

Risk in the dynamic evolution of bank and firms: A Viable systems approach

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Abstract

This study investigates the literature on the topic of the risk that accompanies evolutionary dynamics, both within companies and credit institutions, and puts particular focus on the risk of uncertainty and unknown risk, analyzed according to the paradigm of Viable Systems Approach. The aim is to investigate the capitalization and solvency of Italian banks, both large and small. This is a topic that has become much more relevant in recent times: it is now essential that the banking system be solid and responsive, in order to ensure sustainable growth for all stakeholders.

Keywords: operational risk, credit risk, uncertain risk, unknown risk, allocated capital, regulatory capital, risk appetite framework.

SUMMARY: *Introduction – I. Research methodology – II. The sensitive risk and the risk of not knowing – III. A brief description of some types of risk that characterize the activity of enterprises and banks – IV. A focus on operational risks of companies in management – V. A focus on credit risk – VI. The risk qualification of allocated capital – VII. The role of regulatory capital in risk monitoring – Conclusions, managerial implications, limitations of the research and insights for future research.*

INTRODUCTION

In an environment plagued by persistent economic and financial crises, companies complain of the difficulties they face daily in accessing credit. This difficulty, combined with the other critical issues that characterize the environmental dynamics, have increased the level of riskiness. Risk cannot be standardized over time and space (Bertini, 1987), but is inevitable, unavoidable, systemic, multidimensional, and changeable. This situation prompts the governing body of the business to focus considerable attention on the analysis, mapping, and systematic monitoring of the risks connected to the business' objectives and strategic choices, by implementing adequate protection measures.

Based on these considerations, the present study aims to analyze primarily the prevailing literature on the subject of the risk that accompanies evolutionary dynamics both within the companies themselves and the credit institutions—with a particular focus on the risks and uncertainty of not knowing—analyzed according to the paradigm of the Viable Systems Approach. It is known that risk affects intersystemic relationships activated by the context, and in particular between banks and businesses, in terms of capital that must be allocated by credit institutions in accordance with the financial system. Furthermore, we will try to answer the following research questions: in the past five years, have banks strengthened their capital base to support their risks? How can small banks, and those strongly rooted in a territory, be rated in this context? The article is structured as follows: following the introduction and the description of the research methodology, random and unknown risk will be discussed. In the third section, we analyze some types of risk that are typical of the activity of enterprises and banks. The fourth and fifth sections will focus respectively on the risks of companies operating in the management and on credit risk. Subsequently, the focus will be placed on the link between risk and the capital allocated. In the final section, the study focuses on the analysis, under a managerial point of view, of the importance of the risks, associated with the exposure of the data collected to give an answer to the research questions. The work will be

completed with the conclusions, the managerial implications, limitations of the research and insights for future research.

I. RESEARCH METHODOLOGY

The framework for the study incorporates an interdisciplinary approach. To achieve the objectives of the study, our method of investigation is to carry out a desk-study of Italian and international contributions, in order to outline a framework of interpretation for the subject. In particular, we used a qualitative approach (Creswell, 2012) based on an examination of the information provided by the Bank of Italy in Title IV, Chapter 1 of the New Regulations for the Prudential Supervision of Banks, Circular No. 263 of 27 December 2006, called Basel II, as comprehensive, complete, relevant, comparable and reliable. The data were taken from a panel of lenders of different sizes: in addition to the main banking groups operating throughout Italy, we also examined small local lenders in the province of Frosinone.

II. THE SENSITIVE RISK AND THE RISK OF NOT KNOWING

The Viable Systems Approach is receiving considerable attention, particularly in regard to the two categories of risks that the viable enterprise needs to deal with. These are distinguished by the level of knowledge of the decision maker as the risk of uncertainty and the risk of not knowing. The first is characterized by the ability of the system to include cognitive events among its varieties, as part of the understanding of observed reality. These establish the probability of occurrence of events as basically reliable and rationally evaluate their impacts on the expected results. The governing body may implement forms of protection against these risks by transferring the losses that arising from them to outside (Ferrero, 1987), by negotiating to transfer the risk to another entity, through contractual arrangements or specific clauses arising from risky events (Rullani, 1989), by resorting to insurance (Hicks, 1931), or by providing specific allocations to equity to cover possible risks. The risk can be transferred to an entity that belongs to the company structure, or which falls within the context of the reference of the company but is not part of it. The company thus aims at a situation of risk sharing or risk shifting. In the first case, the risk is shared within the company, as are the losses or benefits, expanding the variety that characterizes its structure, or with external entities; this occurs in cases of outsourcing, long-term marketing contracts, joint ventures that pool innovative research and development, and so on. The most important aspect is for the parties to acquire the

skills and abilities that help to monitor risks and detect them early on (Proietti, 2012).

Risk shifting consists of the transfer of the risk to a nonstructural subject, while transforming it into one or more different risks (Jensen and Meckling, 1976).

Risk sharing involves contractual settings that have a third party assume the risk—for example, through the signing of a swap contract, an insurance policy, or something of that sort. The possibilities for the enterprise to manage risk through the use of insurance instruments and contractual settings with internal entities belonging to the structure—or with the wider environment—depend, however, on the ability of the enterprise to read the complexity of defining and setting reasonable contract. Ultimately, the attitude and the risk appetite of the various subjects are included in the environment in which the company operates.

The risks of not knowing are related to events or environmental situations completely unknown to the governing body. It may be that the decision maker does not believe it appropriate to consider these possibilities, or does not have the necessary resources to locate them. They may include extraordinary events that are not foreseeable, or events whose probability of occurrence cannot be calculated. It may also be that the event's possible effects on results cannot be known in advance, perhaps because it can be correlated with other events. This risk category is not transferable and cannot be kept actively; nevertheless it has great potential to threaten the viability of the enterprise. Therefore, an appropriate coping strategy requires cognitive efforts and cultural growth, as well as the enhancement of intangible resources and the capital base to absorb the fallout that might result from adverse events that are unpredictable (Proietti, 2012).

