate and/or spread systemic risk within the market. Subsequently, a second analysis was conducted to verify whether or not the

**Table 13.5** Descriptive statistics of the ten indicators with respect to each group of banks. Year 2022

	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10
<i>Group 1</i>										
Mean	10.87	11.89	21.91	22.99	7.92	47.67	3.68	0.38	72.96	113.09
St. Dev	6.86	7.35	12.54	7.86	8.27	182.31	5.41	0.51	12.34	107.57
Skewness	1.48	0.80	0.14	1.76	6.88	11.34	-2.31	-1.29	0.91	2.03
Var. Coeff	0.63	0.62	0.57	0.34	1.04	3.82	1.47	1.35	0.17	0.95
<i>Group 2</i>										
Mean	6.12	13.43	24.12	19.62	7.96	24.83	3.20	0.31	71.95	136.38
St. Dev	4.73	7.74	13.35	9.48	5.99	13.32	5.85	0.50	14.66	151.38
Skewness	1.42	0.74	-0.05	3.97	4.51	1.62	-1.85	0.25	2.20	2.20
Var. Coeff	0.77	0.58	0.55	0.48	0.75	0.54	1.83	1.63	0.20	1.11
<i>Group 3</i>										
Mean	7.53	20.36	26.34	18.32	7.13	30.96	4.11	0.33	68.80	141.29
St. Dev	5.67	11.96	11.73	7.34	3.52	26.53	8.35	0.55	15.25	220.62
Skewness	2.33	2.75	0.30	3.01	1.33	5.02	-2.38	-2.32	1.50	4.56
Var. Coeff	0.75	0.59	0.45	0.40	0.49	0.86	2.03	1.68	0.22	1.56
<i>Group 1.1</i>										
Mean	11.40	11.99	25.91	24.49	7.16	70.96	6.16	0.68	67.75	135.60
St. Dev	6.24	7.76	11.73	7.22	10.69	262.95	2.98	0.35	10.88	121.25
Skewness	0.86	1.09	0.21	1.15	6.71	7.85	0.98	1.44	-0.25	1.55
Var. Coeff	0.55	0.65	0.45	0.29	1.49	3.71	0.48	0.51	0.16	0.89
<i>Group 1.2</i>										
Mean	10.38	11.79	18.33	21.64	8.61	26.78	1.45	0.11	77.64	92.91
St. Dev	7.35	6.95	12.17	8.19	5.15	14.63	6.19	0.49	11.69	88.89
Skewness	1.91	0.43	0.18	2.37	2.50	2.91	-2.26	-2.37	2.08	2.77
Var. Coeff	0.71	0.59	0.66	0.38	0.60	0.55	4.26	4.37	0.15	0.96
<i>Group 2.1</i>										
Mean	7.36	13.15	28.03	22.82	6.24	31.24	6.88	0.67	64.50	147.27
St. Dev	4.99	8.63	14.69	12.38	3.54	14.76	2.85	0.41	9.51	146.54
Skewness	0.82	1.40	-0.34	3.30	1.97	1.42	0.87	2.61	-2.00	2.09
Var. Coeff	0.68	0.66	0.52	0.54	0.57	0.47	0.41	0.61	0.15	1.00
<i>Group 2.2</i>										
Mean	5.13	13.66	21.02	17.08	9.33	19.75	0.29	0.03	77.87	127.74
St. Dev	4.31	6.95	11.25	5.16	7.09	9.67	6.16	0.41	15.32	154.58
Skewness	2.23	-0.21	-0.17	2.29	4.35	1.60	-1.92	-1.34	3.18	2.40
Var. Coeff	0.84	0.51	0.54	0.30	0.76	0.49	21.36	13.18	0.20	1.21
<i>Group 3.1</i>										

(continued)

