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The determinants of loan acceptance: a case study of French farms

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Abstract

Bank financing is a crucial issue for farm development and sustainability. This paper analyzes the credit-granting process to farms by identifying the main criteria that are used by banks to decide whether a loan is to be accepted, and according to which modalities. Using original individual data collected in a French bank and processing logit, ordered logit and multinomial logit models, we show that farms benefiting from a good capital structure and wealth have a higher probability of receiving the requested loan. The analysts' opinion is central to the outcome of the loan process. Such information may be useful for the bank by making explicit the principal decision criteria for loan granting.

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1. Introduction

Farms' development heavily relies on bank loans, which are necessary for their growth (Fecke et al., 2016). This method of financing has usually represented an attractive way of gathering funds insofar as interest rates have been subsidized for farms over time in many countries (Jansson et al., 2013). In the current context, with very low interest rates, loans are even more competitive if farmers show evidence that their projects to be financed will generate enough cash to pay back the borrowed money.

An extensive literature in banking and finance tackles the issue of assessing supply- and demand-side effects using firm-level data or bank lending survey data (Hempell and Kok, 2010; Ciccarelli et al., 2010; Puri et al., 2011; Belaid et al., 2016). In the farm sector, few studies tackle the issue of the credit-granting process (Jansson et al., 2003; Featherstone et al., 2007; Afari-Sefa et al., 2018). Most studies related to credit indeed consider credit rationing (Awunyo-Victor et al., 2014; Turvey and Weersink, 1997) and more specifically its consequences (Barry and Robison, 2001; Petrick, 2004). Some studies also consider the evaluation of credit default risk (Katchova and Barry, 2005). Because farms are mainly of small and medium size, the literature on the lending decisions concerning small and medium-sized enterprises can be useful to provide information on factors leading to loan acceptance or denial (Berger et al., 2005; Cassar et al., 2015).

This paper aims to contribute to the literature on loan granting in three ways. First, we use direct banking information, which allows for improved precision regarding the individual, structural, and financial characteristics of studied farms. Second, we consider both the objective and the subjective dimensions in credit granting set out above. While the literature highlights the need for information in the banking system, many empirical analyses pay little attention to the analysts' personal dimension, probably due to a lack of precise data (Heider and Inderst, 2012). Third, we differentiate loans according to their purpose, namely real estate investment, machinery investment, and cash position improvement.

We adopt an econometric modeling approach that relies on logit models. These kinds of models seem to be the most appropriate to consider the bank decision regarding the acceptance of requested loans (LaCour-Little, 1999). In a first stage, we consider a binary response, *i.e.*, whether the loan is fully granted or not. In a second stage, we use an ordered logit that considers the gradation of the opinion exposed above, from 1 (refusal of the loan) to 4 (full acceptance without guarantee). In a third stage, we use a multinomial logit which considers the same gradation.

The paper is organized as follows. In the first part, we develop the theoretical modeling associated with our study. In the second part, we present the review of literature. In the third part, we discuss the results. In the fourth part, we conclude the analysis and propose some implications.

2. Review of literature

One of the keys in the loan-granting process is the information available for the bank that will lead in the end to acceptance or rejection of the requested loan. According to Berger and Udell (2006), banks use four primary methods to compensate for information asymmetries: (1) accounting-based lending, (2) credit scoring, (3) relationship lending, and (4) collateral-based lending. We structure this section according to this typology and we consider the four following key points as well as control variables.

2.1 Accounting figures

By definition, the holder has the best available information on his or her company's performance and its default risk (Bharath et al., 2008). However, the bank needs to gather such information in order to assess the ability of the borrower to pay back its debt. Information asymmetries tend to be greater in small, private businesses such as farms, which often have little institutional history and are not required to publicly disclose company-specific information (Butler et al., 2007). As a result, these businesses tend to be more informationally opaque than larger, publicly listed firms, increasing information risk and potentially influencing lending decisions. For banks, cash flow information is the most important factor in small business loan approval decisions, far above credit scores (Cowen and Cowen, 2006).

