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Bank-firm relationship and credit risk: An analysis on Tunisian firms

Faiçal Belaid[a,b], Rim Boussaada[b,c,*], Houda Belguith[b,d]

[a] The Higher Institute of Management, ISG Tunis, Tunisia
[b] Université de Tunis, ISG, GEF2A lab, Tunis, Tunisia
[c] Faculty of Law, Economics and Management of Jendouba, Tunisia
[d] Faculty of Economic and Management of Nabeul, Tunisia

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ABSTRACT

This paper analyses the impact of the intensity and length of bank-firm lending relationship on Tunisian banks' credit risk over the period 2001–2012. The sample includes 494 bank-firm relationships for 383 firms. By applying probit and ordered probit models, our results indicate that firms which engage in intense relationships with banks are less likely to encounter a credit default. In addition, these firms exhibit a higher loan quality. However, no evidence has been found for the impact of the relationship length on credit risk. Further, the findings show that private banks, unlike public financial institutions, take advantage of their close lending relationships with borrowers to mitigate information asymmetry and therefore improve their loans portfolio quality.

1. Introduction

The recent financial crisis made it clear that excess risk-taking by banks can be an outstanding source of the collapse of the financial system. This crisis has raised the problem of the soundness of the banking system at the forefront of academics and politicians. In this vein, exploring the determinants of the credit risk, considered as a major cause of bank failure (Caprio et al., 1998; Campbell, 2007), is a question of substantial importance for regulatory authorities concerned with financial stability.

The effect of bank governance on the credit risk has been widely investigated in recent years (Pathan, 2009; Shehzad et al., 2010; Azofra and Santamaria, 2011; Wang et al., 2012; Boussaada and Labaronne, 2015). Nevertheless, few studies have examined the impact of bank-firm relationships' features on credit risk. Relationship lending exists if there is a strong, stable and long-term credit relationship between a bank and a firm (Petersen and Rajan, 1994). The theoretical literature suggests that relationship lending play key roles in resolving information problems and mitigating financial market imperfections (Bhattacharya and Thakor, 1993; Boot, 2000; Petersen, 2004). Financial intermediation theory states that banks and other financial intermediaries can reduce information asymmetry and agency costs by developing close and repetitive contacts. The close relationship lending produces informational rents for the bank (Sharpe, 1990; Rajan, 1992) enabling it to assess the borrower's risk more precisely. On the other side, some researchers state that the close bank-borrower relationship boosts the willingness to take more risk and is behind the process of the accumulation of nonperforming loans (Hellwig, 1977; Dewatripont and Maskin, 1995). In the case of financial distress, banks may renew loans to

* Corresponding author at: University of Jendouba, Faculty of Law, Economics and Management of Jendouba, Campus Universitaire de Jendouba, Avenue de l'U.M.A., 8189, Tunisia.
E-mail addresses: faicel.belaid@gmail.com (F. Belaid), boussaada.r@gmail.com (R. Boussaada), h.belghith@gmail.com (H. Belguith).

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insolvent borrowers and, as a consequence, accumulate losses (Hellwig, 1991). They can subsequently offset higher default rates by applying higher interest rates to the surviving firms (Boot, 2000; Freixas, 2005).

In this paper, we investigate the impact of the development of relationship lending on credit risk of Tunisian banks. The Tunisian context is worth studying for several reasons. The financial system remains excessively bank-based despite the reforms undertaken to establish a market-based financial sector. External finance to Tunisian firms is provided mainly by banks. Moreover, according to numerous reports of the World Bank (2004, 2014), the International Monetary Fund (2002, 2010, 2015) and rating agencies (Fitch Ratings, 2006, 2007), the Tunisian banks' credit risk management is inefficient and reckless. Tunisian banks have "high risk appetite" (S & P, 2011). In 1997, the nonperforming loans (NPLs) ratio reached 15% of the GDP and more than 22% of total bank loans (IMF, 1998). Thanks to reforms in the banking system that have aimed at mitigating credit risk, the NPL ratio was reduced to 15% in 2015 (Central Bank of Tunisia-CBT).

Despite the remarkable progress achieved since 1998, the Tunisian banking sector is still characterized by an important credit risk. In comparison to the Arab Mediterranean countries (AMC),[1] Tunisia is notably distinguished by its high level of NPLs ratio which is presented as a major problem of the country's banking system (IMF, 2002, 2010). The NPLs ratio is well beyond the international standards level (IMF, 2010).[2] Under provisioned NPLs increase the cost of bank intermediation and deprive Tunisia from a better access to international capital markets as it affects investors' confidence (World Bank, 2004).

The contribution of this research is twofold. It aims to fill the gap in relationship banking literature by focusing on the banking sector in Tunisia. Although the literature on relationship between banks and firms is particularly wide, there are few studies that examine the relationship between the intensity of relationship banking and credit risk (Ferri and Messori, 2000; La Porta et al., 2003; Jiménez and Saurina, 2004; Menkhoff and Suwanaporn, 2007; Chang et al., 2014; Fiordelisi et al., 2014). The major empirical analyses have prevalently concentrated on the benefits of relationship lending to firms expressed in terms of credit availability (Petersen and Rajan, 1994; Lehmann and Neuberger, 2001; Cenni et al., 2015), better term loans (Berger and Udell, 1995; Elsas and Krahenn, 1998; Berger et al., 2007; Bellouma et al., 2009; Matias et al., 2010) and better financing of distressed borrowers (Brunner and Krahnen, 2008; Huang and Huang, 2011).

