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## Is the Presence of Women on the Branch Credit Committee Important? Evidence from an Iranian Private Bank

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### Abstract

Recent financial literature argues that there are gender differences between men and women, impacting financial decision making and performance. This paper, using data related to micro-loans of an Iranian private (commercial) bank between 2012 and 2018, investigates the effects of the characteristics of the members of the branch credit committees (BCCs), especially gender, on loan quality. Because, the dependent variable (loan quality) is a discrete ordinal variable and based on the Brant test's result the proportional odds assumption was violated, the generalized ordinal logit model was used. The results of this paper show that increasing the presence of women in BCC improves the quality of micro-lending. Based on the literature and related studies, a potential explanation for these results is that increasing the number of women in the BCC improves the compliance of the decision-making and lending processes with the credit guidelines and recommendations, increases the BCC risk aversion, and reduces the agency problem by improving monitoring in the BCC. Moreover, the results also show that the quality of micro-lending management by BCCs with a higher average age is poorer than that of a younger BCC, and the higher education of the BCC members improves micro-lending quality.

### Highlights

- Gender differences between men and women may affect financial decision making and performance.
- Female loan officer compared to their male counterparts, can increase the compliance of the decision-making and lending processes with credit guidelines and recommendations, increase the risk aversion, and reduce the agency problem by increasing monitoring.
- Increasing the presence of women in BCC improves the quality of micro-lending.

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## 1. Introduction

The recent finance-related literature indicates that there are gender differences between men and women, which may affect financial decision making and performance. Based on these studies, the dimensions of these differences include risk aversion and overconfidence; job concerns; level of compliance with regulations; credit policies, and recommendations; and monitoring. While these studies are less relevant to loan managers and the process of credit risk management at the bank, the differences can be generalized to loan managers (e.g., loan officers and branch credit committee (BCC) members) in the banks.

Since this paper examines the effects of the presence of women in the BCC on the lending outcome, it also relates to the literature on the role of gender in group decision making. In this regard, most of the existing literature has examined the importance of women's presence on the board's performance. One group of studies has focused on gender diversity. Another group of studies has examined the effects of women's presence on the board's performance.

In addition, this issue can be examined in connection with the agency problem. The agency theory is based on the assumption that managers may have aims and interests different from those of the shareholders. Therefore, board directors are selected by shareholders to ensure that the interests of the shareholders are considered. However, when CEOs also activate as the board's chairperson, a board leadership system known as the duality of CEO, the board's monitoring of top executives is prevented. Such CEOs may look for increase their power by selecting board members who are less probably that monitor their decision making and more likely to patronage their decisions. In this regard, some studies show presence of female directors in boards improve the monitoring of executives (e.g., [Halliday et al., 2020](#)).

Therefore, growing evidence suggests that an increase in female board representation improves board decision-making and performance.

Following these research studies, this paper investigates the effects of the characteristics of the BCC members, with a focus on gender, on loan quality in an Iranian private bank. While previous studies have focused on the loan officers, because of the major role of branch credit committees (BCCs) in the micro-lending process, this paper investigates the effects of characteristics of the BCC on loan quality. Also, previous studies have mainly examined the impact of "macroeconomic variables" and "out-of-bank factors" on the quality of loans, and have rarely studied (as far as we know) the effect of BCC' performance on lending quality. Therefore, this research could encourage banks as well as future studies on lending quality to pay more attention to factors within the bank and efficiency at the microeconomic level.

Therefore, the remainder of this paper is organized as follows. Section 2 we present the theoretical foundations and previous studies. Section 3 describes the data, variables, and methodology. In section 4, reviews the results. Section 5 presents the discussion, and finally, Section 6 concludes the paper.

## 2. Theoretical Foundations and Previous Studies

### 2.1 Theoretical Foundations

Based on the literature and studies related to differences between men and women, the results obtained by studies focusing on individual dimensions of gender differences are discussed in the following.

- **Gender, Risk Aversion, and Overconfidence**

There is extended literature on behavioural differences between men and women in terms of risk. The majority of previous studies show that women are more risk-averse than men (e.g., [Sunden & Surette, 1998](#); [Agnew et al., 2003](#); [Eckel & Grossman, 2008](#)).

[Croson and Gneezy \(2009\)](#) conclude that women compared with men are more risk averse. They highlight some of the factors that they believe cause this gender difference as follows: (1) the emotional reaction of women to uncertain situations is stronger than that of men, which results in risk taking differences; (2) men compared with women are more confident, and, they probably have a different realization of the probability distribution fundamental a given risk; and (3) men have tendency to view risky situations as challenges, and not threats, which leads to an increased level of risk tolerance.

The different responses of men and women to risk can also affect credit risk management and lending decisions. For example, a higher rank of risk aversion of female loan officers probably lead to them becoming more conservative in lending, and granting loans more restrictively than male loan officers. Moreover, the more overconfidence of male loan officers can impact their screening and monitoring efforts, leading to their lower lending quality compared to female loan officers.

However, some empirical studies (e.g., [Niederle, 2016](#); [Filippin & Crosetto, 2016](#)) argue that gender differences in terms of risk aversion are less frequently found in reality than usually depicted in the literature, and that these differences depend on the elicitation method.

- **Gender and Job Concerns**

Some studies argue that females have typically fewer outside options due to the extent of gender discrimination in the labor market against women. Therefore, they have more job concerns and stronger incentives to excel in their job (see e.g., [Darity & Mason, 1998](#); [Beck et al., 2013](#)).

