XXXVII CONFERENZA ITALIANA DI SCIENZE REGIONALI

THE IMPACT OF CRIMINALITY ON THE RISKINESS OF COOPERATIVE CREDIT BANKS IN ITALY: A MACRO REGIONAL APPROACH

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SOMMARIO

In Italy, Credit Cooperative Banks (CCBs), unlike large banks, despite the economic downturn, have continued to extend credit to customers, but at the cost of a higher incidence of bad credit. This increased credit risk of local banks has been caused by management policy choices, such as preferring to modify the conditions applicable to credit supply and to engage firms in long-term credit relationships rather than initiating credit recovery procedures. The originality of this empirical analysis is due to the demonstration of the effects of environmental factors related to the spread of crime and lower economic well-being, higher unemployment rate and poverty of families on the credit market in Southern Italy. This correlation between the riskiness of credit for CCBc and socioeconomic variables has also been reported through the analysis of territorial differences between geographical areas. This analysis highlights a broader diffusion in this macro-region than in the North and the Centre. Finally, a Pooled OLS approach is provided for modelling the credit risk as a function of environmental factors.

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1. Introduzione

In Italy and especially in the South, positive relational networks (friends or family) become veritable anti-meritocratic tools, often affecting the growth capacity of southern regions (Helliwell and Putnam, 1995). In addition, low trust would discourage investment, because the entrepreneur would have to spend more time and money to monitor any subtractions of innovative ideas from employees, partners, and suppliers. Instead, societies characterized by high levels of confidence are less dependent on formal institutions to reinforce agreements. The informal credit market based on strong interpersonal trust can facilitate investment, even though there is no formal protection of that investment. Where the trust increases, businesses' access to credit is greater (Borri et.al, 2014).

A key element in discussing social capital in Southern Italy is the strong presence of criminal organizations in those regions (Calderoni, 2014, Ofria and David, 2014). In recent years, numerous studies have tried to prove how much and in what way the existence of criminal networks – with mafia characteristics – in a specific area conditions the development of that region. Some studies go as far as to claim that it is the high crime rate in the South that prevents the possibility of developing normal entrepreneurial activities (Daniele and Marani, 2011). For Ofria and Farinella (2011), mafia businesses (apparently legal but in fact run by the mafia) can be awarded contracts and win tenders or auctions, not through competitive bids but rather by threatening the commission of criminal acts. Similarly, criminal organizations may also set up barriers preventing non-affiliated companies from accessing markets. The presence of cartels imposed by organized crime generates negative pecuniary externalities, which reduce the economic activities of legal businesses. The consequence is a state of economic inefficiency, because businesses participating in the cartel are not forced to increase productivity, due to the lack of competitive pressures.

In light of the above considerations, this paper proposes an empirical analysis to respond to the following research question: "does the more concentrated presence of crime, the expression of dangerous localism in southern Italy, cause a deterioration in the quality of the credit issued by CCBs in this macro-region compared to CCBs in central/northern Italy?"

The empirical analysis provided in section 4 focuses on dangerous localism and in particular aims to assess, for the years 2006-2011, whether crime impacts the degree of risk of CCBs located in the two main Italian macro-regions (Central/North vs South).

This relationship has already been confirmed by several empirical studies that consider a sample of the years preceding the outbreak of the international crisis (Ofria and Venturi, 2000; Battaglia et.al., 2010). The originality of this paper lies in the fact that it considers the importance of socioeconomic variables on the credit market and subsequently the impact of criminality on the riskiness of CCBs. Therefore special attention is paid to the intensity of the relationship between crime and the riskiness of loans granted by CCBs in the regions of Southern Italy.

The results obtained show that the CCBs operating in the regions of southern Italy risk being victims of dangerous localism, theorised in literature and represented by the significant presence of crime. This can be seen from the statistically significant impact of crime on the riskiness of credit issued by the CCBs.

The paper is organised as follows: section 2 provides an overview of some studies that have empirically investigated the intensity of the relationship between crime and the credit market, with particular attention to southern Italy; section 3 describes the data and variables used for the empirical analysis; section 4 verifies the statistical significance of territorial differences relating to these variables in the three main macro regions; section 5 outlines the methodology of the estimated model and the underlying reasons; and section 6 comments on the obtained results, while section 7 contains the conclusions.

2. Literature review

In literature, several studies have shown for the Italian economy a correlation between credit risk and environmental conditions, such as crime. It is known, in fact, that the greater degree of risk for banks in the

South, compared to those in the rest of the country, is an issue that has been dealt with for many years in economic literature. By the late nineties, Morelli and Pittaluga (1998) showed a longer duration of economic recessions in the southern areas and the resulting effects on both the liquidity of banks and on the solvency of borrowers; in the presence, too, of a less competitive credit market than that of the North. Ofria and Venturi (2000), using econometric analysis, note that in the South the crime generating phenomena of "adverse selection", increases the lending interest rates of local banks. These results have been confirmed by Bonaccorsi di Patti (2009). He finds that higher interest rates are applied by banks to firms established in Italian provinces featuring lower levels of social capital but strong family ties, thus apparently driving a wedge between universalistic and particularistic networks. However, recently Stacchini and Degasperi (2015), by using micro data from the Italian Credit Register, found that banks apply a discount on loan rates charged to family firms and they have suggested that this is a result of family ties which makes managerial opportunism less likely. More importantly from our perspective, they found that the discount is lower in those communities that are endowed with a higher social capital, indicating that trust and family ownership are alternative solutions to agency problems. Other research confirms the existence of a relationship between social capital and access to credit. Moro and Fink (2013), analyzing a sample of Italian small and medium firms, show a positive relationship between access to credit and mutual trust between banks and enterprises. Hernández-Cánovas and Martínez-Solano (2010) obtained similar results for Spain.

Barra et. al. (2014) analyse the impact of the current financial crisis on the efficiency of Italian small banks belonging to two great institutional categories: CCBs and other banks. They apply DEA throughout the 2006-2010 period, highlighting the effect of some environmental and institutional factors on banks' performance. The evidence shows that local shocks, proxied by SLL-level GDP per capita, affect technical efficiency differentials, especially for CCBs. This can be easily rationalised. Their mission in favour of the local community, as well as current regulations, may endow CCBs with fewer performing locations vis-à-vis other banks, harming their relative efficiency. Also in accordance with our expectations, the evidence shows that the differential impact of the crisis on CCBs attenuates or vanishes when we include in the banks' production set proxies of local environment (GDP per capita) or an indicators traditionally associated with credit risk (bad loans).

In this respect, Puri et al. (2011) outlined that the credit supply reduction in the aftermath of the crisis was comparatively stronger for (German) banks which were more liquidity-constrained, while Ivashina and Scharfstein (2010) point out asymmetric effects on bank credit depending on the liability structure of the lender, since banks whose funding was more reliant on short term agreements tended to cut new credit lines to a major extent. Carvalho et al. (2013) find that the stronger the bank-firm relationship, the stronger the credit reduction after the 2007-2009 crisis, since lenders exploited their market power towards borrowers stemming from the accumulation of non-transferable information; expectedly, this pattern was the strongest for the more opaque borrowers – i.e. those featuring the highest information asymmetry towards banks – and those with the weakest financial position. By contrast, De Mitri et. al (2010) conclude that Italian borrowers did benefit from stronger bank-firm relationships, that is borrowing from a few banks, having a reference bank with a larger share of granted credit (hausbank) and having long-running and stable credit relationships.