Moreover, very few of the empirical studies on relationship lending are applied to data on emerging countries, where relationship lending may be particularly important because of financial system inadequacies (Berger et al., 2008). The institutional environment of an emerging market seems favorable to the widespread use of relationship lending (Menkhoff and Suwanaporn, 2007).

In this paper, we examine the relationship lending effect on the bank credit risk ex-post using a unique dataset on 383 Tunisian firms. We focus on loan by loan analysis and we conclude that closer relationship with banks decreases the probability of default of Tunisian firms. Its effect is stronger for private banks. However, longer term banking relationship does not seem to be linked to bank's credit risk.

The remainder of this paper is organized as follows. In the second section, we expose an overview of the Tunisian banking sector. In the third section, we review the literature on the topic and present our hypotheses. In the fourth section, we present our methodological approach and provide the descriptive statistics in the fifth one. Section 6 presents and discusses the empirical results. Finally, Section 7 displays the concluding remarks.

2. Trend in the Tunisia banking sector structure

Since the 1980s, the Tunisian financial sector has undergone several reforms aiming at increasing the degree of financial liberalization. Although some measures have been taken by the authorities in order to encourage financing through the financial market, the Tunisian financial system remains bank-based. Banks are fundamental partners of Tunisian firms in providing funds. The nonbank financial sector is small and accounts for only about 20 percent of all financial system assets (World Bank, 2014).

Tunisia's banking sector appears overbanked and fragmented (S & P, 2014). Indeed, the banking sector is comprised of 22 banks with the market share of the largest three banks accounting for about one-third of the total assets of banks. Whereas recent privatization efforts have reduced direct state ownership, public banks continue to play a predominant role in the banking sector. The Tunisian state is the main shareholder of three banks: STB (51%), BH (57%), and BNA (65%). These banks are currently representing 37 percent of banking assets and around 28 percent of banking sector deposits (IMF, 2015).

The ability to provide credit to the economy remains weak, especially when compared to banks in neighboring economies such as Morocco (World Bank, 2014). In the Tunisian context the information available to the commercial bank and the customer is often asymmetric (Omri et al., 2005). Tunisia continues to rely only on public registries which restrict the borrowers' right to inspect their credit histories. In addition, this does not allow collecting and distributing detailed data, including from non-bank sources (Ayadi et al., 2011). In this context, the development of bank-firm relationship would play a significant role in providing information on borrowers' quality and repayment capacity.

However, from the perspective of the banking regulation in Tunisia, banks are obliged to maintain diversified loan portfolios which would impede the development of the relationship between banks and Tunisian firms. In fact, the incurred risks on the same borrower should be less than 25% of the bank's net capital stock. In addition, the total of incurred risks on beneficiaries whose

[1] For the period 2000–2009, Tunisia has the highest level of average NPLs ratio (19.7%) among AMCs. The ratio reaches 19.07% in Egypt, 13% in Morocco, 10.56% in Jordan, 9.53% in the United Arab Emirates and 7.58% in Kuwait (IMF, 2007, 2009; WB data, 2000, 2001).

[2] During 2000–2009, the average NPLs ratio stood at 1% in Australia, 1.7% in United States, 2% in Great Britain, 3.88% in France and 4.1% in Germany (IMF, 2007, 2009; WB data, 2000, 2001).

incurred risks for each one are higher than or equal to 5% (15%) of the bank's net capital stock should be less than or equal to 3 (1.5) times of the bank's net capital stock (the circular of the CBT n° 2014-14).

Moreover, significant strides toward a more developed banking sector have been achieved since 2001 in order to strengthen the credit culture and to provide banks with more useful tools to help them evaluate the credit risk. After the Tunisian revolution of January 2011, the authorities have also revised the laws on the central bank and credit institutions in response to the extensive political interference of former regime's members in banking system. A recent banking law took place in July 2016 aiming at establishing a modern regulatory framework and preserving financial stability through a better governance of the banking market and a boosted micro-prudential control, with depositor's protection as an ultimate goal. Despite notable achievements and progress, the banking system remains fragile and non-performing loans continue to be high (IMF, 2015).

3. Related literature and hypotheses

The extant literature addresses the issue of relationship banking and credit risk in the banking sector from the informational asymmetry theory perspective. Excessive credit risk taken in the bank can be resulted from the poor evaluation of information about the quality of the borrower. Decision-making and credit risk management require a diagnosis of the borrower's repayment capacity. The managers/shareholders of a firm do not have the same interests as creditors (Jensen and Meckling, 1976) and have more information about the quality of their projects and their own intentions repayment of the credits granted. This information asymmetry leads to adverse selection and moral hazard (Akerlof, 1970; Stiglitz and Weiss, 1981). In this perspective, the informational asymmetry theory emphasizes the information superiority of banks compared to other financial institutions (Benston and Smith, 1976; Leland and Pyle, 1977; Ramakrishnan and Thakor, 1984; Diamond, 1991). Banks generate information, through screening (Diamond, 1991) and monitoring activities (Rajan and Winton, 1995). Because relationship lending typically involves repeated interaction between a bank and a borrower over time (Cotugno et al., 2013), such interactions may generate "inside information" for the bank and reduce its cost of providing further loans (Petersen and Rajan, 2004). Bank can use this information when analyzing a borrower's credit risk (Berger and Udell, 1995; Degryse and Van Cayseele, 2000). Thus, banks engaging in relationship lending tend to experience lower credit risk in their loans portfolios. However, the opposite impact of the development of lending relationship on credit taking may also occur. From this perspective, the monitoring of the borrower tends to be weaker which can impair the assessment of the risk (Boot, 2000). Thus, borrowers may have a perverse incentive to activate opportunistic behaviours and risk-taking policies that, consequently, increase the probability of non-repayment of loans (Fiordelisi et al., 2014).

