

THE IMPORTANCE OF SIGNALLING ENTREPRENEURIAL ORIENTATION AND RELATIONSHIP LENDING FOR SMES' BANK CREDIT ACCESS

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ABSTRACT

Although SMEs matter for the development of economies, they need financing that is the main impediment to their survival. To overcome this barrier, SMEs might reduce information asymmetries between them and banks by signaling their entrepreneurial activities that are based on Entrepreneurial Orientation (EO) and by having frequent contact with banks in a lending relationship. In this regard, this paper purposes to find out the impacts of signaling EO and relationship lending on bank credit access of SMEs. To fulfill this aim, the researcher has applied stratified random and purposive sampling methods to create the research sample from SMEs that operate in various geographical regions of Turkey. The researcher also employs a self-administered internet-mediated questionnaire to collect data from 479 SMEs. Moreover, this paper runs Binary Logistic Regression Test to analyze the impacts of signaling EO and lending relationship on bank credit access. According to the results, trademark ownership, R&D subsidies received by SMEs and closeness of communication between SMEs and banks positively affect bank credit access of SMEs. On the other hand, patent ownership, R&D investments and alliances of SMEs with prominent firms do not influence their credit access.

Keywords: Entrepreneurial orientation, SMEs, bank credit, patent-trademark ownership, R&D investments-subsidies, alliances, relationship lending

Submission: 22nd August 2021

Accepted: 1st March 2023

<https://doi.org/10.33736/ijbs.5946.2023>

1. INTRODUCTION

SMEs are prominent players of economies due to reducing unemployment rates, and increasing value addition and export amount of countries. For instance, 71% of labor force, 30.4% of total export (Turkish Statistical Institute, 2022), and 53.2% total value addition in 2021 were generated by SMEs in Turkey (European Commission, 2021). Although Turkish SMEs have those positive contributions to the Turkish economy, access to bank finance is the main concern of the majority of those enterprises. Moreover, compared to high-income countries' SMEs, Turkish SMEs face higher interest rates, and more collateral requirements (OECD, 2022). For this reason, the examination of credit obstacles and finding solutions to overcome those credit barriers for SMEs that operate in an emerging market will be noteworthy and will make a value addition to academic literature.

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The main reason why Turkish SMEs face those credit obstacles is information asymmetry between SMEs and banks (Erdogan, 2020). This fact has been also confirmed by many studies that investigate SMEs from various countries (Beltrame et al., 2022; Degryse et al., 2021; Moro et al., 2014). Since banks are not well informed about the conditions of SMEs, they can not accurately evaluate the creditworthiness of SMEs, thus, banks can charge them with higher interest rates, or ask for more collateral to minimize credit default problems. In this case, signaling some entrepreneurial characteristics and abilities might be a solution for SMEs to reduce information asymmetries. By having more interactions with lending officers, SMEs can signal their competencies that indicate their quality. In this regard, this paper aims to investigate whether signaling those entrepreneurial characteristics that belong to EO, and closeness of communication that is based on relationship lending enable bank credit access for them or not. Thus, the research question might arise “Do signaling EO and relationship lending enable SMEs to access to bank finance?”

EO consists of some entrepreneurial abilities and behaviors such as innovativeness, risk-taking, proactiveness, competitive aggressiveness, and autonomy (Civelek, 2022; Zarrouk et al., 2020). EO enables firms to receive financing from external sources (Brouthers et al., 2015) and increase firm performance (Aidoo et al., 2020). Corresponding to signaling, Spence (1974) is the first scientist who has mentioned the importance of sending signals by introducing Signalling Theory. This theory aims to reduce information asymmetries. Signals are related to business characteristics and actions that enable receivers to be informed about signalers' attitudes (Moss et al., 2015). The loan manager's perception regarding the entrepreneurial abilities of SMEs are crucial when making lending decisions (Moro et al., 2014). Those characteristics are also related to EO dimensions, namely, innovativeness, risk-taking, proactiveness, competitive aggressiveness, and autonomy. Thus, firms signaling autonomy, competitive aggressiveness, and risk-taking increase their probability of receiving credits (Moss et al., 2015). In line with the arguments of previous studies (Ahlers et al., 2015; Hauessler et al., 2012; Arthurs et al., 2009), patent and trademark ownerships, R&D subsidies and investments and alliances with prominent businesses are considered dimensions of signaling EO in this research.