It is important to emphasize that the risks of uncertainty partly coincide with the risks of not understanding when errors occur in estimates. If distinguishing between risks of not understanding and sensitive risks were actually possible and always exact, a financial structure “limit” could be defined. In view of the systemic risks, this might refer to either an unfavorable utilization of capacity or an inability to design and implement the necessary structural changes. Then failures in the ability of the governing body to develop a culture of risk can be transferred from the scope to be aware of the event and that the complication must be governed, by reducing the complexity of underlying uncertainty. Companies can protect themselves by preparing a defense that is adjusted to their tolerance for the risks they assume. The effects of negative events are thus limited to a defined amount of allocated capital.

III. A BRIEF DESCRIPTION OF SOME TYPES OF RISK THAT CHARACTERIZE THE ACTIVITY OF ENTERPRISES AND BANKS

Accurate “risk governance” requires the identification of the main areas of risk, their distinctive features, and consequences they entail for the systemic entities that populate the environment (Chessa, 1929; Golinelli, 2002; Proietti, 2008). In this study, however, it is considered appropriate to limit the analysis to those areas of risk that are considered significant in light of the study's objectives. The risk categories that lenders focus on include those of a financial nature which depend on the level of indebtedness

and the volatility of the financial markets, whose instability can generate direct negative consequences or critical situations, as well as giving rise to indirect effects on the company's profitability in the short and long terms (Van Arsdell, 1968; Solomon, 1972; Donna, 1999; D'Onza, 2008; Jorion, 2009). The prudent management of these risks is a key factor in the growth or consolidation of the company. The risks that result primarily from the financial intermediation process include credit risk (discussion in the sequel), market (financial) risk, and liquidity risk. Market (financial) risks, which can be described as speculative risks, refer to the chances of achieving a yield different than expected (i.e., independent of the direction of the change) at a given time horizon, from trading in financial instruments (Sironi, 1995). These are relatively standardized and comparable across the range of sizes observable in organized markets (Proietti, 2008). In this category may be included the price risk of financial instruments and goods (commodities) traded on regulated markets, foreign exchange risk, interest rate risk, investment risk (securities, equity indices, etc.), equity risk, the risk of credit spreads, default risk, and the risk of credit migration (Resti and Sironi, 2008). Liquidity risk is attributable to timing differences between income and expenditure that can have negative effects on the daily short-term management, in terms of supplier relationships, production levels, delays, or suspension of investment, thus undermining profitability and reputation (Ruozi and Ferrari, 2009). This risk increases in case of difficulties in the various forms of funding (funding liquidity risk and cash flow risk) (Jorion, 2003), in the process of liquidating assets to cope with unforeseen situations (market liquidity risk or asset risk), and when this can only be done in unfavorable economic conditions. This typology is inherent, in particular, in the financial intermediation activities tied to the time lag between the incoming and outgoing cash flows. In this context, it can be carefully managed by optimizing the risk–return profile through an appropriate weighting of financial stability and economic balance. In banking, this allows the delineation of boundaries and management criteria in the medium-to-long term, as well as the scope of the interventions to be implemented in the short term (Ruozi and Ferrari, 2009) in order to ensure continuity, with adequate correspondence between the flows of incoming and outgoing cash, so as to ensure the technical solvency of the bank; so as to coordinate the issuing of financial instruments in the short, medium and long terms; to optimize the cost of refinancing, balancing the trade-off between liquidity and profitability; to optimize the management of cash flows within the banking group, in order to reduce the dependence on external financing needs through cash pooling or other optimization tools. Liquidity risk includes funding liquidity risk, liquidity mismatch, liquidity contingency risk, and market liquidity risk. These types are mentioned alongside other risks by the Bank of Italy (Circular no. 263/06) under the Internal Capital Adequacy Assessment Process (ICAAP) of the New Minimum Capital Requirement, so that banks can independently identify the relevant risks, both with respect to the current and future situations, on the basis of their areas of operations and markets. In order to identify significant risks, “the analysis must consider at least the risks contained in the list in Annex A. This list is not exhaustive: the identification of any additional risk factors

associated with their specific operations is left to the prudent assessment of each bank.” This feature is part of the tasks of risk management, which should identify annually, unless endogenous or exogenous events intervene, the risks to which the bank is exposed, identifying those “relevant” and “irrelevant”, before proceeding with the selection of the set of significant risks that are measurable and quantifiable through specific methods, with the aim of calculating the allocation of regulatory capital. It follows that there are other types of risk. With operational risk, the main problems are due to errors, infringements, fraudulent conduct, internal or external relations of employment, workplace safety, interruption of business, damage caused by internal processes, the nature or characteristics of the products offered to customers, business practices, outsourcing, failures and system failures, failures of processes arising from pathological phenomena in information systems (loss of service caused by viruses, programming errors, etc.), natural disasters, and so on. The concentration risk arising from exposure to a counterparty or group of counterparties in the same line of business or geographical area (Szego and Varetto, 1999) can generate significant losses and threaten the solvency of the company. To mitigate this risk, banks usually implement a strategy of distributing this risk, both over the economic sector for single counterparties or an economic group of companies, while respecting the rules on the concentration of “large risks,” as the insolvency of a large borrower may adversely affect the financial soundness of banks. Interest rate risk is determined in the event of changes in interest rates that may affect the value of the assets of the bank. Strategic risk is defined by Simons (2004) as “an event, a set of unexpected conditions that significantly reduce the ability of managers to implement the business strategy deliberately.” It can thus be considered the current or future risk of a decline in profits due to changes in the operating environment or incorrect management decisions, inadequate implementation of decisions, and lack of responsiveness to changes in the competitive environment. It may well be the result of the implementation of a new strategy that is not appropriate—for example concerning entry into new markets, the competitive position of the bank, the introduction of new products, the acquisition of new customers, a new governance structure, and so on, or it might originate in an inability or unwillingness to perceive and respond quickly to the presence of market changes, adapting and innovating business models. Reputational risk is manifested in the case of a decline in profits or capital as a result of a current or future negative perception of the bank by stakeholders—primarily customers, counterparties, shareholders, investors, and supervisors—as a result of strategies, policies and behaviors that jeopardize the soundness of the reports (Fombrun et al., 2000; Bennett and Kottasz, 2000; Rayner, 2003; Gabbi 2004; Eccles, 2006; Soana, 2010). This factor is relevant to the performance of credit intermediation that, relying specifically on trust and credibility, allows banks to improve their financial, competitive, and social performance, as well as reducing the risk through strong relationships with stakeholders based on the assumed behavior over time (Shapiro, 1983; Fombrun, 1996; Rindova and Fombrun, 1997; McMillan and Joshi, 1997; Petrick et al., 1999; Roberts and Dowling, 2002; Fombrun and van Riel, 2004; Neville et al., 2005). The performances are