Two major elements characterize relationship lending, namely, its intensity and length (Petersen and Rajan, 1994; Berger and Udell, 1995; Cole, 1998; Elsas, 2005; Degryse et al., 2009).

3.1. *Intensity of lending relationship*

Close relationships between banks and borrowers can reduce the degree of asymmetric information in lending which may be beneficial for both. The ability of a bank to privately observe information about the borrower can engender a lock-in problem in that the borrower cannot costlessly transfer to another lender what the bank knows about it (Degryse and Van Cayseele, 2000). Bank switching costs are major barriers to seek a new financing partner (Klemperer, 1995). The bank then gains monopoly power over the borrower through its informational advantage over competitors (Sharpe, 1990; Rajan, 1992; Von Thadden, 2004). The borrower may be "informationally captured" (Sharpe, 1990; Rajan, 1992). However, this informational advantage can result in a better credit risk management to the extent that it would facilitate bank monitoring of the firm in its repayment capacity as a borrower.

The intensity of the borrower–bank relationship can be approximated by the number of institutions providing finance for the borrower. The limited number of the firm's partner banks reflects the exclusiveness of the relationship between the bank and its clients. A relationship with just one bank helps to create a climate of trust and consolidate the relationship over time (Foglia et al., 1998). A large number of lenders reduces the monitoring incentive, allows the dilution of the information and thus facilitates the occurrence of asymmetric information (Uchida et al., 2012).

Moreover, the number of banking relationships can signal the quality of the firm. In fact, a good quality firm has the ability to obtain refinancing from one main lender (Petersen and Rajan, 1994). However, a poor quality firm which anticipates a deterioration of its performance tends to develop several banking relationships to dilute information and escape the strict control of the main bank.

According to the delegated monitoring model (Diamond, 1984), a single bank relationship is most efficient if a firm borrows once, while in case of the models of repeated lending, it is optimal to hold a few bank relationships (Ongena and Smith, 2001; Elyasiani and Goldberg, 2004).

The theoretical literature about banking relationship has highlighted a major cost of this relationship that is the developing of a certain laxity of the bank to its clients. In case of a default it is much easier and cheaper for the borrower to renegotiate the debt contract if there is one lender than if there were multiple lenders. The contracts become flexible and the firm is not subject to a fixed budget constraint, but rather soft budget constraint (Hellwig, 1977; Dewatripont and Maskin, 1995; Bolton and Scharfstein, 1996).

Indeed, a large number of lenders discipline the firm's management and firms which develop an exclusive relationship with a bank have a higher incentive to default strategically (Memmel et al., 2007).

Most of the previous empirical studies refer to the number of lending relationships as an indicator for the intensity of the relationship lending (Petersen and Rajan, 1994; Elsas and Krahnen, 1998; Harhoff and Korting, 1998; Detragiache et al., 2000; Machauer and Weber, 2000; Ongena and Smith, 2001; Farinha and Santos, 2002; Elsas, 2005). However, empirical studies about the role of the number of bank with which each borrower relates on bank credit risk ex-post are almost nonexistent. Ferri and Messori

(2000) take into account a sample of 208 Italian banks and conclude that banks with strong relationships have a significantly lower ratio of bad and doubtful loans. Geršl and Jakubík (2011) investigate the model of bank financing of firms in the Czech Republic and conclude that an orientation towards clients applying dominant relationship lending has a positive effect on the bank's loan portfolio quality. Jiménez and saurina (2004), based on Spanish data, find that the more widespread multiple lending is, the lower the probablity of defaut of loans. More recently, Fiordelisi et al. (2014) show that a closer relationship with lenders decreases the probability of default of Italian firms.

In addition, these empirical studies can be criticized from the point of view that they do not take into account the intensity of each individual bank-firm relationship as they assume that banks maintain the same features of their lending relationship with firms.

Based on the aforementioned theoretical developments, we formulate the following hypothesis:

H1. There is a positive relation between the lending relationship intensity and loan quality.

3.2. Length of lending relationship

The length of the banking relationship has been used as a proxy of the solidness of the relationship (Petersen and Rajan, 1994; Berger and Udell, 1995; Matias et al., 2010) and therefore can influence the banks' credit risk management. The "long term" perspective is the main feature of a relational approach. Over time, the bank can be filled, more than other lenders, the ability of the borrower firm to meet its future obligations (Degryse and Van Cayseele, 2000). Several studies support the hypothesis of the informational advantage acquired by the bank through the relationship lending (Diamond, 1984; Fama, 1985; Ongena and Smith, 2001). The interaction established by the long-term relationship with the borrowers enables the bank to acquire continuously internal and private information that will subsequently be an instrument for monitoring the creditworthiness of its clients. This unceasing information transfer through repeated contacts towards the bank should decrease the probability of non-repayment of loans and thus the level of credit risk.