Gambacorta and Mistrulli (2014), Ferri et. al (2014), and Mistrulli and Vacca (2015), show that relation lenders (lenders investing a great effort on building stable and deep relationships with their customers) are able to smoothen out the effect of the crisis on the cost of credit granted to firms.

3. The sample

The sample of the empirical analysis consists of 390 CCBs and may be considered sufficiently representative of the behaviour of the CCBs operating in the North/Centre and Southern Italy in terms of both numbers and market shares. In terms of sample size, as at 31 December 2006, this sample recorded the behaviour of 91% of CCBs located in the former macro-region and 88% in the latter. In the last year investigated, 2011, this sample recorded the behaviour of 96% of CCBs located in the former macro-region and 97% in the latter. The higher percentages of representation in 2011 are associated with the change in the structure of the system of cooperative credit in the two macro regions as a result of bank mergers and

takeovers (in Central / North from 323 in 2006 to 305 CCBs in 2011, while in Southern Italy from 108 CCBs in 2006 to 99 in 2011). Looking at market share, as represented by the amount of loans granted by the sampled CCBs relative to the amount of credit from the national system of cooperative credit (i.e. also considering the CCBs excluded from the sample), as at 31 December 2006, the CCBs in Central / Northern Italy held, on average, an amount of credit equal to 93% of the loans made by the entire network of credit unions in this region while the CCBs in Southern Italy accounted for 75% of the loans made by the entire network of cooperative credit in this latter macro region. In the last investigated year (2011) the CCBs in the North/Centre held, on average, an upper credit tranche of 4 percentage points (97%) of the loans made by the entire network of cooperative credit in this macro region, while CCBs in Southern Italy benefited from more intense growth in their ability to serve the market, almost reaching the share of loans held by the CCBs in the North/Centre (a market share of about 96% with an increase of about 29 percentage points compared to pre-crisis levels)

The dataset panel just described, referring to the classification proposed by Kennedy (2003) is a "short wide" panel; in fact, it is composed of a large number of observation units (i=396 CCBs) observed for a relatively short period of time (T= 6 years). The presence of panels with these features (i.e. with an individual dimension much larger than the temporal dimension) makes it possible to monitor the heterogeneity or the presence of differences not observable among the observation units.

We have a balanced dataset panel since the number of observations in historical series does not change for each CCB (six observations for each bank).

For the construction of the dependent variable (Risk) of the econometric model to be estimated and subsequently described, we used accounting information from the balance sheets of the CCBs made available by FEDERCASSE. The indicator used is a measurement of the quality of credit and is the relationship between bad debt and the total gross credit exposure (Tab 1). Impaired loans to customers are ordered in a decreasing scale of risk of insolvency, in the first place represented by bad debts (immediately followed by substandard loans, restructured loans, overdue loans). Total gross credit exposures are exposures before adjustments made in the impairment test.

This indicator can vary, due to the different dynamics of the bad debts and total gross credit exposures. For example, as generally happens during an upswing in economic activity, we witness a decrease in this indicator and therefore an improvement in the quality of credit due to an accelerated growth of total loans. In the presence of an economic downturn such as that produced by the international crisis, this improvement may be, however, of little importance, if the growth of total exposures occurs in the face of increasingly high risk, it will later result in the increase of bad debt (and in general of impaired loans). This is caused by the anticyclical behaviour engaged in by the CCBs in the years of the international crisis (Arnone and Ofria, 2014 and Ferri et al. 2014). Otherwise, during recessions, we see the accelerated growth of bad debt (and impaired loans) along with stagnation in total loans with a consequent increase in the value of the indicator and thus a worsening of the quality of credit issued.

For the construction of the model's explanatory variables (Tab 2), the following social (relating to the spread of crime) and proxy economic variables of the territory were considered:

a) Murders (MU): committed and reported by police forces to the judiciary per 100,000 inhabitants, taken from Italian Interior Ministry data. This variable is expected to have a positive effect on the dependent variable;

b) Widespread crime (WC): intended, for the computer system of the Interior Ministry, as thefts of all kinds and thefts from homes. In other words, thefts and less serious burglaries per thousand inhabitants. Source: The Italian statistics institute (ISTAT) and the Italian Interior Ministry. This variable too is expected to have a positive effect on the dependent variable;

c) Violent crime (VC): violent crimes such as terrorist attacks per 10,000 inhabitants, Source: The Italian statistics institute (ISTAT) and the Italian Interior Ministry. This variable is expected to have a positive effect on the dependent variable.

d) Criminal Organization (CO): associative crimes per 100,000 inhabitants. This variable, together the above, is calculated by ISTAT to monitor the status of legality and safety of Italian citizens. It monitors the presence in the territory of the following associative crimes: conspiracy, Mafia-type associations, association for drug production and trafficking, and association for drug dealing. This variable is also expected to have a positive impact on the dependent variable;

e) Loans: percentage of the granted credits on the total asset of the BCCs. In literature (Tutino et al., 2012; Mottura and Paci, 2015; Tutino, 2015) this ratio is classified as indicator of composition of the asset and it can help to identify the business areas of the banking management and credit policies. For the construction of this indicator, the source data is from FEDERCASSE. For this variable we expect a negative effect on the dependent variable in accordance with the benefits connected to a wide diversification of the lending portfolio (Scannella, 2011).

Along with the preceding variables we decided to include another variable in light of evidence from the Osservatorio Europeo sulla Sicurezza (2012) that underlines a redistribution of these phenomena in the perceptions of the Italian citizens. This variable called "RFS" (Regression Factor Score), allows us to synthesize three variables: GDP per capita, rate of unemployment and incidence of poverty with a single "first principal component "[4] . Particularly, the unfavorable economic situation and high unemployment, according to the precedent contribution, respectively arouses great worries for 35.2% and 19.3% of Italians (against only 3.8% related to the crime phenomenon). In recent years the increasing attention to these problems is linked to structural shocks such as the global crisis. This variable is expected to have a positive effect on the dependent variable.

Table 1- Dependent variable

Name	*Construction*	*Source*
Risk	Bad debts on loans	FEDERCASSE data

Table 2- Explicative variables

Explicative Variables	*Expected effect on riskiness of Italian CCBs*	*Source*
MURDERS (MU)	+	Italian Interior Ministry data
WIDESPREAD CRIME (WC)	+	ISTAT Italian Interior Ministry data
VIOLENT CRIME (VC)	+	ISTAT Italian Interior Ministry data
CRIMINAL ORGANIZATION (CO)	+	ISTAT Italian Interior Ministry data
LOANS	-	FEDERCASSE
REGRESSION FACTOR SCORE (RFS)	+	Own elaboration on the Istat data

[4] As we will see in section 4, to overcome the limitations of the OLS estimate, the usage of this method based on regression factor scores which were estimated in Principal Factor Analysis (PCA) can be preferred over the classical method for conditions in which varying degrees of multicollinearity are present among the independent variables. In this analysis we choose to take only the first component that explains 97% of the total variability. The new variable obtained (RFS) is positively correlated with the unemployment rate (0.98) and the incidence of poverty (0.97) and negatively with the GDP per capita (0.98).