**Table 13.5** (continued)

	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10
Mean	7.59	20.07	26.24	20.10	5.98	37.49	7.10	0.58	62.48	179.02
St. Dev	6.25	13.18	12.49	8.86	3.72	34.09	5.02	0.36	11.42	276.63
Skewness	2.58	2.30	–	2.73	1.98	4.15	3.78	3.39	–1.16	4.01
Var. Coeff	0.82	0.66	0.48	0.44	0.62	0.91	0.71	0.62	0.18	1.55
<i>Group 3.2</i>										
Mean	7.48	20.65	26.44	16.52	8.29	24.30	1.05	0.07	75.26	102.74
St. Dev	4.56	10.56	10.89	4.81	2.84	12.54	9.93	0.61	15.95	131.43
Skewness	1.55	3.66	0.78	2.00	1.52	2.46	–2.74	–3.59	2.53	2.97
Var. Coeff	0.61	0.51	0.41	0.29	0.34	0.52	9.45	8.48	0.21	1.28

presence of cooperative banks is homogeneous within the various groups identified. If the cooperative banks were evenly distributed among the groups, this would mean that they do not differ in any way from other types of banks; therefore, it would not be possible to draw any conclusions about their ability to contribute, positively or negatively, to systemic risk propagation. The situation would be different if the cooperative banks were actually more numerous in those groups for which the indicators of systemic risk propagation speed and capacity as well as the indicators representing the bank's health status assume, respectively, more limited and better values. Indeed, in this case it would be possible to conclude that the presence of cooperative banks constitutes an important shock absorber capable of hindering (or, at least, braking) the spread of systemic risk phenomena within the banking market.

Table 13.6A–E show, therefore, for each year analysed, the presence of the various categories of banks within the nine groups previously identified.

The values represented in the first part of Table 13.6 (Group 1, Group 2 and Group 3) refer to the subdivision of the banks into three homogeneous categories on the basis of the values assumed by indicators I1, I2 and I3. It should be noted that these indicators provide information on the degree of interconnectedness of each bank, that is, the exposure of the banks analysed to the interbank market and to sovereign debt.

Moving from Group 1 to Group 3, it is possible to find banks for which the above indicators take on progressively worse values, thus indicating a more pronounced inclination to contribute significantly to the transmission of systemic problems among market participants.

From Table 13.6A–E it emerges that the probability of finding a cooperative bank within the groups decreases significantly when moving from Group 1 to Group 3. In particular, with reference to the most recent data (Table 13.6E), this probability goes from 87% for Group 1 to 80% for Group 2, reducing to 56% for Group 3. This dynamic, which shows a progressive and marked reduction, is confirmed in each of the years considered in the analysis (Fig. 13.1). This means that most of the cooperative banks in the dataset are characterised by a lower relative exposure to the

**Table 13.6** (A) Banking group and sub-group composition in terms of business model. Year 2018. (B) Banking group and sub-group composition in terms of business model. Year 2019. (C) Banking group and sub-group composition in terms of business model. Year 2020. (D) Banking group and sub-group composition in terms of business model. Year 2021. (E) Banking group and sub-group composition in terms of business model. Year 2022

(A)				
Commercial banks	Investment banks	Saving banks	Cooperative banks	Total
<i>Group 1</i>				
11	2	1	125	139
8%	1%	1%	90%	100%
<i>Group 2</i>				
16	4	5	59	84
19%	5%	6%	70%	100%
<i>Group 3</i>				
34	7	3	61	105
32%	7%	3%	58%	100%
<i>Group 1.1</i>				
2	2	1	90	95
2%	2%	1%	95%	100%
<i>Group 1.2</i>				
9	0	0	35	44
20%	0%	0%	80%	100%
<i>Group 2.1</i>				
11	2	1	36	50
22%	4%	2%	72%	100%
<i>Group 2.2</i>				
5	2	4	23	34
15%	6%	12%	68%	100%
<i>Group 3.1</i>				
11	3	1	23	38
29%	8%	3%	61%	100%
<i>Group 3.2</i>				
23	4	2	38	67
34%	6%	3%	57%	100%
(B)				
Commercial banks	Investment banks	Saving banks	Cooperative banks	Total
<i>Group 1</i>				
13	2	1	118	134
10%	1%	1%	88%	100%
<i>Group 2</i>				

(continued)

**Table 13.6** (continued)

(B)				
Commercial banks	Investment banks	Saving banks	Cooperative banks	Total
18	3	5	68	94
19%	3%	5%	72%	100%
<i>Group 3</i>				
35	7	3	55	100
35%	7%	3%	55%	100%
<i>Group 1.1</i>				
3	1	0	66	70
4%	1%	0%	94%	100%
<i>Group 1.2</i>				
10	1	1	52	64
16%	2%	2%	81%	100%
<i>Group 2.1</i>				
11	2	1	37	51
22%	4%	2%	73%	100%
<i>Group 2.2</i>				
7	1	4	31	43
16%	2%	9%	72%	100%
<i>Group 3.1</i>				
14	2	1	30	47
30%	4%	2%	64%	100%
<i>Group 3.2</i>				
21	5	2	25	53
40%	9%	4%	47%	100%
(C)				
Commercial banks	Investment banks	Saving banks	Cooperative banks	Total
<i>Group 1</i>				
15	4	1	121	141
11%	3%	1%	86%	100%
<i>Group 2</i>				
12	2	3	49	66
18%	3%	5%	74%	100%
<i>Group 3</i>				

