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Female and male risk aversion:
An empirical study of loan officers' assessment of SME loan applications

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Abstract

Purpose – The aim of the paper is to analyse female and male loan officers' risk aversion as they assess different types of small and medium-sized enterprises' loan applications.

Design – The data were gathered from a sample of 75 Swedish loan officers, using the Repertory Grid Technique and related questions. The data were analysed statistically.

Findings – The findings demonstrate that female loan officers focus more on collateral (used as a proxy for risk aversion) in their evaluations of first-time loan applications than male loan officers. However, the findings also suggest that there are no significant differences between the two groups as far as risk aversion when they evaluate additional loan applications. The other variables controlled for (age, tenure, insight, education, and location) did not significantly affect the loan officers' risk aversion.

Research limitations – The study might have benefited from the use of complementary data collection approaches. Access to actual assessment and decision-making procedures could have increased our understanding of female and male loan officers' attitudes toward risk.

Practical implications – Our findings suggest that by the use of female-male loan officer teams, banks may achieve more balanced assessments of SME loan applications.

Originality/value – To our knowledge, the literature has not explicitly addressed risk aversion among female and male loan officers with respect to different types of bank loans. Moreover, we investigated risk aversion in the context of standardised assessments procedures used to reduce exposure to credit risk.

Keywords Bank loan, Assessments procedures, Female loan officers, Male loan officers, Risk aversion, Small and medium-sized enterprises, Sweden

1. Introduction

Small and medium-sized enterprises (SMEs) are important for job creation and regional growth because they can quickly respond to changes in the economy (Bruns & Fletcher, 2008). Yet most SMEs encounter barriers to growth. One significant barrier is the difficulty in obtaining external financing, bank loans in particular (Berger & Udell, 2005; Watson *et al.*, 2009). Typically, SMEs require bank loans to start up as well as to finance their business expansion or to support their underperforming operations (Deakins *et al.*, 2010).

From an information asymmetry perspective, SMEs are generally viewed as riskier borrowers than larger companies (Berger & Udell, 2005). As many SMEs exist in an opaque information environment, their repayment capacity may be difficult to assess (Berger & Udell, 2006). Furthermore, banks typically find start-up firms more opaque compared to established firms because loan officers (LOs) lack the kind of information they continually collect on existing borrowers (Fletcher, 1995; Ferrary, 2002).

In the loan assessment process, LOs gather relevant information about SMEs in order to reduce the information asymmetry and to evaluate the credit risk in lending to such firms. Based on this information, LOs make assessments and formulate arguments that they forward to credit committees that approve or reject the loan applications (Deakins & Hussain, 1994). Studies have identified the several types of information that are required when assessing SME loan applications (Deakins & Hussain, 1994; Berry *et al.*, 2004; Berry & Robertson, 2006; Bruns & Fletcher, 2008; Deakins *et al.,* 2010; Rad *et al.*, 2013). One important type of information is the collateral that signals the borrower's ability and commitment to repay the loan. Thus, a loan secured by collateral reduces the bank's credit risk (Berger & Udell, 1990; Beck *et al.*, 2009).

Previous research suggests that LOs' degree of risk aversion influences their loan assessments. With regard to the difference in risk aversion between female and male LOs, the research results are mixed. On the one hand, Bellucci *et al.* (2010) concluded that female LOs are more risk-averse, while on the other hand, Beck *et al.* (2009) demonstrated that female LOs are not necessarily more risk-averse than male LOs. To our knowledge, however, the literature has

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not explicitly addressed risk aversion among female and male LOs with respect to different types of bank loans.

At the time of this study (2009 and 2010), many banks were affected by the financial crisis that had major consequences for the world´s financial markets (Ivashina & Scharfstein, 2010) including reduced lending activities (Udell, 2011). Following that crisis, the banking industry reemphasised initiatives that enhanced calculative practices (Mikes, 2009) and that improved standardised assessments and decision procedures (Berger & Frame, 2007; Puri *et al.*, 2011). These initiatives were aimed at achieving conformity with the regulatory requirements for risk management (Wilson *et al.*, 2010). As a consequence, many banks have now centralised their commercial loan decisions at either regional business centres or bank headquarters. At the same time, branch offices have become more responsible for assessing potential and current borrowers using standardised procedures. These initiatives, which have influenced how LOs assess SME loan applications, have resulted in defensive behaviour by LOs (Nilsson & Öhman, 2012).

In the context of these changes in the banking industry, this paper analyses female and male LOs' risk aversion as they assess different types of SME loan applications. According to Gatens (1996), the process of gendering can be considered as embodied and situated. Thus, in its investigation of the relationship between gender and risk aversion among LOs in specific circumstances, this study contributes to the literature on situated contexts (e.g., see, for example, Benhabib, 1995; Young, 2005; Ashe & Treanor, 2011).

The setting of our study is Sweden, a country well known for its gender equality in society (Achtenhagen & Tillmar, 2013), and in the work place (The World Bank, 2011). In the four banks that dominate the Swedish banking market, women comprise between 50 and 55% of all personnel, and between 40 and 45% of all managers. In its 2012 Annual Report, the studied bank reported that women comprise 55% of the employees at the corporate group level. In the Report, the bank emphasised its gender policy and highlighted the fact that a Swedish report ranked it number one among Swedish banks for gender equality amongst its managers and board members (AllBright-rapporten, 2012). Thus, this bank provided suitable conditions

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for our investigation for two reasons. First, the female and male LOs worked in an egalitarian environment. Second, our study began during the period when commercial lending activities by Swedish banks diminished dramatically. From the Lehman Brothers' default in September 2008 to December 2009, commercial bank loans in Sweden decreased by 20% (Statistics Sweden, 2012). In this timeframe, the studied bank was engaged in structural efforts to reduce its exposure to credit risk.