This theoretical debate has given rise to few empirical studies about the impact of the banking relationship on credit risk. The only studies, to our knowledge, that have addressed empirically the relationship between the length of the lending relationship and credit risk-taking in banks is those of Menkhoff and Suwanaporn (2007) and Chang et al. (2014). Menkhoff and Suwanaporn (2007) investigate a panel of Thai commercial banks and conclude that close relations to borrowers, do not seem to be the core issue in explaining default with the exception of some easy lending to large and close borrowers. More recently, Chang et al. (2014), based on a sample of loans granted by a Chinese state-owned bank, conclude that while relationship information significantly predicts non-repayment of loans, its effect is stronger for firms that borrow more frequently from the bank and have a longer term banking relationship.

In sum, it worth noting that the effect of the length of lending relationship on banks' loan portfolio quality is still under debate and the obtained empirical findings are scarce and diverge. Based on the aforestated theoretical developments, we formulate and test the following hypothesis:

H2. There is a positive relation between the length of lending relationship and loan quality.

3.3. Banks' ownership structure and relationship lending

Several papers have found that the ownership structure of banks affects their credit risk taking behaviour and credit policies. The extant literature addresses the impact of banks' ownership structure on credit risk from the theory of the firm perspective and the separation of ownership and control (Berle and Means, 1932; Jensen and Meckling, 1976).

In the banking sector, large shareholders have strong incentives to monitor bank management through tight oversight of lending practices, operational efficiency and risk management (Unite and Sullivan, 2003). According to Jensen and Meckling (1976), the more the ownership structure is dispersed, the more the agency costs are higher. The presence of large shareholders mitigates the classic owner-manager agency's problems through their strong incentives to collect information and substantial power to influence management (Shleifer and Vishny, 1986), which would result in a more efficient governance structure leading to an important value for shareholders.

The development of relationship lending varies depending on the bank ownership structure. The latter impacts the type of the information processed (soft or hard) and so the nature of lending relationship (Bouslema, 2014). Moreover, ownership type affects the banks' risk exposure (Boubakri et al., 2005).

According to the social welfare theory (Atkinson and Stiglitz, 1980), public banks may pursue social and economic development objectives which render them more credit risky compared to private banks. Public banks are viewed as a mechanism to maximize social welfare (Banerjee, 1997). Further, according to the political theory (Shleifer and Vishny, 1994), the banks controlled by the State are inefficient and politically used. An increase in the state's shareholding facilitates political lobbying. Indeed, the state owned banks are more vulnerable to political lobbying than the private ones (Hu et al., 2004).

The potential effect of bank ownership on the development of relationship lending is based on the differences in monitoring. State-owned banks are subject to less monitoring (Megginson, 2005). They have a competitive advantage in terms of standard lending whereas private banks are more efficient in the area of relationship lending (Berger and Udell, 2002). The former are also characterized by their tolerance or relatively low level of monitoring (Berger et al., 2008). The government guarantees enjoyed by the state-owned banks can encourage managers to take higher credit risk (Gropp et al., 2012; Moshni and Otchere, 2014).

For these reasons, state-owned financial institutions have relatively low efficiency, often tolerate poor loan repayment performance and have very high proportions of nonperforming loans as a result (Berger et al., 2008; Boussaada and Labaronne, 2015; Lassoued et al., 2016). Privatized banks experience a significant decrease in credit risk after privatization, but they continue to exhibit higher risk than their rivals (Mohsni and Otchere, 2014).

Based on these arguments, we formulate and test the following hypotheses regarding the effect of banks' ownership structure on the relation between lending relationship (proxied by its intensity and length) and loan quality:

H3a. The positive effect of the lending relationship intensity on loan quality is relatively strong in private banks

H3b. The positive effect of the lending relationship length on loan quality is relatively strong in private banks

4. Research methodology

4.1. Sample and data collection

Our paper provides a loan-by-loan analysis of credits awarded by banks to Tunisian firms. The data come from two sources: The Central Bank of Tunisia (CBT) and Thomson Reuters Eikon Central database. Firm-specific variables and loan quality information are collected from the Risk and Central Balance Sheet database held by the CBT. This database contains information reported by the banks which share information between credit institutions to facilitate their credit risk assessment and management. It contains detailed and annual accounting information on a large sample of Tunisian firms as well as data on loans granted to firms including their classification (status: defaulted or non-defaulted loans). It also provides information about the rating given by banks to individual loans depending on the credit risk assessments which are made by the lenders.

Ratings are standardized into a rating scheme with six categories ranging from safe loan to the very bad loan. Bank-specific variables are collected from the Thomson Reuters Eikon Central database. The sample of banks is composed by the ten largest lending institutions in Tunisia.

The period of our analysis is 2001–2012. The choice of this period is motivated by the change in loans classification methodology by the CBT which took after 2011s revolution, temporary measures asking banks to revise the classification of their loans granted to economically affected firms. Within our sample period, the banks included in our analysis accounted on average for 87.6% of the total assets of the Tunisian banking sector.