Another difference regarding the job concerns of men and women, which can affect their performance, is gender discrimination in terms of the punishment for bad performance. In this regard, several studies (see e.g., [Sarsons, 2017](#); [Egan et al., 2017](#); [Montalvo & Reynal-Querol, 2020](#)) have presented the possibility of this discrimination, i.e., higher punishment of women than men, which if present, can increase the job concerns of female loan officers, leading to an increase in their screening and monitoring efforts. This can ultimately improve their performance in terms of lending quality compared to their male counterparts.

[Montalvo and Reynal-Querol \(2020\)](#) state one potential explanation to the higher degree of compliance of women compared with men involves the gender

bias in the “mistake-punishment tradeoff”. In other words, women’s faults, and thus their careers, are more intensively penalized based on their history of loan performance. According to their data, the women who cumulate a higher ratio of non-performing loans, which is more maybe if they do not follow the recommendations, have a more likely of being punished than men with the same level of performance. Egan, Matvos, and Seru (2017) show that after an incident of misconduct, female financial advisors are greater probably than their male peers to lose their job and pay out more time searching for a new job.

- **Gender and Compliance**

A number of studies in other fields, such as drivers’ compliance with traffic regulations, pedestrian behavior, and so on, have shown that women have better compliance with regulations compared to men. However, as far as we know, except for Montalvo and Reynal-Querol (2020), there are no similar previous samples in the economic literature. Montalvo and Reynal-Querol (2020) use data particularly well-suited for analyzing this issue, and they show that based on the risk scores, women are more likely than men to follow the recommendations generated by the credit policies of the bank. Moreover, women are less likely to often apply exceptional conditions to ignore the recommendation of the system compared to their male counterparts. They also show that women respect the compliance with regulations more than men.

- **Gender and Monitoring**

Several studies have argued that there are gender differences related to monitoring. For instance, Adams and Ferreira (2009) conclude that the presence of women on boards of corporate strengthens monitoring. In addition, Beck, Behr, and Guettler (2013) argue that their findings provide suggestive evidence for the hypothesis that female loan officers are better at building trust relationships and utilizing monitoring possibilities. Furthermore, some studies have indicated that having female directors will improve the monitoring of executives (see e.g., Nekhili and Gatfaoui, 2013; Triana et al., 2013).

## 2.2 Previous Studies

Based on differences between males and females, the role of gender has been analyzed in different fields in financial economics. While the majority of these studies have been carried out in other financial economic fields, such as investment decisions, corporate executives’ behavior, corporate financial decisions, equity analyst performance, and so on, only a few studies we know of assess the impact of loan officer’s gender on the lending outcome.

For instance, using the results of a survey of 36 loan officers employed by a large British bank, Carter et al. (2007) show that while both male and female loan officers use the same assessment indicators for approving loan applications, there are gender differences in the relative importance given by the loan officers to some of these indicators. These authors conclude that female loan officers tend to focus on the procedural and business ingredients of the loan application, while

male loan officers trust more strongly on individual decision making and negotiation.

Moreover, [Bellucci, Borisov, and Zazzaro \(2010\)](#) conclude that female loan officers are more risk-averse or less self-confident than male officers, and they are more likely to restrict credit availability to new unestablished borrowers than their male counterparts.

In addition, [Beck, Behr, and Guettler \(2013\)](#) indicate that the loan portfolios of the female loan officers in Albania exhibit default rates significantly lower than those of the male loan officers. They argue that women seem to be better at building trust relationships and making use of monitoring possibilities.

[Montalvo and Reynal-Querol \(2020\)](#) analyze the effects of loan officers' gender on the approval of loans and their latter performance. They show that female loan officers have around a 15% lower delinquency rate than male officers. Moreover, they conclude that the risk profiles of applicants screened by male and female loan officers are very similar; however, based on the risk score, women follow the recommendations more frequently than men. They argue that one potential explanation for the higher degree of compliance of women compared to men involves the gender bias in the "mistake-punishment trade-off". In other words, women's mistake, and thus their careers are more intensively penalized based on their record of loan performance. According to their data, they state that women who cumulate a high ratio of non-performing loans, which is more likely if they do not follow the recommendation, will have a greater likelihood of being punished than men with the same level of performance.

In addition to the abovementioned studies, which are related to loan officers, since this paper examines the effects of the presence of women in the BCC on the lending outcome, it also relates to the literature on the role of gender in group decision making.

One group of studies has focused on gender diversity. However, in general, gender diversity has both positive and negative effects on team functioning and performance (see e.g., [Milliken & Martins, 1996](#); [Williams and O'Reilly, 1998](#); [Tajfel, 1981](#); [Turner, 1987](#)). Nonetheless, most studies related to the board of directors show a positive effect of gender diversity on the board's performance (see e.g., [Meglino et al., 1992](#); [Harrison et al., 2002](#); [Letendre, 2004](#); [Adams and Ferreira, 2009](#)).

Another group of studies has examined the effects of women's presence on the board's performance. For instance, [Pearce, and Zahra \(1991\)](#) show that boards with higher ratios of women, characterized as collaborative boards, are more probably to engage in debates and disagreement, and they are associated with higher perceived and objective firm performance. [Burke \(1997\)](#) states that women increase access to resources and expertise. [Westphal and Milton \(2000\)](#) argue that the presence of women on the board of directors encourages multiple perspectives that are better aligned with the market. [Nielsen and Huse \(2010\)](#) conclude that an increase in female board representation makes better board decision-making and attendance. [Nekhili and Gatfaoui \(2013\)](#) argue that female board representation

fosters ethical organizational behavior. Post and Byron (2015) state that an increase in female board representation is positively associated with board monitoring, board strategy involvement, and firm profitability.

Therefore, growing evidence suggests that an increase in female board representation improves board decision-making and performance.