The structure of the paper is as follows. We next present our frame of reference followed by a description of the research methods used. Thereafter we present our empirical findings including our quantitative analyses. In the conclusions section, we discuss our findings, note the study's limitations, offer comments about practical implications, and suggest areas for further research.

2. Frame of reference

2.1. LOs' risk assessments

According to banking theory, the expectation is that banks will evaluate and monitor lending relationships so as to reduce information asymmetry (Diamond, 1984). This responsibility is delegated to the LOs (Fletcher, 1995) who, among other things, wish to avoid Type I and Type II errors in assessing such relationships (Nilsson & Öhman, 2012). A Type I error is the rejection of a loan application as the result of misclassifying the borrower as uncreditworthy. A Type II error is the failure to reject a bad loan application. According to Deakins and Hussain (1994), LOs focus more on avoiding Type II errors than avoiding Type I errors.

Various studies have identified the types of information that are of particular interest when assessing SME loan applications. Using hypothetical situations, Deakins and Hussain (1994) interviewed 30 LOs in the UK about the information they found useful. These LOs listed projected income, borrower guarantees and management skill. For existing borrowers, these LOs also listed profitability, liquidity ratios, and loan repayment histories. In their study, Deakins *et al.* (2010) developed five hypothetical cases they used in interviews with eight LOs in the UK. They found that information about sector and location, collateral, firm development

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stage, existing relationships, previous business experience, and risk/reward estimations from financial modelling were particularly important in the loan assessment process.

Berry *et al.* (2004) interviewed ten LOs in the UK about different lending decisions. These LOs identified business environment, asset base, debt/equity ratio, availability of collateral, future cash flows, and past and current position as relevant information. In a follow-up study, Berry and Robertson (2006) reported on a survey of 54 LOs in the UK. Their statistical analyses identified liquidity, financial stability, profitability, consistency of trends, security (collateral), and cash requirements as important information that these LOs used.

Bruns and Fletcher (2008) tested various hypotheses linking information and SME loan applications using a sample of 114 Swedish LOs. The authors ranked the most important information as follows: past performance, financial standing, competence in the business project, collateral, and the borrower's share of the investment. Rad *et al.* (2013) analysed cognitive maps of 75 Swedish LOs in relation to their assessments of SME loan applications. They found that different information is required for a holistic picture of the loan applicants. The study highlighted the importance of collateral and anticipated financial conditions. The analysis also revealed that LOs in general evaluated different type of loans similarly. However, minor variations appeared due to the particular information in focus.

All these studies reveal that LOs collect and evaluate information from many sources as they try to reduce the information asymmetry for SME loan applicants. For banks, collateral serves as a substitute for the need to reduce information asymmetry (Berger & Udell, 1990; Beck *et al.*, 2009). Collateral is of particular importance for SMEs because they typically have less documentation and fewer assets than larger companies (Altman & Sabato, 2005; Berger *et al.*, 2005). Therefore, the availability of collateral is a decisive factor in approving loans. In their study, Beck *et al.* (2009) found that 96% of the loans they examined were secured by collateral. Although LOs play a key role in the risk assessment of loan applications, none of the studies described above examines the difference in risk aversion between female and male LOs as they make these assessments.

2.2. Female versus male risk aversion

Other studies suggest that differences in risk aversion in general can be related to gender. A meta-analysis of 150 articles published in major psychological journals reveals that females are, on average, significantly more risk-averse than males (Byrnes *et al.,* 1999). Moreover, females seem more risk-averse than males irrespective of problem framing, the degree of ambiguity involved (Powell & Ansic, 1997), or the degree of abstract and contextual designs (Eckel & Grossman, 2008). Experimental finance studies based on abstract decision games confirm that females are more risk-averse (Charnessa & Gneezy, 2012). For example, females are found to be more conservative investors than males (Sunden & Surette, 1998; Bernasek & Shwiff, 2001). Jianakoplos and Bernasek (1998) found that single females are more cautious than single males in portfolio allocations with risky assets. Graham *et al.* (2002) found that females consider a risk dimension in investment strategies while males are more likely to focus on the expected returns. Ertaca and Gurdalb (2012) found that females in groups are more risk-averse than males in groups, and females are less willing than males to attempt to influence group decisions.

Despite the access issues that generally limit the extent of banking studies, researchers have made some attempts to study how risk aversion may influence LOs' loan assessments. Bellucci *et al*. (2010) analysed loan contract terms—interest rates, collateral, and credit limits—among 7,800 SMEs. Their study concluded that female LOs are more risk-averse than male LOs because the female LOs approved fewer loans for new borrowers than the male LOs.

Carter *et al.* (2007), who conducted interviews with 35 LOs in four branch offices of one bank, found evidence of differences in risk aversion by female and male LOs. They found that female LOs focused more on procedural and business-related factors and on compliance with bank policies whereas male LOs were more inclined to make independent decisions and to engage in processes of internal negotiations at the bank. Using the same sample as Carter *et al. (2007),* Wilson *et al.* (2007) examined how female and male LOs perceived the character of entrepreneurs applying for loans. Their findings indicated relatively few individual gender differences between the LO groups in this respect, and no evidence of systematic gender discrimination as far as perceptions of entrepreneurial character.