2.2 Credit scoring

Banks use scoring methods as a convenient way to aggregate available information. Globally speaking, the literature shows that the hard, quantitative information in credit scores provides a cost-effective method for lenders to assess loan applications and monitor borrowers (e.g., Turvey and Weersink, 1997; Frame et al., 2001; Akhavein et al., 2005; Berger and Frame, 2007; Pederson and Zech, 2009). Although initially designed for large companies, scores are completely suitable for small businesses given the small quantity of objective information they can provide. Small companies do not usually purchase scores from credit agencies (Kallberg and Udell, 2003). Therefore, banks compute a solvency score themselves according to the Basel regulation. Because such a score predicts the probability of failure of the company, it is used as a tool for granting a loan or not (Cassar et al., 2015).

2.3 Collateral

By definition, collateral can be used as a way to repay the debt in case of default. Therefore, it reduces the risk to be borne by the lender (Jiménez and Saurina, 2004; Voordeckers and Steijvers, 2006). Such a guarantee is adapted to the loan characteristics and to the probability of default estimated by the bank. Following Coco (2000), Cassar et al. (2015) emphasize a double action of collateral against information asymmetries. First, moral hazard is reduced by preventing borrowers to shift from low-risk to higher-risk projects. Second, collateral acts as a signal sent by a quality borrower, which reduces adverse selection. In a farm context, collateral can concern both the farmer's personal wealth (real estate) and the facilities of the company (farmland and machinery). Livestock and crop stocks can also be considered as guarantees (Henderson, 2015).

2.4 Banking relationships

In contrast to accounting reports and other figures, the banking relationship is subjective (Cassar et al., 2015). It is in the realm of "soft information" in the sense that it is hard to quantify and communicate to others, and may not be verifiable by outsiders. For small-business lending decisions, even more important may be the "soft" information obtained through ongoing banking relationships (Berger and Udell, 1995; Petersen, 2004; Petersen and Rajan, 1994). Such information is first related to the knowledge of the potential borrower: his or her character (honesty, integrity, and reliability), skills, and ability to operate the business. Second, loyalty and past transactions provide additional information about attitude toward risk. Consequently, past dealings with a borrower may provide superior information for assessing creditworthiness (Diamond, 1991; Petersen and Rajan, 1994). All these elements directly reduce information asymmetries. Consequently, a close bank-borrower relationship might be associated with a lower level of screening on each individual loan (Jiménez and Saurina, 2004).

2.5 Control variables

Finally, one must refer to the loan in itself: amount, interest rate, intended purpose, effective use of the funds, and repayment terms (Petrick, 2004). Many of these parameters are interdependent. For instance, short-term borrowing is less risky from the bank's point of view because it is usually associated with a low amount and a fast payback. Thus, the effective interest rate and the collateral should be lower. However, borrowing for a long-term investment may act as a signal of quality because of the commitment required (Kutsuna and Cowling, 2003).

3. Empirical framework

To explain the process leading to granting a loan, we have developed an empirical framework, which relies on a description of a loan-granting process, the use of an original database, and a two-stage econometric model.

3.1 Loan-granting process

A loan request is basically examined through several stages. First, the applicant has to submit a complete file, including relevant information on his or her project, activity, accounts, and request. The first step is an examination in the bank's local branch, which provides a notice and an opinion regarding the loan request on the basis of the supplied information and of the knowledge of the customer. The branch may be permitted to grant the amount requested only for small amounts. The second step consists in sending the file to the bank loan service, located in the headquarters, which complements the file and decides to grant the loan or not. For major projects and distressed farms, a special credit committee decides on the request.

In all cases, the decision is then transmitted to the customer. It can take four forms: full acceptance of the loan without guarantee (51.30% of our sample), full acceptance of the loan with guarantee (32.51%), partial acceptance of the loan (6.69%), and rejection of the loan (9.50%). This key variable is used as the main dependent variable of our analysis.

