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What drives the disintegration of the loan origination value chain in the banking business

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Abstract

Purpose – The purpose of this paper is to analyze the vertical disintegration of the bank loan origination value chain. This paper conducts a study on the credit information market from the perspective of the bank's decision to vertically disintegrate the loan origination value chain. The main aim is to identify the relevant drivers of the decision to vertically disintegrate the credit assessment phase in the lending business.

Design/methodology/approach – Transaction cost economics and information asymmetry are the typical perspectives of analysis of the vertical scope of business value chains.

Findings – This paper argues that in order to capture the drivers underlying the dynamic evolution of the vertical scope of bank loan origination business models, the above perspectives must be combined and integrated further with a resource-based view and the modularity perspective. Combining managerial and financial perspectives, this paper offers an examination of the drivers of vertical disintegration in the lending value chain and, specifically, in the credit assessment phase.

Originality/value – Although the existence of substantial research on value chain vertical integration/disintegration in the literature, none has directly focussed on the credit assessment value chain. It leaves a gap that the paper aims to overcome. The value chain disintegration has deep managerial and financial implications at firm and industry levels, and the comprehension of the rational underlying it is critical to maintaining competitive business model configurations in the bank lending industry.

Keywords Lending, Value chain, Information sharing, Vertical scope, Banking, Credit information

Paper type Conceptual paper

1. Introduction

In the past, most banks adopted an integrated value chain model, in which a single bank conducted all the phases of lending production and distribution. A single bank originated the loan, subscribed it on its own, managed it and held it to maturity. The individual stages of the lending value chain were integrated into a single banking firm: gathering and processing information on borrowers, provision of financing, carrying out the monitoring of credit exposures, collection and management of cash flows, review of credit lines and litigation management.

Nowadays, business areas of financial intermediation are subject to redefinition in relation to competitive dynamics. The most notable trend in recent years is the adoption of a disintegrated value chain model. Banking firms coordinate combinations of lending activities, leading to an orientation toward specialization in the process of financial intermediation.

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Value chain disintegration is based on the possibility of sharing production and distribution processes between variously coordinated organizational units, also belonging to different firms. The emergence of new markets along the banking value chain, and the wide use of outsourcing of individual stages of the lending process:

- foster the breakdown of the value chain;
- force to focus on the strategic relevance of business activities;
- imply a distinction between core business activities and other activities;
- create new forms of specialization and change the role of banking firms in the financial system; and
- lead to a profound reorganization of bank lending processes.

In my paper, I shall analyze the disintegration of the lending value chain in relation to the loan origination stage, and particularly, the credit assessment phase.

The central question in my paper is to identify the relevant drivers of the decision to vertically disintegrate the credit assessment in the lending business value chain. Combining managerial and financial perspectives, this paper offers an examination of the drivers of vertical disintegration in the lending value chain and, specifically, in the credit assessment phase. In particular, the paper identifies the enabling drivers underlying the decision to outsource the information production to assess the creditworthiness of borrowers, and measure their risk profiles, and piece out their role and the way they are linked together. I discuss how the creation of a market in the stage of loan origination is an innovation of great importance that changes the vertical scope of the industry. This innovation implies that other firms outside the bank can carry out effectively information production activities. This process of unbundling the lending value chain changes instruments and organizational forms employed by banking firms, fostering a flow of financial, organizational, and technological innovations. Such innovations have deep managerial and financial implications at firm and industry levels, and the comprehension of the rational underlying them is critical to maintaining competitive business model configurations in the bank lending industry.

Although the existence of substantial research on value chain vertical integration/disintegration in the literature, none has directly focussed on the credit assessment value chain in banking. Research on value chain integration/disintegration has mainly focussed on mortgage banking (Jacobides, 2005; Jacobides and Winter, 2005), banking industry (Boot and Marinc, 2008; Brickley *et al.*, 2003; Mottura, 2011), retail banking services (Berger, 2000; Consoli, 2005), organization design and governance (Leiblein and Miller, 2003; Schilling, 2000; Schilling and Steensma, 2001; Williamson, 1975, 1985), product and industrial design (Milgrom and Roberts, 1990; Sanchez and Mahoney, 1996; Ulrich, 1995), technology and IT services (Afuah, 2001; Iansiti, 1997; Poppo and Zanger, 1998), manufacturing industry and product/service innovation (Baldwin and Clark, 2000; Christensen *et al.*, 2002; Langlois, 2003). Yet research on value chain structure has not directly focussed, to date, on explaining how credit information market that links two stages of the credit assessment value chain in banking arises.

It leaves a gap in the literature that the paper aims to overcome. The objective of this paper is to provide deeper insights into the issue of vertical disintegration in banking. Particularly, this paper provides a theoretical framework that explains the bank's decision to vertically disintegrate the credit assessment in the loan origination value chain. The growth of the credit reporting market in the financial system, which has

enabled the development of specialized firms providing credit information to banks, evidences the strategic importance of this topic. The integration/disintegration of the credit information production process has many implications on the shaping of the boundaries of banking business models. The paper also aims to evaluate and discuss such implications.

Whereas previous studies have examined some microeconomic issues of the credit information market and the information sharing mechanism in bank-borrower relationship (Brown *et al.*, 2009; Brown and Zehnder, 2007, 2010; Jappelli and Pagano, 2000; Kallberg and Udell, 2003; Padilla and Pagano, 1997, 2000; Pagano and Jappelli, 1993), this paper takes the value chain configuration as the level of analysis and identifies and discusses the drivers that lead to the credit assessment value chain disintegration in banking and the deconstruction of the integrated bank lending model. The lack of a consistent theory on credit assessment vertical disintegration in banking leaves gaps that this paper aims to fill up.

The paper is organized as follows. Section 2 briefly reviews the literature on vertical integration, and provides the theoretical framework and the conceptual model of the value chain. This paper emphasizes the strategic importance of the value chain to study vertical disintegration in banking. Section 3 analyses the credit information market as an episode of vertical disintegration in lending value chain. Section 4 analyzes the information sharing mechanism in the credit information market that help better understand the dynamics of the loan origination value chain. In Section 5, the main theoretical bases for the multi-level analysis of the dynamic processes leading to credit assessment vertical disintegration are considered and the drivers underlying the process are singled out. Section 6 aims to clarify the nature and interaction between the drivers of the vertical disintegration of the credit process assessment and discuss their theoretical and managerial implications. The final section concludes the paper.

2. Literature review and theoretical approach

Several theoretical and empirical studies have analyzed the integration and disintegration processes in different industries. The vertical integration and disintegration is a complex issue that has significant implications not only on the shaping of the boundaries of firm business models, but also on the industry competitive dynamics.