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In a similar vein, Beck *et al.* (2009) reported that female LOs are not necessarily more risk-averse than male LOs. In their study of the performance statistics for 43,000 loans, they concluded that loans approved and monitored by female LOs tended to perform better than those approved and monitored by male LOs. However, the analysis also revealed that the female LOs were associated more often with risky borrowers than, as expected, with less risky borrowers. Moreover, the female LOs did not reject borrowers more often than the male LOs.

Agarwal and Wang (2009) analysed 30,000 SME loan applications and the performance of more than 140 LOs in a bank that had suffered from the recent financial crisis. Following the crisis, the bank changed its incentive plan for LOs. Among other issues, this study looked at how this change affected the loan approval rates by female and male LOs. The authors found that under the new plan, the female LOs approved more loans. However, the default rate for these female-approved loans increased significantly and was higher than the default rate for the male-approved loans.

In summary, this literature review shows that risk aversion for female and male LOs is more situated than static (cf. Benhabib, 1995; Gatens, 1996; Young, 2005; Ashe & Treanor, 2011). Bank researchers have observed situated variations in different settings with different types of borrowers (Carter *et al.*, 2007; Wilson *et al.,* 2007; Bellucci *et al.*, 2010) and in times of change (Agarwal & Wang, 2009). We contribute to the literature with our study of the gender aspects related to different types of loans.

2.3. Hypotheses and control variables

LOs may focus on different types of information depending on the kind of loan applied for and the characteristics of the applicant (Deakins & Hussain, 1994; Bruns & Fletcher, 2008; Deakins *et al.,* 2010). It is probable that first-time borrowers are evaluated differently from existing borrowers since it takes time to develop mutual trust and commitment between banks and SMEs (Fletcher, 1995; Ferrary, 2002). Given that first-time borrowers and their business operations are new to the bank, LOs lack relevant information on the borrowers' credit history (Fletcher, 1995). The assessment of loan applications submitted by existing borrowers may vary depending on the purpose of the loans (i.e., to rescue underperforming operations or to

finance business expansion; see Deakins *et al.,* 2010). The conclusion is that LOs distinguish between types of loans depending on the length and nature of the relationship with the borrower and on the purpose of the loan. In this study, we distinguish between first-time loans, additional defensive loans, and additional offensive loans for SMEs.

Although LOs may assess various types of loans differently, there appears to be a difference between female and male risk aversion in general (Byrnes *et al.*, 1999), and, in particular, to some degree among LOs (Bellucci *et al.*, 2010). Thus, we formulate the following hypotheses:

> H1: Female LOs are more risk-averse than male LOs in assessing first-time loan applications.
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> H2: Female LOs are more risk-averse than male LOs in assessing additional defensive loan applications.
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> H3: Female LOs are more risk-averse than male LOs in assessing additional offensive loan applications.

According to Charnessa and Gneezy (2012), researchers should control for variables other than gender when investigating potential differences in male and female risk aversion. Therefore, in our study, as described next, we controlled for several additional personal characteristics of the LOs.

In bank lending, LOs deliver a service that requires interactions with specific individuals in complex projects (Deschênes, 2008). In these projects, LOs are permitted some discretion. Andersson (2004) reports that the extent of such discretion is related to experience. More experienced LOs are generally older and are more likely to have longer tenure, greater insight, and more education. Such factors are unique for each LO (Bruns *et al.*, 2008). Age signals life experience, tenure signals work experience, insight signals management and banking experience, and education signals broad-based skills and knowledge.

Another control variable is location. Commercial lending operations require branch offices and their personnel to make assessments and decisions on SME loan applications (Petersen &

Rajan, 2002; Berger *et al.*, 2005). For LOs, the distance between the bank's head office and its branch offices may create problems with the bank´s standardised procedures. In studies of bank lending in rural areas, for example, LOs may consider their access to social networks and the embeddedness of the banking and borrower relationships (Uzzi, 1999). In our study, we controlled for the geographic dispersion of the branch offices by distinguishing between LOs at different locations in the rural region (i.e., branch offices in sparsely populated areas and in towns).

3. Methods

3.1. The choice of bank and respondents

Our data are from a research programme on SME loan assessments. The present study, which is a follow-up of an earlier study in this research programme (Rad *et al*., 2013), was conducted at a single Swedish bank (one of the four leading banks in Sweden). This bank gave us permission to collect empirical data related to the purpose of our study. In the study, we focused on a rural region[1] in mid-Sweden that has 22 bank office locations in three counties. We chose this region because two senior managers at the bank allowed us access to 75 LOs at different locations in the region. We categorised these LOs by gender, age, tenure, insight, education, and location.

The LOs at this bank submit their assessments of SME loan applications to credit committees that decide if the applications will be accepted or rejected. As a result of the new regulations[2] and the credit losses stemming from the recent financial crisis, the bank had formulated a new lending strategy. Although the strategy emphasised the need for collateral, it also emphasised that LOs should focus strongly on the applicants' future repayment capability. Furthermore, the bank preferred to serve borrowers who use several of its other services (e.g., mortgage

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[1] A survey of 19,000 Swedish SMEs, conducted by the Swedish Agency for Economic and Regional Growth, reveals that SMEs in rural regions have more difficulty obtaining loans than SMEs in urban regions.

[2] The Basel II Accords were introduced in 2007. Under these regulations, banks were given a transition period in which to find suitable ways to implement the new regulations. The regulations mostly affected the largest banks (Bank of International Settlement, 2006).

loans and pension investments). Such borrowers, in the bank's terminology, are "total clients". To manage the loan assessment process, the bank gave its control and support system a more prominent role than it had previously. In sum, the overall intent of the new strategy was to reduce the bank's exposure to credit risk.