When it comes to relationship lending, it is different from transactional lending methods since it is based on soft information and mutual interactions between lender and borrower (Degryse et al., 2021). Moreover, SMEs can not be satisfied with transaction lending since it only evaluates financial data (Moro et al., 2014). By following Degryse et al. (2021), Uchida et al. (2012), and Moro et al. (2015), this paper focuses on the closeness of communication in relationship lending by paying regard to frequent interactions between banks and SMEs.

Although those above-mentioned studies analyze the impacts of patent, trademark ownership, R&D investment, gained subsidies, and alliances of SMEs with prominent firms on receiving external finance, none of them analyze the effects of all those factors on bank credit access of SMEs in a unique study. On the other hand, investigating the impacts of both the closeness of communication between SMEs and banks in a lending relationship and signaling EO on bank credit access makes this paper to be the sole study. By fulfilling this gap, this study makes a significant value addition in related literature. Hence, policymakers, SMEs, banks, and other financing institutions might be interested in reviewing the results of this paper.

The remaining parts of the paper are structured as follows: Section 2 clearly declares the research variables and explains the development of the research hypotheses. Section 3 not only expresses the methodological approaches that the paper applies but also outlines the research data and data collection methods. Section 4 describes the main findings of this paper, discusses those main results, and proposes some policy implementations. This study summarizes the main points in Section 5 and provides limitations of this research and recommendations for further studies.

2. LITERATURE REVIEW

Having a patent makes SMEs to send signals about their strength in R&D activities, innovation (Lv et al., 2018), and to provide information about themselves to outside investors (Wu, 2017). Thus, patent ownership reduces information asymmetries (Spence, 1974). Patents have been also used as collateral by some SMEs in various countries when making credit applications (Nikitenko et al., 2017; Saidi & Žaldokas, 2021). Hence, firms that have patents face reduced obstacles when receiving credit access and become more likely to access finance (Hoffmann, & Kleimeier, 2021; Hoffmann et al., 2019). Di Novo et al. (2022) analyze UK firms and suggest that a patent signals firm quality and innovativeness and enables firms to receive credit from external sources. Wei et al. (2022) investigate Chinese SMEs and substantiate the positive impact of patent ownership on debt financing. For those reasons, a research hypothesis might be set as follows:

H1: Patents of SMEs are positively related to their access to bank finance.

Trademarks belong to innovative activities that cause increases in the revenues of businesses (Nikitenko et al., 2017). As an outcome of intellectual property, trademarks have been used by firms as collaterals in European countries when receiving loans (Nikitenko et al., 2017). Moreover, firms having trademarks can use this effective tool to indicate their quality when communicating with loan officers (Gao et al., 2008). Thus, similar with patents, trademarks can also send signals about firms' quality and decrease information asymmetries between firms and financing institutions and enable firms to receive credits (Li et al., 2019). As an example of intangible assets, trademarks also enable to improve conditions of receiving credit (Gumbau-Albert, & Maudos, 2022). For this reason, this paper creates another hypothesis as presented below:

H2: Trademarks of SMEs are positively related to their bank credit access.