The decision to vertically integrate or disintegrate reshapes the boundaries of a firm. Understanding the determinants of such boundaries is a fundamental concern of the theory of the firm. Since Coase's (1937) paper on the "nature of the firm" several studies have been conducted with regards to the boundaries of vertically integrated and disintegrated firms and different approaches have been adopted (for a complete review see: Bresnahan and Levin, 2010).

The literature on vertical integration can be divided into two major segments: the first examines the decision to integrate at the transaction/firm level of analysis, the second at industry level.

Perhaps, the most influential author write on vertical integration is Coase (1937). By posing the crucial question "What determines the boundaries of the firm?" he argues that the decisions to make or buy are determined by transaction costs and that the reduction of these costs increase market transactions. Williamson (1975, 1985) recognizes that production cost differences influence make or buy decisions. These differences crucially determine the vertical integration in an industry. In addition, vertical integration aligns incentives and interests of exchange parties. The transaction is the unit of analysis and firms choice their vertical scope as a function of transaction costs. Transaction cost

economics has largely focussed on a firm's decision to make or buy. It does not take into account the industry perspective and the emergence of intermediate markets to create vertical disintegration. This perspective is focussed on the individual choice of a firm.

Following a different approach, Argyres (1996) and Demsetz (1988) suggest that differential production costs arise from different firm-specific capabilities rather than from scale economies. They demonstrate that vertical integration relates to capability differences. Firm's comparative capabilities play an important role in defining boundaries of the firm. The uneven distribution of capabilities and knowledge between different firms fosters vertical disintegration (Argyres, 1996; Barney, 1991, 1999; Demsetz, 1988; Langlois, 2003).

At the origin, this stream of research focussed on firm growth and performance (Penrose, 1959). More recently it has focussed on firms' boundaries decisions. Most of these studies are linked to the surge of interest in capabilities, competences and knowledge in the theory of the firm (Barney, 1991, 1999; Conner and Prahalad, 1996; Grant, 1991a, b, 1996; Peteraf, 1993; Teece *et al.*, 1997; Winter, 1987). This view differs from that of transaction cost economics, which over simplifies firm choices of make or buy to the difference between costs of internal governance and costs of using the market.

At the industry level of analysis several factors may operate to shape the structure of the industry and the boundaries of the firms, to explain the processes of institutional changes and the emergence of intermediate markets (Evans and Wurster, 1999; Lafontaine and Slade, 2007; Langlois, 2003; Langlois and Robertson, 1995; Sampler, 1998). The industry perspective enables the identification of the major drivers of market creation and firm's choices of scope, such as firm-specific knowledge (Conner and Prahalad, 1996), firm-specific competences (Winter, 1987), firm-specific strategies and capabilities (Argyres, 1996; Demsetz, 1988; Wernerfelt, 1984; Winter, 1988).

According to the resource-based view of the firm, resources based on information and knowledge (invisible assets) are increasingly playing a key role in explaining the competitiveness and survival of firms (Grant, 1991b; Itami, 1987; Penrose, 1959; Prahalad and Hamel, 1990). These studies have led to the development of a branch of analysis focussed on the role of knowledge in firm evolution and competitiveness. The knowledge-based theory of the firm finds the reason for bank existence in the process of acquiring, combining, using and creating knowledge (Conner and Prahalad, 1996; Grant, 1996; Nonaka, 1994). In this context, make or buy decisions depend on the impact they exert on the efficiency of acquisition, use and knowledge creation. By shifting focus from a firm's make or buy choice to industry structure it is possible to capture important dynamics of industry evolution (Jacobides, 2005; Jacobides and Hitt, 2005; Jacobides and Winter, 2005, 2012; Nelson and Winter, 1982).

A third stream of research that sheds light on firms' vertical integration decisions is the modularity literature. Modern literature on modularity traces back to the fundamental contributions of Baldwin and Clark (2000). Over the last decade the concept of modularity has attracted the attention of researchers and managers in a growing number of economic sectors. Originally developed in the computer industry, the concept of modularity has broadened its perspectives of theoretical and empirical investigations.

The modular concept originates largely in the studies regarding the decomposition of systems (Simon, 1962). Simon shows that a system is decomposable (nearly decomposable system) when it is possible to break a system down into many stages, or modules, in such a way that most interactions (information flows) occur within individual modules, while interaction between modules is kept to a minimum and regulated through formal interfaces. One of the main advantages of this decomposition

is the stability of the system. A single system component may be altered, replaced or destroyed, without threatening the survival of the entire system.

The dynamic aspects of the modularization processes of complex systems have a direct impact both at the firm level and at the industry level, influencing the way firms organize business, define corporate boundaries, and acquire competitive advantages.

The early literature on vertical integration was concerned with a manufacturer's decision to integrate partially or completely the production and distribution processes. Significant vertical disintegration decisions affected both automobile sector and computer industry (Afuah, 2001; Baldwin and Clark, 2000; Iansiti, 1997; Poppo and Zanger, 1998).

An industry that underwent significant vertical disintegration was banking. By the end of the last century banking industry has evolved into a vertically disintegrated structure. Banks abandoned their existing strategies of process integration and pursued new business models. One episode of vertical specialization that is analyzed in this paper is the loan origination, particularly the credit assessment.

The theoretical framework that I employ in this paper to analyze the bank boundary determination in loan origination business includes the following paradigms:

- transaction cost economics: which allows to answer the question of whether market-based production should be preferred to the in house production;
- information asymmetry perspective: to properly understand the role of information sharing systems in the credit market;
- capabilities and resource-based view: to explain how knowledge and capability differences among firms are necessary conditions for the development of specialized credit information providers; and
- modularity: to examine the technological prerequisites of the emergence of the credit information market.

In this paper I shall adopt the concept of "value chain" to illustrate the vertical disintegration in loan origination business model. The value chain is grounded on transaction cost, information asymmetry, capability and resource-based, and modularity approaches to vertical integration.

The value chain is the sum of interactive processes that aims to achieve one or more specific outputs (Porter, 1985), and a process is a vector of activities that may differ from each other. The value chain is a useful tool to systematically portray the different activities and processes related to the "production of loan." In the economics of banking firms, the notion of business process is important not only from a strategic point of view but also from an operating one (Armistead and Rowland, 1996; Baravelli, 2003, 2011; Davenport, 1993; Mottura, 1996). The process approach, compared to the functional one, identifies and analyses the different activities that are carried out in a single process. The value chain represents the business organization of a banking firm in terms of processes. This perspective is particularly useful to gain insights regards the transformation of the banking industry in a dynamic and competitive environment.