4. Spatial and temporal analysis

Table 3 shows the main descriptive statistics regarding all variables of the model while figures 1-3 show the different spatial and temporal dynamics of these variables in the three macro-regions (geographical area).

Table 3 - Main descriptive statistics for dependent and explicative variables (years 2006-2011) by Geographical Area

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Geographical Area		*RISK**	*MU**	*WC**	*VC**	*CO**	*LOANS**	*RFS**
North	Mean	3.07	0.53	52.80	15.34	84.53	93.08	-0.66
	N	1314	1314	1314	1314	1314	1314	1314
	Std. Deviation	4.09	0.21	4.42	3.39	28.61	100.70	0.13
Centre	Mean	7.49	0.69	53.73	17.62	150.54	107.12	-0.23
	N	450	450	450	450	450	450	450
	Std. Deviation	22.54	0.20	5.94	2.51	49.990	442.63	0.10
South	Mean	14.79	1.50	47.64	20.83	108.94	57.09	1.682
	N	576	576	576	576	576	576	576
	Std. Deviation	44.78	0.81	6.38	7.18	59.64	78.18	0.38
Total	Mean	6.81	0.80	51.71	17.13	103.23	86.92	0.00
	N	2340	2340	2340	2340	2340	2340	2340
	Std. Deviation	24.97	0.60	5.77	5.05	49.48	212.42	0.99

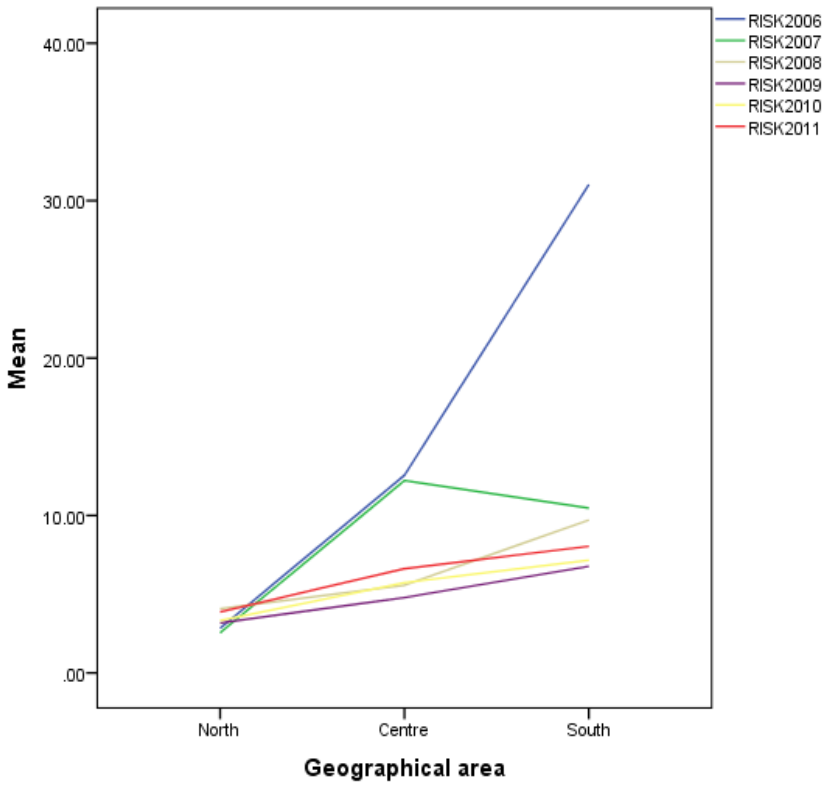
*= the means between the geographical areas are significant with $p<0.05$

Source: Our Elaboration

With reference to the dependent variable "Risk" and considering the years of observation of the phenomenon (2006-2011), in Southern Italy bad loans represent, on average, 14.79% of the total credits, a higher percentage than Central and Northern Italy (respectively 7.49% and 3.07%). This gap underlines a large amount of bad debt in the South. This condition exposes the CCBs in this geographical area to a more elevated risk of erosion of their assets, which, in extreme cases, can produce a crisis of liquidity for such banks. However there is wide heterogeneity among the sampled BCCs as can be deduced from the high value of the standard deviation.

On the contrary, the CCBs in the North of Italy seem to profit from lower credit riskiness. This last datum assumes a particular importance because the CCBs in this macroregion are more numerous (meaning more available observation data). With reference to the space-time dynamics of this variable, the greatest credit riskiness emerges in 2006, immediately before the outbreak of the international crisis, to then clearly continue to grow but at a lower rate in the following years. Furthermore, with reference to the spatial dynamics of this variable, it emerges that, in every considered year, more elevated values were observed for CCBs in Southern Italy with 39% (see table 3, figures 1 and appendix 1). This confirms the fact that consumer credit exposure in Southern Italy introduce a higher degree of default risk in comparison to subjects resident in the rest of Italy: 2.56 in the South against 1.76 in the Centre / North. Such great riskiness concerns both the segment of families (1.51 against 136) and enterprises (3.50 against 247) (Bank of Italy, 2011).

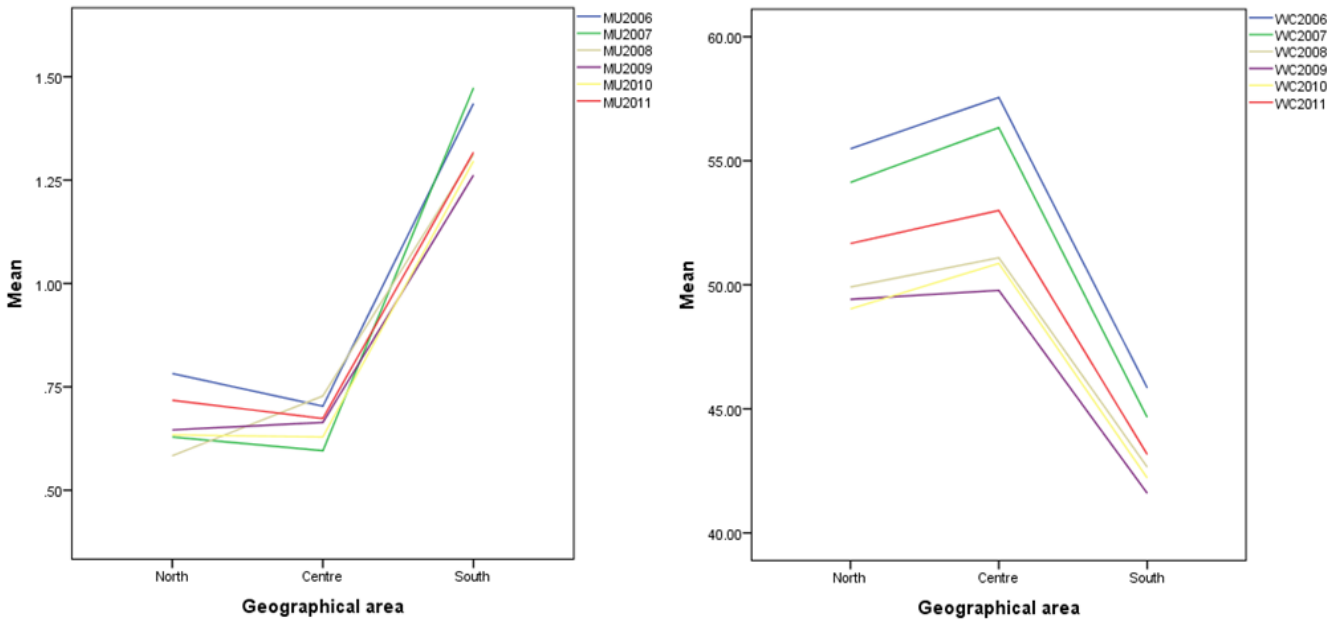
Figure 1- space-time dynamic for variable RISK