According to a review of the literature, we expect that an increase in the number of women in the BCC will improve the quality of the branches' micro-lending through (1) increasing the compliance of the decision-making and lending processes with credit guidelines and recommendations; (2) increasing the BCC's risk aversion; and (3) reducing the agency problem by increasing monitoring in the BCC.

### 3. Model and Data

#### 3.1 Model

Our dependent variable, i.e., loan quality, is an ordinal variable. The most well-known model for estimating an ordinal outcome variable is the ordered logistic regression or proportional odds model.

The Proportional Odds (PO) model is used to estimate the cumulative probability of being at or below a particular level of a response variable or being beyond a particular level, which is the complementary direction. In this model, the effect of each predictor is assumed to be the same across the categories of the ordinal dependent variable. This means that for each predictor, the effect on the odds of being at or below any category remains the same within the model. This restriction is referred to as the proportional odds, or the parallel lines, assumption. This assumption is often violated. It is misleading and invalid to interpret results if this assumption is not tenable (Liu & Koirala, 2012). Accordingly, the proportional odds assumption is violated in our analysis.

To address this issue, Fu (1998) and William (2006) developed the generalized ordinal logit model. This model relaxes the PO assumption by allowing the effect of each explanatory variable to vary across different cut-off points of the ordinal outcome variable.

The generalized ordered logit model, for an ordinal dependent variable  $Y$  with  $M$  categories, as proposed by Fu (1998) and Williams (2006), can be written as equations 1 and 2:

$$P(Y_i > j) = g(\mathbf{X}_i \boldsymbol{\beta}_j) = \frac{\exp(\alpha_j + \mathbf{X}_i \boldsymbol{\beta}_j)}{1 + \exp(\alpha_j + \mathbf{X}_i \boldsymbol{\beta}_j)}, \quad j = 1, \dots, M - 1, \quad i = 1, \dots, n \quad (1)$$

With

$$P(Y_i = 1) = 1 - g(\mathbf{X}_i \boldsymbol{\beta}_1) \quad (2)$$

$$P(Y_i = j) = g(\mathbf{X}_i \boldsymbol{\beta}_{j-1}) - g(\mathbf{X}_i \boldsymbol{\beta}_j), \quad j = 2, \dots, M - 1$$

$$P(Y_i = M) = g(\mathbf{X}_i \boldsymbol{\beta}_{M-1})$$

Where  $M$  is the number of categories of the ordinal dependent variable (loan quality),  $i$  refers to the loan,  $\mathbf{X}_i$  is the vector of predictors (i.e., explanatory variables) for the  $i$ -th loan, and  $\boldsymbol{\beta}_j$  is the vector of the parameters to be estimated (Greene & Hensher, 2010).

Therefore, using this model and the dependent and explanatory variables as follows, the required estimates of this paper will be performed.

The dependent variable is the loan quality, which is an ordinal variable with five levels (5=loans without overdue; 4 = up to 2 months overdue; 3 = 2 to 6 months overdue; 2= 6 to 18 months overdue, and 1= more than 18 months overdue). These five loan quality domains are hierarchically structured. This is a standard classification of loans in the Iranian banking system, and it is used in the instructions for collecting overdue loans, calculating the overdue loans' penalty, calculating risk-weighted assets (for calculating capital adequacy), and preparing financial statements.

According to the Cole, Kanz, and Klapper (2015) and data made available by the bank, the explanatory variables include three main groups, i.e., (1) loan specifications including amount, maturity, and interest rate; (2) borrower specifications including customer type, relationship history, type and value of collateral, and income; and (3) characteristics of the BCC members , including gender, age, and education level. Table 1 presents the dependent and the explanatory variables.

**Table 1. Description of variables**

Type of variable	Label	Variable name	Description	
Dependent variable	LQ	Loan quality	5=loans without overdue; 4 = up to 2 months overdue; 3= 2 to 6 months overdue; 2= 6 to 18 months overdue, and 1= more than 18 months overdue	
Explanatory variables	Loan Specification		The amount of each loan (million Rials)	
		LA	Loan amount	$Real\ Loans\ Amount = \frac{Loans\ Amount}{CPI}$
		Mat	Loan maturity	The maturity of each loan (month)
		LI	Loan interest rate	The interest rate of each loan (percentage)
	Borrower Specification	BT	Borrower type	0= legal entity and 1= individuals
		Coll	Collateral type	0= low liquidity and 1= high liquidity
		CtL	Collateral to loan	$CtL = \frac{Collateral\ value}{Loan\ amount + loan\ interest}$
		ItL	Borrower income to loan	$ItL = \frac{Borrower\ income}{Loan\ amount + loan\ interest}$
		RH	Relationship history	The number of years in which the customer has been in contact with the bank.

**Table 1(Continued). Description of variables**

Explanatory variables	Characteristics of the BCC members	BCC gender	BCC gender	0= male and 1= female $BCCgender$ = Number of woman in the BCC
		BCC age	BCC age	$BCCage$ = $\frac{Sum\ of\ the\ BCC\ memebers\ age}{3}$
		BCC edu	BCC education	1= bachelor's degree or higher and 0= others $BCCedu$ = Sum of the BCC memebers educat

Source: Research findings

### 3.2 Data

In order to analyse the effects of the characteristics of the BCC members on loan quality, the current study used the data for 226,789 microloans approved by the BCCs of a private bank in Iran<sup>1</sup>. These loans were paid by this bank's branches in seven years from 2012 to 2018. In fact, these are all micro-loans that have been approved and paid by all branches of this bank in the form of Islamic sharia contracts. In other words, these loans are approved by the credit committee of the branches and not by other credit committees such as macro credit committee and board of directors.