quantifiable in terms of market share, increases in brand value, reduced costs of collection, favorable strategic relationships with market participants, the ability to attract investors (Fleischer, 2004), ease in recruiting and retaining talented human resources (Morrison and Wilhelm Jr., 2003), and upgrading by rating agencies (Soana, 2010). This risk can be mitigated by controlling the events that generate it internally, which may be preventable through careful management of reputation, though not completely controllable, even if they are connected to external factors; they thus require permanent monitoring in order to act effectively and in a timely manner (Cafarotti, 2012). The uniqueness of the reputation, however, precludes the transfer to third parties of the relative risk to it, while requiring management to be implemented through organizational solutions, and strategic communication (Gabbi and Patarnello, 2010). Managing these types of risks, which requires an appropriate culture of compliance at the ethical level, has been made mandatory for banks by the standards of prudential supervision, which have imposed measures to prevent and control risk, from the point of view of the organization, the management, and the policies of allocating an adequate capital base (Gabbi and Patarnello, 2010). As evidenced by the supervisory board, it assumes a multidimensional character, since it “reflects the perceptions of the other players in the market and also exists outside the organization” and is derived from operational failures and the violation of established ethical principles, as well as legal and regulatory failures. The presentation of a strong systemic component also depends on other factors, such as credit risk, liquidity risk, and market risk (BIS, 2009). The capacity of the intermediary to accumulate reputational capital is an intangible asset (Cramer and Ruefli, 1994), that it is not imitable and must be considered a strategic factor (Barney, 1991) to be used at any time with the aim of attracting the customer and mobilizing the resources to deal with crisis situations—as long as it is not compromised by bad corporate conduct, such as unethical or socially irresponsible behavior (Keim, 1978; Carroll, 1973; Chalmers and Godfrey, 2004). The latter situation can generate conditions of insolvency, with serious consequences for even the stability of the entire banking system. Although the clientele is well protected by the same sort of credit, which extricates intermediaries from bankruptcy while subjecting them to procedures of receivership or compulsory liquidation, even through guaranteed funds or insurance schemes for depositors. As evidenced by Gabbi and Patarnello (2010) with respect to financial risks, this category is characterized by a hiring process that is less transparent and highly complex identification in the business line of the intermediary, with the same production and distribution processes. Finally, the residual risks are generated when the techniques for mitigating credit risk used by the bank are less effective than expected.

IV. A FOCUS ON OPERATIONAL RISKS OF COMPANIES IN MANAGEMENT

Operational risks arise from the variability of corporate performance as a function of the operating structure, which is in turn affected by the various combinations of fixed and variable costs that define the structural configurations as more or less rigid, according to the prevalence of the fixed

costs over the variable. This distinction, if reinterpreted in a systemic way (Golinelli, 2000), qualifies the two categories in terms of overhead costs and the costs of use of the structure. The first, which arises from strategic decisions that are essential for the achievement of company goals, are not choices concerning acquisition, sale, trading, or compensation, nor do they refer to the level of activity. Rather, this conceptualization qualifies the flow of services arising from skills acquired from external entities that are strategically important for the survival of the enterprise. With such exogenous entities, which are identified on the basis of a critical resource that is held and released (Paniccia, 1995), we establish relations at the expense of that which is permanent, inherent in its service flow, and is part of the costs of structure. This strategy is particularly appropriate in the case of the absence of systemic entities that can offer fungible performance, unfavorable conditions, the difficulty of access to resources, information asymmetries, opportunistic behavior that can only be controlled by incurring large transaction costs and constraints arising from relevant supra systems (Golinelli et al., 2002). Within the scope of the transaction costs are acts to obtain this information in order to enable an interaction, those relating to decision making, the negotiation of agreements between the parties, and finally cost control for verifying and enforcing compliance with contractual constraints. In many situations, these costs make the market transactions uneconomic. Structural costs, being linked to the productive capacity of the specific structure, remain constant as long as they do not implement structural modifications of the business system other than smaller adjustments. The changes may be dictated by the need to replace capital goods that have outlived their useful life on account of the intensity of technological innovation, to rationalize processes so as to make production more efficient, to expand production capacity, and to develop new opportunities through research for the future (Brusa, 2000). With evolutionary developments of the structure that are implemented through changes and restructuring of the organ of government—involving the design and implementation of new specifications—the system constraints incur a new cost structure. The systemic capacity to achieve such structural mutation—a manifestation of flexibility (Golinelli, 2000)—is fraught with great risk if it does not adequately exploit surplus capacity. A high incidence of these costs impinges on the rapid adjustments of corporate strategies to environmental change (Bastia, 2001) which can be implemented through the appropriate structural modifications.