R&D investments of SMEs make them to differ from rivals by increasing their competitive power. Furthermore, making expenses regarding R&D activities stimulate firms to create new products or services that increase their performance (Ughetto, 2008). Firms with R&D investments also increase their abilities regarding technological purposes and their competencies when making investment decisions (Pereira & Suárez, 2018). According to Hoffmann and Kleimeier (2021), R&D investments give information about firms' entrepreneurial behaviors, such as innovativeness, risk-taking and proactiveness, therefore, investments reduce information asymmetries. Thus, firms with R&D investments are more likely to access to finance. Moreover, when making investments in R&D activities, SMEs' high-quality inventions also increase their probability to receive government subsidies or incentives (Pereira & Suárez, 2018). Pereira and Suárez (2018) also substantiate the fact that R&D activities have positive impacts on receiving public funds and non-refundable grants. In case of having higher returns on investments, SMEs

continue to seek for new opportunities by acting their innovative and proactive behaviors. Ughetto (2008) declares that firms making investments for R&D operations face with reduced obstacles when receiving external finance. Compared to firms investing less amount of capital for R&D activities, firms with more R&D expenses receive more loans (Hoffmann, & Kleimeier, 2021). R&D activities also increase firms' access to debt financing (Wei et al., 2022). In line with the arguments of above-mentioned studies, the research assumes another hypothesis as follows:

H3: R&D investments of SMEs are positively related to their access to bank finance.

Since R&D activities are costly for some SMEs, many firms are also interested in collaborating with other businesses. This is because compared with larger-sized enterprises, SMEs have lower amount of financial sources. Alliances between larger businesses and SMEs increase the market value of SMEs (Lv et al., 2018) and their access to new markets (Wasiuzzaman et al., 2020). Larger partners of alliances might also give raw materials and intermediate inputs that increase SMEs' ability to produce more products. Moreover, partners of SMEs in those alliances can share their experiences in strategy-making and management processes, therefore, SMEs can be more effective when making strategic decisions regarding their financing (Wasiuzzaman, 2019).

By analyzing co-patent agreements of SMEs with larger enterprises, Lv et al. (2018) state that SMEs with co-patent agreements signal their abilities to improve R&D operations. By having alliances with larger enterprises, SMEs can use their partners' credibility and reputation as collaterals when applying for credits (Wasiuzzaman, 2019). SMEs having alliances with leading firms also increase their trustworthiness from the perspective of the lenders and send quality and observable signals to lenders to access to finance (Janney & Folta, 2006). International strategic alliances that SMEs have, also increase the financing of these enterprises (Tatarinov et al., 2021). These opportunities enable SMEs to decrease information asymmetries between banks (Wasiuzzaman et al., 2020), to increase their competitiveness and cash flows, to share their risks with their larger partners (Wasiuzzaman, 2019), thus, SMEs become more likely to receive external financing (Lv et al., 2018) such as trade credits from banks (Wasiuzzaman et al., 2020; Wasiuzzaman, 2019) and also financial supports from the governments (Lv et al., 2018). Wu (2017) has also confirmed the positive relationship between receiving government subsidies and receiving financial sources from other institutions Thus, the research hypothesis might be set as follows:

H4: Alliances of SMEs with leading firms in their sector are positively related to their bank credit access.

Governments aim to provide R&D subsidies to increase the innovativeness of businesses, their productivity, and revenues, so, the national income. When providing R&D subsidies, governments evaluate the applications of businesses and make investments for businesses that have the potential to achieve their targets with the better usage of those subsidies (Egger & Keuschnigg, 2015). Since governments know many details about businesses, their evaluation to provide subsidies for SMEs is very crucial for other financing institutions too. This is because more information about businesses enables governments to make more accurate predictions (Wu, 2017).

In this regard, firms receiving R&D subsidies signal their quality to other financing institutions such as banks (Hauessler et al., 2012) and decrease information asymmetries (Li et al., 2019) that

stimulate investors to provide financing for SMEs (Meuleman & Maeseneire, 2012; Wu, 2017). Other studies have also confirmed the fact that R&D subsidies improve access to external financing (Guo et al., 2022; Wu, 2017; Egger & Keuschnigg, 2015; Meuleman & Maeseneire, 2012) such as access to bank credit (Li et al., 2019). Furthermore, Oh and Hwang (2022) analyzes Korean SMEs and verify the fact that since R&D subsidies increase firms' sales and profitability, those subsidies improve SMEs' probabilities to gain debt financing. Those empirical arguments make this paper set another research hypothesis as follows:

H5: R&D subsidies of SMEs are positively related to their bank credit access.