We have selected only loans having principal values ranging between 1000 and 10 million dinars for the sake of avoiding any specific effect related to credit scale. We have included in our sample firms for which we know when the loan was obtained and for which annual data are available during 2001–2012.

After data cleaning, we have 494 bank-firm lending relationships for 383 firms. 72.3% of them have only one bank as a counterpart, while 26.6% of firms that are included in the sample have two banks as lenders. However, 1.1% of them have more than two banking relationships. We examine the impact of lending relationship on credit risk by analyzing the status (defaulted or not) and the quality (rating) of loans in 2012. For robustness checks, we examine this impact in 2011 and 2010.

4.2. Variables definition

4.2.1. Dependent variables

In our study, we drew on two dependent variables. Following Jiménez and Saurina (2004), Menkhoff and Suwanaporn (2007), Chang et al. (2014) and Fiordelisi et al. (2014), the first dependent variable is loan default which is a dummy variable that is equal to one if a firm defaults on its financial commitments and zero otherwise. There is a credit default whenever there is a delay in the reimbursement of the principal and/or interests for more than three months (Bonfim, 2009; Louzis et al., 2012; Belaid and Bellouma, 2016).

The second dependent variable is the loan quality which varies according to the severity level of the problem loan and therefore the risk of losses for the banks and is ranging from 1 (very bad loan) to 6 (safe loan). This variable can take six possible values which are given by banks based on the regulation on loans' classification set by the Central Bank of Tunisia (The circular n° 91-24 of CBT). Based on this regulation, banks classify the loans granted to firms into six classes. The first class contains safe loans for which the integral repayment seems to be ensured. The second class includes loans for which the repayment seems to be ensured, but firms are facing deteriorating financial situation and/or operating in stressed activities. The third one contains loans granted to firms mainly those facing financial difficulties and for which the repayment is becoming uncertain and presenting a reimbursement delay (in principal and/or interest) between 90 and 180 days. The fourth class includes loans granted to firms presenting mainly a severe financial distress and for which there is a reimbursement delay (in principal and/or interest) between 180 and 360 days. The fifth one contains loans presenting a reimbursement delay (in principal and/or interest) of more than 360 days. Finally, the last class includes those presenting a reimbursement delay (in principal and/or interest) of more than 360 days and for which there are a legal proceedings initiated by banks.

4.2.2. Independent variables

Since firm-specific relationship information is not observable (Chang et al., 2014), we construct two proxies to identify the bank-firm relationship: the intensity *RINij* and the length $LENG_{ij}$. To capture the intensity of the lending relationship, we build the variable

Table 1
Summary of the variables.

		Definition
Dependent variables		
Loan default	=	Binary variable which takes 1 if the loan granted by bank *i* to firm *j* is a defaulted loan and 0 otherwise.
Loan quality	=	This variable is ranging from 1 (very bad loan) to 6 (safe loan). The rating of loans is given by banks based on the regulation on loans' classification set by the Central Bank of Tunisia. Based on this regulation, banks classify loans granted to firms into six classes.
Independent variables		
The intensity of the lending relationship	=	The indicator *RINij* which is set for each relationship between bank i and firm j. The indicator is defined as follows: $RIN_{ij} = \frac{Lij}{\sum_{i=1}^{n} L_{ij} \quad NB_j}$ *Lij* represents the amount of the loan granted by bank I to firm j and NB_j indicates the number of the lending banks to firm j.
The length of the lending relationship	=	The number of years of the lending relationship between bank *i* and firm *j*.
Ownership structure	=	Binary variable that takes 1 if the bank is private and 0 if it is a public one
Control variables		
Firm size	=	Firm's natural log of total assets
Bank capitalization	=	The owned capital divided by the difference of the risk and weighted assets
Activity diversification	=	the ratio of non-interest income (NII) over total income
Sectors dummies	=	Dummy variables representing five sectors: Agriculture, Real estate, Commerce, Tourism and Industry

RINij which is defined as follows:

$$RIN_{ij} = \frac{Lij}{\sum_{i=1}^{n} L_{ij} \quad NB_j}$$

Where *Lij* represents the amount of the loan granted by bank *i* to firm j and NB_j indicate the number of the lending banks to firm j. This indicator shows to what extent the bank i-firm j lending relationship is a strong and a close one. The values of RIN_{ij} belong to the interval: [0; 1]. A value of 1 indicates that the firm has all its credits granted by only one bank. However, a value approaching 0 of RIN_{ij} indicates that the amount of the credit obtained by the firm j from the bank i is not significant compared to the total loans granted by other banks to the firm j. Our proxy of the banking relationship intensity addresses the drawback of the measure constructed by Ferri and Messori (2000) who develops an indicator of multi-bank borrowing for each bank. Our indicator reflects the intensity of each individual bank-firm relationship rather than assuming that banks maintain the same characteristics of their lending relationships with firms as it was assumed by Ferri and Messori (2000).

To capture the length of the bank-firm lending relationship, we build the variable *LENGij* as the number of years of the lending relationship between bank i and firm j. In addition, a dummy variable *OWN* is used to capture the ownership structure of the bank. *OWN* is equal to one if the bank is private and 0 if it is a public one. We also include various control variables (related to the bank and borrower characteristics) that are likely to influence the effect of the relationship lending on the probability of default and loan quality: firm size, bank capitalisation and activity diversification.