I assume that the value chain is an helpful concept to better understand the different configurations of business processes in the economics of banking firms, and the different degree of integration, interdependence, differentiation and homogeneity between business processes. The value chain perspective gives an overview of the drivers behind the creation of new markets, and the resulting business model and industry structure. I conveniently use the theoretical framework of the value chain to represent the evolutionary dynamics of banking and, in particular, to seize the strategic

and organizational capabilities that these dynamics involve at the industry, firm and product level.

3. The credit information market and business models in lending

Loan origination is the credit asset creation that starts with a loan application and ends with a loan approval (Figure 1). The different activities in the loan origination are: application, processing, credit assessment and approval.

The traditional value chain of bank lending was an integrated one. Banks processed applications, evaluated creditworthiness and serviced loans until they expired.

Credits remained on the bank's portfolio until their extinction. Nowadays, the traditional credit process is fragmented and different organizations perform single aspects of the value chain. As a consequence, markets emerged.

The development of a market for credit information which allows to outsource single parts of the loan origination process has altered the degree of integration which characterizes the value chains of modern banking firms. This disintegration process means that other firms outside the boundaries of a banking firm can manage some of the loan origination activities (Figure 2). With the creation and evolution of a credit information market, different business organizations can carry out the complex activities of acquisition, production, processing, storage and utilization of creditworthiness information.

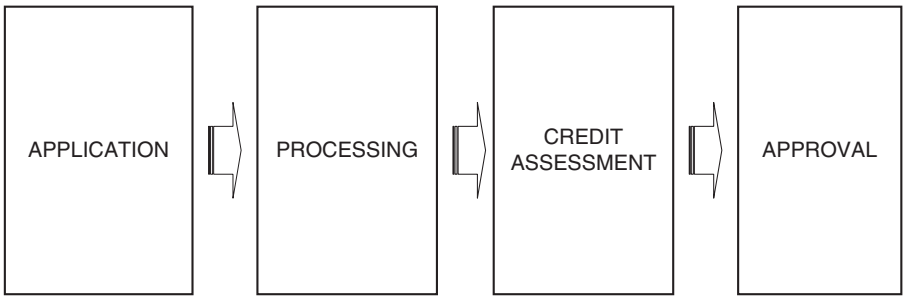

Figure 1.
Loan origination value chain: a scheme

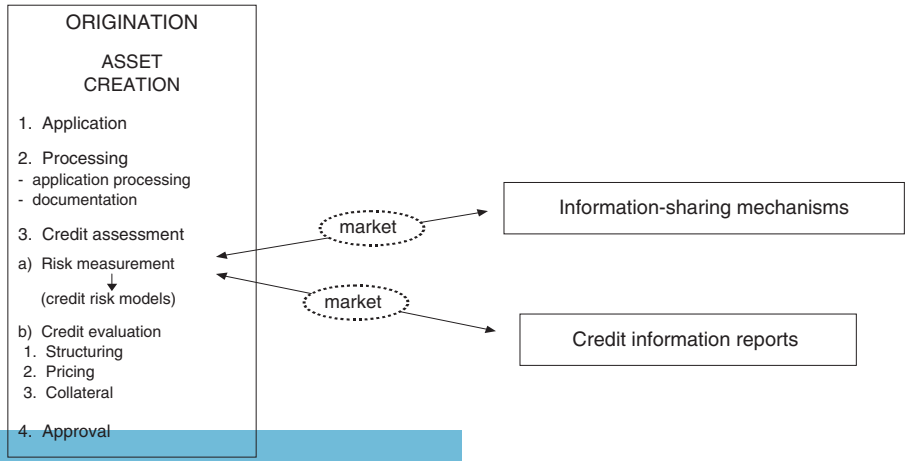

Figure 2.
Disintegration of loan origination value chain

The vertical disintegration of the value chain and the creation of a credit information market implies shifting from a firm-based to a market-based governance system (Jacobides, 2005; Jacobides and Winter, 2005).

Banking firms can place some parts of the credit assessment process out of their boundaries, creating contracts that further develop the credit information market. Traditional loan origination activities that were integrated in a single value chain can be split between different organizations, allowing a flow of information through the banks' boundaries. Given the existence of the credit information market, the creation of a vertical disintegration in the loan origination value chain is conceivable. This disintegration enables the development of specialized information providers linked to banks through the market.

As a result, two business models may emerge in the banking industry. One is vertically integrated, that is, a banking firm may start out loans and internally manage all the activities in the loan origination value chain; the other is vertically disintegrated, that is, a banking firm may start out loans and manage some activities of the value chain while outsourcing others. Among them different combinations of internal production and outsourcing exist. The lending business model could be the result of different decisions to increase or decrease vertical specialization in the lending value chain.

The strategic option to make or buy credit information during the assessment of bank loans implies the corporate banking firm's definition of its borders, and the evaluation of the extent and the variety of the content available and acquirable on the market. It is, therefore, a choice that is limited not only to the comparative economic advantage in terms of minimizing the costs of information production and distribution, but it also affects the search for competitive advantage in the loan origination process. These competitive advantages translate into a greater ability in the analysis and the selection of potential borrowers, be they individuals or firms.

The level and quality of credit information available for the assessment of creditworthiness affects the relationship between bank and borrower:

- banks may possess credit information because of their credit function and long-term relationship with borrowers;
- banks may originate internally credit information during credit assessment; and
- finally, banks can acquire credit information on the market where three players or information providers operate: public records, private credit reporting firms and credit information registers.

4. Information sharing mechanism in the credit information market

In this section of the paper I shall analyze the information sharing mechanism in the credit information market that helps better understand the dynamics of the loan origination value chain.

The creation of an information sharing mechanism that links the lenders to one another generally requires a mutual commitment in the provision of information. Such agreements can operate on the principle of reciprocity in the exchange of information between members. In this case it is more appropriate to talk about credit bureaus that act as information brokers. In other cases, the mechanism of information sharing can operate on a mandatory basis. In either case, the result is an information exchange between lenders, useful for the evaluation score in the granting of credit. It is more appropriate to call the latter a public credit register, which is often managed by national

central banks, as occurs in most European countries (Brown *et al.*, 2009; Miller, 2003). Empirical researchers find a positive cross-country correlation between the existence of a credit register and the aggregate level of lending (Djankov *et al.*, 2007; Jappelli and Pagano, 2000).