3.2 Database

We use data obtained from a partnership with Crédit Agricole, the second largest commercial bank in France, which provides loans to nine farms out of 10, representing a total of €7.2 billion in 2014 (Crédit Agricole, 2015). Credit is granted by regional branches, our study being focused on Crédit Agricole Sud-Rhône-Alpes, which encompasses three departments (Ardèche, Drôme, Isère) in the southeast part of France. Our dataset consists of 1,045 farms located in the Auvergne-Rhône-Alpes region, the fourth largest producing area in France, whose agricultural production is fairly close to the observed distribution for French agriculture (Agreste Auvergne-Rhône-Alpes, 2016).
The data were gathered on a random basis at the regional headquarters of the branch, with the service in charge of bank loans. They include a wide set of individual, structural, accounting, and financial components (balance sheets and income statements) as well as measures of riskiness such as the Basel II counterparty measure up to a three-year period for each farm. Data collection consisted in the compilation of individual forms completed either automatically (financial data) or manually by local bank analysts (individual data and remarks) during the period 2012–2017. All this information was gathered within the bank and remains private. For the sake of analysis, data were anonymized, and no information was provided regarding the precise location of the farm or the age and gender of the farm holder. A list of variables used in the analysis is provided in Table 1.

Table 1 - List of variables used in the analysis

Variable		Unit	Definition
Decision		-	Ranking of a requested loan (favorable without guarantees, favorable with guarantees, partial acceptance, refusal)
Counterparty risk (Basel II)		-	Counterparty risk (Basel II score, in 5 classes = very low risk, low risk, medium risk, high risk, proven risk)
Analysts' opinion	**Strengths**	-	Counter + Specific items (good capital structure, off-farm income, farmer's wealth, feasibility of the project, good relationships between the bank and the farmer, farmer's experience)
	Weaknesses	-	Counter + Specific items (fragile capital structure, low profitability, high indebtedness, poor season, no guarantee)
Banking relationship	**Maturity of the requested loan**	Month	Maturity of the requested loan
	Amount of the requested loan	k€	Amount of the requested loan
	Amounts already borrowed	k€	Amounts already borrowed
	Motivation of the requested loan	-	3 classes (cash increase, movable assets, property assets)
	Loyalty	Year	Loyalty to the bank
Farm	**Usable Agricultural Area (UAA)**	Hectare	Cultivated area of the farm
	UAA belonging to the farmer	Hectare	Cultivated area of the farm belonging to the farm holder
	Tax situation	-	Flat tax vs. regular
	Economic and Technical Orientation	-	Economic and technical orientation (in 9 classes = field crops, market gardening, fruits & wine, cattle, granivores, mixed crops, mixed livestock, mixed crops & livestock, other farms)

An original feature of this database is that it includes the analysts' opinions, either positive or negative, regarding loan requests. This information takes the form of comments, e.g., "good capital structure," which are freely written by the analysts and relate both the financial situation of the farm and the relationship between the bank and the customer. We could group this information in two different ways: first, by using categories grouping similar comments; second, by counting the number of positive and negative comments, even if they overlap.

3.3 Econometric modeling

We adopt an econometric modeling approach that relies on logit models. These kinds of models seem to be the most appropriate to consider the bank decision regarding the acceptance of requested loans (LaCour-Little, 1999; Zambaldi et al., 2011).

In a first stage, the econometric approach relies on binomial logit models (McFadden, 1984). The endogenous variable, y_{it}, is dichotomous:

$$y_{it} = \begin{cases} 1 \; if \; the \; loan \; is \; fully \; rejected \; or \; partially \; rejected \\ 2 \; if \; the \; loan \; is \; accepted \; with \; or \; without \; guarantee \end{cases} \quad (1)$$

y_{it} is related to another latent non-observable random variable, y^*_{it}, which can be understood as the quality of a loan, which is a function of the farm characteristics, as well as the loan request. A farmer will obtain credit if the bank's utility is greater than that for which it would not grant the loan, in terms of its expectations. In other words, the company will be granted the credit if $y^*_{it} > 0$.

In a second stage, we use ordered logit models that consider the graduation of the analysts' decision mentioned above. Such models is more suitable to consider the graduation of the quality attributed to the loan request (Voordeckers and Steijvers, 2006; Belaid and Bellouma, 2016).