### 4. Results

The results of the ordered logistic regression or proportional odds (PO) model and the Brant test are shown in Table 2. The Brant test showed that the proportional odds assumption across the different categories of loan quality (cut-offs) was significantly violated for all explanatory variables ( $P < 0.001$ ). Therefore, it is misleading and invalid to interpret the results of the proportional odds (PO) model.

Therefore, we estimated generalized logistic regression model using GOLOGIT2 program in Stata. The results of this estimation are shown in Table 3. Because all the predictor variables violated the PO assumption, the generalized logistic regression model relaxes the PO assumption, allowing the logit effects of all predictor variables to vary across cut-off points, which dichotomizes the loan quality outcome. Therefore, the logit effects and the corresponding odds ratios (OR) of all eleven variables were different across all four models, comparing the probabilities of being beyond category j versus at or below that category. For example, the sign of the coefficients for the collateral to loan variable is different at different levels of loan quality (LQ). Moreover, the OR values of the BCC

<sup>1</sup> Due to the principle of confidentiality and the emphasis of the selected bank, it is not possible to announce the name of this bank in this paper.



gender variable increase as the level of the loan quality variable is increased. In addition, the statistics and values presented at the end of table 3, include the Likelihood Ratio, Wald, Count R2, and McFadden R2, indicate the model's goodness of fit is acceptable. Accordingly, the main results of this estimation are discussed below.

**Table 2. Results of the ordered logistic regression or proportional odds (PO) model and Brant test**

Variable		Log. (relative odds)		Odds ratio		Brant test
Label	Name	Coeff. ( $\beta$ )	Std. error of $\beta$	OR [ $exp(\beta)$ ]	Std. error for OR	chi-square (df)
LA	Loan amount	0.000 ***	0.000	1.000 ***	0.000	106.42 (3)***
Mat	Loan maturity	-0.013 ***	0.000	0.987 ***	0.000	66.86 (3)***
LI	Loan interest rate	-0.056 ***	0.001	0.945 ***	0.001	985.20 (3)***
BT	Borrower type	0.119 ***	0.014	1.127 ***	0.016	251.12 (3)***
Coll	Collateral type	0.277 ***	0.001	1.319 ***	0.012	641.75 (3)***
CtL	Collateral to loan	-0.057 ***	0.011	0.945 ***	0.011	159.42 (3)***
ItL	Borrower income to loan	0.003 ***	0.000	1.003 ***	0.000	82.84 (3)***
RH	Relationship history	-0.139 ***	0.001	0.871 ***	0.001	1,446.07 (3)***
BCC gender	BCC gender	0.377 ***	0.006	1.458 ***	0.008	854.02 (3)***
BCCage	BCC age	-0.063 ***	0.001	0.939 ***	0.001	483.30 (3)***
BCCedu	BCC education	0.265 ***	0.007	1.303 ***	0.010	1,638.33 (3)***
/cut1		-6.701	0.065	-6.701	0.065	NA
/cut2		-5.584	0.064	-5.584	0.064	NA
/cut3		-4.674	0.064	-4.674	0.064	NA
/cut4		-3.658	0.064	-3.658	0.064	NA
All				NA		7,336.68 (33)***
Number of cases				226.789		

**Table 2 (Continued). Results of the ordered logistic regression or proportional odds (PO) model and Brant test**

Likelihood ratio chi-square (df)	43,794.65 (11) ***
Wald chi-square (df)	40,995.15 (11) ***
Pseudo R2	0.0713

Source: Research findings

\* P< 0.05; \*\* P< 0.01; \*\*\* P< 0.001

**Table 3. Results of the generalized ordinal logit model using Stata gologit2 (Y > cat. j vs. Y ≤ cat. j)**

Variable	Y > 1 vs. Y ≤ 1 (LQ=1 vs. LQ >1)		Y > 2 vs. Y ≤ 2 (LQ≤2 vs. LQ >2)		Y > 3 vs. Y ≤ 3 (LQ≤3 vs. LQ >3)		Y > 4 vs. Y ≤ 4 (LQ≤4 vs. LQ =5)		
	Log. (relative odds)	Odds ratio	Log. (relative odds)	Odds ratio	Log. (relative odds)	Odds ratio	Log. (relative odds)	Odds ratio	
Label	Description	Coef. f. (Std. error)	OR (Std. error)	Coeff. (Std. error)	OR (Std. error)	Coeff. (Std. error)	OR (Std. error)	Coeff. (Std. error)	OR (Std. error)
LA	Loan amount (million Rials)	0.000 (0.000)* **	1.000 (0.000) ***	0.000 (0.000) ***	1.000 (0.000)* **	0.000 (0.000) ***	1.000 (0.000) ***	0.000 (0.000) ***	1.000 (0.000) ***
Mat	Loan maturity (per month)	0.006 (0.001)* **	0.994 (0.001) ***	-0.009 (0.001) ***	0.991 (0.001)* **	-0.013 (0.000) ***	0.987 (0.000) ***	-0.015 (0.000) ***	0.985 (0.000) ***
LI	Loan interest rate (percentage)	0.101 (0.003)* **	0.904 (0.003) ***	-0.081 (0.002) ***	0.922 (0.002)* **	-0.070 (0.001) ***	0.932 (0.001) ***	-0.048 (0.001) ***	0.953 (0.001) ***
BT	Borrower type (0= Legal Entity and 1= Individuals)	0.360 (0.026)* **	1.432 (0.037) ***	0.252 (0.019) ***	1.286 (0.024)* **	0.123 (0.016) ***	1.131 (0.018) ***	0.026 (0.015) ***	1.026 (0.016) ***
Coll	Collateral type (0= low liquidity and 1= high liquidity)	0.740 (0.026)* **	2.096 (0.055) ***	0.448 (0.015) ***	1.565 (0.024)* **	0.164 (0.011) ***	1.178 (0.013) ***	0.242 (0.010) ***	1.273 (0.013) ***