3.2. Research design and data collection

It may be useful to understand risk perceptions by examining how risk objects and the psychological variables of individuals interact (Burgess, 2006). Psychological studies demonstrate that individuals react to risk more according to their subjective perceptions of risk than to their objective perceptions of risk or to standardised procedures for the evaluation of risk (Starr, 1969; Burgess, 2006). According to Wilson *et al.* (2007), it is fruitful to study risk aversion by viewing cognitive maps. The Repertory Grid Technique (RGT), a tested tool for analysing cognitive maps, is based on George Kelly's Personal Construct Theory. Kelly (1955) suggested that constructs are the discriminations a person makes between various elements, such as people, events or cases, and general things. This means that an individual is part of a network of constructs in which construing occurs with limitations for time and differences between contexts (Fransella *et al.*, 2004).

Previous studies have used RGT to elicit and analyse the cognition of LOs (e.g., Jankowicz & Hisrich, 1987; Wilson *et al.*, 2007). RGT was also the point of departure for data collection in the study by Rad *et al.* (2013) and in the present study. When collecting data using RGT, the first step is to select elements, the second is to elicit bipolar constructs, and the third is to score the elements in terms of the constructs (Fransella *et al.*, 2004; Jankowicz, 2004; Wright, 2006).

We conducted pre-studies with experienced LOs who were not in our research programme study. The aim of these pre-studies was to identify a standard set of elements and constructs that make sense to the LOs. Based on an extensive literature review and on discussions with the LOs in the pre-studies, we used 13 predetermined elements and 13 predetermined constructs (see Rad *et al.*, 2013). We gathered data from the respondents at the bank's branch offices. The LOs took between 50 and 80 minutes to complete the grid and to answer ten

complementary, open-ended questions. In this study, we focus on one element and three constructs in the grid, and on two of the ten open-ended questions, as described below.

The one element used in this study is *collateral*. Collateral, which banks may require in order to reduce their credit risk, gives them the legal right to take borrowers' pledged assets if they default on their loans (Berger & Udell, 2006; Bruns & Fletcher, 2008; Deakins *et al.*, 2010). We use the LOs' perception of the relative importance of collateral compared to other elements in the assessment process, such as market conditions, business relationships, and financial situation (see Rad *et al.*, 2013).

A construct that is often used in assessing loan applications is importance, where "unimportant" is one pole and "very important" is the other pole (see Rad *et al.*, 2013). In this study, we use three importance constructs since the literature argues that the influence of various information depends on the type of loan applied for (Bruns & Fletcher, 2008; Deakins *et al.*, 2010). As mentioned in the previous section, we distinguish between *first-time loans*, *additional defensive loans,* and *additional offensive loans*. Accordingly, we focus on the answers (scores) in the three squares that are highlighted in Figure 1.

Figure 1 about here

As a complement to RGT, we used two open-ended questions to elicit the LOs' perceptions of risk aversion in assessing SME loan applications in a changing bank environment. These questions dealt with how the LOs perceived the changes introduced in the loan assessment process and whether they thought their room for negotiating contract terms had been limited in any way. In addition, we posed various questions related to background variables in order to categorise the LOs.

3.3. Data analyses

In our analysis of the RTG data, we used three dependent variables to connect collateral (as a proxy for risk aversion) to the three types of loans depicted in Figure 1. Hence, the dependent

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variables are collateral/first-time loans, collateral/additional defensive loans, and collateral/additional offensive loans. In the grid, the 75 LOs scored collateral (and the remaining elements) in terms of the three constructs (first-time loans, additional defensive loans, and additional offensive loans) and the remaining constructs on a seven-point scale (where the lowest score = 1, and the highest score = 7).

The independent variable is the LOs' gender (coded as female = 1, male = 2). The five control variables are as follows:

– Age: the LOs were divided into five groups (less than 30 years = 1, 30-39 years = 2, 40-49 years = 3, 50-59 years = 4, and 60 years or more = 5).

– Tenure: less than 3 years = 1, 3-5 years = 2, 6-10 years = 3, 11-19 years = 4, and 20 years or more = 5.

– Insight: employment at one bank and with no experience in business management = 1, employment at several banks and with no experience in business management = 2, employment at one bank and with experience in business management = 3, and employment at several banks and with experience in business management = 4.

– Education: junior high school = 1, high school = 2, and university education = 3.

– Location: a sparsely populated area in the first of the three counties, county A = 1, a sparsely populated area in county B = 2, a sparsely populated area in county C = 3, a town in county A = 4, a town in county B = 5, and a town in county C = 6.

Similar to Greenhalgh and Chapman (1998) and Wilson et al. (2007), we analysed the grid data using a number of statistical methods. First, we made descriptive analyses. Thereafter, we performed an ANOVA significance test to study potential differences in risk aversion between the female and male LO groups. We also conducted a Pearson correlation analysis of the relationship between the variables. Subsequently, given that our sample is small, we employed Seemingly Unrelated Regression (SUR) models to identify the variables that influence the dependent variables. SUR, which is used to avoid the disadvantages of conventional regression, may be applied in cases where there is a risk of heteroscedasticity and/or correlation between variables (Zellner & Theil, 1962).

In our analysis of the written answers to the two open-ended questions, we coded the answers in different categories. For the first question, we labelled the first category "no change", which indicated that a respondent did not observe that loan assessments in the bank had changed in recent years. The second category was for answers that revealed that a respondent noted a significant change as far as collateral and/or a more intense use of the bank's control and support system, both of which indicated a strong focus on risk reduction. In the third category, we placed answers that indicated the respondents noted a significant change regarding future repayment capability.