The costs of use of the structure instead qualify on the basis of the choices made with the aim of making efficient use of resources. In this case, the relevant decisions relate to the acquisition, negotiation, and the remuneration of resources in production. To overcome such problems, the viable systems company outsources one or more phases of the production process. The adoption of such a strategic decision gives a reduction in operational risk, a higher proportion of variable costs, increases the degree of flexibility, and thus enhances competitiveness, while downsizing the financial requirements for both the working and the fixed capital component. Because the need for working capital is mainly determined by the delay between the economic cycle and the technical and financial cycle, the

elimination of some processes from the production cycle helps to reduce the intervals that separate the timing of payments, and consequently the use of sources of coverage (Ricciardi, 2009). With regard to capital assets, the disposal of investment, following the sale of certain outside activities, frees resources for alternative uses, resulting in a reduction in financial needs, thus fostering the downsizing of the costs relating to the acquisition of funding sources. It also allows businesses to respond more flexibly to changes in the market, thereby reducing the risk of creating high barriers to exit in case of sectoral crisis or the cessation of business activity. Operational risk is also linked to the Break Even Point, which allows evaluation of the effects on profitability arising from structural changes. The reduction of overhead costs as a result of outsourcing move the “breaking point,” leading to greater vulnerability of the financial result in the event of any contraction in demand. So a reduction in fixed costs corresponds to a contraction of operational risk and an increase in the value created by the company.

This type of risk, for Donna (1999), is conditional on:

- the sectors and markets to which the company will appeal and the competitive intensity that characterizes the sector: the more intense, the greater the risk;
- the sensitivity of the operating profitability to changes in production volumes and market prices;
- the attitude to business growth;
- the characteristics of competitive advantages.

To this was added the fact that a high degree of operating leverage increases the risk of high structural costs, resulting in structural rigidities or the total contribution to margin decreasing as a result of lower sales volumes, lower sales prices, or higher costs of use of the structure. This situation, while constituting a barrier to entry for potential competitors, enables the company to generate a multiplier effect on profitability in the case of growing demand for its products or services. In this case, it may be a source of competitive advantage that can support corporate performance over time (Tutino, 2012).

Operational risk is specifically mentioned (Stewart, 2000) when it expresses the dependence of the future cash flow on the changing conditions of the competitive system of the business, in addition to the particular characteristics of the company and its strategy. This risk can be determined based on the impact generated on future operating cash flows. It is determined essentially from the uncertainty inherent in the potential variability in the attractiveness of the sector and the stability of the competitive advantages of the company (Galeotti, 2008). Stability is influenced by both factors and helps the company to determine also the behavior of its competitors. The most common such factors are the stability of the value chain of the business, the level of competitive advantage, growth orientation or competitive repositioning, the strong dependence on specific skills, the sources of supply, the use of key resources, the relationships and interactions with certain stakeholders, the width of the product mix, degree of internationalization, the production capacity, the degree of horizontal and vertical integration, the concentration of ownership, and the governance model (which suffers, on one hand, from inadequate development of the organization and management, and on the other hand

from the opacity that results when the roles of owner and managerial largely coincide) (Forestieri, 2011).

The specific risk component can be eliminated via the efficient market, through a shrewd investment strategy in a diversified portfolio. The other operative risk elements, collectively called systematic risk, cannot, however, be eliminated or governed without exiting the industry in which the company operates. This risk is affected by general economic conditions that affect the business in which the investor places its financial resources. The macroeconomic variables in question are both “real” (the correlation of demand for the goods of the business with the GDP trend) and financial (the effect of the development of interest rates, inflation rates, exchange rates, and the relative differential). Operational risk must be implemented systematically through the cost of capital, because it affects the income expectations of investors. Its effect determined by calculating the “beta asset” coefficient (which corresponds to “equity beta” when the organization is exclusively funded by shareholders’ capital—thus, in the absence of financial risk).

V. A FOCUS ON CREDIT RISK

Credit risk can be analyzed both in terms related to the management of commercial credit (the variety of customers, the contractual terms, and the concentration of sales) and the debt in terms linked to the type of financial counterparties involved in the financial transactions. They form the point of contact between the economic dynamics and the financial variables, which inevitably affect each other. In companies that determine that the management of these risks should not be the prerogative of the finance function alone, they should be integrated with the other functions that assume the strategic and operating decisions (McGuire, 2003; Gaudenzi, 2006). Management must constantly monitor the level of reliability of the counterparties from which the company takes the active position, by virtue of loads from commercial or financial transactions (Intrigano, 2012). Credit risk (Malinconico, 2000) has been defined as “the possibility that an unexpected change in the creditworthiness of a counterparty results in a corresponding unexpected change in the fair value of the related credit exposure” (Resti and Sironi, 2008; Duffie and Singleton, 2012). The credit exposure can result from a financing transaction or from commitment to the occurrence of an event. This concept implies not only the limiting case, in which the debtor becomes insolvent (credit default risk) (Ammann, 2001), but also any impairment or deterioration of the creditworthiness of the latter (credit spread risk) (Bielecki and Rutkowski, 2001) and the case of partial fulfillment of the obligations assumed, (Banfi et al., 2010). These risks can influence the management activity of any company, regardless of sector, legal form, or size, although those most exposed are the banks whose core business (Siano, 1995; Sicca, 2003) is based on lending. Banking is not just concerned with the granting of loans in the strict sense, but also involves other exposures and off-balance-sheet items, such as investment in securities, derivatives, and guarantees. These are linked to the risk of technical insolvency, the settlement of risk (late and partial payment), the risk of deterioration in the quality of the borrower, the risk of double default (insolvency of the guarantor), and the risk of credit risk concentration, spread, or migration. For careful management of these risks—since

even the “best” customers can go into default—the customer portfolio needs to be constantly monitored by analyzing the expected losses (EL), both predictable and measurable, and the unexpected losses (UL), which are the real source of risk.