The credit information register is a form of centralization of borrowers' credit information that helps enhance economies of scale and scope in the collection, production and distribution of information in a financial system. This information sharing mechanism leads to the production of network externalities (Farrell and Saloner, 1985; Katz and Shapiro, 1985). Any creditor may enter the market to acquire credit information reports and the value of this information depends on the number and types of lenders who use the system. The more the database increases, the higher the value of the information for the potential borrowers. Generally speaking, the determinants that underlie the development of voluntary information sharing mechanisms, and that can therefore encourage the exchange of information between different lenders, are: heterogeneity of the borrowers, size of the credit market, development of information technology.

Credit bureaus are primarily developed in the consumer credit markets (Pagano and Jappelli, 1993). A high number of applicants which allows an efficient statistical analysis of the characteristics and credit history of borrowers characterizes consumer credit markets. The degree of loan standardization (more for consumer and small business loans, less for corporate loans) undoubtedly reflects the degree of standardization of credit reports, and the complexity of the data analyzed. The pooling of data from different lenders enables the credit bureaus to provide a high variety of information (credit reporting). The content of credit reporting varies according to the type of loan, the level of information detail requested from lenders, the breadth of the data collected, the number of members, the degree of geographical and productive business diversification, and limits imposed by law. Credibility and reputation are very important invisible assets for the development of a private information exchange that acts as an information broker.

Public credit registers represent an institutional mechanism for the exchange of information relevant for the assessment of creditworthiness. The underlying principle is the reciprocity of information exchange between lenders. Its basis is institutional rather than contractual, through the involvement of the entire banking system. Participation in the mechanism of information exchange is therefore mandatory for banks and for non-bank financial intermediaries.

Each member provides, at regular intervals, a set of loan information and obtains, upon request, a detailed flow of information on potential borrowers' state of indebtedness to the whole banking system (Figure 3). Credit information sharing is an important mechanism to manage informational opacity and reputational incentives (Brown and Zehnder, 2007; Kallberg and Udell, 2003; Hertzberg *et al.*, 2011; Padilla and Pagano, 1997, 2000), and reduce holdup by a privately informed bank (Rajan, 1992). This information set is acquired outside corporate boundaries, and is subsequently integrated with the structures and banking processes for the assessment of creditworthiness. The information thus acquired from outside contributes significantly to increase the

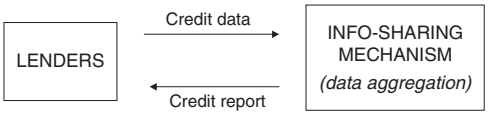

Figure 3.
Credit information register: information flows

bank's ability to assess the degree of reliability of potential borrowers, simultaneously improving the credit quality of bank assets, the efficiency of credit markets and the stability of the banking system. Credit registers perform the pooling of information that are thus able to provide detailed credit reports on the characteristics of overall indebtedness of households or firms toward the banking system, on the standing of each loan, on the degree of coverage offered by guaranties, and the amounts of credit granted and credit used.

The instituting source differentiates the two types of information sharing (private and public): voluntary and contractual the former, institutional and binding the latter. This different structure of information sharing creates a different level of completeness of credit reporting, which is higher when the information sharing mechanism is extended to the whole banking system. This difference, however, should not be interpreted in a general sense, as the current institutional configurations of public credit registers have a number of shortfalls which offer opportunities for the emergence and development of private credit registers (credit bureaus), able to reduce the information gaps that characterize the structure of each information register at the national level. The main shortfalls which may characterize public credit registers include the following:

- Reporting thresholds often lead to the exclusion of data regarding consumer loans and loans to small businesses.
- Credit data that feeds into the credit registers varies in different European countries.
- National level of credit registers limits the completeness of information reporting. Loans made by banks outside the national borders have no representation in the national pooling information system. The integration of capital markets at the European level reduces the information value of credit reports related to individual domestic markets.
- Nature and number of lenders (credit institutions) placed under the information exchange affects the effectiveness and efficiency of the credit information market. The progressive opening up to non-bank financial institutions (e.g. factoring, leasing, consumer credit, credit card companies, etc.) significantly increases the quality of information. The creation of special public registers for specific categories of loans reduces the effectiveness and efficiency of credit information markets.
- Storage time of the credit information sharing system affects the quality of the information tool for the evaluation of borrowers, and the efficiency of credit markets.

The nature and the details of information exchanged also differentiates the two types of information sharing (private and public). Credit bureaus provide a higher level of information detail, together with data analyses from different sources (such as public records, research, rating agencies, etc.). In public registers the information content is primarily negative type data (e.g. defaults, late payments, outstanding debts, uncovered cheques, bank overdrafts and other abnormalities in a banking relationship). Positive type data (e.g. current credit exposure, value and nature of guaranties, data from credit history of households or firms, demographic information for households and capital structure, financial and economic performance for firms) are present in more advanced systems of information sharing.

Regulation and public intervention are particularly important in the credit information market when private arrangements have not arisen spontaneously. Information exchange can be voluntary or imposed by regulation. Regulation and other institutional variables have a huge impact on quality, quantity and type of data exchanged. The value of formal information sharing depends on the quality of the information provided. The reduction of information opacity in the credit market can encourage a greater competition between lenders, a greater access to credit and lower credit prices.

In short, quality, quantity and type of information relates to structural, procedural and regulatory aspects of information sharing mechanisms operating in each financial system. These connotations lead to a greater or lesser effectiveness of services offered by information providers. Technological developments have created new distribution channels for information services of credit bureaus and public registries, reducing operational costs of production, management and distribution of information through the exploitation of economies of scale and scope. Technological developments increase the tendency toward a progressive centralization of information production/processing and toward a stronger concentration of the industry, leading to the overcoming of the national dimensions of credit bureaus (Brown and Zehnder, 2010; Carretta *et al.*, 2006; Miller, 2003).

5. The vertical disintegration of the loan origination value chain: a firm- and industry-level analysis

The appearance of the credit information market in the lending business poses the basis for the disintegration of the loan origination value chain. In this section of the paper I shall examine the drivers underlying the creation of markets in the loan origination stage.

5.1 Transaction cost economics perspective

According to the transaction cost perspective, the acquisition of information and knowledge on the market is attributable to production cost differences that influence make or buy decisions. Banking firms define their degree of vertical integration on the basis of transaction costs necessary to gain the set of information for creditworthiness assessment. The transaction cost paradigm may usefully help take make or buy decisions: if in house production costs outweigh the costs of using the market, banks choose to make use of external suppliers of information.