We have included a series of dummy variables to control the impact of the business sector on credit risk. Table 1 presents a brief description of the key variables used in this study.

4.3. Econometric methodology

We use the following model specification to examine the impact of the relationship lending on the credit risk of Tunisian banks. Probit and ordered probit are used.

$$CreditRisk_{it} = \propto_{it} + \beta_1(Relationshiplending)_{it} + \beta_2(Ownershipstructure*Relationshiplending)_{it} + \beta_3(Controlvariables)_{it} + \varepsilon_{it}$$

Two regressions were undertaken to test the impact of relationship lending on loan default *LDF* (Table 5: Model 1, Model 2). We rely on binomial probit approach. The first model (Model 1) includes only the relationship lending and variables of control. We then estimate new specification (Model 2) to analyze the moderating effect of ownership structure on the association between relationship lending and credit risk measured by loan default.

For the robustness checks, we use an ordered pobit model where we define our dependent variable, namely loan quality, as an ordered outcome that takes six possible values (Table 6: Model 3, Model 4). The loan quality proxy *LQU* is ranging from 1 (a very bad loan) to 6 (a safe loan). We estimate a specification including only the relationship lending and variables of control (Model 3). The latest specification (Model 4) considers the effect of banks' ownership structure on the impact of banking relationship on loan quality.

Table 2
Descriptive statistics.

Variables	Mean	Min	Max	Standard deviation
Loan default (LDF)	0.21	0	1	0.409
Loan quality (LQU)	5.17	1	6	1.52
Relationship intensity (RIN)	0.666	0.001	1	0.381
Relationship length (LENG)	6.744	1	12	3.633
Ownership structure (OWS)	0.801	0	1	0.399
Bank size	11.84	4.75	16.25	3.162
Bank capitalization	11.21	6.52	19.39	2.926
Activity diversification	31.08	19.57	42.10	6.78
Firm size	21.581	17.24	27.91	1.608

5. Descriptive analysis

Tables 2 and 3 show the descriptive statistics for the main variables used in this study. Table 2 reveals that 21% of the examined loans are defaulted loans. However, the average quality of these loans is 5.17 with a value of 6 indicating a safe loan and a value of 1 reflecting a very bad one. The rate of the defaulted loans in this study is comparable to the average rate of NPLs in the Tunisian context over the period 2001–2012 which is equal to 18% (WB data).

The analyzed data on the intensity of relationship between firms and bank reveal that relationship lending predominates in Tunisia. The mean value of RIN is about 0.66 which highlights that on average, banks in Tunisia maintain a relatively intense lending relationship with their borrowers. Added to that, the average of lending relationship length is 6.7 years. Table 2 also indicates that 80% of the banks included in our sample are private.

Besides, they have on average, a ratio of noninterest income over total income that is equal to 31% which indicate that the financial intermediation function remains the main banking activity of Tunisian banks.

Table 3 provides descriptive statistics concerning the distribution of the observations amongst the six categories of loan classes (as taken from the regulation on banks' assets classification).

Table 4 represents the correlation matrix for all variables. This table confirms the absence of serious correlation problems. Table 4 shows that the intensity of the lending relationship is negatively correlated with the probability of loan default. However, the length of the lending relationship is found to be uncorrelated with the likelihood of loan default. In addition, Table 4 shows that the intensity of the lending relationship is positively correlated with loan quality. This means that banks which maintain intense and close lending relationship with their borrowers have a good loan portfolio quality. For the length of lending relationship, Table 4 indicates no significant correlation of this variable with loan quality. Unsurprisingly, the results indicate that the dummy variable ownership structure in negatively correlated with loan default and positively correlated with loan quality.

6. Empirical results

In Table 5, we present the results obtained using probit models. In Model 1, we examine the impact of the intensity and the length of lending relationship on the loan default binary variable while controlling the other bank-specific and firm-specific information. In Model 2, we test how ownership structure affects the relationship between loan default and lending relationship.

The coefficient relative to relationship intensity is negative and significant at 1% as expected (Table 5, Model 1). This suggests that an increase in the intensity of the bank-firm lending relationship decreases the likelihood that the firm encounters a credit default.

The marginal effects reported in Model 1 accentuate that one unit increase in the bank-firm relationship intensity decreases the probability that the firm defaults on its loan by 23.9%. This result is consistent with Ferri and Messori (2000) and Fiordelisi et al. (2014) who find that banks engaging in relationship lending are associated with lower credit risk. This confirms the theoretical assertion of the informational advantage hypothesis according to which an intense banking relationship allows for an effective bank monitoring and screening.

At odds with the expectations, Table 5 highlights that the coefficient relative to relationship length is statically insignificant. Our

Table 3
Distribution of loan quality indicator among classes.