(continued)

**Table 13.6** (continued)

(C)				
Commercial banks	Investment banks	Saving banks	Cooperative banks	Total
36	5	5	64	110
33%	5%	5%	58%	100%
<i>Group 1.1</i>				
5	1	0	70	76
7%	1%	0%	92%	100%
<i>Group 1.2</i>				
10	3	1	51	65
15%	5%	2%	78%	100%
<i>Group 2.1</i>				
6	2	1	28	37
16%	5%	3%	76%	100%
<i>Group 2.2</i>				
6	0	2	21	29
21%	0%	7%	72%	100%
<i>Group 3.1</i>				
14	2	1	28	45
31%	4%	2%	62%	100%
<i>Group 3.2</i>				
22	3	4	36	65
34%	5%	6%	55%	100%
(D)				
Commercial banks	Investment banks	Saving banks	Cooperative banks	Total
<i>Group 1</i>				
16	2	1	127	146
11%	1%	1%	87%	100%
<i>Group 2</i>				
11	3	4	37	55
20%	5%	7%	67%	100%
<i>Group 3</i>				
32	6	4	67	109
29%	6%	4%	61%	100%
<i>Group 1.1</i>				

(continued)

**Table 13.6** (continued)

(D)				
Commercial banks	Investment banks	Saving banks	Cooperative banks	Total
3	0	0	74	77
4%	0%	0%	96%	100%
<i>Group 1.2</i>				
13	2	1	53	69
19%	3%	1%	77%	100%
<i>Group 2.1</i>				
4	2	1	16	23
17%	9%	4%	70%	100%
<i>Group 2.2</i>				
7	1	3	21	32
22%	3%	9%	66%	100%
<i>Group 3.1</i>				
10	4	2	30	46
22%	9%	4%	65%	100%
<i>Group 3.2</i>				
22	2	2	37	63
35%	3%	3%	59%	100%
(E)				
Commercial banks	Investment banks	Saving banks	Cooperative banks	Total
<i>Group 1</i>				
14	2	2	116	134
10%	1%	1%	87%	100%
<i>Group 2</i>				
9	3	1	52	65
14%	5%	2%	80%	100%
<i>Group 3</i>				
35	4	6	58	103
34%	4%	6%	56%	100%
<i>Group 1.1</i>				
5	0	1	59	65
8%	0%	2%	91%	100%
<i>Group 1.2</i>				

(continued)

**Table 13.6** (continued)

(E)				
Commercial banks	Investment banks	Saving banks	Cooperative banks	Total
9	2	1	57	69
13%	3%	1%	83%	100%
<i>Group 2.1</i>				
4	1	0	25	30
13%	3%	0%	83%	100%
<i>Group 2.2</i>				
5	2	1	27	35
14%	6%	3%	77%	100%
<i>Group 3.1</i>				
14	2	3	30	49
29%	4%	6%	61%	100%
<i>Group 3.2</i>				
21	2	3	28	54
39%	4%	6%	52%	100%

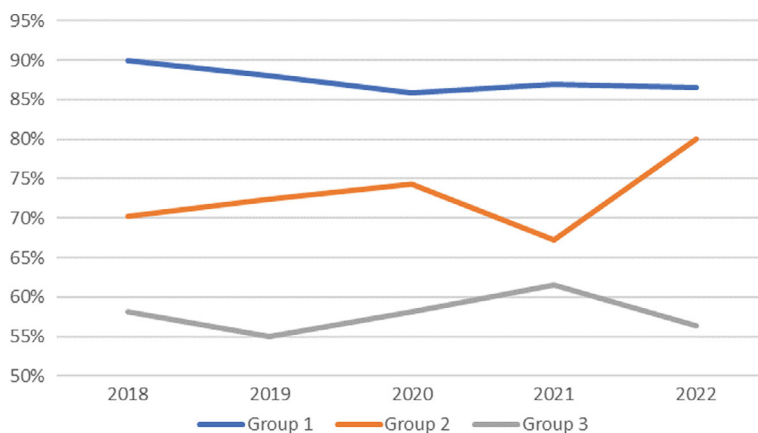
interbank market and to the public sector and, therefore, are less interconnected with the other nodes in the financial network.<sup>2</sup> This is in line with the main peculiarities of cooperative banks, namely their small size and their marked attention to local needs, which leads them to concentrate almost all of their funding and financing activity on customers belonging to the local community in which they operate.