Williamson (1975, 1985) clarifies the conditions of internalization and outsourcing of production processes, and defines two types of costs: internal costs of coordination and external costs of transaction (e.g. costs of screening, contracting, monitoring and agreement implementation). Banks should rely on the market when external transaction costs are lower than costs of internal coordination. Transaction costs are related to asset specificity (the transaction object, parties involved and terms of transaction), frequency and uncertainty of transactions, bounded rationality, opportunistic behavior, and information opacity of contractual relations. The higher uncertainty and specificity of the market transactions, frequency, risk of opportunistic behavior, the higher transaction costs, especially in the presence of incomplete contracts (Hart and Moore, 1990, 2008; Hart, 1995).

Notwithstanding this important theoretical basis, transaction cost perspective does not fully explain the formation and evolution of credit information markets and, in

particular, the contractual and institutional mechanisms for sharing information. Transaction cost economics' focus is not on the evolution of value chain structures. It is thus not surprising that, though transaction cost economics constitutes an important theoretical lens, it is unable to convey a complete explanation of the underlying drivers of vertical disintegration. In particular, the main limitations of this line of research with regard to the issue of value chain evolution are the followings:

- The analysis focusses on individual transactions and therefore it is not able to fully evaluate the factors and evolutionary profiles that emerge at the industry level.
- The existing literature on transaction costs does not provide an adequate explanation of how and why transaction costs can be reduced. Transaction cost economics does not examine the evolutionary dynamics of the industry.
- The analysis focusses on explanatory causes of abandonment of the market by firms and the adoption of an integrated the value chain. This analysis implicitly assumes the a priori existence of the market (Williamson, 1985, p. 87).
- The analysis assumes the existence of markets in which other firms produce intermediate goods.
- This line of research puts an excessive emphasis on transaction costs, underestimating the internal costs of production and coordination of firms' activities.

Given this list of limits to transaction cost economics, I suggest to explore other theoretical perspectives that may offer significant support to discover drivers underlying the creation of markets in the loan origination value chain.

5.2 Information asymmetry perspective

The asymmetric information perspective (Akerlof, 1970; Stigler, 1961) offers important contributions, both theoretical and empirical, for a proper understanding of information sharing systems operating in the credit market. Lenders can internally produce information on their borrowers or can buy it on the market. An intermediate solution is to share information about their borrowers with other lenders through formal sharing mechanisms (Pagano and Jappelli, 1993). A mechanism for the exchange of information on potential borrowers helps to reduce information asymmetries in bank-borrower relationships, and relationships between banks. This result is possible because information sharing systems:

- Improve bank knowledge on potential borrowers' characteristics. Banks can mitigate adverse selection problems and render processes of loan selection and loan monitoring more efficient.
- Reduce the problem of informational rents (Fama, 1985), according to which banks access and produce inside information in credit relationships which allow them to gain an information monopoly that could modify industry competitive dynamics. The information sharing reduces horizontal information asymmetries between banks.
- Reduce moral hazard of borrowers. The information sharing between lenders acts as a mechanism for regulating borrowers' behavior during the credit relationship.

- Reduce incentives of multiple credit lines. The sharing of information between lenders provides an overall exposure of borrowers to all banks and financial intermediaries. Borrowers' default risk and creditworthiness also depend on their overall level of indebtedness. If banks were not aware of other lenders, borrowers might have a strong incentive to borrow excessively. Therefore, horizontal information asymmetries are mitigated as credit information is available to most banks.

In the lending business, the bank has private information about the creditworthiness of customers but not on new borrowers (Fama, 1985). The bank has to face an adverse selection problem. The exchange of information reduces informational asymmetries between lenders and borrowers and reduces the impact of adverse selection and moral hazard on lending decisions (Dwight and Russell, 1976; Stiglitz and Weiss, 1981). Banks exchange credit information about borrowers because it reduces informational rents and informational opacity. This exchange of information also heightens borrowers' incentive to repay, reducing moral hazard.

The credit information market, and the information sharing mechanism in particular, in addition to mitigate adverse selection and moral hazard problems, might reduce coordination costs among multiple lenders, and incentivize a more competitive credit market. A collection of papers (Miller, 2003) provides empirical evidence of the value of credit reporting data for credit risk analysis. They demonstrate how the credit reporting market contributes to the reduction of transaction costs in lending (by reducing loan processing costs and the time required to process loan applications), the improvement of credit portfolio quality, the facilitation of transactions at a distance from bank offices, the stability and supervision of the financial system, the development of the loan secondary market and securitized loan portfolios.

In short, a bank qualifies not only as an information producer, but also as an information acquirer, to overcome or at least reduce the problems caused by the presence of asymmetric information in the credit market. In this market, however, quality, comprehensiveness and reliability of information are the critical variables that can affect the allocative efficiency of banks and, in general, efficient capital allocation in the financial system (Allen, 1990).

5.3 Capability and resource-based views of the firm

Capability and resource-based views of the firm shed light on the implications of knowledge and capability differences for the vertical disintegration of the loan origination value chain. In this perspective, the asymmetric distribution of knowledge and capabilities between banks are the drivers of business decisions on specialization and integration. These differences are necessary conditions for the development of specialized credit information providers.

Differences in terms of knowledge, capabilities and expertise that emerge between banks and other financial firms or institutions (specialized in production and distribution of credit information reports) are the drivers of the development of markets for credit reporting. Vertical integration is therefore a function of banks' capabilities in a segment of the lending value chain, and knowledge that is variously located in business organizations. In this perspective, if all banks have similar capabilities at all stages of the loan origination value chain, no form of specialization emerges. If, however, a significant difference between inter bank capabilities emerges, even in the presence of transaction costs, specialization and markets along the loan origination value chain will appear.

In a dynamic perspective of analysis, I agree that both transaction costs and capability considerations may influence make or buy decisions in the loan origination value chain. The two sets of considerations are intertwined dynamically. Treating them as distinct theories is misleading. As noted by Leiblein and Miller (2003), even though all firms have similar competencies, transaction costs may still make vertical integration or specialization (outsourcing) the preferred form. The extention of the pre-eminent theory of vertical integration (transaction cost economics) to a dynamic model could shed light on the origin of these differential resources. If they arise from past investments in transaction-specific assets, then the "capabilities" fit well within transaction cost economics (Argyres and Zenger, 2010). The distribution of capabilities across banks may reflect transaction costs operating in the past or present (the distribution of capabilities across banks is not static).