Now let us analyze in detail the independent variables. On average, in Southern Italy, there is a higher rate of homicides of 1.5 per 100,000 inhabitants, compared to 0.69 and 0.53 respectively for the Centre and the North of Italy (see "MU" in table 1 and figure 2a). With reference to the space-time dynamics, except for 2008, for every other year there was a fall in murders in both Central and Northern Italy. On the contrary, a sustained growth in murders marked the South without any slowdown in the years 2006-2011 (see appendix 1 for more details).

Unlike the situation for murders, smaller gaps among the macro-regions were observed for widespread crime (WC). There was a slight predominance of thefts and robberies in the North-Centre of Italy, with 52.80 and 53.73 robberies respectively per 1000 inhabitants. In Southern Italy, although the figure is lower (47.6), there is great variability in the diffusion of this form of crime as seen in the high value of the standard deviation (6.38). In general, the national mean is 51.71 for robberies and theft per 1000 inhabitants. (see table 3 and figure 2b).

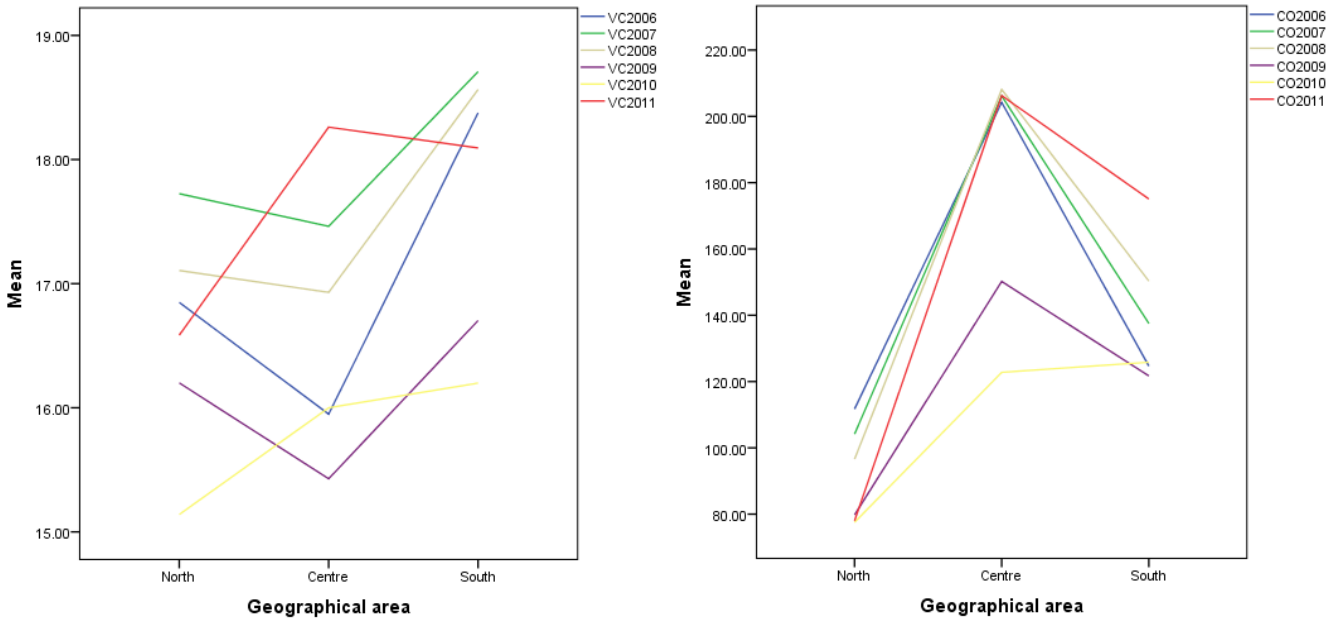
Figure 2 - space-time dynamic for (a) Murders (MU) and (b) Widespread Crime (WC)



Let us now turn to Violent Crime (VC). It is inhabitants of the South Italy, in the years considered, who suffer most from this type of crime; in fact, there were committed, on average, around 20.83 violent crimes against 17.62 in the Centre and 15.34 in the North per 10,000 inhabitants. The highest value of the standard deviation and the average can be attributed to Campania, whose territory was victim to a large number of violent crimes (around 33). Except in 2011, for every other year a reduction of the number of crimes of violent was observed in the Centre and the North. These temporal dynamics are completely overturned in the South (see table 3, figure 3a).

The South of Italy witnesses an average rate of criminal organization (CO) of around 109 per 100,000 inhabitants, twenty points higher than the North (85) and near to the rate calculated for the national territory as a whole (103). Among the macro regions, the Centre is mostly penalized by the presence of this form of crime, with an average rate of 151. A strong incidence of organized crime does not unite all the regions of the South, as underlined by the high value of the standard deviation (see table 3, figure 3b). Looking at the space-time dynamics, in the years 2006-2011, we observed up to 2008 sustained growth for the North and Centre of Italy, reaching a peak in 2010 in this last macro region and then a downturn in the following years, especially in the South of Italy. Despite this reduction, organized crime in the South of Italy recorded higher values for 2011 than Northern Italy (see table 3, figure 3b).