For the second question, we identified three main categories: (a) answers by the respondent who observed "no particular limitations"; (b) answers by the respondents who observed "none or insignificant room for negotiations due to a focus on collateral and/or a more intense use of the bank's control and support system"; and (c) answers by the respondents who observed "none or insignificant room for negotiations with customers who were not "total clients". The respondents whose answers were in category (b) were classified as more risk-averse than the respondents whose answers were in categories (a) or (c).

Two research team members individually interpreted and categorised the written answers from the first eight respondents (c. 10% of the sample) before comparing the classifications. We reached an agreement in the one case where our initial classifications differed. Following this initial categorisation, one researcher categorised the other respondents' written answers. We then collectively discussed the three cases that were difficult to categorise.

4. Empirical findings

4.1. Descriptive statistics

Table 1 presents the descriptive statistics for the respondent sample. Of the 75 respondents, 25 were women and 50 were men. Although education level and location were evenly distributed among the respondents, age, tenure, and insight were unevenly distributed. Of the respondents, 47 had more than ten years of lending experience. However, 48 respondents had only worked at the bank in the study and lacked practical insight into small business management.

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4.2. Analysis of the dependent variables

Table 2 summarises the descriptive statistics for the dependent variables (i.e., the distribution of the respondents' perceptions of the relative importance of collateral for first-time loans, additional defensive loans, and additional offensive loans). Whereas 44 respondents chose alternatives 6 or 7 (i.e., the alternatives that indicate a strong focus on collateral) when first-time loans were highlighted, no respondent chose alternative 1. Six respondents chose alternatives 2 or 3 (i.e., the alternatives that indicate collateral has a rather minor effect on the assessments). As Table 2 shows, there are similar patterns for the two types of additional loans.

The mean value and standard deviation for collateral/first-time loans are 5.56 and 1.29, respectively. Since the standard deviation is significantly lower than the mean value, this variable is quite stable. This analysis may be generalised to the variables collateral/additional defensive loans and collateral/additional offensive loans. Thus, all dependent variables are characterised by relatively high mean values and low standard deviations. However, comparing the three variables, it is confirmed that the mean value for collateral/first-time loans is higher than the corresponding mean values for the other variables, and, in particular, for the variable collateral/additional offensive loans (5.56 versus 5.36 and 4.82, respectively). The standard deviations are rather similar (1.29, 1.48, and 1.31).

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4.3. Analysis of the independent variable

Table 3 shows that there is no significant difference between the female and male LOs as far as age, insight, education, and location. However, on average, the corresponding value for tenure for male LOs is significantly higher than that for female LOs at the 1% level (Mean: 3.9 > 2.9; F: 9.54; sig: 0.000).

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Table 3 about here
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4.4. Analysis of variance

The purpose of the significance test is to determine whether the focus on collateral can be distinguished significantly between the female and male LOs for different types of loans. The null hypothesis (HO) is stated as follows: There is no significant difference between the female and male LOs as far as the importance of collateral in assessing SME loan applications. As presented in Table 4, the results of the ANOVA test show that statistically significant differences exist between female and male LOs for collateral/first-time loans at the 1% level. However, the differences with respect to the variables collateral/additional defensive loans and collateral/additional offensive loans are not statistically significant. Thus, the findings indicate that female and male LOs differentiate as far as the perceived importance of collateral only for first-time loans. The ANOVA test, Welch's test, and Levene's test confirm the robustness of these results.

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4.5. Correlation analysis

Table 5 reveals a significant and negative correlation between gender and collateral/first-time loans. This finding supports the conclusion that female LOs focus more on collateral than male LOs in this particular situation. Furthermore, because age and tenure have significant and negative associations at the 1% level, the implication is that younger LOs and LOs with fewer years of employment focus more on collateral in assessing first-time loan applications than older LOs and LOs with more years of employment.

No significant correlations were found between gender and the variables collateral/additional defensive loans and collateral/additional offensive loans. Nor were any significant correlations found between the control variables and these two dependent variables at the 1% level.

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The correlation analyses also examined the degree of multicollinearity among the variables. As the value of the correlation coefficients between gender and the other variables is below 0.50 in absolute terms, there is little evidence of multicollinearity amongst the variables.

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4.6. SUR analysis (model specifications)

We used Seemingly Unrelated Regression (SUR) to detect the combination of variables that best estimated the influence of the explanatory variables on the dependent variables. The underlying equation in SUR is as follows:

$$Y = \alpha_0 + \beta_1(X1) + \beta_2(X2) + \beta_3(X3) + \beta_4(X4) + \beta_5(X5) + \beta_6(X6) + \varepsilon$$

where:

Y = the dependent variable, X1 = gender, X2 = age, X3 = tenure; X4 = insight, X5 = education; X6 = location, and ε = error term.

The results from the SUR model on the relationships between the explanatory variables and the three dependent variables are presented in Tables 6, 7, and 8. In Table 6, the coefficient of gender is negative and significant at the 1% level, which indicates that gender affects risk aversion for first-time loans. The results also show the control variables have no effect on the dependent variable collateral/first-time loans. The results from the first SUR model indicate that the model explains about 30% of the change in the dependent variable. The high *F*-statistic and Durbin–Watson statistics, with a value around 2, confirm the overall best fit and validity of the model. In addition, the diagnostic tests including VIF and the Breusch–Pagan/Cook–Weisberg tests indicate appropriate specification.