The production of soft information depends on loan officers who have close interactions with borrowers (Uchida et al., 2012). Since lending relationships include frequent meetings by various channels, information asymmetries between both parties become reduced to a large extent (Moro et al., 2015). Those close interactions also increase the mutual trust of both sides (Lehmann & Neuberger, 2001). According to D'Auria et al. (1999), the closeness of communication in lending relationships is the main factor for lending institutions when determining loan rates (Lehmann & Neuberger, 2001). By being more informed about borrowers, banks provide better options such as charging firms with lower interest rates, lowering the cost of loans (Uchida et al., 2012), and asking for a lower amount of collateral (Uchida et al., 2012). If loan officers and entrepreneurs meet frequently, they produce more soft information, thus, information asymmetry would be reduced more (Degryse et al., 2021) and more amount of credits would be provided to firms by loan officers (Moro et al., 2015). This is because a close relationship between borrowers and lenders pushes borrowers to give more information about themselves. The increases in the production of soft information rise SMEs' abilities to access bank finance (Berger & Udell 2006). In addition, lenders' perceptions of the entrepreneurial abilities of borrowers help them to measure the risk of borrowers, thus, lenders can reduce their credit risk (Moro et al., 2014).

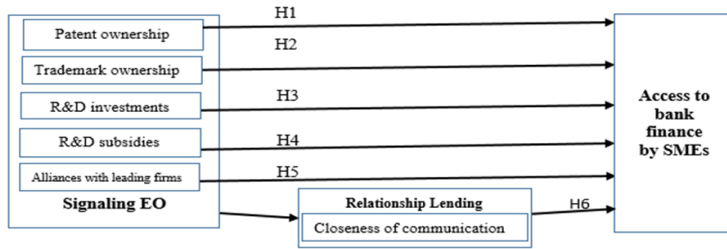
Information that loan officers and banks receive from SMEs also consists of firms' patent and trademark ownership, R&D investments, subsidies, and alliances with other businesses. During their contacts, SMEs might present details about those facts that signal their entrepreneurial attitudes. Beltrame et al. (2022) express that the interaction between entrepreneurial abilities and relationship lending improves the credit access of firms. For instance, a patent is a significant parameter that indicates firms' innovative posture (Hoffmann, & Kleimeier, 2021), and enables firms to signal their inventions by reducing information asymmetries. R&D subsidies received from the government by SMEs have also a signal/certification effect that stimulates investors to provide financing for SMEs (Meuleman & Maeseneire, 2012). Since those kinds of information reduce information asymmetry via relationship lending, firms with higher amounts of R&D investment and long-year relationships with lenders become more likely to access to finance (Ughetto, 2008). The positive relationship between the closeness of communication (frequency) between lender and borrower and access to bank finance is also confirmed by many studies (Degryse et al., 2021; Asnawi et al., 2014; Lehmann & Neuberger, 2001). The empirical results of the above-mentioned studies make this paper to create the following hypothesis:

H₆: Signaling EO and SMEs' closeness of communication with a lender are positively related to SMEs' access to bank finance.

Figure 1 is presented below to illustrate the conceptual framework. This framework is generated by following the studies of Janney and Folta (2006), Arthurs et al. (2009), Meuleman and De Maeseneire (2012) and Moro et al. (2015). The constructs that those researchers created

implemented in a unique framework that illustrates the key relationships that the researcher aimed to analyze.

Figure 1: Conceptual Framework



Source: Own processing.