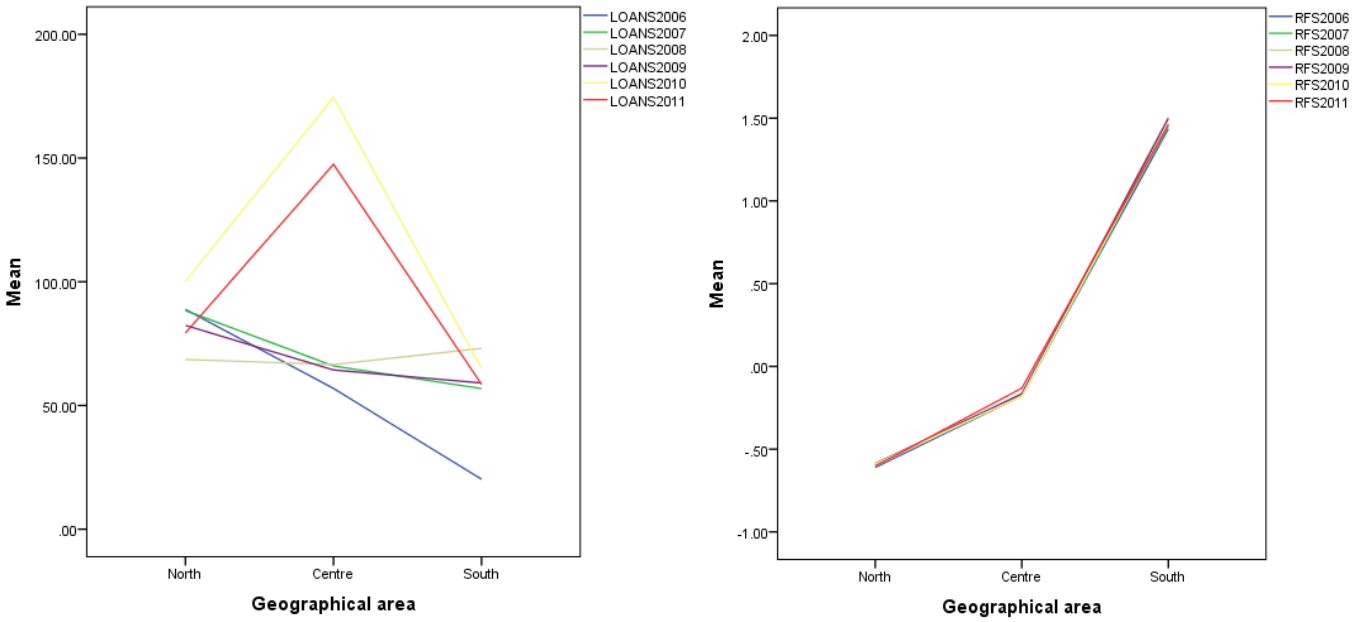
Figure 3 - space-time dynamic for (a) Violent Crime (VC) and (b) Criminal Organization (CO)



With reference to the sole banking variable of "LOANS", it is suggested that the credits issued compose a lower percentage, in average, of total assets (57%) in the South Italy in comparison to the other macro regions (86.9% national mean). This evidence could underline a strategic orientation of the CCBs localized in this part of Italy in favour of a policy of less diversification of the lending portfolio. In this way, such banks would not fully profit from the positive effects of such a strategy in terms of the reduction of credit riskiness. Such behaviour could explain the higher values in average and the adverse temporal-space dynamics of this variable in the South of Italy already before the international crisis. The lower value of the standard deviation (78% of total assets) shows that this strategic choice unites all the CCBs in this part of Italy (see table 3, figure 4a). The growth of this variable represents a key feature of CCBs in Central Italy, especially in the years when the crisis became more intense (2010-2011) (see table 3, figure 4a). This result confirms that the CCBs, exploiting their distinctive characteristics (mutual governance, flexibility of the organizational model, strongly rooted in the territory, attention to social profitability and a focus on the person rather than a focus on profit, the economic culture of the lending relationship) have managed to guarantee, thanks to non-cyclical behaviour, support for local economies more than the rest of the banking industry. In other words, in a general context of credit crunch, the CCBs, an example of territorial banks, have preferred to adopt an expansive lending policy (Arnone and Ofria 2014, Lopez, 2015). Lopez underlines that in the period 1999-2013 the stock of loans grew sevenfold (against only three times in the rest of the banking system). Its market share of loans doubled, from 3.4% in 1993 to 7.1% in 2013. The CCBs became the main banks for the segment of the micro and small enterprises (over 22% for artisan enterprises and 18% for capital companies. The data relating to the regional federations of cooperative credit underline that the market share grew in all regional areas, with very different intensity and starting in 2008 with different initial values, ranging from 41.50% in Trentino Alto Adige to 2.9% for Lazio, Umbria and Sardinia (data not shown).

Such market share dynamics reflect the fact that the CCBs, unlike the larger banks, with a highly diversified offer and complex plans of fusion and “cross border” growth, have continued to specialize in traditional lending activity (Bonaccorsi di Patti et al., 2005). This strategic choice affects in particular those customers at a high risk of becoming insolvent in periods of economic crisis.

Figure 4 - space-time dynamic for (a) LOANS and (b) RFS



The variable denominated "RFS" (Regression Factor Score) shows a clear gap among regions of the South of Italy and the Centre (more than seven percentage points) which widens even further with respect to the North (around 12 percentage points). The presence of these penalizing gaps for Southern Italy shows that high unemployment and levels of poverty represent structural limits that strongly affect the activation of development processes in this part of Italy. Greater prosperity is a common feature of most of the regions of Northern Italy, as the smallest value of the standard deviation of this variable all unites the regions of the North as it suggests a lower value of standard deviation. On the contrary, the higher values of standard deviation in the other two macro regions suggest that the intensity with which such ties condition the economic structure of the territories is manifested with a high degree of differentiation between the regions of the Centre and South of Italy. Observing the space-time dynamics, we see robust, uninterrupted growth above all in the South of Italy with particular intensity in the years of the international crisis (see table 3 and figure 4b). Regarding the macro region comparison of all variables, the Mann-Whitney[5] test was applied to assess the presence of statistical differences across the geographical areas (North vs. Centre, North vs. South and Centre vs. South) for each year. The results obtained show that there are huge regional differences for each year considered in particular between Northern and Southern Italy (see appendix 2 for more details).

5. A tentative model for riskiness of CCBs

Using these data on the sector of credit cooperatives in Italy, we try to estimate a model according to a pooled OLS approach[6] [1].

$$RISK_{it} = \mu + MU_{it}\beta + WC_{it}\beta + VC_{it}\beta + RFS_{it}\beta + LOANS_{it}\beta + \varepsilon_{it}$$

[5] Since the assumption of normality was violated, which meant that it was not appropriate to use "t"-tests, it was necessary to use a non-parametric test such as the Mann-Whitney

[6] Although data can be adapted to be analyzed by a panel approach, we used the Pooled OLS model because the Breusch and Pagan Lagrangian multiplier test for random effects is not significant (p=0.454). In this case, the Pooled OLS estimation is efficient and all associated statistics are asymptotically valid.

Furthermore, the possibility to use the RFS variable in place of the Area dummy variables (North/Centre vs. South) allowed us to overcome the problem of multicollinearity. In fact, the estimates produced by the model including this dummy variable provided VIF (Variance Inflation Factor)[7] values greater than 10. The table in appendix 3 that lists the RFS values for each region suggests (better) why it can be considered (almost) a dummy. As we can see, this variable establishes (almost) a north-south distribution. The possible relationship between the dependent variable and the explanatory variables was assessed using a statistical but above all economic interpretation of the impact that environmental factors may have exerted on the management decisions of cooperative credit banks.

We recall that the pooled OLS model assumes that the intercepts are equal for every individual (in our case for every cooperative credit bank) and, accordingly, that the whole individual heterogeneity is explained by the explicative variables and the term of error εit. So, if this hypothesis is confirmed, the model Pooled OLS produces undistorted, consistent estimates.

The first estimates of pooled OLS model are given in Tab. 4. The results obtained refer to the entire national context.