In summary, the empirical findings confirm H1 by demonstrating that gender explains differences in LOs' risk aversion when first-time SME loan applications are assessed. The control variables that examine whether age, tenure, insight, education, or location affect the perceived importance of collateral do not demonstrate risk aversion differences.

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Table 6 about here

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Tables 7 and 8 present the results from the second and third SUR models. In contrast to H2 and H3, these results reveal there is no association between gender and collateral/additional defensive loans or collateral/additional offensive loans, or between the control variables and these two dependent variables. Consequently, the LOs seem to view collateral similarly when they assess the applications for additional loans.

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Table 7 about here

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The respondents' answers to the two open-ended questions suggest that female LOs, on average, tend to be somewhat more risk-averse than male LOs. Relatively more female LOs perceived a change in the bank's new policy towards collateral and/or a more intense use of the bank's control and support system (48% > 40%). Similarly, relatively more female LOs perceived there was less room for negotiations because of the focus on collateral and/or a more intense use of the bank's control and support system (76% > 62%).

5. Conclusions

5.1. Discussion

This paper contributes to the research with its findings on how female and male LOs view risk in different loan assessment situations. While some prior studies conclude that women in general are more risk-averse than men (e.g., Byrnes *et al*., 1999), our findings demonstrate that this conclusion may be too simplistic. We find that risk aversion for women and men may be contextually dependent. This finding supports the argument made by Beck *et al*. (2009) that female LOs are not necessarily more risk-averse than male LOs. The results demonstrate that female LOs focus more on collateral than male LOs in assessing first-time SME loan applications. This finding is consistent with the finding by Bellucci *et al*. (2010) that female LOs

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are more risk-averse than male LOs when approving loans to new borrowers. Moreover, the results from our regression analyses show that gender is the variable that explains most of the change in the variable collateral/first-time loans.

Collectively, these findings indicate that a correlation between gender and risk aversion exists in the assessment of first-time loan applications. Female LOs are more risk-averse than male LOs when the information asymmetry is considerable. While Berger and Udell (1990) and Beck *et al*. (2009) argue that LOs use collateral as a substitute for information asymmetry, our findings suggest that this is the case primarily with female LOs.

Risk aversion seems to be context dependent (e.g., Gatens, 1996). In the current banking environment, when banks have increasingly introduced standardised assessments and decision procedures in order to conform to regulatory requirements (Wilson *et al.,* 2010), recent findings show that such processes may promote less risk-taking among LOs (Nilsson & Öhman, 2012). Our findings indicate that these processes may influence female LOs more than male LOs. Female LOs who wish to comply with external regulations and bank policies (cf. Carter *et al.,* 2007) are likely to focus closely on collateral in assessing first-time loans.

In our analysis of LOs' assessments of additional loans—defensive as well as offensive— we found no statistically significant differences in risk aversion between female LOs and male LOs. This finding may also be explained in terms of information asymmetry. When bank assessment procedures are adopted that require more relevant borrower information, LOs gradually collect additional information about loan applicants (Fletcher, 1995; Ferrary, 2002). Previous research has emphasised that information about loan applicants' past performance, profitability, liquidity, existing relationships and repayment histories are relevant in the evaluation process (Deakins & Hussain, 1994; Deakins *et al.,* 2010). Based on our findings, we suggest that additional information about loan applicants' performance helps female LOs more than it helps male LOs decrease their focus on collateral.

5.2. Practical implications

This study concludes that female and male LOs' risk aversion in assessing loan applications correlates with the type of loan applied for. When the level of information asymmetry is high, as is normally the situation with first-time loan applications, female LOs are likely to show more risk aversion than male LOs. Given that female LOs are strongly focused on collateral in making loan assessments, it is also likely that they are more strongly focused on avoiding Type II errors. This focus normally results from the wish to control lending risks (Deakins & Hussain, 1994). Such behaviour is in accordance with the recent changes in the banking industry that promote increased risk management.

Thus, if banks employ only female LOs, their risk of credit losses may decrease (as the result of fewer Type II errors) and their revenues may decrease (as the result of more Type I errors). The likely outcome is that SMEs will have fewer opportunities to obtain start-up capital. On the other hand, if banks employ only male LOs, their risk of credit losses may increase (as the result of more Type II errors) and their revenues may increase (as the result of fewer Type I errors).

Our findings lead to the recommendation that banks employ LO teams with both men and women members (at least for loan applications from start-up firms with no previous loan history). Mixed gender groups of LOs may also solve the problem observed by Wilson *et al*. (2007) that potential borrowers may receive more favourable terms depending on the gender of the LO.

5.3. Limitations and suggestions for further research

We draw attention to certain limitations in our study because awareness of these limitations may be useful to other researchers working in this area. Our study could have benefited from other data collection approaches, including participant observation. For example, observations of LOs' assessment and decision-making procedures would potentially have increased our understanding of their risk-averse behaviour. Our study would also have benefitted from analyses of loan contract terms and loan default statistics. However, the bank's confidentiality policies prevented us from collecting this data.

Our study is limited in the sense that the data are from only one bank. For our examination of risk aversion among LOs, we chose a rural region because, according to the Swedish Agency for Economic and Regional Growth (2012), access to credit is a greater barrier in rural regions than in urban regions. Thus, because our sample is relatively small and very specific, we are limited in our generalisations about LOs' risk aversion at the organisational, regional or national levels. We agree with Berger and Udell (2005) as well as Levine (2002) that it would be of interest to conduct comparative studies that examine female and male LOs' risk aversion in countries where bank loans are not the main source of SME external financing.