Under the Basel Committee, the term ‘default’ has both a subjective aspect (assessing the borrower’s ability to fulfill its obligations in full) and an objective aspect (loans falling due after a certain period of time). Such situations are attributable to arrears, overdrafts over 90 days, substandard loans, past due exposure, depreciation and provisions that may cause an imbalance in earnings, capital, restructured cash loans, covenant violations; they are not attributable to the concepts traditionally used, such as statutory insolvency and failure.

The expected loss (EL) (Chava et al., 2006) is given by the product of the probability of customer default (PD), the rate of loss in the event of a default (Loss Given Default, LGD), and the exposure at default (EAD):

$$PA = PD * LGD * EAD$$

The probability of default (PD) is estimated as the frequency at which borrowers, united by a common denominator (e.g., turnover, number of employees), will default within the time horizon of one year. This estimate, which will be compared with past frequencies of default, is based on the characteristics of the counterparties (e.g., financial soundness and corporate profitability) using mathematical and statistical models, as well as subjective elements.

This quantity is not influenced by guarantees that arising if profitability, solvency, and capital ratios remain the same.

The loss in the event of customer default (LGD) is related to the fraction of the remaining credit that can definitely not be recovered if the default occurs. While each customer bank is assigned a single borrower rating for any form of loan, it is usual to use as many LGDs as there are lines of credit outstanding (facility rating). This depends mainly on the form of the credit and the “strength” of the financial and real guarantees that support the loan, the level of subordination of the credit, and out-of-court collection actions. We can express this as:

$$LGD = 1 - RR$$

$$RR = \frac{ER - AC}{EAD} \cdot (1 + TIT)^{-T}$$

where:

RR (recovery rate) = net present value recovered / initial exposure

ER = absolute amount of recovery

AC = administrative costs

EAD = exposure at default

TIT = discount rate of future recovery

T = duration of the dispute

The factors that influence the LGD (Resti, 2001) as a result of their direct impact on the recovery rate are:

- the size of the loan and its characteristics (the presence of mitigation instruments: collateral or financial guarantees to third parties), the state of exposure—understood as the presence of any forms of seniority or subordination to other creditors—and the type of dispute;
- the opportunity cost of the interest not received;

- factors internal to the bank: the efficiency of the recovery processes expressed in terms of administrative costs (internal or external) directly incurred by the bank in bankruptcy proceedings or procedures of internal debt collection;
- time efficiency of liquidating the assets;
- the discount rates applied to the cash flows from the recovery of expression of the marginal cost of funding;
- external factors and the macroeconomic situation (Chava et al., 2006) (such as the stage in the economic cycle and the interest rates, which affect the present value of cash recovered following the default of the borrower), the construction or industrial production of the counterparty (which affects the degree of liquidity of the assets of the company), and its country of origin (on which may depend the speed and effectiveness of recovery procedures).

It should be noted, however, that there is a strong link between PD and RR (Bruche and González-Aguado, 2010). As noted by Altman et al. (2005), in periods in which default rates rise, recovery rates are significantly reduced, due to the decline in the value of the assets of the counterparties. This shows an inverse correlation between the recovery rate and the systematic risk of the economy. A correct estimation of PD and LGD is therefore essential for the cost of bank management as it forms the basis for determining the pricing of loans (Bank of Italy, 2006b; De Laurentis and Caselli, 2006). Exposure at default (EAD) represents the maximum potential loss in the event of insolvency, if the recovery procedure cannot retrieve even a minimum percentage of the position. It depends on the form of reimbursement fixed at time of credit (lines of “revolving” credit commitments, derivatives, etc.). For overdrafts and credit lines granted to companies, banks should actively monitor the financial condition of the borrower and possess the internal control systems to revoke line when its credit merit deteriorates (Felisari, 2008). The EAD is a random variable that is difficult to quantify, not being the predictable development of the actual use of credit granted, as measured by the ratio of credit used and credit granted. This factor affects in direct proportion the amount of regulatory capital that must be set aside by the bank as a result of transactions with the borrower. The expected loss (EL) determines the provision in the budget as the average percentage loss that occurs within a time interval of one year on each exposure (or pool of exposures) in the existing portfolio. If properly estimated, this is not a real concept of risk, but rather a measure of the rate spread that the bank should apply to the credit so as to have sufficient funds to cover the risk assumed. It is also crucial to the quantification of provisions in the budget and represents more than an element of risk—rather, a component of some loss associated with each loan. To effectively determine the credit risk, it is also necessary to measure the unexpected loss (UL), which represents the variability of the expected loss around its average value, and as such, is the true size of the risk. The intermediary must maintain a capital base so as to cope with the possible occurrence of losses that exceed expectations. It is calculated as the difference between the VaR of the loan portfolio and the expected loss. The cost of this form of loss to the bank is based on the risk premium, as

the capital to be set aside must be repaid at a rate that is being consistent with the expectations of the shareholders. While the loss is covered in allocating the debt through pricing and allocations in the budget, the unexpected loss needs to be covered by the assets.

For lenders who hold a portfolio that consists exclusively of small and medium enterprises, the expected loss can be measured statistically and with some precision, though this is irrelevant to the unexpected loss. On the contrary, in a portfolio made up of large companies, the unexpected loss becomes important and should be quantified through the use of concentration indices.

To understand the distinction between expected and unexpected losses, take as an example the case of a bank that has a portfolio of 100 credits of €1.00, with 1% PD and an LGD of 100%.

The expected loss assumes that one client in 100 will fail, resulting in a loss of €1.00. Unexpected loss occurs, for example, in the case of an economic and financial environment that induces more borrowers to default—say, for example, 7—causing an unexpected loss of € 6.00 on a total loss of € 7.00. Hence the logic of risk monitoring of a bank depends on the level and composition of its capital, which cannot be less than the capital absorbed by all the risks that are incurred, with stress-tests or further absorptions emerging from worsening market conditions, such as in the case of changes in interest rates, are assessed by considering both the current situation, taking both scenarios as possible. This size must constitute a risk of at least 8% of weighted assets based on the risks inherent in banking and finance, weighted according to the regulatory segmentation of borrowers and considering techniques for mitigating credit risk.