Table 4 -The impact of the crime proxy on the Italian CCBs (pooled OLS) (*)Significant at p<0.05% - Number of banks: 390, temporal dimension: 2006-2011, number of observations: 2340

Explanatory variables	*Estimated coefficients*	*S.E*	*t-ratio*	*VIF*
MU	0.6412	1.2593	0.5100	2.26
WC	0.5727*	0.1034	5.5400	1.41
VC	-0.3792*	0.1329	-2.8500	1.79
CO	-0.0049	0.0104	-0.4700	1.06
LOANS	-0.0043	0.0024	-1.8100	1.01
RFS	6.8706*	0.7566	9.0800	2.27
Constant	-15.9496	5.0547	-3.1600	

Source: Our Elaboration

The results underline that the presence of illegal conditions and widespread crime and violent crime produce significant statistical impact on the credit risk of Italian CCBs. The positive signs of beta coefficients suggest that an increase of these type of crimes causes a downgrading of the quality of credit granted by these local banks. The negative sign of violent crime, contrary to the expected effect on the dependent variable, can be attributed to the high correlation that violent crime has with another kind of lawlessness apart from murders (whose sign is correctly positive). The model was thus re-estimated, leaving only those statistically significant variables and those with coherent expected signs (Table 5).

Tab 5: The impact of the crime proxy on the Italian CCBs (pooled OLS) (*) Significant at p<0.05% - Number of banks: 390, temporal dimension: 2006-2011, number of observations: 2340.

Explanatory variables	*Estimated coefficients*	*S.E*	*t-ratio*	*VIF*
WC	0.4419*	0.0932	4.7400	1.15
RFS	5.9669*	0.5386	11.0800	1.01
Constant	-15.6553	4.8427	-3.2300	

Source: Our Elaboration

[7] Basically VIF (*Variance inflation factors*) estimates by how much the variance of a coefficient is "inflated" because of its linear dependence with other predictors. Values of VIF above 10 are usually considered a sign of multicollinearity.

The results regarding the relationship between widespread crime and the risk of CCBs in the south are also confirmed in the conclusions of other studies (Bonaccorsi di Patti, 2009), that explain the greater riskiness of banks in the south of Italy by analyzing the conduct of "unfaithful" bankers. These, motivated by personal benefit, engage in collusive agreements with borrowers and issue credit without respecting the correct procedures, moreover taking on risks which have not been adequately covered.

Even the environmental variable RFS is significant and is positively correlated with the dependent variable. In fact, the worsening of the economic situation identified by a higher value of the RFS variable increases the risk of insolvency of customers of cooperative credit banks. Therefore, these banks increasingly view the tangible risk of future losses on their loans. The higher value of this variable is a main feature of regions with a high percentage of unemployment and poverty and lower GDP per capita (see table 3 in the appendix). The greater statistical significance of the variable RFS in this macro region is perfectly consistent with Giordano et. al, (2013) and Barra et. al. (2014), who focus on the greater duration of economic recession in the south and the consequent effects both on the liquidity of banks and on the solvency of borrowers, and also take into consideration the fact that there is a less competitive credit market than that found in central-northern Italy.

This risk was not reduced by CCBs thanks to an increase in the percentage of granted loans on total assets (i.e. loans variable) i.e. by managerial choice to further diversify the credit portfolio. To reduce the credit risk, the cooperative banks can, for example, adopt various strategies. An example is the change in the contractual conditions of credit supply before the loans expire. In this way, local banks are able to retain customers through intense, long-term relationships, according to the economic culture of relationship lending (Arnone and Ofria, 2014). Consequently, loans made pass from the status of bad debt to restructured credit. This strategy is an example of a risk containment policy. Other examples include: 1) the predisposition of a suitable process of management of the credit that includes phases of initial evaluation, suitable ICT solutions, and unified risk management with specific responsibilities; 2) the real obtainment of personal guarantees and/or as tools of mitigation for the customer’s risk of default; 3) the total or partial revocation of the granted loans. This strategy is the implementation of a greater diversification of the loan portfolio according to various dimensions: geographic areas, customers, product and services lines, delivery channel etc. (Mottura and Paci, 2015, Tutino 2015).

The only banking explicative variable "loans" can be considered a proxy of this credit portfolio diversification strategy and it underlines that the maintenance of a good quality of disbursed credits depends not only on the efficiency of the scoring systems but also on the management of the portfolio credits to the clientele according to specific policies. The failure to adopt diversification strategies can explain the growth of bad loans in the credit portfolio by CCBs in all three main macro regions (see figure 1 above). The non-statistical significance of this variable can be explained on the basis of management decisions related to the main features of cooperative credit banks, highlighted in the literature (Barbagallo, 2015, Lopez, 2015), namely: 1) an operation aimed at a limited spatial environment; 2) limited operational dimensions; 3) a supply model addressed to a customer segment represented mainly by households and smaller firms. According to Barbagallo (2015), the intense deterioration in loan quality distinguishing local banks, of which over 70 percent were cooperative banks, was caused not only by two heavy recessions, but also by an at times unbalanced relationship with the surrounding territory. This is due to the risk of undue influence on banks, which prevents their local links from bringing informational benefits to improve the selection of creditworthy customers. On the contrary, the relationship with the territory can affect banking operations by compromising the objectivity and impartiality of decisions to grant credit. In addition, to compensate for lower profits, banks may abandon their other distinctive features (especially those noted above as 1) and 3)), diversifying their loan portfolio in less known geographical areas by granting credit to larger, little known and undeserving firms.

6. Conclusions

The results of the empirical analysis allow us to reflect on intervention policies aimed at reducing or stemming the possible negative effects of widespread crime on the Italian credit system and environmental variables such as lower GDP, higher unemployment and poverty (captured by the RFS variable) above all in the South of Italy. Ultimately, widespread crime adversely affects the riskiness of credit cooperative banks but even more so are adverse environmental conditions, which have a greater impact on RISK. These policy measures could, amongst other things, be aimed at intensifying the fight against organized crime in the areas where the phenomenon is most intense, paying particular attention to preventing and repressing any phenomena of collusion between bank officers and the surrounding environment.

And in any case, as economists know, intervening to ensure the good working of the credit market is a necessary condition for generating economic development, particularly in an underdeveloped area such as the South of Italy.

The econometric results obtained highlight that in Italy the crime rates influence the conduct of banks. The possible explanations of these results are as follows: 1) bankers in the South of Italy are more likely, in selecting who to give credit to, to be conditioned, albeit indirectly, by a criminal environment. Anecdotes tell of how a bank manager, when arriving in a certain area with a strong criminal presence, first receives a visit from the mayor of the town, then probably one from the chief of police. But, it is the third visit that counts, in other words the visit from the person who controls the territory, who immediately offers his services to provide any information he may need; 2) a further effect of the criminal variable derives from judicial action through the seizing of assets of Mafia bosses. We are however well aware that the majority of these seizures are not successfully translated into confiscation, but definitely result in non-performing loans with banks; 3) a third explanation could be the fact that banks in the South of Italy, in an "unhealthy" environment, find it more convenient to select borrowers mainly by raising interest rates, rather than bearing the significant costs involved in obtaining information on the credibility of customers and thus implementing a “qualitative analysis of credit” (Albertazzi and Bottero, 2014). Increasing interest rates, as reported in economic literature, generate a negative phenomenon known as "adverse selection". This occurs when, in the presence of high interest rates, those that ask for credit are probably those planning extremely risky initiatives, and those that have nothing to lose, from an ethical point of view, in the event of bankruptcy; 4) a fourth explanation of the greater incidence of crime in the regions of the South could be found in the fact that these regions display more widespread social tensions, poorer families and businesses and greater risks of insolvency on the part of the latter (Guiso et al., 2009; Arnone et. al, 2013; Arnone, 2014). However, when the full regional data set is available we will be able use some spatio-temporal data models to test the results obtained using the Pooled OLS estimate.