Furthermore, unlike the study by Agarwal and Wang (2009), our data do not allow the analysis of changes over time. Longitudinal studies of female and male LOs' risk aversion could be fruitful, especially, as Nilsson and Öhman (2012) suggest, when changes in banking environments influence LOs' practices.

Although our findings suggest that a mixed group of LOs may be beneficial, such groups may also result in subtler forms of risk aversion. As Ertaca and Gurdalb (2012) found, men may influence group decisions about risk levels more than women. If such unequal influence occurs, the desired objective of mixing the genders on LO teams may be thwarted. We suggest that researchers study the power dynamics in banks' LO teams to learn if this is the reality.

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Figures and Tables

	Element A (Collateral)	Element B / Element …	Element M

Element

Construct

Construct 1

Construct 4: Small (1) – large (7) impact on first-time loan applications.

Construct 8: Small (1) – large (7) impact on recurring applications for additional defensive loans.

Construct 12: Small (1) – large (7) impact on recurring applications for additional offensive loans.
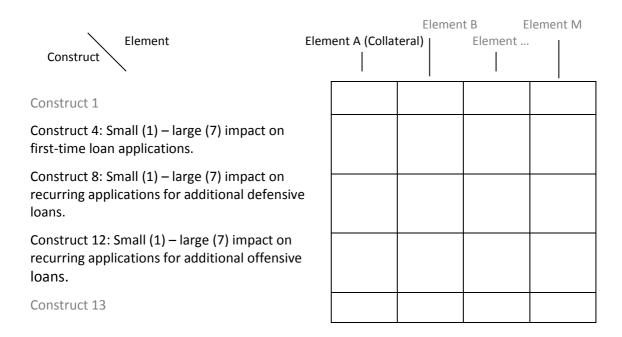
Construct 13

Figure 1: The grid with a focus on collateral and three different types of loans.

Table 1: Summary of descriptive statistics for characteristics of respondents

	Variable	Frequency	Percent	Cumulative Percent
Gender	Female	25	33,33	33,33
	Male	50	66,67	100
Age	< 30	3	4	4
	30-39	11	14,67	18,67
	40-49	29	38,67	57,33
	50-59	27	36	93,33
	> 59	5	6,67	100
Tenure	< 3	10	13,33	13,33
	3-5	9	12	25,33
	6-10	9	12	37,33
	11-19	20	26,67	64
	> 19	27	36	100
Insight	The present bank and no small business management	48	64	64
	Several banks and no small business management	11	14,67	78,67
	The present bank and small business management	10	13,33	92
	Several banks and small business management	6	8	100
Education	Public school	26	34,67	34,67
	High School	25	33,33	68
	University education	24	32	100
Location	County A - sparsely populated area	19	25,33	25,33
	County B - sparsely populated area	7	9,33	34,67
	County C - sparsely populated area	10	13,33	48
	County A - town	10	13,33	61,33
	County B - town	15	20	81,33
	County C - town	14	18,67	100

Table 2: Descriptive statistics of dependent variables

Alternative	Collateral/ first-time loans			Collateral/ additional defensive loans			Collateral/ additional offensive loans		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
1	0	0	0	0	0	0	2	2,67	2,67
2	1	1,33	1,33	4	5,33	5,33	3	4	6,67
3	5	6,67	8	7	9,33	14,67	7	9,33	16
4	10	13,33	21,33	7	9,33	24	11	14,67	30,67
5	15	20	41,33	18	24	48	30	40	70,67
6	23	30,67	72	18	24	72	15	20	90,67
7	21	28	100	21	28	100	7	9,33	100
Total	75	100		75	100		75	100	
Mean	5,56			5,36			4,82		
Std.	1,286			1,485			1,371		
N	75			75			75		

Table 3: Analysis of independent variables

Gender		Age (categorical)	Tenure	Insight	Education	Location
Female	Mean	3,80	2,92	1,60	2,04	3,40
	Std. Deviation	1,08	1,19	0,96	0,79	2,02
	Kurtosis	- 0,75	- 0,92	0,07	- 1,35	- 1,79
	Skewness	- 0,65	0,00	1,24	- 0,07	- 0,11
	N	25,	25	25	25,	25
Male	Mean	4,16	3,94	1,68	1,94	3,54
	Std. Deviation	1,13	1,42	1,02	0,84	1,82
	Kurtosis	2,13	0,13	0,37	- 1,59	- 1,34
	Skewness	- 1,65	-1,23	1,30	0,12	0,08
	N	50	50	50	50	50
Total	Mean	4,04	3,60	1,65	1,97	3,49
	Std. Deviation	1,12	1,42	0,99	0,82	1,88
	Kurtosis	0,82	- 0,91	0,25	- 1,52	- 1,47
	Skewness	-1,27	- 0,67	1,26	0,05	0,10
	N	75	75	75	75	75
ANOVA	F	1,74	9,54	0,10	0,54	0,092
	Sig.	0,19	0,00**	0,74	0,47	0,763
Welch test		0,19	0,00	0,740	0,62	0,772
Levene test		0,82	0,57	0,853	0,37	0,146

**; *; The significance level at 0.01 and 0.05, respectively.

Table 4: ANOVA, of variables included in study as dependent variables

		Sum of Squares	Df	Mean Square	F	Sig.	Welch	Levene
Collateral/ first-time loans	Between groups	21,66	1	21,66	15,6832	0,000172	0,000	0,0023
	Within groups	100,82	73	1,381096				
	Total	122,48	74					
Collateral/ additional defensive loans	Between groups	1,5	1	1,5	0,676845	0,413355	0,361	0,070
	Within groups	161,78	73	2,216164				
	Total	163,28	74					
Collateral/ additional offensive loans	Between groups	2,406667	1	2,406667	1,288592	0,260021	0,218	0,022
	Within groups	136,34	73	1,867671				
	Total	138,7467	74					

** The significance level at 0.01, Levene's and Welch's tests of variables' homogeneity of variances and the equality of the population means of groups, are significant at 0.01.