The values represented in the second part of Table 13.6 (Group 1.1 and 1.2, Group 2.1 and 2.2 and, finally, Group 3.1 and 3.2) refer to the subsequent subdivision of the first three groups into two sub-groups on the basis of the values assumed by indicators from I4 to I10. These indicators provide information on each bank's health status as they refer to capitalisation level, loan portfolio, quality, liquidity level, profitability, operating efficiency degree, and insolvency and instability risk.

Moving from Group 1.1 to Group 3.2, it is possible to find banks whose situation is increasingly problematic with reference to one or more of the aforementioned indicators and, therefore, banks characterised by an ever-increasing probability of acting as systemic risk propagators in the financial sector, due to their precarious managerial conditions and, therefore, their intrinsic instability.

Specifically, Group 1.1 includes those banks that can contribute most to containing the overall entity of systemic risk in the financial sector; indeed, they are intermediaries characterised by a particularly positive health status from a managerial point of view and therefore by a low probability of transmitting problematic situations in the economic-financial system, due to their intrinsic solidity. For these banks, the

<sup>2</sup> It should be noted that I1, I2 and I3 are expressed as percentages of total assets and therefore the values referring to banks of different sizes are directly comparable.



**Fig. 13.1** Probability to find a cooperative bank in each group during the period 2018–2022

overall probability of contributing to the spread and generation of systemic risk is the lowest ever. In this group there is a massive presence of cooperative banks which in 2022 (numerically) represent, on average, about 91% of the total.

Group 1.2 assembles those banks which, albeit to a very slight degree, could possibly contribute to systemic risk in the financial sector since, despite their modest participation in the propagation process, they show a relatively problematic situation from a managerial point of view, making them more dangerous than the banks in Group 1.1. Consequently, although their probability of contributing to the development and spread of systemic problems is still low overall, it is nonetheless higher than that of the previous group. Even in this group, the number of cooperative banks remains relatively high at an average of 83%, which is lower than in Group 1.1.

Applying the same interpretative criteria, we observe that Group 2.1 includes those types of banks that seem to offer an average contribution to the spread of systemic phenomena. In this case, in 2022, the number of cooperative banks is similar to the case highlighted above, reaching 83%.

Group 2.2 includes those banks that are thought to contribute significantly to the systemic risk propagation in the sector, since they are characterised both by problems of a managerial nature and by a consistent propensity to act as a driving force in the diffusion of the negative effects caused, precisely, by systemic phenomena within the sector. In this Group, the percentage of cooperative banks is significantly reduced, settling at an average level of 77%.

Group 3.1 consists of those banks for which the probability of contributing to the generation and spread of systemic risk is rather high. In this group, the number of cooperative banks decreases to an average level of 61%.

Finally, Group 3.2 is made up of those intermediaries that undoubtedly play a decisive role in the dynamics of the propagation of systemic risk in the financial system. These are, in fact, banks in management disequilibrium and therefore characterised by a marked propensity to amplify the contagion dynamics and diffusion of

their own difficulties as well as those of other banks. In this last group, the presence of cooperative banks is drastically reduced and reaches minimum levels (specifically 52% in 2022).

The results of our empirical analysis with reference to the Italian banking market therefore allow us to answer our research question and, in particular, confirm the countercyclical and mitigating role of cooperative banks in systemic risk. In fact, as highlighted above, moving towards groups of banks characterised by a greater probability of contributing significantly to the transmission process of systemic problems, and therefore towards groups of banks characterised by a greater aptitude to act as amplifiers of systemic risk, the presence of cooperative banks is significantly reduced.

## Conclusions

The events of the last decades have highlighted how we live in a “small world”, in which everything is connected to everything else and often in different ways that are variable and not easy for human rationality to understand.

It is also evident that the “Achilles’ heel” of a “small world”, and therefore of real networks, is represented by the vulnerability due to interconnection. An isolated shock can create chain reactions that destabilise an entire economic system, and the probability that an isolated shock will undermine an entire system is higher if the affected nodes are the most interconnected.