In the light of these considerations, it can be assumed that, since local banks have managed to preserve their way of banking and as a result the contact with local businesses, making changes to their creditworthiness assessment models by applying advanced technology such as credit scoring could allow them to have access to additional funds to support the productive fabric of the Italian economy.

The adoption of these quantitative models for the assessment of creditworthiness, which would be used together with information gained in a timely manner both of a qualitative nature (relating to the quality of the management, production and commercial strategies, organizational structure and corporate governance structure) and regarding economic and financial forecasts (business plans, budgets, business, budgeting capital), could allow local banks to manage more effectively the bank-firm relationship in terms of a more effective, conscious and selective monitoring of credit risk. In other words, the crisis requires a resetting of the distance between the two traditional competitive models of credit risk assessment, the “relational” model typical of local banks (and therefore also of the CCBs) and the “quantitative” model typical of large banks (Demma and Provenzano, 2012; Del Prete et al. 2013). Stable credit relationships can also be achieved by CCBs through the realization of credit portfolio diversification policies. This strategy, as emerged from the existence of a statically meaningful negative, has not yet been adopted by the CCBs, which is shown by the absence of a statistically significant correlation between the variable and RISK LOANS.

If this goal is achieved, local banks will benefit from a strengthening of the competitive advantage of the culture of relationship lending, that will become an effective tool for attracting, in addition to traditional firms, more innovative and dynamic firms specializing in science-based fields, functional to the greater financial diversification of the supply model of local banks (Borri et al. 2014). In this way, thanks to the stability of the relationships with the clientele over time and also to the start-up of new credit relationships with new segments of clientele, CCBs will be able to operate in a more competitive credit market following the global crisis. In the light of such considerations, the stability of these relationships assumes particular relevance for all the types of banks and above all for local banks, according to the economic culture of relationship lending. This is a key objective to guarantee their survival. To achieve this objective it is necessary to combine price policies and customer satisfaction policies. The latter in particular represent the basis for the realization of credit portfolio development policies aimed at acquiring a greater market share.

Appendix 1: dependent and independent variables by area and year

Year	*Area*		*RISK*	*MU*	*WC*	*VC*	*CO*	*LOANS*	*RFS*
2006	North	Mean	2.91	0.57	56.10	14.89	103.30	98.82	-0.66
		N	219	219	219	219	219	219	219
		S.D.	5.09	0.24	3.84	4.10	34.69	113.19	0.11
	Centre	Mean	12.51	0.75	58.58	16.75	167.38	62.36	-0.23
		N	75	75	75	75	75	75	75
		S.D.	23.50	0.11	6.90	2.04	49.53	58.89	0.06
	South	Mean	39.08	1.55	50.47	21.69	107.48	18.72	1.68
		N	96	96	96	96	96	96	96
		S.D.	90.16	0.86	6.13	9.73	46.75	10.33	0.41
	Total	Mean	13.66	0.85	55.19	16.92	116.65	72.09	0.00
		N	390	390	390	390	390	390	390
		S.D.	48.26	0.62	5.89	6.43	47.87	94.81	1.00
2007	North	Mean	2.55	0.56	55.34	15.92	97.93	92.32	-0.66
		N	219	219	219	219	219	219	219
		S.D.	4.06	0.18	3.93	3.98	28.48	90.49	0.10
	Centre	Mean	12.92	0.59	57.17	18.35	163.96	69.71	-0.24
		N	75	75	75	75	75	75	75
		S.D.	48.69	0.22	6.03	2.55	54.25	36.71	0.11
	South	Mean	14.63	1.70	49.46	22.29	113.47	54.22	1.68
		N	96	96	96	96	96	96	96
		S.D.	51.59	0.81	6.20	8.47	54.29	35.41	0.40
	Total	Mean	7.52	0.85	54.25	17.95	114.45	78.59	0.00
		N	390	390	390	390	390	390	390
		S.D.	33.80	0.65	5.74	5.88	48.58	73.62	1.00
2008	North	Mean	2.47	0.46	51.02	15.74	92.57	78.24	-0.66
		N	219	219	219	219	219	219	219
		S.D.	3.39	0.25	3.64	3.49	23.53	51.10	0.13
	Centre	Mean	5.15	0.75	51.62	17.91	160.54	71.53	-0.21
		N	75	75	75	75	75	75	75
		S.D.	7.68	0.31	4.69	2.13	59.14	48.07	0.10
	South	Mean	10.65	1.50	47.33	21.93	119.46	81.83	1.68
		N	96	96	96	96	96	96	96
		S.D.	22.43	1.03	6.50	7.51	62.91	164.75	0.39
	Total	Mean	4.99	0.77	50.22	17.68	112.26	77.83	0.00
		N	390	390	390	390	390	390	390
		S.D.	12.33	0.70	4.97	5.30	51.21	92.43	1.00
2009	North	Mean	3.23	0.63	50.63	14.95	78.60	85.29	-0.66
		N	219	219	219	219	219	219	219
		S.D.	4.92	0.14	3.47	2.80	21.05	72.32	0.15
	Centre	Mean	4.06	0.64	50.16	16.60	132.57	67.58	-0.23
		N	75	75	75	75	75	75	75
		S.D.	1.98	0.18	4.24	1.91	23.96	13.96	0.12
	South	Mean	7.61	1.48	45.58	19.59	96.17	61.02	1.69
		N	96	96	96	96	96	96	96
		S.D.	5.37	0.79	5.84	5.93	51.26	51.08	0.33
	Total	Mean	4.47	0.84	49.30	16.41	93.30	75.91	0.00
		N	390	390	390	390	390	390	390
		S.D.	4.97	0.55	4.80	4.17	37.69	61.01	1.00

Year	*Area*		*RISK*	*MU*	*WC*	*VC*	*CO*	*LOANS*	*RFS*
2010	North	Mean	3.37	0.47	50.79	14.66	64.84	122.75	-0.66
		N	219	219	219	219	219	219	219
		S.D.	3.52	0.15	3.60	2.38	16.35	164.80	0.16
	Centre	Mean	4.79	0.72	51.11	17.09	109.36	205.89	-0.23
		N	75	75	75	75	75	75	75
		S.D.	2.56	0.19	4.67	2.40	33.87	684.67	0.12
	South	Mean	7.97	1.40	45.83	18.68	94.92	66.56	1.68
		N	96	96	96	96	96	96	96
		S.D.	5.47	0.67	5.82	4.34	50.87	51.47	0.36
	Total	Mean	4.78	0.75	49.63	16.12	80.81	124.91	0.00
		N	390	390	390	390	390	390	390
		S.D.	4.37	0.53	4.95	3.44	36.74	327.34	1.00
2011	North	Mean	3.90	0.48	52.93	15.89	69.93	81.06	-0.66
		N	219	219	219	219	219	219	219
		S.D.	2.96	0.20	4.43	3.03	20.36	61.04	0.13
	Centre	Mean	5.52	0.67	53.75	19.01	169.43	165.65	-0.22
		N	75	75	75	75	75	75	75
		S.D.	2.64	0.07	2.83	2.99	39.62	832.46	0.10
	South	Mean	8.79	1.38	47.13	20.83	122.15	60.20	1.68
		N	96	96	96	96	96	96	96
		S.D.	5.93	0.63	6.37	4.97	80.90	31.70	0.37
	Total	Mean	5.42	0.74	51.66	17.71	101.92	92.19	0.00
		N	390	390	390	390	390	390	390
		S.D.	4.35	0.51	5.41	4.18	60.70	368.13	1.00