Such analysis allows us to take values as a dependent variable:

$$y_{it} = \begin{cases} 1 \; if \; the \; loan \; is \; rejected \\ 2 \; if \; the \; loan \; is \; partially \; accepted \\ 3 \; if \; the \; loan \; is \; accepted \; with \; a \; guarantee \\ 4 \; if \; the \; loan \; is \; accepted \; without \; guarantee \end{cases} \quad (2)$$

Again, this variable y_{it} is related to the latent non-observable random variable, y^*_{it}. For a very low y*, loan status is poor. When y* increases, the loan quality improves further, and so on. Regression parameters determine the extent to which the latent variable y^*_{it} increases with the independent variables. A positive sign increases the probability that the loan is accepted and subsequently decreases the probability of rejection or renegotiation.

In a third stage, we estimate multinomial logistic regressions, which are a simple extension of binary logistic regressions that allow for more than two categories of the dependent or outcome variable (McFadden, 1974; Miyamoto, 2014). The dependent and the independent variables included in the models are the same than in the ordered logit (equation 2). The coefficients measure the propensity to fall into the category studied (3 modalities of loan acceptance) over the alternative (loan not granted).

In all models, estimates of the parameters are obtained by maximizing the log-likelihood function of y_{it}. The effect of the independent variables on probabilities is described by using odds ratios (logit and ordered logit) and relative risk ratios (multinomial logit) which can be calculated from the estimated parameter values.

4. Results

4.1 Main results

We carry out our empirical study using both descriptive statistics and an econometric analysis with three different models for robustness checks. Results are also discussed regarding their policy implications.

The descriptive statistics consider the main characteristics of the studied population according to the four possible decisions made in response to the loan request (Table 2). They show at first glance that 85% of loan applications were actually accepted with or without guarantee. This very high acceptance rate can be interpreted in two ways. The first one is that French farmers are prime clients for banks not only due to their wealth but also to the steady flow of payments within the Common Agricultural Policy (Ciaian et al., 2012). The second one is that some potential borrowers may be discouraged before the submission of their formal application, which increases the rate of success for applications finally submitted (Kon and Storey, 2003).

Moreover, a clear distinction emerges for most criteria between (fully/partially) accepted loans and rejected loans. Indeed, accepted loans are associated with better Basel II scores and the analyst's opinion. They refer to greater amounts but with a reduced term compared to the other loans.

To confirm and further develop these results, logit, ordered logit and multinomial logit models are implemented. Given the correlations that exist between risk measures, we estimate for each class three different models, each one with a different measure of banking risk assessment. We notice that the results of the econometric models confirm the descriptive statistics. Moreover, the estimation of the logit, ordered logit and multinomial logit models provides quite similar results, which ensures their robustness (Table 3).

The results show that some critical aspects underlined by the analysts appear to be significant in the loan decision. The most encouraging factors are, first, the feasibility of the project to be financed by the loan, which is the source of future cash flows that will be used to pay back the credit.

The results also emphasize the strategic importance of the counterparty risk (Basel II score), which is higher for rejected or partially accepted loans. This synthetic indicator (scoring method), which is automatically computed by the bank according to the balance sheet and the income statements of the farm, appears to be a key element, and likely the first element, in the decision to grant or refuse a loan. The counterparty risk plays a strong negative role in a loan grant, which confirms the importance of this indicator. Banks are reluctant to lend money to customers that represent at least a medium solvency risk.

As expected, farms benefiting from a good wealth and capital structure have a higher probability of receiving the requested loan. However, loyalty is not a significant factor in favor (or to the detriment) of a loan request. Long-term relationships between the bank and its customers do not represent a particular advantage for borrowing farms. The reason may lie in the competition between banks whose preoccupation is to attract new customers even if it leads to the undervaluing of the benefits of loyalty.