Banks can avoid credit risk by acting on two fronts (Resti, 2000):

- on the characteristics of individual exposures to reduce the size of the losses that could occur with each of them, exclude those that have a high probability of default. For each transaction, ancillary clauses can be applied, or guarantees may be required to limit losses in the event of a disruption of the debtor. In the case of revocable lines of credit, we may face risk when the first signs of deterioration in the creditworthiness of the counterparty emerge;
 - on the overall structure of the loan portfolio, to control the degree of risk through a credit distribution among separate counterparties for economic segments and poorly correlated. This allows common causes of instability to be avoided; instability can result in significant losses, due to the simultaneous insolvency of many or even all borrowers.
- It is believed, finally, that as part of the credit risk of the counterparty there is the possibility that the transaction could default before the final settlement.

VI. THE RISK QUALIFICATION OF ALLOCATED CAPITAL

Allocated capital is defined as the amount of financial resources under equity appointed to cover the risk of not knowing with which the company needs to cope in its

development—understanding by this also the risk of insufficient ability to manage the uncertainty. The perception of the importance and the quantification of the magnitude of capital allocated thus becomes fundamental in order to give the company adequate means to cover the risk of not knowing (Golinelli and Gatti, 2005).

This concept is taken up directly by the regulations provided to financial institutions, and has thus been adapted to nonfinancial companies. The basic rule is based on the knowledge that the business risk is to be borne by the property, regardless of the form in which it manifests.

To determine the extent of this coverage, it is assumed that the net effective result (P_e) could deviate from the objective result (P_o), as provided in the budget of the investment (Golinelli, 2005). The riskiness of the plan is determined by considering the deviation of the actual values around the mean value (the target value), and then by taking, according to a statistical approach, a distribution of the normal type of the net variable (P). Assuming, then, that σP (the standard deviation of the variable P) is distributed normally according to a Gaussian, it is estimated that the maximum expected loss ($P_o - P_e$) is equal to $3\sigma P$, or will be within the confidence level of 99%—73% of which is associated with the practical certainty of the occurrence of the deviation.

$$3(p) = PMA \quad P_o - P_e \quad 3(p)$$

This formula is the equation of the normal distribution curve, proposed by the Gaussian theory of errors, with its characteristic bell curve shape. By varying the parameters (the average and the standard deviation), the graph becomes more or less flattened.

In formula:

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-1/2 (x-\mu)^2 / \sigma^2}$$

The maximum expected loss refers to future values, and so needs to be updated on the basis of a perpetuity, in order to obtain the maximum possible loss, and then to calculate the amount to cover at risk due to lack of knowledge:

$$\frac{3\sigma}{i} = PMP$$

The discount rate (s) is the weighted average cost of the debt capital and the equity capital (WACC); these values are recognized on the basis of the accounting records of the stated goal. So “ i ” is estimated based on the specific situation of the company.

For the correct quantification of the maximum possible loss, it is also necessary to consider the past; we must therefore add the maximum possible loss (PMP), as calculated from the loss recorded in the opening accounts or the loss claimed to have occurred in the past (PPP), so that management defines the correct amount of allocated capital.

$$CA = PMP + PPP$$

This is very difficult in reality, as the Allocated Capital (CA) is equal to the Equity (MP), because the CA is the result of estimates, especially in relation to the discount rate. Despite this, the estimate of allocated capital finds its validity in comparison with its own means; a comparison between the financial structure and the balance sheet actual limit—which allows the level of capitalization of the company to be defined.

The total capital invested (K) is equal to the sum of debt (D) and Equity (MP):

$$K = MP + D$$

If $MP = CA$, we are dealing with the financial structure described thus:

$$K = AC + D$$

Since $MP \neq CA$, we define a new entity EDC (excess/deficit capital) equal to their difference:

$$EDC = CA - MP$$

Even in relative terms:

$$EDC / EDC = K / MP + D$$

We can now define the parameters outlined in the following two financial situations:

1) Enterprise over-capitalized, where:

$$MP > CA$$

$$EDC < 0$$

The company in this situation shows excessive use of its own resources that not only cover the risk from the lack of knowledge, but also the risk from uncertainty. Besides these, additional resources can be used in an industrial perspective, with a policy of investing for implementing the value of the structure. In terms of the financial perspective, however, the company is solid, as in this case, the grant greater confidence, as it can at all times meet the repayments on its loans.

2) Enterprise undercapitalized, where:

$$MP < CA$$

$$EDC < 0$$

In this case, the loan amount is allocated to the risk from the lack of knowledge among creditors. This makes the company very sensitive and unreliable from the point of view of the financial system. In the context of industrial growth, projects are financed externally and thus subject to the risk of development being foreclosed, if the risk–return profiles required by supra systems are not met. This is the case with almost all Italian SMEs.

This new awareness of risk—that requires the enterprise system to think in terms of risk–return profiles—requires high-paying projects in underfunded situations, compared to what happens in the financing of companies with a more solid financial structure. This allows us to argue for the quotient of debt in relation to the higher or lower pressure that the financial system has on the system.

The concept of allocated capital in the enterprise, however, is a different concept from the banking capital allocation. The latter represents a constraint for the banking business, with the level of lending still required by law. Capital allocated to cover the risk of not knowing is a measure used internally and voluntarily, in order to assess the correct capitalization of the company. It is also a sensitive measure of the different capacity of the governing body in reading environmental complexity—the greater the predictive power of the potential risks and the lower the amount of money to capitalize for the risk of not knowing, while in the banking sector, it is only with Basel 2 that greater consideration has been given to internal interpretive skills, though, the sensitivity of the estimate happens through fairly rigid regulations. The evaluation of the risk–return profile by qualifying the act of the financial intermediary explains the attention that must be given in government action to promoting the development of a culture of risk. The allocated capital then becomes particularly important for implementing a form of management that is aware of the risk conditions for the survival of the system in terms of the

consonance with the suprasystems—and in particular with the financial suprasystem. Risk management, in essence, means overseeing the consequences of the preordained evolutionary dynamics of the business system in terms of the possible occurrence of adverse events, in the form of the two classes of risk of uncertainty and risk of not knowing. Capital allocated, as a full-risk capital, compete to the ownership, that has also outlined the structural settings and qualified governing bodies, in relation to a planned evolutionary dynamics, aimed firstly, to create the conditions for an adequate chance of survival.