**Table 3 (Continued). Results of the generalized ordinal logit model using Stata gologit2 (Y > cat. j vs. Y ≤ cat. j)**

CtL	Collateral to loan (values)	0.48							
		0 (0.037)* **	1.617 (0.060) ***	0.089 (0.022) ***	1.093 (0.024)* **	-0.053 (0.015) ***	0.949 (0.014) ***	-0.090 (0.012) ***	0.914 (0.011) ***
ItL	Borrower income to loan (values)	0.00							
		9 (0.01)* **	1.009 (0.001) ***	0.003 (0.001) ***	1.003 (0.001)* **	0.002 (0.000) ***	1.002 (0.000) ***	0.002 (0.000) ***	1.002 (0.000) ***
RH	Relationship history (per year)	-							
		0.16 1 (0.03)* **	0.851 (0.003) ***	-0.170 (0.002) ***	0.843 (0.002)* **	-0.148 (0.001) ***	0.862 (0.001) ***	-0.124 (0.001)***	0.884 (0.001) ***
BCCg ender	Number of women in the BCC (0, 1, 2, or 3)	0.27							
		6 (0.013)* **	1.318 (0.018) ***	0.270 (0.008) ***	1.310 (0.011)* **	0.299 (0.007) ***	1.348 (0.009) ***	0.442 (0.006) ***	1.555 (0.009) ***
BCCa ge	Average age of the BCC members	-							
		0.10 9 (0.02)* **	0.897 (0.002) ***	-0.067 (0.001) ***	0.935 (0.001)* **	-0.066 (0.001) ***	0.936 (0.001) ***	-0.057 (0.001) ***	0.945 (0.001) ***
BCCe du	Number of educated members of the BCC (0, 1, 2, or 3)	0.16							
		7 (0.015)* **	1.181 (0.017) ***	0.130 (0.010) ***	1.139 (0.012)* **	0.145 (0.009) ***	1.156 (0.010) ***	0.405 (0.009) ***	1.450 (0.013) ***
Intercept		9.21							
		1 (0.149)* **	NA	6.576 (0.095) ***	NA	5.540 (0.077) ***	NA	2.904 (0.071) ***	NA
		Log-likelihood			Model: -282,151.961 , Intercept-only: -307,312.470				
		Chi-square (df)			Deviance(226741): 564,303.921 LR(44): 50,321.018 ***				
Measures of fit		R2			McFadden: 0.082 , McFadden(adjusted): 0.082 , Cox-Snell/ML: 0.199 Cragg-Uhler/Nagelkerke: 0.213 , Count: 0.502 , Count(adjusted): 0.023				
		IC (df)			AIC: 564,399.921 , AIC divided by N: 2.489 , BIC(48): 564,895.847				

Source: Research findings

\* P< 0.05; \*\* P< 0.01; \*\*\* P< 0.001

The BCCgender variable (number of women in the BCC) is significant at the 0.001 level in all models, and its coefficients (OR) are +0.276 (1.318), +0.270 (1.310), +0.299 (1.348), and +0.442 (1.555), respectively. Sign of the coefficients indicate that increasing the presence of women in the BCC improves loan quality. In addition, odds ratio values show that replacing a woman with a man in the BCC improves loan quality 1.3 to 1.6 times. Another important point is that the effects became much stronger when loan quality level moved from low to high, while the largest effect was identified in the last comparison (loan quality level 5 versus loan quality levels from 1 to 4).

The BCCeducation variable (number of educated members of the BCC) is significant at the 0.001 level at all loan quality levels, and its coefficients (OR) are +0.167 (1.181), +0.130 (1.139), +0.145 (1.156), and +0.405 (1.450), respectively. These results show that a higher level of education leads to better lending quality. In fact, sign of the coefficients and odds ratio values indicate that replacing an educated member (i.e., a member with a bachelor's degree or higher) with an uneducated member (i.e., a member with less than a bachelor's degree education) in the BCC improves loan quality 1.1 to 1.5 times.

The BCCage variable (average age of the BCC members) is significant at the 0.001 level in all models, and its coefficients (OR) are -0.109 (0.897), -0.067 (0.935), -0.066 (0.936), and -0.057 (0.945), respectively. While due to the small coefficients and closeness of the OR values to 1, the effects of BCCage variable on the loan quality are not strong, the negative coefficients indicate that the higher the average age of the BCC, the worse the loan quality.

The collateral type (Coll) variable is significant at the 0.001 level at all loan quality levels, and its coefficients (OR) are +0.740 (2.096), +0.448 (1.565), +0.164 (1.178), and +0.242 (1.273), respectively. These results indicate that the quality of loans with high liquidity collateral is (1.2 to 2 times) better than other loans. This finding is consistent with the related theoretical literature, showing that collateral, as a screening and signaling device, can mitigate adverse selection and moral hazard (see Ioannidou, Pavanini, and Peng 2019). Moreover, the effects became much stronger when the level of the loan quality variable moved from high to low. Furthermore, the largest effect was identified in the first comparison (loan quality level 1 versus loan quality level from 2 to 5), which can be interpreted as explained for the collateral to loan (CtL) variable.