The process of capability development depends not only on the degree of firm integration but also changes depending on the degree of vertical integration at industry level. The evolution from an integrated industry to a disintegrated one drastically changes the nature of the industry and the structure of capabilities that a bank needs in order to compete successfully. The degree of specialization at the industry level produces a significant impact on the processes of accumulation and development of capability at the bank level, and the processes of organizational learning and knowledge development. The process of value chain disintegration produces significant effects on the knowledge base of each stage of the value chain, and this process helps outline the trajectory of capability development, both at the bank and the industry level. As noted by Jacobides and Winter (2012) industry architecture affects capability development.

In other words, the vertical division of labor at the industry level contributes to shape capabilities and related development trajectories at the bank level. This path of analysis seeks, therefore, to investigate the dynamics of vertical integration structures, shifting the focus from a static analysis of institutional structures to a dynamic analysis of firms and industry boundary changes. The perspective of coevolution of capability and transaction costs does not preclude the presence and development of reintegration processes due to: product and process innovations, development of integrated capabilities, coordination problems of complex organizational interdependencies (especially in a dynamic environment) and new regulatory guidelines.

Summing up, different variables come into play in defining the nature and boundaries of an industry (these different variables facilitate or accelerate value chain integration/disintegration). Furthermore, integration and disintegration choices may coexist in the same industry. Multiple vertical structures coexist and can therefore form different ecosystems (Iansiti and Levien, 2004). Therefore, to fully investigate the determinants and characteristics of the vertical structure of an industry and to better understand its evolutionary mechanisms, it is necessary to adopt a dynamic perspective of analysis. This framework of analysis thus helps shed light on the dynamics of the industry structure.

According to the resource-based view of the firm, the creation of knowledge in the corporate structure of banking firms involves internal production and external knowledge acquisition as well as its representation, coding and use. But it is necessary to consider the role that activities or processes play in the creation of competitive advantages in banking firms. Banks may evaluate the activities in each step of the loan origination value chain (application, processing, credit assessment and approval) to determine those where they have competitive advantages and, consequently, make decisions on specialization or diversification. Each step of the loan origination value

chain requires skills, knowledge and capabilities that differ from those in the other steps, and each displays distinctive economies of scale and scope. This breakup permits banks to focus on a limited number of roles in the process and to build a competitive advantage through specialization (focussing on core capabilities). The unbundling of the loan origination value chain reduces barriers to the entry into the banking industry, increasing potential entrants and competitors. New firms (financial and non-financial) may enter into the lending business to provide credit assessment activities to banks, such as credit information reports.

Banks may have competitive advantages in the upper side of the loan origination value chain. They could come from: branch network, relationship banking expertise, corporate size and market position, commercial competences and skills in the single credit market segments, pricing policies, cross-selling, and so on. At the same time, banks often do not have distinctive competitive advantages in the credit assessment phase, because of information asymmetry, incompleteness of credit contracts, costs of information production, complexity of statistical risk management techniques to process the data, available technology, and so on.

The comparative advantage perspective implies that the higher the knowledge and capability differences in the single steps of the loan origination value chain, the higher the probability of having a disintegrated loan origination value chain.

5.4 Modularity view

The modularity paradigm allows to examine the technological prerequisites for the emergence of the credit information market in the loan origination value chain. In order to do so, structural properties that distinguish information and communication technologies (ICT) for banking must be taken into consideration. These properties traces back to modularity.

Modularity enables the standardized connection, interaction and exchange of resources (information) between different components of the product, through communication interfaces. This concept is widely applied to ICT, in which the specification of inputs and outputs that connect the components together defines relationships between individual components. Modularity allows a high flexibility in terms of intergenerational compatibility, scalability, upgradability and interconnectivity. The dynamic aspects inherent in modularity are summarized as follows: splitting, subdivision, substituting, augmenting, excluding, inverting, porting (Baldwin and Clark, 2000). Standards facilitate intra firm transactions (between different organizational areas within the firm) and inter firm transactions (between different firms) in the form of connection and communication interfaces.

The development of shared interfaces by specification and definition of the transaction content, documents, level of quality, technical aspects, makes possible the development of shared conventions that facilitate communication between various entities involved in the transactions. The sharing of standards might reduce asset specificity of the single transactions and the cost of research, monitoring and execution of transactions. This reduction in transaction costs reduces the incentives to integrate activities within firms. Developments in information technology have facilitated the use of the market and have favored value chain disintegration by reducing transaction costs. The crucial element behind such innovation processes is the codification of knowledge (Sturgeon, 2002) which implies that contents of interactions become standardized. ICT helps to ensure this knowledge codification through the standardization of acquisition, transferring and processing of data and information. The disintegration of production processes that occurs

in different economic sectors is a response to innovations in coordinating technologies and resulting market extensions (Langlois, 2003). Technological innovation provides the breakdown of traditional business processes in distinct phases.

Standardization of information collection and information processing, in the market of credit reporting information, is a major driver behind the vertical disintegration of the lending business. Information technology allows banks to process an increasing volume of information, and enhances the sharing of standardized sets of information. Thus, information becomes more marketable in an electronic format. In addition, information is an intangible asset that varies in its degree of marketability and usability. This characterization of information in terms of alternative use traces back to the transaction cost paradigm, and the concept of asset specificity. In this context, information specificity is connected to restrictions of the value of information, concerning its use and acquisition (Sampler, 1998).

Information technologies increase the possibility to decompose and standardize information content (Simon, 1962). Information takes on a modular architecture, thanks to which the single piece can be assembled in different configurations, stored and transferred using highly automated processes. The credit reporting market reflects the determinants of modularity in terms of product and organizational structures:

- Standardization of communication interfaces between banks and external information providers. The credit reporting markets increasingly use a common language (communication interface) also to standardize the information content of credit reports (e.g. ratings, credit scoring, business information).
- Standardization of operating procedures that underlie information sharing mechanisms: data collection, processing, distribution and archiving.
- Identification of basic information units and provision of informational categories. For example to identify potential borrowers' outstanding debt toward the banking system (informational category), elementary information units may be: amount of granted credit and used credit, value of collaterals, guaranteed credit, other amounts, etc.
- Heterogeneity of inputs in credit information reports as a variety of data elements that fuel the production process of information producers. This heterogeneity is due to the uneven nature, scope and diversity of information content, information sources, firms, business industries, accounting rules, etc.
- Heterogeneity of information that a bank needs during the loan origination (in relation to banking size, characteristics of markets in which a bank operates, complexity of credit rating, etc.). This diversity of demand reduces the ability of integrated solutions (a single credit information report) to fully meet the informational needs to assess loan applications.
- Use of computer technology and sophisticated automation systems that provide high levels of standardization and interactivity. The spread of electronic data interchange systems, web-based information systems, universal language of communication such as extended mark up language, represent significant examples of how information technology contributes to standardize the architecture of communication and information processing as a condition to ensure the proper functioning of market transactions.