Class	Frequency	%	Cum.
1	22	4.45	4.45
2	38	7.69	12.15
3	24	4.86	17.00
4	21	4.25	21.26
5	33	6.68	27.94
6	356	72.06	100.00
Total	494	100.00	

Table 4
The correlation matrix of Pearson.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
[1] Loan default	1.00								
[2] Loan quality	−0.93***	1.00							
[3] Relationship intensity	−0.24***	−0.29***	1.00						
[4] Relationship length	0.01	−0.01	0.01	1.00					
[5] Ownership structure	−0.14***	0.10*	0.04	−0.00	1.00				
[6] Firm size	0.02	−0.03	−0.04	−0.05	−0.01	1.00			
[7] Bank size	−0.16***	−0.13**	0.01	0.01	−0.20***	0.01	1.00		
[8] Bank capitalization	−0.06	0.01	−0.05	−0.01	0.15***	−0.01	−0.47***	1.00	
[9] Activity diversification	−0.10***	0.08*	−0.05	−0.03	0.66***	−0.02	0.10*	−0.13***	1.00

**, ** and * indicate statistical significance at the 0.01, 0.05 and 0.10 level, respectively. Variables loan default [1] and loan quality [2] are dependent variables.

hypothesis (H2) is then not confirmed. Our result refutes the empirical evidence of Chang et al. (2014) for a panel of Chinese firms. It is likely that although longer term relationship between firms and banks foster mutual confidence and help to reduce information asymmetries, screening and monitoring remain pertinent to reduce borrowers' incentives to default. Tunisian banks are willing to support costs of monitoring to experience lower credit risk in their portfolios. Moreover, related borrowers are easier to monitor (La Porta et al., 2003).

The results in Model 2 point out that the impact of the relationship intensity on loan default is affected by bank's ownership structure. In fact, an increase in the lending relationship intensity diminishes the likelihood of credit default in private banks more than it does in the public ones. This result suggests that private banks can extract more valuable and soft information on their clients when they have intense lending relations with them which would help mitigating credit risk. The marginal effects reported in model 2 indicate that one unit increase in the private bank-firm relationship intensity lowers the probability of non repayment of loans by 12.6% more than it does in public banks. These results support our hypothesis which states that the positive effect of the lending

Table 5
Relationship lending and loan default: Probit estimations.

Independent variables	Loan default			
	Model 1		Model 2	
	Coeff. (t)	Marginal effects (t)	Coeff. (t)	Marginal effects (t)
Constant	3.05** (2.33)	–	2.96*** (2.98)	–
RIN	−1.17***	−0.239***	−0.891***	−0.122***
	(−5.51)	(−5.58)	(−4.36)	(−4.25)
LENG	0.0009	0.0001	0.002	0.001
	(0.30)	(0.30)	(0.45)	(0.24)
RIN*OWS	–	–	−0.762***	−0.126***
			(−3.32)	(−2.86)
LENG*OWS	–	–	−0.184***	−0.213***
			(−4.51)	(−3.12)
Bank capitalization	−0.088***	−0.017***	−0.071***	−0.012***
	(−3.14)	(−3.11)	(−3.32)	(−3.14)
Bank size	−0.072***	−0.014***	−0.065***	−0.015***
	(−2.77)	(−2.76)	(−2.87)	(−3.01)
Activity diversification	−0.034***	−0.007***	−0.028***	−0.005***
	(−2.97)	(−3.01)	(−3.11)	(−2.82)
Firm size	−0.033	−0.006	−0.036	−0.002
	(−0.67)	(−0.67)	(−0.81)	(−0.51)
Agriculture	−0.056	−0.011	−0.042	−0.023
	(−0.14)	(−0.14)	(−0.24)	(−0.42)
Real estate	0.300	0.061	0.401	0.052
	(1.24)	(1.24)	(1.11)	(1.32)
Commerce	−0.654**	−0.133**	−0.512**	−0.112**
	(−2.40)	(−2.52)	(−3.14)	(−2.90)
Tourism	1.57***	0.321***	1.23***	0.215***
	(7.49)	(6.26)	(4.56)	(4.86)
Observations	494		494	
Prob > chi2	0.0000		0.0000	
Pseudo R2	0.3787		0.3345	
AIC	339.576		309.632	

All variables are defined in the Table 1. The dependent variable is loan default. The numbers in parentheses are t-student. *,**,*** indicate statistical significance at the 10%, 5% and 1% level.

Table 6
Relationship lending and loan quality: Ordered Probit estimations.

Independent variables	Loan quality	
	Model 3	Model 4
	Coeff. (t)	Coeff. (t)
RIN	0.999***	0.245***
	(6.04)	(4.02)
LENG	0.001	0.003
	(0.58)	(0.16)
RIN*OWS	–	1.22***
		(4.33)
LENG*OWS	–	1.19***
		(5.12)
Bank capitalization	0.035	0.021
	(1.57)	(1.13)
Bank size	0.026	0.066
	(1.28)	(1.07)
Activity diversification	0.027***	0.038***
	(3.01)	(3.57)
Firm size	0.010	0.009
	(0.27)	(0.11)
Agriculture	−0.260	−0.365
	(−0.95)	(−0.71)
Real estate	−0.033	−0.018
	(−0.17)	(−0.26)
Commerce	0.611***	0.872***
	(3.12)	(3.44)
Tourism	−1.13***	−1.28***
	(−6.67)	(−5.63)
cut1	0.107	−1.31
cut2	0.801	−0.704
cut3	1.09	−0.435
cut4	1.33	−0.222
cut5	1.63	0.062
Observations	494	494
Prob > chi2	0.000	0.000
Pseudo R2	0.1626	0.1542
AIC	885.37	812.54

All variables are defined in the Table 1. The dependent variable is loan quality. The numbers in parentheses are t-student. *,**,*** indicate statistical significance at the 10%, 5% and 1% level.

relationship intensity on loan quality is relatively stronger in private banks. Indeed, state owned banks have incentives to fund projects with negative net present value, leading to an increase in credit default (Dewatripont and Maskin, 1995). In MENA region, state owned banks finance risky projects and are vulnerable to political lobbying (Boussaada and Labaronne, 2015). Close relationships in weak institutional settings are conduits of loot and not information (La Porta et al., 2003). Indeed, Tunisian public banks have been hampered by weak lending practices and governance issues (IMF, 2015).