Table 2 - Descriptive statistics

Variables	All farms	Decision				Differences in distributions (Chi2 test)
		Rejection	Partial acceptance	Acceptance with guarantee	Acceptance w/o guarantee	
Decision	100,00%	9,24%	5,84%	40,55%	44,37%	/
Counterparty risk (Basel II score)						
Very low risk	32,30%	29,63%	23,08%	33,87%	31,91%	
Low risk	24,38%	13,58%	25,00%	24,19%	27,64%	
Medium risk	42,08%	51,85%	50,00%	41,13%	39,95%	***
High risk	13,68%	27,16%	15,38%	13,44%	10,30%	
Proven risk	1,23%	4,94%	1,92%	0,81%	0,50%	
Motivation of the requested loan						
Cash increase	48,78%	50,67%	70,21%	45,53%	48,53%	
Movable assets	26,06%	20,00%	14,89%	27,95%	28,27%	**
Property assets	25,17%	29,33%	14,89%	26,51%	23,20%	
Amounts already borrowed (k€)	265,832	211,823	286,436	280,062	263,386	*
Amount of the requested loan (k€)	91,978	71,689	84,267	98,909	90,117	***
Maturity of the requested loan (months)	65,79	77,20	66,72	69,16	58,43	**
Strengths noticed by the analyst (yes/no)						
Good capital structure	43,42%	12,05%	39,62%	47,21%	48,28%	***
Off-farm income	29,93%	25,30%	33,96%	33,69%	29,90%	n.s.
Farmer's wealth	44,98%	32,53%	28,30%	45,09%	50,74%	***
Feasibility of the project	25,61%	6,02%	15,09%	24,14%	33,58%	***
Good relationships bank-farmer	33,70%	22,89%	26,42%	38,46%	34,64%	n.s.
Farmer's experience	37,35%	28,92%	28,30%	37,77%	39,71%	n.s.
Weaknesses noticed by the analyst (yes/no)						
Fragile capital structure	15,77%	27,71%	15,09%	14,59%	12,99%	*
Low profitability	15,77%	21,69%	24,53%	15,92%	11,76%	n.s.
High indebtedness	32,25%	53,01%	33,96%	33,95%	26,23%	***
Poor season	10,52%	10,84%	13,21%	10,88%	9,07%	n.s.
No guarantee	10,44%	14,63%	11,32%	9,02%	11,30%	n.s.
Number of strengths (counter)	4,75	3,56	4,76	4,9	4,95	***
Number of weaknesses (counter)	2,62	4,18	3,14	2,5	2,3	***
Loyalty (years)	21,32	19,80	15,92	24,29	19,93	*
Usable Agricultural Area (UAA, hectares)	84,72	82,08	85,85	97,17	74,93	***
UAA belonging to the farmer (%)	38,08%	32,73%	45,16%	34,02%	41,76%	***
Tax situation (flat tax/regular)	94,29%	95,29%	94,55%	93,70%	94,23%	n.s.
Economic and technical orientation of the farm						
Field crops	22,11%	26,44%	23,64%	23,61%	19,52%	
Market gardening	4,34%	4,60%	0,00%	3,45%	5,30%	
Fruits & wine	28,73%	14,94%	29,09%	24,40%	34,94%	
Cattle	20,04%	26,44%	12,73%	20,16%	19,52%	
Granivores	4,54%	3,45%	7,27%	4,51%	4,82%	***
Mixed crops	8,09%	9,20%	5,45%	7,43%	9,16%	
Mixed livestock	2,86%	4,60%	9,09%	3,45%	1,45%	
Mixed crops & livestock	6,32%	3,45%	12,73%	9,81%	3,61%	
Other farms	2,96%	6,90%	0,00%	3,18%	1,69%	

Source: Own database.

Key: Percentages are expressed in line for variable "Decision" and in row for variables "Counterparty risk (Basel II score)", "Motivation of the requested loan" and "Economic and technical orientation of the farm". Other values and percentages can be read directly according to the line and row. A Chi2 test is performed to compare the differences in distributions for each variable according to the decision taken by the bank. A Kruskal-Wallis equality-of-populations rank test is specifically estimated for continuous variables. Significances are the following: n.s. not significant, * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

By comparison with (short-term) loans used to improve the farm's cash position, long-term loans used to invest in moveable or property assets leads to a lower probability of acceptance. Consequently, an accepted loan has a shorter maturity than a rejected loan, because of the uncertainty associated with the long haul. The bank is therefore willing to control risk overtime by rejecting requested loans associated with large amounts and/or long terms when there is a strong uncertainty on future cash flows available to the farm.