While not yielding to the initial temptation to believe that the systemic propagation of crisis situations is exclusively due to the difficulties caused by large institutions (since the systemic value of the various intermediaries depends not only on their size, but above all, on the degree of riskiness and correlation with others), one cannot fail to consider the fundamental anti-cyclical role played by cooperative credit banks. These banks have the intrinsic potential to interrupt the vicious circle that fuels the propagation of a systemic crisis. This intrinsic potential is due to the granularity of their relationships, their peculiar governance model, and their characteristic business model based on mutuality, long-term relationships, commitment to local development, in-depth knowledge of their customers, and greater consideration of qualitative information in the credit process.

The results of the empirical investigation, with specific reference to the Italian banking system, support the initial hypothesis at the basis of the work and allow us to answer the research question of this essay. In particular, the empirical results of our analysis confirm the countercyclical and mitigating role of cooperative banks, which are actually less involved than other categories of intermediaries in contagion phenomena deriving from the spread of systemic risk.

As the empirical analysis shows, moving towards groups of banks that are more likely to contribute significantly to systemic problem transmission, and thus towards groups of banks that are more likely to act as systemic risk amplifiers, the presence of cooperative banks is significantly reduced.

The results obtained from this study thus enrich the existing debate on the *raison d'être* of cooperative banks, which is fundamentally focused on the idea that they have withstood the various recent crises thanks to a business model that is by no means anachronistic but, on the contrary, is still capable of satisfying the needs of their customers, while also fulfilling a fundamental function of mitigating systemic risk.

The data used in this work derives exclusively from public sources, mainly financial statements, and represents the only information accessible to external researchers interested in analysing companies and the system in which they operate. Such information, however, can only partially capture actual individual banks' health status and real systemic risk propagation dynamics.

In view of this, the methodological approach presented in this chapter could prove particularly useful to the authorities and policymakers for the purposes of evaluating and monitoring systemic risk, both at a national and international level. What is more, the proposed methodology could easily be enriched with all the classified and sensitive information which was not available to this contribution, but which would certainly be useful (if not essential) for the purpose of obtaining an even more complete and up-to-date picture of the equilibrium conditions of the international banking system.

Finally, it should be pointed out that the variety and complexity (and, moreover, often lack transparency) of financial relations between the different nodes in a network tend to increase the complexity of financial systems; this circumstance produces information asymmetries, moral hazard risks and, therefore, opacity and consequences in the processes of systemic risk propagation. This complexity in the relationships between the economic agents of a financial system has been fed since the early years of the new millennium by the evolution (often uncontrolled) of financial engineering, which has made the economic-financial systems more interconnected, and therefore complex, linking operators with each other in multiple ways, and often unconsciously. In addition, network science teaches us that the mechanisms of "growth" and "preferential connection" lead the "hubs" (i.e., the largest nodes) to expand in phases of network expansion and thus encompass smaller nodes. This phenomenon, otherwise known as globalisation, leads, however, to the risk of extinction of smaller economic operators, such as local banks; their disappearance, or even their simple competitive downsizing, would lead, over time, to the loss of the extraordinary intangible and relational patrimony of these intermediaries. This situation could also lead to the financial system's impoverishment and exposure, as demonstrated in this essay, to greater systemic risks.

In addition, the events of the last fifteen years have exhaustively highlighted all the risks of a highly interconnected financial system that is disconnected from the real economy, which has grown over the years to a hypertrophic extent thanks to financial engineering and has therefore become excessively complex and exposed to human greed. This is especially true if it is left free to expand, where there is a lack of adequate controls and forms of protection and guarantee, as well as alternative models of intermediaries that are less systemic and more linked to the territory and the real economy.

Therefore, to toy with some of the paradigmatic expressions that have been in vogue for some years now, that is, since the subprime mortgage crisis in the USA in 2008, what emerges from the proposed empirical analysis should probably contribute to inducing the international supervisory authorities to shift their attention from the paradigms of “Too Big to Fail”—or “Too Central (Interconnected) to Fail”—to the notion of “Too Useful to Fail”.

Indeed, in light of the results of our empirical analysis, the utility of local cooperative banks with a mutual vocation is enriched with an important connotation referring to the counter-cyclical and mitigating dimension of the contagion mechanisms deriving from systemic risk propagation. In other words, it seems evident that a model of intermediation characterised by such varied levels of utility deserves adequate and specific attention and protection from the authorities.

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