VII. THE ROLE OF REGULATORY CAPITAL IN RISK MONITORING

Regulatory capital is the resource that is responsible for development, but it is also the amount capitalized that lies at the basis of the rules of prudential supervision issued by the Basel Committee. This financial resource is designed to absorb losses that could arise following exposure to the risks inherent in banking; the covering function of collateral is in the public interest, thus minimizing the social costs generated as a result of any bank insolvencies. The primary purpose of the Basel Committee on Banking Supervision, which was created in 1974, was to establish the minimum permissible holdings of banks and to strengthen risk management, thereby reinforcing the efficiency, productivity, and reliability of the international financial system. Based on these assumptions, in July of 1988 the “International Agreement on Asset valuation and Capital Accord” issued. It is sometimes called Basel 1 and it is just a system of measures to provide the minimum capitalization of lenders needed to cover the risks assumed in connection with operations. However, regulatory developments, innovated repeatedly over time, have introduced a closer correlation between risk and capital amount, and have revolutionized the criteria for assessing the credit risk by encouraging banks to develop “internal methods.” They have thus modified the procedure for the calculation of market risk and imposed an allocation of regulatory capital that addresses the operational risk that arises from the core business of the banks. The regulatory capital, which must be reported monthly by each bank to the Bank of Italy, consists of:

- Core capital (Tier 1), composed of elements as asset used to cover general business risks and to share the risks of shareholders. This category includes both positive elements, of which the bank must have the full availability to address to potential risk even as actual losses, and negative elements. The first consists of the paid-up capital, share premiums, reserves, retained earnings, the fund for general banking risks, and the innovative capital instruments. The latter include the subscribed but not paid-up capital, own shares, goodwill, and other intangible assets, and operating losses;
- Supplementary capital (Tier 2) includes elements that are not strictly assets, and therefore not subject to quantitative and qualitative limits. This value is also determined by adding positive and negative components, such as revaluation reserves, innovative capital instruments not in Tier 1, funds

to cover the specific risks, hybrid capital instruments, subordinated loans, unrealized capital gains on equity investments, other positive elements, net unrealized capital losses on equity investments, “prudential filters”, and other negative elements;

- Tier III capital (Tier 3) is exclusively dedicated to the coverage of market risks and includes the portion of subordinated liabilities not calculated in supplementary capital, subordinated liabilities of the third level and negative prudential filters;
- Capital deductions—that is, mandatory adjustments made to the total of the core capital and the supplementary capital; for example, investments in credit and financial institutions.

The financial resources allocated to managing risks, however, generate an opportunity cost for the bank that, not being able to use it in alternative investments, loses the opportunity to increase revenues. With regulatory capital, as already mentioned, any exposure of banks to the risk of default that could create such consequences is to be avoided, in order to prevent domino effects with serious repercussions on the national, and even international, economy (as in the case of Lehman Brothers Holdings). To all this, we must add the harmonization of the rules relating to capital requirements to bank must conform, so as to avoid speculations that could damage the competition. This legislation has thus stimulated a dynamic evolution of the banking system to strengthen the methodologies for calculating regulatory capital—also because of the possible savings capital—in addition to accentuating the reputation of the system on the international level. This demonstrates the increasingly scientific approach of government to the financial system, which reflects a number of more articulate constraints and incentives that integrate and complement each other (Proietti, 2012). This mode of ‘banking’ is also focused on careful analysis and risk management to lead to the emergence of new competencies, new organizational structures, and new management and administration processes. To highlight the link between risk and intervening regulatory capital, it was considered appropriate to focus on the notion of capital adequacy management by analyzing the trend over the last five years—the financial resources that banks set aside to cover the risks they assume and the estimates of capital absorbed by these risks. The process of evaluation of this capital adequacy begins by defining the “risk appetite framework” (Circ. N. 263 of 27 December 2006, 15th update, of July 2, 2013) which allows the determination of the “level of risk (overall and by type) that the bank intends to take in pursuit of its strategic objectives”. “Risk appetite can imply a forward-looking or wider view of acceptable risks, whereas risk tolerance suggests to immediately define the specific risks banks that will take” (Basel Committee on Banking Supervision—Principles for enhancing corporate governance, 2010; GDLinterbancario, ABI Risk Appetite, 2011). This step aims to manage the business with a greater awareness of the risks by setting and monitoring objectives for the strategic positioning, as well as their translation into measurable indicators, financial strength, and its interpretation; financial stability; the identification of the responsibilities undertaken and risk management; positioning within the efficient frontier of the possible risk–return configurations. The

appetite for risk (Prasanna, Vause, 2005), which defines the strategic direction on the basis of the assessment of capital and of current and future policies of risk-taking, is an appropriate means to ensure sustainable development in the medium to long term, preventing decisions being taken in order to maximize short-term profits by taking on an excessive level of risk. The risk appetite framework, which involves employees on all organizational levels, from the organ of government to the front line, includes both quantitative and qualitative elements. The former are related to the amount of capital that the bank allocates to risk, and which influences its strategic positioning; the latter refers to the will of the bank to strengthen the safeguards and monitoring systems, as well as the efficiency and effectiveness of the system of internal controls. Since part of the risk appetite is among the target indicators, capital adequacy is assessed by taking into account the extent of the regulatory solvency ratios, and is shown in Tables 1 and 2, which presents data from the period 2009–2013 obtained by analyzing the financial statements of a panel of lenders, divided into “banking groups” and “local banks”. The first were selected as representative of the national banking system in terms of the total amount of funds traded, the number of employees, and the number of branches in Italy. The second are the main local lenders, strongly rooted in the territory of the province of Frosinone selected for the survey. By splitting the sample data into the identified clusters, according to the average of the total capital ratio measured for each bank in the period examined, it was found that no bank holds less regulatory capital than the minimum expected by the Regulatory Authority. However, the most relevant information concerns the small local banks, which had, in the reporting period, capital levels well above the 8% minimum required by supervisory regulations, calculated as the ratio between capital and the risk-weighted assets, ranking all as being well above the average of the banks analyzed.