One should note that the counters of positive and negative opinions from the analyst have respectively a significant positive and negative influence on the decision to grant the loan. The analysts encompass both financial and non-financial aspects, and they clearly weigh the strengths and weaknesses of the loan and the requesting farmer.

As stated before, the main significant strengths of an accepted loan encompass a good capital structure, the farmer's wealth, and the feasibility of the project. Factors such as off-farm income, the farmer's experience, good relationship between the customer and the bank do not appear to be discriminant. The analyst seems to decide according to the project's potential while considering some guarantees in case it fails.

The main weaknesses associated with rejection are a fragile capital structure and high indebtedness. These two aspects translate into a financial distress due to inappropriate financial structure. However, a bank may grant a loan that provides cash to the farm in order to help this structure overcome a temporary slump. To that extent, the occurrence of a poor season (due to bad weather conditions) is not a significant criterion for the decision, mostly because of its short-term influence on the farm.

Technical features of the farm (acreage, tax situation) do not seem to influence the outcome of the loan process. Thus, the main features of the farm do not influence the analyst's sensitivity, which is consistent with the results found by Janssen et al. (2013) in European countries. Finally, some specializations such as field crops and cattle breeding are more subject to a loan rejection than market gardening, fruit and wine production. This result may be explained by unfavorable market conditions, with strong decrease in prices, for the former productions.

4.2 Policy implications and recommendations

The results reveal some implications and recommendations for the bank, its customers, and also public policies. Because the banking sector is competitive, banks have to propose efficient services to the customers. Cost reduction for processing loans goes hand in hand with a reduction of the response provided to farmers. A solution lies in the automatization of some of the loan requests. The results tend to prove that such a process may be possible for small loans, farmers exhibiting fair financial scores, and also for some specializations (market gardening, fruits, and wine-growing). For these specific criteria, loans are usually granted in practice, mainly because farms are considered as less risky.

Table 3 - Econometric models

	Logit			Ordered logit		
Variables	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Counterparty risk (Basel II score, ref = very low risk)						
Low risk	-1.100*			-0.306		
Medium risk	-1.883***			-0.827***		
High risk	-2.242***			-1.206***		
Proven risk	-3.807***			-2.814***		
Strengths noticed by the analyst (yes/no)						
Good capital structure		1.183***			0.391*	
Off-farm income		0.261			0.078	
Farmer's wealth		0.839**			0.415*	
Feasibility of the project		1.460***			0.867***	
Good relationships between the bank and the farmer		0.228			0.110	
Farmer's experience		0.397			0.277	
Weaknesses noticed by the analyst (yes/no)						
Fragile capital structure		-0.021			-0.156	
Low profitability		-0.242			-0.262	
High indebtedness		-0.517*			-0.527**	
Poor season		-0.078			-0.424	
No guarantee		-0.482			-0.209	
Number of strengths (counter)			0.319***			0.203***
Number of weaknesses (counter)			-0.524***			-0.359***
Amount of the requested loan (€)	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
Motivation of the requested loan (ref = cash increase)						
Movable assets	0.422	0.384	0.762*	0.094	0.112	0.109
Property assets	-0.218	-0.021	-0.093	-0.264	-0.240	-0.224
Amounts already borrowed (€)	-0.001	-0.001	-0.000	-0.001	-0.000	-0.000
Loyalty (years)	0.010	0.005	0.001	-0.000	-0.000	-0.001
Usable Agricultural Area (UAA, hectares)	0.001	0.002	0.001	-0.000	0.000	-0.000
UAA belonging to the farmer (%)	-0.460	-0.300	-0.346	0.003	-0.012	0.099
Tax situation (flat tax/regular)	-0.923	-1.037	-0.811	-0.448	-0.468	-0.334
Economic and technical orientation of the farm (ref = field crops)						
Market gardening	0.966	0.806	0.669	0.862*	0.728	0.523
Fruits & wine	0.749	1.059*	0.983*	0.567*	0.685**	0.536*
Cattle	-0.156	0.285	0.132	0.022	0.115	0.056
Granivores	-0.175	0.087	-0.313	0.258	0.193	-0.070
Mixed crops	-0.157	0.224	-0.030	0.053	0.297	0.004
Mixed livestock	-0.864	-0.418	-0.813	-0.755	-0.642	-0.738
Mixed crops & livestock	-0.323	-0.200	-0.372	-0.492	-0.320	-0.390
Other farms	-0.789	-0.093	-0.289	-1.207*	-0.929	-0.881
Constant	4.299***	1.528*	2.526***			
Constant/cut1				-3.764***	-2.540***	-2.889***
Constant/cut2				-3.111***	-1.892***	-2.271***
Constant/cut3				-0.942*	0.329	-0.049
Log-likelihood	58.02	91.50	97.77	72.33	103.38	102.63
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pseudo-R2	0.1009	0.1594	0.1736	0.0463	0.0665	0.0672
Number of observations	715	711	700	715	711	700
BIC	655.1	666.3	590.0	1641.0	1648.3	1561.8