In addition, Table 4 presents the marginal effects of the BCC gender variable on loan quality. These results indicate that increasing the presence of women in the BCC (from BCCgender= 0 to BCCgender= 1, 2, and 3) increases the probability of loans being placed in the without overdue category (LQ= 5), and reduces the probability of placing loans in the categories with overdue (LQ< 5).

**Table 4. Marginal effects of BCCgender variable on loan quality (LQ) in the generalized ordinal logit model**

Predictor	Loan quality										
	More than 18 months overdue (LQ= 1)		6 to 18 months overdue (LQ= 2)		2 to 6 months overdue (LQ= 3)		Up to 2 months overdue (LQ= 4)		Loans without overdue (LQ= 5)		
at	dy/dx	Std. error	dy/dx	Std. error	dy/dx	Std. error	dy/dx	Std. error	dy/dx	Std. error	
Number of women in the BCC	BCCgender= 0	-0.012***	0.001	-0.023***	0.001	-0.031***	0.001	-0.039***	0.001	0.105***	0.001
	BCCgender= 1	0.009***	0.000	0.019***	0.001	0.030***	0.001	0.052***	0.001	0.110***	0.001
	BCCgender= 2	0.007***	0.000	0.016***	0.000	0.027***	0.001	0.055***	0.001	0.105***	0.001
	BCCgender= 3	0.006***	0.000	0.013***	0.000	0.023***	0.001	0.050***	0.001	0.092***	0.001

Source: Research findings

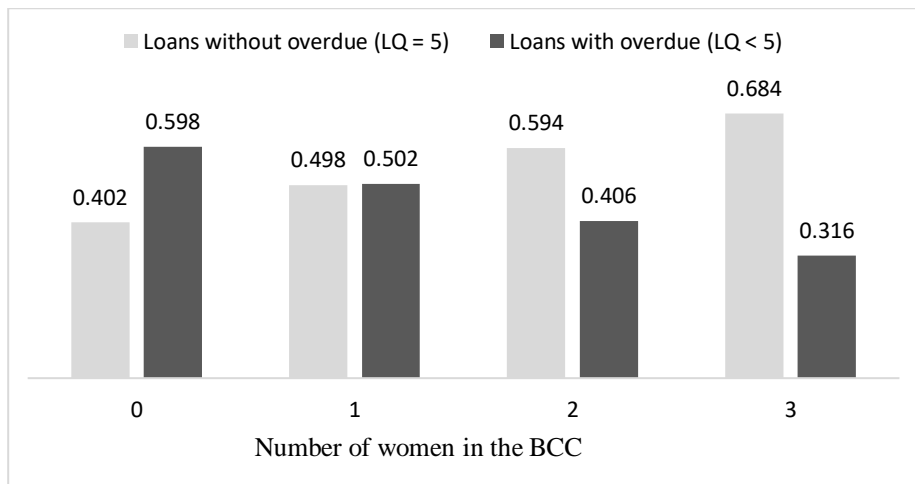
\* P<0.05; \*\* P<0.01; \*\*\* P<0.001

**Table 5. Probability of loan quality (LQ) at different levels of BCCgender variable using Stata Long and Freese's Mtable command**

	Loan quality					
	More than 18 months overdue (LQ= 1)	6 to 18 months overdue (LQ= 2)	2 to 6 months overdue (LQ= 3)	Up to 2 months overdue (LQ= 4)	Loans without overdue (LQ= 5)	
Number of women in the BCC	BCCgender= 0	0.075	0.113	0.164	0.246	0.401
	BCCgender= 1	0.059	0.094	0.141	0.208	0.497
	BCCgender= 2	0.046	0.077	0.118	0.165	0.594
	BCCgender= 3	0.036	0.063	0.096	0.121	0.684

Source: Research findings

Finally, using the Stata Long and Freese's Mtable command (Williams, 2020), Table 5 and Graph 1 more clearly show the effects of increasing the presence of women in the BCC (from BCCgender= 0 to BCCgender= 1, 2, and 3) on the probability of placing loans in different quality categories. The results show that when the number of women in the BCC is zero, the probability of placing loans in the without overdue category (LQ= 5) and categories with overdue (LQ< 5) equal 40% and 60%, respectively. However, by increasing the presence of women in the BCC (from BCCgender= 0 to BCCgender= 1, 2, and 3), the probability of loans being placed in the without overdue category (LQ= 5) is increased, while the probability of placing loans in the categories with overdue (LQ< 5) is reduced so much so that when all BCC members are women (BCCgender= 3), these percentages are 68% and 32%, respectively.



**Figure 1. Probability of placing loans in different loan quality categories at levels of the BCCgender variable (number of women in the BCC)**

*Source: Research findings*

## 5. Discussion

Our results indicate that increasing the presence of women in the BCC improves micro-lending quality. This is consistent with the results of previous studies including, Carter et al. (2007), Bellucci et al. (2010), Beck et al. (2013), and Montalvo and Reynal-Querol (2020). In accordance with these studies results, we believe this result is due to the fact that increasing the number of women in the BCC improves the compliance of the decision-making and lending processes with credit guidelines and recommendations, increases the BCC's risk aversion, and reduces the agency problem through increasing monitoring in the BCC. Considering these reasons, it is probable that promoting the presence of women in the BCC can lead to more conservative lending, and it can affect the profitability of the branches and the bank by decreasing risk-taking. In this regard,

based on their own strategies related to income and profit, asset portfolio management, and risk appetite, banks can determine the optimal composition of the BCC in terms of the number of men and women present in the committee, which may vary depending on the characteristics of each branch. For example, if the bank's risk appetite decreases, the bank can replace women with men on the BCC of the branches with high lending potential. In any case, in order to increase compliance and reduce the agency problem, it is recommended that at least one woman be present in the BCC .