- Use of information technologies with a high degree of flexibility, in terms of compatibility of information systems over time, scalability, updating and interconnectivity.

The main advantage of credit information modularity is the increase of its flexibility, which is the ability to come up with multiple configurations through the packages of different individual data elements (Baldwin and Clark, 2000; Schilling, 2000). Banking firms can therefore acquire different information sets on the credit information market. Consequently, also the pricing of different pieces of information can have a modular structure: a flat fee, independent of the specific content of the information acquired, or a single fee related to the individual data elements acquired. Between these two types of fees different pricing structures may emerge consistent with the profile of a modular credit reporting market, which variously aggregates individual pieces of information. Different levels of information (credit report details) are therefore available during the loan origination process through the use of the credit information market and information sharing mechanisms.

The modular approach therefore provides a basis on which to build a better comprehension of the complex processes of composition and recomposition of business value chains.

6. Summary and implications

In the transaction cost perspective the main driver of vertical disintegration is asset specificity. With specific assets vertical integration leads to higher performance (Coase, 1937; Williamson, 1985). In addition, contractual and environmental uncertainty, lack of standards, opportunistic behavior, increase transaction costs and the incentive for make decisions.

Studies on modularity have demonstrated that it is possible to reduce asset specificity with the development of standardized interfaces of communication and connection. Standards facilitate intra firm and inter firm transactions (Sanchez and Mahoney, 1996; Baldwin and Clark, 2000; Schilling, 2000; Schilling and Steensma, 2001). The sharing of standards reduces the specificity of a single transaction and their costs of searching, monitoring and implementation.

The considerations developed above have highlighted the managerial implications of modularization. The adoption of a modular technology has complex implications in terms of coordination and division of labor. The widespread modularization of the economy, and the financial sector in particular, is associated with an increased division of labor within and between firms. The increased specialization, on the one hand, and the degree of interconnectivity, on the other hand, emphasizes the role of interfaces, which may have a technological, organizational, contractual and informational nature.

The crucial element behind such modularization and division of labor is the knowledge codification (Sturgeon, 2002). Knowledge codification implies that the extensive use of ICT and the adoption of standardized interfaces are necessary conditions of value chain modularization and, accordingly, the disintegration of loan origination value chain. Knowledge codification recognizes the primary importance of tacit knowledge as a determinant of organizational behavior (Nonaka, 1994); on the other hand, however, knowledge codification tends to enhance the implementation of technical, organizational processes and information support that aims at enabling a degree of codification of knowledge, through the description of what to do in certain situations (know what), describing how to do (know how) and the reasons underlying behavior (know why).

The processes of codification and knowledge transfer drives the development of the credit information market. The increased computational power of computer systems, the use of sophisticated and complex statistical risk management models and pervasiveness of communication systems and internet-based technology, foster processes of knowledge codification and knowledge transfer (Cowan and Foray, 1997; Cowan *et al.*, 2000).

Banking requires taking decisions on the basis of information available inside and information acquired outside corporate boundaries. The adoption of ICT in banking not only influences production and distribution function, but also the interconnection, coordination and interaction function at the intra firm and the inter firm levels. The design of business processes in banking, and, in particular, in the lending business, fully reflects these evolutionary paths.

The dynamic nature of these evolutionary processes has fostered a cross-fertilization between the modularity view and the resource-based view. This cross-fertilization improves the theoretical analysis of the value chain dynamics in banking. The implementation of modular approaches in the banking organizational structure require new forms of division of labor and functions at the inter firm and intra firm level. In this perspective, the creation and the development of a portfolio of competences and capabilities is more important than the statically pursuit of efficiency. Without modularity, the division of knowledge across many firms would have been impossible (Baldwin and Clark, 2000). Technological and organizational capabilities are driving forces of the process of value chain deconstruction.

The vertical disintegration of the loan origination value chain is reshaping the boundaries of the banking firms. The value chain disintegration offers new organizational opportunities by extending the decomposition and recomposition of business through new combinations of market, services and customers, consistent with the management of banks and a strong competitive environment. Taking decisions on organizational boundaries, on the degree of bank vertical integration, and therefore on organizational structures, is a corporate-level strategic decision. The bank is able to outsource some components of the loan creation process to other firms on a contract basis. New technology for the handling of information and increasing interoperability of systems allow radical expansion in third party product/service offerings.

Therefore, the market becomes a viable alternative to the bank (make decision) when modularity and dynamic capabilities evolve. The shift of transactions from banking firms to markets implies an ability to cut apart the stages of loan production without incurring in high costs of coordination. The outsourcing of production processes needs some degree of standardization of communication interfaces in order to develop a modular system and provide a valuable inter firm coordination. In short, ICT enables the loan value chain marketization.

This perspective of analysis opens the possibility of a deeper understanding of strategic and organizational dynamics of the banking industry, in the context of institutional and technological framework changes, where business conducts are increasingly oriented toward efficiency and innovation. The automation of business processes and the redefinition of inter firm relationships involve a profound change in business conduct (Tutino and Nicastro, 2011). Process and product innovation, both internal and external to the banking system, help boost strategic and operational flexibility of banking firms.

In a dynamic perspective, the development of capabilities is closely connected to the process of industry disintegration. The standardization of information and modularity

creates the preconditions for a market to be feasible. Information technology enables better information handling capabilities across bank boundaries. Production process becomes more disintegrated and markets appear. Vertical disintegration has profound implications on the nature of an industry, the nature of the firms that participate in an industry, the degree of competition, the market entry of new players, and the accumulation and dissemination of new knowledge. Communication and information technologies not only facilitate the dissemination of knowledge across a firm and between firms, but at the same time they enable processes of organizational and inter organizational learning, and facilitate the creation of organizational capabilities, beneficial in acquiring and developing resources and skills, and new knowledge as determinants of competitive advantages (Figure 4).

The acquisition of information on the creditworthiness of potential borrowers, by companies external to the bank, leads to substantial changes in the boundaries of the banking business. Decisions on the degree of specialization of the loan origination value chain requires a clear understanding of the impacts that such decisions have on banks' competitive advantages. It seems naive to evaluate the convenience to outsource without considering the role that activities or processes being outsourced have on the generation of competitive advantages (Prahalad and Hamel, 1990). Credit assessment is a crucial stage in the loan origination value chain. Credit assessment represents a core activity for the selection, screening and monitoring functions of banks that allows transferring resources across time and space in the financial system (Leland and Pyle, 1977). The primary function of a bank is to collect funds from surplus spending units and to allocate these funds among deficit units. In doing so the bank has to evaluate the creditworthiness of borrowers and their risk profiles. This credit evaluation affects many aspects of banking intermediation: the composition of the credit portfolio, the allocative efficiency of the credit market, the risk profiles of the banking credit assets, loan pricing, loan approval, the risk adjusted performance, the expected loss value, the regulatory capital requirements, and ultimately the soundness and stability of the bank.