Table 1. Capital endowment and the solvency ratio of a panel of Italian banking groups

	2009		2010		2011		2012		2013		Total Capital Ratio Average
	Regulatory Capital in Million Euros	Total Capital Ratio	Regulatory Capital in Million Euros	Total Capital Ratio	Regulatory Capital in Million Euros	Total Capital Ratio	Regulatory Capital in Million Euros	Total Capital Ratio	Regulatory Capital in Million Euros	Total Capital Ratio	
INTESA	42,754	11,80%	43,802	13,18%	46,552	14,25%	40,744	13,60%	40,940	14,80%	13,53%
UNICREDIT SPA	54,372	12,02%	57,635	12,68%	58,979	12,37%	62,016	14,52%	57,651	13,61%	13,04%
IMPS	14,304	11,89%	14,143	12,90%	16,305	15,70%	12,734	13,71%	12,409	15,19%	13,88%
MEDIOBANCA	6,736	12,86%	7,851	14,26%	7,499	13,48%	8,066	14,76%	8,436	15,94%	14,26%
UBI BANCA	10,202	11,91%	10,536	11,17%	12,282	13,50%	12,259	16,01%	11,546	18,91%	14,30%

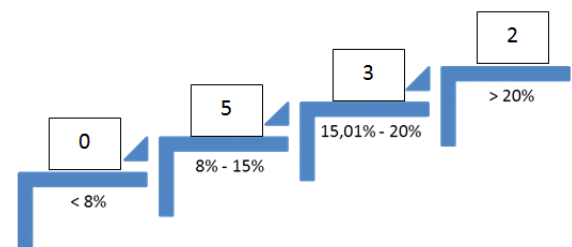
Source: own work

Table 2. Capital endowment and the solvency ratio of a panel of local banks belonging to the province of Frosinone

	2009		2010		2011		2012		2013		Total Capital Ratio Average
	Regulatory Capital in Thousand Euros	Total Capital Ratio	Regulatory Capital in Thousand Euros	Total Capital Ratio	Regulatory Capital in Thousand Euros	Total Capital Ratio	Regulatory Capital in Thousand Euros	Total Capital Ratio	Regulatory Capital in Thousand Euros	Total Capital Ratio	
BPC	68,951	19,30%	74,575	20,22%	73,608	17,76%	83,752	18,20%	91,682	18,19%	18,74%
BPF	57,731	21,59%	60,158	21,22%	78,564	24,84%	91,205	24,88%	87,053	19,67%	22,44%
BPLAZIO	239,779	18,01%	248,284	18,01%	247,101	18,31%	257,909	19,12%	264,913	19,10%	18,51%
BANCANAPOLI	118,952	25,37%	122,905	24,30%	120,600	24,00%	134,200	26,58%	130,000	26,52%	25,75%
BCCFROSINONE	17,975	17,90%	18,515	17,96%	18,715	18,19%	19,235	16,71%	19,578	20,79%	18,31%
BCCROMA	601,044	14,82%	639,539	17,66%	653,951	16,00%	671,347	15,13%	680,245	15,67%	15,86%

Source: own work

Figure 1. Breakdown of the average Total Capital Ratio



Source: own work

By analyzing the performance of the Total Capital ratio average in the period 2009–2013, there was a steady increase in both the banking groups in local banks which largely exceeds the limit imposed by regulatory provisions, especially those in small confirming what was already mentioned above.

Table 3 - Changes in the Total Capital ratio average

	2009	2010	2011	2012	2013
Bank groups	12.10%	12.84%	13.86%	14.52%	15.69%
Local banks	19.50%	19.90%	19.85%	20.10%	20.32%

Source: own work

Strengthen the capital took place when the banks are able to be proactive with respect to the evolution of the regulatory framework and they can benefit, thanks to a higher strength, from the growth opportunities that will emerge. This buffer has a conservative character, being designed to support banks in situations of economic and financial shock, with every effort and through an adequate level of capital.

CONCLUSIONS, MANAGERIAL IMPLICATIONS, LIMITATIONS OF THE RESEARCH AND INSIGHTS FOR FUTURE RESEARCH

In a scenario plagued by the numerous shocks that have hit the Italian economy in recent years (including the international financial crisis and the sovereign debt associated with the recession), several parties, primarily from the ECB, have urged strengthening the capital reserves of banks in order to ensure the stability of the financial system by supporting their ability to absorb losses arising from the risks they take. Risk, along with its prudent management through the preparation of an adequate risk appetite framework, as well as being relevant to the selective credit policies of the banks, also generates an improvement in the solvency ratio. Although the study showed that the investigated banks have surplus funds, they are less than the

minimum requirements in relation to the degree of risk, which correspond to positive results for the solvency ratio. It is this considered appropriate in subsequent studies to expand the investigation by considering the data of all the banks operating throughout Italy, in order to further confirm the results obtained. One clear the limitation of the research is the small number of banks used and the small amount of data analyzed with respect to the overall banking sector. It is suggested to proceed with a more detailed analysis of the benefits that the implementation of the risk appetite framework can have on the financial system.

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