We found that the quality of micro-lending managed by BCCs with a higher average age was poorer than that of their younger counterparts. Based on related studies, such as [Cole et al. \(2015\)](#), this is because of the higher level of screening efforts and lower risk-taking level of young people in comparison with people who are close to the retirement age, which is due to their different career concerns and career advancement prospects. In this regard, banks can determine the impact of the lending performance of the BCC members on its promotion by considering their strategies.

In addition, the higher education level of the BCC members improves lending quality. In accordance with the human capital theory and the related literature (see e.g., [Becker, 1962](#); [Spence, 1973](#); [Kauko, 2009](#)), this result can be due to the fact that people with a higher education level have a greater ability to analyze the data and signals received from the loan applicants. Therefore, improving the education and knowledge of the BCC members in areas related to lending and data analysis can have a positive effect on the branch's lending performance.

## 6. Conclusions Remarks

The recent financial literature has pointed out that there are gender differences between men and women, which can affect financial decision making and performance. Based on previous studies, it can be said that the dimensions of these differences include risk aversion and overconfidence; job concerns; the level of compliance with regulations, credit policies and recommendations; and monitoring .

Although these studies are less relevant to loan managers and the process of credit risk management at the bank, these differences can be generalized to loan managers of the banks, such as loan officers and the members of the branch's credit committee (BBC).

Following these studies, this paper investigated the effects of the characteristics of the BCC members, with a focus on gender, on micro-lending quality in an Iranian private (commercial) bank.

Since, on the one hand, the dependent variable (i.e., loan quality) is a discrete ordinal variable, and on the other hand, based on the results of the Brant test, all the predictor variables violated the proportional odds assumption, the generalized ordinal logit model was used in the current study. According to the estimation results of this model, our main findings are discussed below .

Increasing the presence of women in the BCC improves loan quality. While the results of the marginal effects indicate that the different characteristics of the BCC male and female members do not have a significant effect on the estimation results, based on the related literature, a potential explanation for these results is that increasing the number of women in the BCC improves the compliance of the decision-making and lending processes with credit guidelines and recommendations, increases the BCC's risk aversion, and reduces the agency problem by increasing monitoring in the BCC. Moreover, the results of the analysis related to the adjusted predictions and marginal effects show that by increasing the presence of women in the BCC, the probability of loans being placed in the without overdue category is increased, while the probability of placing loans in the categories with overdue is reduced. In addition, when the number of women in the BCC is zero, the probability of placing loans in the without overdue category and the categories with overdue is equal to 40% and 60%, respectively. In contrast, when all BCC members are women, these percentages are 68% and 32%, respectively.

The quality of micro-lending, managed by BCCs with a higher average age is poorer than that of their younger counterparts. Based on related studies, this is due to the differences between young people and those who are close to the retirement age in terms of their career concerns and career advancement prospects, which leads to a higher level of screening efforts and a lower risk-taking level among young people.

Moreover, the higher educational level of BCC members improves lending quality, which is in line with the human capital theory and the related literature. This can be due to the fact that people with a higher education level have a greater ability to analyze the data and signals received from the loan applicants.

Finally, according to the results of this study, banks are recommended to determine the optimal composition of the BCC in terms of the number of men and women present in the BCC based on their own strategies related to income and profit, asset portfolio management, and risk appetite. However, in order to increase compliance and reduce the agency problem, it is recommended that at least one woman be present in the BCC.

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Conceptualization, methodology, validation, formal analysis, resources, writing—original draft preparation, writing—review and editing; all authors.

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#### **Conflicts of Interest**

The authors declare no conflict of interest.



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## References

- Adams, R. B., & Ferreira, D. (2009). Women in the boardroom and their impact on governance and performance. *Journal of Financial Economics*, 94(2), 291-309.
- Agnew, J. R., Balduzzi, P., & Sunden, A. (2003). Portfolio choice and trading in a large 401(k) plan. *American Economic Review*, 93(1), 193-215.
- Beck, T., Behr, P., & Guettler, A. (2013). Gender and banking: Are women better loan officers? *Review of Finance*, 17(4), 1279-1321.
- Becker, G. S. (1962). Investment in human capital: A theoretical analysis. *Journal of Political Economy*, 70(5), 9-49.
- Bellucci, A., Borisov, A., & Zazzaro, A. (2010). Does gender matter in bank-firm relationships? Evidence from small business lending. *Journal of Banking and Finance*, 34(12), 2968-2984.
- Burke, R. J. (1997). Women on corporate boards of directors: A needed resource. *Journal of Business Ethics*, 16(9), 37-43.
- Carter, S., Shaw, E., Lam, W., & Wilson, F. (2007). Gender, entrepreneurship, and bank lending: The criteria and processes used by bank loan officers in assessing applications. *Entrepreneurship Theory and Practice*, 31(3), 427-444.
- Cole, S., Kanz, M., & Klapper, L. (2015). Incentivizing calculated risk taking: Evidence from an experiment with commercial bank loan officers. *Journal of Finance*, 70(2), 537-575.
- Croson, R., & Gneezy, U. (2009). Gender difference in preferences. *Journal of Economic Literature*, 47(2), 448-474.
- Darity, W. A., & Mason, P. L. (1998). Evidence on discrimination in employment: Codes of color, codes of gender. *Journal of Economic Perspectives*, 12(2), 63-90.
- Eckel, C. C., & Grossman, P. J. (2008). Differences in the economic decisions of men and women: Experimental evidence. *Handbook of Experimental Economics Results*, 1(4), 509-519.
- Egan, M. L., Matvos, G., & Seru, A. (2017). When harry fired sally: The double standard in punishing misconduct. *NBER Working Paper Series [No. 23242]*, National Bureau of Economic Research (NBER), Cambridge, MA, March.
- Filippin, A., & Crosetto, P. (2016). A reconsideration of gender differences in risk attitudes. *Management Science*, 62(11), 3085-3105.
- Fu, V. (1998). Estimating generalized ordered logit models. *Stata Technical Bulletin*, 8(44), 27-30.
- Gneezy, U., Niederle, M., & Rustichini, A. (2003). Performance in competitive environments: Gender differences. *Quarterly Journal of Economics*, 118(3), 1049-1074.
- Greene, W. H., & Hensher, D. A. (2010). *Modeling ordered choices: A primer*. Cambridge, Cambridge University Press.