Table 5: Pearson correlation analysis of the relationships among the variables

	Gender	Age	Tenure	Insight	Education	Location	Collateral/	Collateral/	Collateral/

							first-time loans	additional defensive loans	additional offensive loans
Gender	1	0,152	,340**	0,038	-0,058	0,035	-,421**	-0,096	-0,132
Sig.		0,192	0,003	0,745	0,623	0,763	0,000	0,413	0,260
Age	0,1525	1,000	,679**	0,013	-,498**	-0,106	-,353**	-0,179	-,233*
Sig.	0,1915		0,000	0,914	0,000	0,366	0,002	0,124	0,044
Tenure	,340**	,679**	1,000	-0,032	-,356**	-0,153	-,452**	-0,199	-,244*
Sig.	0,002	0,000		0,782	0,002	0,191	0,000	0,086	0,035
Insight	0,03823	0,013	-0,032	1,000	0,055	-0,139	-0,089	-0,015	-0,134
Sig.	0,7447	0,914	0,782		0,641	0,234	0,446	0,898	0,251
Education	-0,05	-,498**	-,356**	0,055	1,000	,263*	0,181	0,174	0,020
Sig.	0,622	0,000	0,002	0,641		0,023	0,121	0,135	0,866
Location	0,035	-0,106	-0,153	-0,139	,263*	1,000	0,158	0,149	0,102
Sig.	0,763	0,366	0,191	0,234	0,023		0,175	0,203	0,384
Collateral/ first-time loans	-,421**	-,353**	-,452**	-0,089	0,181	0,158	1,000	,254*	0,163
Sig.	0,000	0,002	0,000	0,446	0,121	0,175		0,028	0,162
Collateral/ additional defensive loans	-0,095	-0,179	-0,199	-0,015	0,174	0,149	,254*	1,000	0,210
Sig.	0,413	0,124	0,086	0,898	0,135	0,203	0,028		0,070
Collateral/ additional offensive loans	-0,1317	-,233*	-,244*	-0,134	0,020	0,102	0,163	0,210	1,000
Sig.	0,260	0,044	0,035	0,251	0,866	0,384	0,162	0,070	
No.	75	75	75	75	75	75	75	75	75

**; *; The significance level at 0.01 and 0.05, respectively.

Table 6: First regression model: dependent variable: collateral/first-time loans

	B	Std. Error	Z	Sig.	VIF
(Constant)	8,755	0,854	9,206	0,000	
Gender	-0,861	0,283	-3,050	0,002**	1,16
Age	-0,217	0,163	-1,330	0,183	2,22
Tenure	-0,148	0,127	-1,170	0,244	2,14
Insight	-0,298	0,146	-2,050	0,141	1,04
Education	0,018	0,169	0,110	0,915	1,43
Location	0,084	0,077	1,080	0,278	1,13
N	R-sq	RMSE	Durbin-Watson	F	Sig.
75	0,305	1.065	2,266	32,96	0.000

** Coefficients are significant at the 0.01 level, the tests of first model Breusch-Pagan/Cook-Weisberg test for heteroskedasticity, H_0; Constant variance Chi^2, (1) = 4.35, Prob > Chi^2 = 0.0037, No. of parameters=6.

Table 7: Second regression model: dependent variable: collateral/additional defensive loans

	B	Std. Error	Z	Sig.	VIF
(Constant)	5,335	1,114	4,790	0,000	
Gender	-0,142	0,376	-0,380	0,705	1,16
Age	0,070	0,266	0,260	0,792	2,22
Tenure	-0,168	0,174	-0,960	0,335	2,14
Insight	-0,017	0,171	-0,100	0,922	1,04
Education	0,197	0,237	0,830	0,405	1,43
Location	0,079	0,094	0,850	0,398	1,13
N	R-sq	RMSE	Durbin-Watson	F	Sig.

75	0,064	1.427	2,23	5,12	0,523

** Coefficients are significant at the 0.01 level, the tests of first model Breusch-Pagan/Cook-Weisberg test for heteroskedasticity, H_0; Constant variance Chi^2, (1) = 0.75, Prob > Chi^2 = 0.386. No. of parameters=6.

Table 8: Third regression model: dependent variable: collateral/additional offensive loans

	B	Std. Error	Z	Sig.	VIF
(Constant)	7,072	1,044	6,770	0.000	
Gender	-0,186	0,339	-0,550	0,585	1,16
Age	-0,239	0,199	-1,200	0,228	2,22
Tenure	-0,126	0,153	-0,820	0,411	2,14
Insight	-0,157	0,154	-1,020	0,307	1,04
Education	-0,240	0,217	-1,110	0,269	1,43
Location	0,063	0,085	0,740	0,460	1,13
N	R-sq	RMSE	Durbin-Watson	F	Sig.
75	0,107	1.285	2,04	9,01	0,173

** Coefficients are significant at the 0.01 level, the tests of first model Breusch-Pagan/Cook-Weisberg test for heteroskedasticity, H_0; Constant variance Chi^2, (1) = 3.60, Prob > Chi^2 = 0.0578, No. of parameters=6.