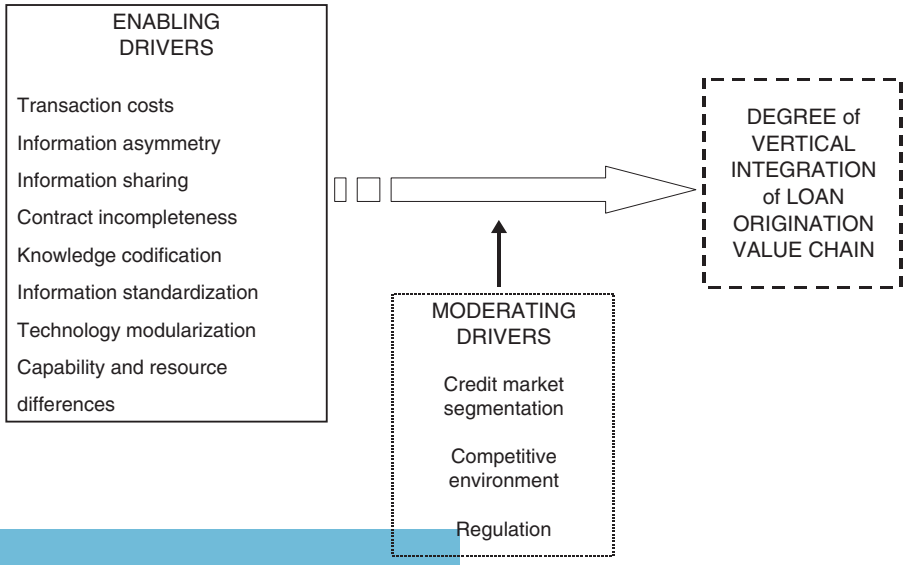

Figure 4.
Loan origination value chain: hierarchy vs market

In brief, the decision to outsource the entire credit assessment activities implies transferring a basic function of the bank to other firms and drastically changes the economics and nature of the bank, with important consequences for the single bank and the banking industry.

In addition, the complete outsourcing of the credit assessment could not be sustainable not only for the above mentioned issues but also for the nature of knowledge and information. Knowledge is difficult to observe and evaluate, it has a highly systemic nature (Winter, 1987), and it is partially codified (Nonaka, 1994). These properties emphasize the complexity and heterogeneity of organizational processes and business relationships between firms. The credit information to evaluate borrowers' loan applications depends also on the accumulation over time of soft information by the loan officer, that may be difficult to codify and transfer through standardized communication channels. Soft information is associated with lending processes that emphasize relationships based on trust that consent to acquire, manage and evaluate non-standardized and non-codifiable information, private information, and tacit knowledge (Boot, 2000; Petersen, 2004; Petersen and Rajan, 1994). Soft information is not easily available on the credit information market. Soft information relies on data gathered over the course of credit relations with borrowers and members of the local community. Relationship lending plays an important role in small business finance (Berger and Udell, 1995, 2002) and contributes to characterize the uniqueness of bank loans (Fama, 1985).

The emergence of new markets divides the previously integrated banking production process. Vertical disintegration radically changes the nature of the financial industry and the capabilities that firms need in order to compete. Value chain disintegration and reintegration have become more frequent as industry and competitive dynamics evolve (Christensen *et al.*, 2002; Langlois, 2003; Prahalad and Hamel, 1990). These evolutionary dynamics gradually develop new banking business models for lending.

7. Conclusion

In the past, most banks adopted an integrated loan origination value chain. Nowadays, financial innovation and new technologies are increasingly putting the basic assumptions of integrated banking business models under pressure. Technological, organizational, institutional and financial innovations offer opportunities to transform banking structures and processes as part of a dynamic competitive environment.

In this paper I propose a theoretical framework for the analysis of the vertical disintegration of the value chain underlying bank loan origination. I argue that to better understand the corporate decisions to vertically disintegrate it is necessary to overcome the static analysis of the transaction cost economics, the dominant paradigm used to understand make or buy decisions, and to adopt a dynamic perspective of analysis that examines the evolutionary dynamics of the industry, by taking into account the informational incompleteness of credit markets, the competitive dynamics in the banking industry and technological development. In particular, I argue that the emergence of the credit information market in the loan origination value chain is not only statically determined by transaction costs, but also by information asymmetries, capabilities and resources differences between firms, knowledge codification, information standardization and the modularization of ICT. Dynamic factors are important drivers in explaining vertical scope in the lending business.

I further underscore how all these drivers are interlinked. This analysis leads to the design of different business models in banking and a different degree of specialization

in the loan origination value chain. Vertical reintegration of the loan origination value chain is also possible in an increasingly dynamic competitive environment. The analysis of the dynamics of vertical scope in the loan origination value chain expands traditional views on the determinants of value chain integration and disintegration.

It is a theoretical paper that has managerial and strategical implications that could stimulate further research in order to better understand the pros and cons related to the integration and disintegration of the loan origination value chain. This aspect represents a promising area for further research, as well as the analysis of the strategic opportunities of the decisions to reintegrate the lending business models; the examination of risks associated to the outsourcing of the core competences and capabilities related to credit assessment; the impact of such risks on the generation of competitive advantages and on the financial functions performed by banks.

In addition, it could be of interest to carry out research in single credit segments (consumer, small business, mortgage, corporate and institutional) and single financial systems, in order to identify institutional variables that affect the degree of integration and specialization in the credit assessment phase. The evaluation of the above drivers of value chain disintegration in the economics of small banks and large ones could also show interesting results as it seems plausible that corporate size of banks, their degree of banking international activity, and banking industry consolidation could significantly alter the importance of the single enabler drivers. Finally, the new financial regulation "Basel 3" (Tutino *et al.*, 2011; Tutino, 2012) and regulatory regime shifts are likely to create incentives to develop the credit information market and increase the likelihood of loan value chain disintegration.

The identification of a limited number of enabling drivers render the paper a useful guide for future empirical studies on some microeconomic issues related to the credit information market, such as the reputation of the players, information reliability, agency problems and scale economies.

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