Source: Own database.

Key: Significances are the following: * p<0.05, ** p<0.01, *** p<0.001.

Table 3 - Econometric models (continued)

	Multinomial logit								
	Model 1			Model 2			Model 3		
Variables	**Partial acceptance**	**Accept with guarantee**	**Accept without guarantee**	**Partial acceptance**	**Accept with guarantee**	**Accept without guarantee**	**Partial acceptance**	**Accept with guarantee**	**Accept without guarantee**
Counterparty risk (Basel II score, ref = very low risk)									
Low risk	-1.544	-2.011	-2.148						
Medium risk	-2.351	-3.008**	-3.625***						
High risk	-2.810*	-3.399**	-4.364***						
Proven risk	-3.846*	-5.408***	-6.094***						
Strengths noticed by the analyst (yes/no)									
Good capital structure				0.549	1.539**	1.509**			
Off-farm income				0.968	0.730*	0.559			
Farmer's wealth				-0.482	0.569	0.732*			
Feasibility of the project				2.478*	2.747*	3.363**			
Good relationships bank-farmer				-0.034	0.217	0.178			
Farmer's experience				0.767	0.612	0.861*			
Weaknesses noticed by the analyst (yes/no)									
Fragile capital structure				-1.277*	-0.436	-0.550			
Low profitability				1.053	0.343	0.012			
High indebtedness				-1.597**	-1.069**	-1.398***			
Poor season				-0.215	0.020	-0.394			
No guarantee				-0.589	-0.809	-0.736			
Number of strengths							0.631***	0.548***	0.648***
Number of weaknesses							-0.489***	-0.661***	-0.826***
Amount of the requested loan	-0.000	-0.000	-0.007***	-0.000	-0.000	-0.006***	0.000	0.000	-0.006***
Motivation of the requested loan (ref = cash increase)									
Movable assets	-1.503*	-0.190	-0.183	-1.800*	-0.395	-0.385	-2.125**	-0.044	-0.029
Property assets	-1.739**	-0.795*	-0.741	-1.431*	-0.522	-0.483	-1.897**	-0.859*	-0.738
Amounts already borrowed	0.002	0.000	0.000	0.004**	0.001	0.001	0.002	0.001	0.001
Loyalty (years)	-0.037*	-0.001	-0.001	-0.029	-0.001	-0.001	-0.027	-0.001	-0.002
Usable Agricultural Area	0.002	0.002	0.001	0.006	0.004	0.004	0.002	0.002	0.001
UAA belonging to the farmer	1.065	-0.188	0.208	1.655*	0.315	0.564	1.550*	0.108	0.619
Tax situation	-1.307	-1.399	-1.397	-1.628	-1.754*	-1.670*	-0.643	-0.931	-0.892
Economic and technical orientation of the farm (ref = field crops)									
Market gardening	-13.884	-0.193	0.609	-13.296	-0.142	0.702	-14.313	-0.443	0.162
Fruits & wine	0.441	0.879	1.224*	0.133	0.892	1.353*	-0.166	0.914	1.191
Cattle	-1.176	-0.589	-0.477	-1.612*	-0.321	-0.151	-1.498	-0.225	-0.193
Granivores	0.566	-0.216	0.483	0.852	0.243	0.861	0.925	0.275	0.604
Mixed crops	-1.149	-0.637	-0.405	-0.702	-0.165	0.277	-1.120	-0.408	-0.223
Mixed livestock	0.199	-0.443	-1.337	0.554	0.329	-0.525	0.289	-0.236	-1.105
Mixed crops & livestock	1.509	0.959	0.128	1.188	0.895	0.275	1.820	1.172	0.538
Other farms	-16.066	-1.144	-3.118*	-15.879	-0.811	-2.168*	-15.062	-0.358	-1.542
Constant	3.714*	5.879***	6.705***	0.818	1.906*	2.016*	-0.464	2.147*	2.302*
Log-likelihood		174.73			238.64			224.40	
Prob > chi2		0.0000			0.0000			0.0000	
Pseudo-R2		0.1119			0.1535			0.1470	
Nb of observations		715			711			700	
BIC		1801.5			1867.7			1675.9	