- Halliday, C. S., Paustian-Underdahl, S. C., & Fainshmidt, S. (2020). Women on boards of directors: A meta-analytic examination of the roles of organizational leadership and national context for gender equality. *Journal of Business and Psychology* 2020 (online).
- Harrison, D. A., Price, K. H., Gavin, J. H., & Florey, A. T. (2002). Time, teams, and task performance: Changing effects of surface-and deep-level diversity on group functioning. *Academy of Management Journal*, 45(5), 1029-1045.
- Hertzberg, A., Liberti, J. M., & Paravisini, D. (2010). Information and incentives inside a firm: Evidence from loan officer rotation. *Journal of Finance*, 65(3), 795-828.
- Ioannidou, V., Pavanini, N., & Peng, Y. (2019). Collateral and asymmetric information in lending markets. *CEPR Discussion Paper [Series No. 13905]*, Center for Economic and Policy Research, Washington, DC.
- Kauko, K. (2009). Managers and efficiency in banking. *Journal of Banking and Finance*, 33(3), 546-556.
- Letendre, L. (2004). The dynamics of the boardroom. *Academy of Management Executive*, 18(1), 101-104.
- Liu, X., & Koirala, H. (2012). Ordinal regression analysis: Using generalized ordinal logistic regression models to estimate educational data. *Journal of Modern Applied Statistical Methods*, 11(1), 242-254.
- Meglino, B. M., Ravlin, E. C., & Adkins, C. L. (1992). The measurement of work value congruence: A field study comparison. *Journal of Management*, 18(1), 33-43.
- Miller, J. E., & Rodgers, Y. M. (2008). Economic importance and statistical significance: Guidelines for communicating empirical research. *Feminist Economics*, 14(2), 117-149.
- Milliken, F. J., & Martins, L. L. (1996). Searching for common trends: Understanding the multiple effects of diversity in organizational groups. *Academy of Management Journal*, 21(2), 402-433.
- Montalvo, J. G., & Reynal-Querol, M. (2020). Gender and credit risk: A view from the loan officer's desk. *Barcelona GSE Working Paper [Series No. 1076]*, Barcelona Graduate School of Economics, Barcelona, March.
- Nekhili, M., & Gatfaoui, H. (2013). Are demographic attributes and firm characteristics drivers of gender diversity? Investigating women's positions on French boards of directors. *Journal of Business Ethics*, 118(2), 227-249.
- Niederle, M., Kagel, J. & Roth, A. E., (2016). *Handbook of experimental economics* (2<sup>nd</sup> edn.). New Jersey: Princeton University Press, 481- 553.
- Nielsen, S., & Huse, M. (2010). Women directors' contribution to board decision-making and strategic involvement: The role of equality perception. *European Management Review*, 7(1), 16-29.
- Pearce, J. A., & Zahra, S. A. (1991). The relative power of the CEOs and boards of directors: Associations with corporate performance. *Strategic Management Journal*, 12(2), 135-153.

- Post, C., & Byron, K. (2015). Women on boards and firm financial performance: A meta-analysis. *Academy of Management Journal*, 58(5), 1546-1571.
- Sarsons, H. (2017). Recognition for group work: Gender differences in academia. *American Economic Review*, 107(5), 141-45.
- Spence, M. (1973). Job market signaling. *The Quarterly Journal of Economics*, 87(3), 355-374.
- Sunden, A. E., & Surette, B. J. (1998). Gender differences in the allocation of assets in retirement savings plans. *American Economic Review*, 88(2), 207-211.
- Tajfel, H. (1981). *Human groups and social categories studies in social psychology*. Cambridge University Press, Cambridge.
- Triana, M. C., Miller, T. L., & Trzebiatowski, T. M. (2013). The double-edged nature of board gender diversity: Diversity, firm performance, and the power of women directors as predictors of strategic change. *Organization Science*, 25(2), 609-632.
- Turner, J. C. (1987). *Rediscovering the social group: A self-categorization theory*. Basil Blackwell, Oxford.
- Westphal, J. D., & Milton, L. P. (2000). How experience and network ties affect the influence of demographic minorities on corporate boards. *Administrative Science Quarterly*, 45(2), 366-398.
- Williams, K. Y., & O'Reilly, C. A. (1998). Demography and diversity in organizations: A review of 40 years of research. *Research in Organizational Behavior*, 20, 77-140.
- Williams, R. (2006). Generalized ordered logit/partial proportional odds models for ordinal dependent variables. *The Stata Journal*, 6(1), 58-82.
- Williams, R. (2020). Adjusted predictions and marginal effects for multiple outcome models and commands (Including Ologit, Mlogit, Oglm, and Gologit2). *Handout, University of Notre Dame, Notre Dame*. <https://www3.nd.edu/~rwilliam/xsoc73994/Margins05.pdf> (November 21, 2020).