Appendix 2: Mann-Whitney test for the comparison geographical areas by year

North Vs Centre

Year		*RISK*	*MU*	*WC*	*VC*	*CO*	*LOANS*	*RFS*
	Mann-Whitney U	4642.000	3765.000	7711.000	6205.000	2399.000	6133.000	0.000
2006	Z	-5.619	-7.140	-.805	-3.223	-9.333	-3.273	-13.184
	Asymp. Sig. (2-tailed)	.000	.000	.421	.001	.000	.001	.000
	Mann-Whitney U	4292.000	6660.000	7693.000	5325.000	2201.000	7025.000	279.000
2007	Z	-6.170	-2.492	-.834	-4.635	-9.650	-1.869	-12.736
	Asymp. Sig. (2-tailed)	.000	.013	.404	.000	.000	.062	.000
	Mann-Whitney U	4318.500	2602.000	7693.000	5347.000	1519.000	6155.000	279.000
2008	Z	-6.128	-9.007	-.834	-4.600	-10.745	-3.238	-12.736
	Asymp. Sig. (2-tailed)	.000	.000	.404	.000	.000	.001	.000
	Mann-Whitney U	4624.000	7339.000	8008.000	5633.000	0.000	6963.000	744.000
2009	Z	-5.647	-1.402	-.328	-4.141	-13.184	-1.966	-11.989
	Asymp. Sig. (2-tailed)	.000	.161	.743	.000	.000	.049	.000
	Mann-Whitney U	4696.000	2305.000	8008.000	4107.000	2254.000	7662.000	279.000
2010	Z	-5.534	-9.483	-.328	-6.591	-9.565	-.866	-12.736
	Asymp. Sig. (2-tailed)	.000	.000	.743	.000	.000	.386	.000
	Mann-Whitney U	4920.000	3442.000	6167.000	3101.000	0.000	6791.000	279.000
2011	Z	-5.181	-7.658	-3.284	-8.206	-13.184	-2.237	-12.736
	Asymp. Sig. (2-tailed)	.000	.000	.001	.000	.000	.025	.000

North Vs South

Year		*RISK*	*MU*	*WC*	*VC*	*CO*	*LOANS*	*RFS*
2006	Mann-Whitney U	2288.000	2222.000	7228.000	5739.000	9182.000	1557.000	0.000
	Z	-11.053	-11.321	-4.485	-6.518	-1.816	-12.035	-14.355
	Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.069	.000	.000
2007	Mann-Whitney U	3650.000	533.000	5809.000	4854.000	10037.000	5048.000	0.000
	Z	-9.222	-13.627	-6.422	-7.727	-.649	-7.343	-14.355
	Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.517	.000	.000
2008	Mann-Whitney U	3548.000	1512.000	5989.000	4192.000	6648.000	6036.000	0.000
	Z	-9.359	-12.291	-6.177	-8.631	-5.277	-6.016	-14.355
	Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
2009	Mann-Whitney U	3905.000	2157.000	5809.000	5187.000	8640.000	5702.000	0.000
	Z	-8.880	-11.410	-6.422	-7.272	-2.556	-6.464	-14.355
	Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.011	.000	.000
2010	Mann-Whitney U	3955.000	412.000	5469.000	4550.000	6419.000	7568.000	0.000
	Z	-8.812	-13.793	-6.887	-8.142	-5.589	-3.957	-14.355
	Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
2011	Mann-Whitney U	4311.000	145.000	5811.000	4520.000	6132.000	4220.000	0.000
	Z	-8.334	-14.157	-6.420	-8.183	-5.981	-8.456	-14.355
	Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000

Centre Vs South

Year		*RISK*	*MU*	*WC*	*VC*	*CO*	*LOANS*	*RFS*
	Mann-Whitney U	1764.000	1221.000	1434.000	2729.000	1137.000	1733.000	0.000
2006	Z	-5.716	-7.472	-6.803	-2.736	-7.736	-5.812	-11.308
	Asymp. Sig. (2-tailed)	.000	.000	.000	.006	.000	.000	.000
	Mann-Whitney U	2236.000	286.000	1434.000	2731.000	1823.000	2106.000	0.000
2007	Z	-4.246	-10.409	-6.803	-2.730	-5.582	-4.651	-11.308
	Asymp. Sig. (2-tailed)	.000	.000	.000	.006	.000	.000	.000
	Mann-Whitney U	2198.000	1692.000	2315.000	2749.000	2226.000	2622.000	0.000
2008	Z	-4.364	-5.993	-4.036	-2.673	-4.316	-3.044	-11.308
	Asymp. Sig. (2-tailed)	.000	.000	.000	.008	.000	.002	.000
	Mann-Whitney U	1990.000	795.000	2597.000	2741.000	1881.000	2008.000	0.000
2009	Z	-5.012	-8.811	-3.150	-2.698	-5.399	-4.956	-11.308
	Asymp. Sig. (2-tailed)	.000	.000	.002	.007	.000	.000	.000
	Mann-Whitney U	2250.000	341.000	2597.000	3040.000	2680.000	2836.000	0.000
2010	Z	-4.202	-10.237	-3.150	-1.759	-2.890	-2.378	-11.308
	Asymp. Sig. (2-tailed)	.000	.000	.002	.079	.004	.017	.000
	Mann-Whitney U	2351.500	88.000	1078.000	3351.000	1573.000	1884.000	0.000
2011	Z	-3.886	-11.031	-7.922	-.782	-6.367	-5.342	-11.308
	Asymp. Sig. (2-tailed)	.000	.000	.000	.434	.000	.000	.000

Appendix 3: The RFS values in Italian regions

Region	*RFS*
VAL D'AOSTA	-0.7808
TRENTINO-ALTO ADIGE	-0.7433
LOMBARDY	-0.7211
EMILIA-ROMAGNA	-0.6947
VENETO	-0.5612
FRIULI-VENEZIA GIULIA	-0.4183
TUSCANY	-0.3326
PIEDMONT	-0.2669
MARCHE	-0.1821
LAZIO	-0.1306
UMBRIA	-0.0194
ABRUZZO	0.5819
MOLISE	1.0017
SARDINIA	1.4045
PUGLIA	1.5645
BASILICATA	1.6392
CAMPANIA	1.7758
CALABRIA	1.7981
SICILY	2.0043

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