Source: Own database.

Key: Significances are the following: * p<0.05, ** p<0.01, *** p<0.001.

From this perspective, when claiming for a loan, farmers should showcase the quality of their application. The results show that financial criteria are predominant for the decision taken by the bank. For example, farms have to think about the structure of their capital, which is not flexible by nature. More precisely, a high indebtedness seems to lower the success of future loan requests. Last but not least, the quality of the project to be financed is a paramount criterion because it seems to condition a large part of the analysts' opinion when the loan request is screened. Despite some drawbacks (for example, substantial indebtedness), a feasible project is likely to be accepted, even with guarantees.

Some implications arise in terms of public policies. The results show that 90% of farmers' applications for a loan are accepted by the bank. Moreover, 40% of total loan requests are granted without explicit guarantee. This result can be explained by the fact that farmers own a large part of the land they use, the latter playing the role of a counterparty in case of financial distress. In that context, government support should focus in priority on the nature of investments in order to help farmers make relevant decisions to maintain and develop their farms.

5. Conclusion

This research has analyzed in detail the credit-granting process to farms. While investments on farms heavily rely on loans, the analysis allowed an understanding of the main criteria that are used implicitly or explicitly by analysts to decide whether a loan is to be accepted or not, and along which modalities. Unlike many of the empirical studies in the literature, we used precise individual data from Crédit Agricole, the main bank that lends money to French farms. We focused on a loan-by-loan basis, analyzing a sample of 1,045 loans. While individual, structural, and financial data were given by the information systems of the bank, the analysts' opinions were provided in a free-form format.

More precisely, the credit-granting decision is examined through four modalities: full acceptance without guarantees, acceptance with guarantees, partial acceptance, and refusal. Explicative variables included criteria such as the financial situation of the farm, its structure, the main features of the loan, and the analyst's opinion. This allowed for a direct test of the relationship between the explanatory variables and loan acceptance. In particular, we have applied both logit, ordered logit and multinomial logit models to the pool of data.

In addition to descriptive statistics, the results obtained with the models provide clear evidence that granting of loans heavily relies on the solvency of the farm. Farms benefiting from a good capital structure, wealth, and a feasible project have a higher probability of receiving the requested loan, because of the guarantee they represent for the bank. The overall analyst's opinion appears to play a key role in the outcome of the loan process, the number of positive strengths and weaknesses strongly influencing respectively the probabilities of acceptance and rejection. Finally, sectorial differences are also noticed: farms involved in fruit and wine production are more likely to receive their grant, mostly because of favorable market conditions.

Such information may be useful for the bank by making explicit the principal decision criteria, which are not only objective. It can also be of interest for farmers, when considering that a good capital structure and out-farm income lead to a higher acceptance rate. Our findings also highlight the importance of considering precise individual data.

The study can be extended in different ways. First, future analyses should consider the outcome of an accepted loan, e.g., a full payback or a default, in order to confirm the efficiency of acceptance criteria. Second, it would be of interest to consider with improved precision the stage of development of a farm. These future lines of research may provide elements for better loan profiling, especially in France and Europe, in which banks represent a major source of financing for farms.

6. References

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