In addition, results of Model 2 show that the lending relationship length does matter for credit default only in private banks. In fact, one year increase in the private bank-firm relationship length decreases the probability that the firm defaults on its loan by 21.3%. This supports the thesis which claims that the positive effect of the lending relationship length on loan quality is relatively stronger in private banks. The latter undertake a thorough screening process before they grant the loan even if the borrower is a related one.

Moreover, the findings emphasize that the likelihood of credit default decreases when banks raise their capital ratio, size and diversification toward noninterest activities. It appears that large and more capitalized Tunisian banks have the experience and the means to evaluate and control risky project. Regarding the firm-specific factors, the results indicate that firm's size does not affect the probability of credit default. However, firms' sector affiliation does. In the Tunisian environment, all firms, irrespective of their size, can adopt a risky strategy which increases the probability of default. We note also that firms operating in the commerce sector are less likely to default while those operating in the tourism sector are more likely to encounter credit default. This result confirms the vulnerability of the tourism sector in Tunisia. The large debt of the tourism sector is emblematic of the financial sector failures in Tunisia (World Bank, 2014). More than 56.5% of loans granted by banks to the firms operating in the tourism sector are nonperforming loans (Banking Supervision Report of the Central Bank of Tunisia, 2016).

Consistent with the expectations, the results reported in Table 6 (Model 3) displays that the coefficient of the lending relationship intensity is positive which implies that the more a bank develops its relationship lending strategy, the higher the loan quality. This result is explained by a better knowledge of these firms and more effective risk management. This result supports our first hypothesis

regarding the positive relation between the lending relationship intensity and loan quality which has been confirmed using probit method. Nonetheless, the length of lending relationships does not impact loan quality.

When we control for bank ownership structure (Model 4), we have obtained results which are similar to those of Table 5. In fact, private banks seem to take more advantages of their intense and long lasting lending relationships with firms than public banks do. However, close state bank-firm relationship lead to certain crony capitalism in the Tunisian banking sector. Under the prior regime, there was a high risk of directed and related credits to members of the ruling elite and their cronies (World Bank, 2014).

For the control variables, the findings show that bank size and capitalization do not affect loan quality. However, banks' activity diversification has a positive and significant coefficient which implies that banks which rely on other banking activities rather than lending are more likely to have a good quality of loans. One explanation of this outcome would be that banks with diversified sources of income apply high standards when they grant loans by selecting only good borrowers. Regarding firm-specific factors, the results indicate that firm size does not have effect on loan quality. Nevertheless, firms which are operating in the commerce (tourism) sector are more (less) likely to have a higher quality of loans.

7. Conclusion

In this study, we empirically examine the impact of the intensity and length of bank-firm relationship on ex-post credit risk in Tunisia. We focus on a loan by loan analysis of 494 bank-firm relationships. Our findings reveal that lending relationship, proxied by its intensity, does affect credit risk in Tunisia. We also show that an increase in the intensity of the bank-firm lending relationship decreases the likelihood that the Tunisian firm encounters a credit default. Moreover, firms which have an intense relation with banks are more likely to have loans of higher quality. These results confirm the theoretical developments of the information asymmetry theory suggesting that banks are able to mitigate agency problems by undertaking appropriate actions. One possible channel through which banks can alleviate moral hazard problems is to engage in intense lending relationship with borrowers in order to extract soft information about the firms' intentions and future projects. Nevertheless, the length of lending relationship does not seem to affect credit risk of Tunisian banks.

Further, as pointed out by the results of our regression, bank's ownership structure seems to have a role in determining probability of default. In fact, our study discovers a new channel through which this impact happens. This channel is definitely banking relationship. Our findings highlight that an increase in the lending relationship intensity decreases the likelihood of credit default in private banks more than it does in public banks. In addition, the results highlight the fact that the lending relationship length does matter to credit default, but only in private Tunisian banks. We conclude that risk is not assessed appropriately and relations are misused in Tunisian state owned banks. The latter have for years followed strategic political decisions (in tourism, agriculture and housing) that were not sustainable over the long term, notably since they lend at favorable conditions to "connected parties". Thus governance structure of these banks should be reviewed and authorities should minimize political interference.

Our results suggest that in general, relationship lending is relevant in the Tunisian banking sector and that banks take advantage from this relationship with regard to their credit risk management. However, the persistence of a higher rate of non-performing loans in Tunisia leads to the question on the adequacy between the current regulatory framework which seems to impede the development of close and intense bank-firm relationship, and credit risk coverage.

Further investigations are needed to better understand the impact of bank-firm relationship on credit risk. It would be worthwhile to incorporate other proxy for credit risk. Finally, future studies may examine the impact of lending relationships on firms' access to credit after default.

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