3. METHODOLOGY

The variables that signal EO are measured by dichotomous questions (yes, no) and the researcher has directed those questions whether SMEs have gained patents, trademarks, licenses, R&D subsidies, have made investments for R&D activities, have had alliances with prominent firms or not. Firms responding “yes” to those survey questions have had patents, trademarks, R&D subsidies, alliances with partners, and have made investments for R&D and vice versa. To evaluate relationship lending that is another independent variable of the 6th logistic regression model, the researcher analyses the closeness of communication between banks and SMEs by including the following survey question in the questionnaire “How many times have you been in contact with this bank? (in person, email, telephone, etc)”. The answers that the respondents might give as follows: “Once a month or less”, “Once a week”, “Several times a week”. Therefore, higher frequency in contacts indicate closer communication between banks and SMEs. Furthermore, the dependent variable for all created research models is access to bank finance by SMEs. To measure the bank credit access of SMEs, the researcher includes a dichotomous (yes, no) question into the questionnaire as follows: “Did your firm received credit from their last bank credit application? Firms that answer this question as “yes”, have accessed to bank finance.

Due to having a binary dependent variable and binary (dichotomous) independent variable(s) for all created research models, this study employs Binary Logistic Regression analysis. This regression analysis is used by many researchers when evaluating credit access of SMEs (Li et al., 2019; Voordeckers & Steijvers, 2006). Binary Logistic Regression analyses also give opportunities for users to measure research models that consist of dichotomous independent and dependent variables. Moreover, the findings of logistic regression provide efficiency and robustness (Voordeckers & Steijvers, 2006).

Corresponding to hypotheses testing, this paper uses 5% level of significance. Thus, in case of having p values that are higher than this significance level, this paper supports null hypotheses that assume the nonexistence of positive association between the independent and dependent variables. Logistic regression models of this research for the H1 to H5 hypotheses are as follows:

$$\text{Model 1: } Y_i = (\beta_0 + \beta_1 X_1)$$

X_1 : Independent variable (X_1 = Gained patents)

Y: Dependent variable (access to bank finance by SMEs)
 β : Regression coefficients (same for all models)
 β_0 : Constant or intercept term (same for all models)

Model 2: $Y_i = (\beta_0 + \beta_1 X_1)$

X_1 : Independent variable (X_1 = Gained trademarks)
Y: Dependent variable (access to bank finance by SMEs)

Model 3: $Y_i = (\beta_0 + \beta_1 X_1)$

X_1 : Independent variable (X_1 = R&D investments)
Y: Dependent variable (access to bank finance by SMEs)

Model 4: $Y_i = (\beta_0 + \beta_1 X_1)$

X_1 : Independent variable (X_1 = alliances with prominent firms)
Y: Dependent variable (access to bank finance by SMEs)

Model 5: $Y_i = (\beta_0 + \beta_1 X_1)$

X_1 : Independent variable (X_1 = Received R&D subsidies)
Y: Dependent variable (access to bank finance by SMEs)

Multiple logistic regression model for H6 hypothesis is also presented below:

Model 6: $Y_i = (\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_6 X_6)$

X_{1-6} : Independent variables (X_1 : Gained patent, X_2 : gained certifications, X_3 : R&D investments, X_4 : alliances with prominent firms, X_5 : R&D subsidies, X_6 : closeness of communication)
Y: Dependent variable (access to bank finance by SMEs)

The reason why this paper sets first five different research models is to indicate the impacts of different variables of signalling EO separately. By creating the 6th research model, this paper not only aims to investigate joint effects of the variables of signalling EO, but also examines the impacts of signalling EO with relationship relationship lending on access to finance. Although different studies examine the impacts of EO and relationship lending on access to finance (Beltrame, 2022; Moss et al., 2015), this paper is a sole study that includes signalling EO into the analyses with relationship lending and access to finance.

Corresponding to the assumptions of Logistic Regression Models, the results regarding model fit and independence of errors are presented below in Table 1. -2 Log likelihood statistics are depicted in Table 1 because those statistics investigate whether the research models fit with the data or not. Moreover, -2 Log likelihood statistics also examine how overall models estimate the variations in the dependent variable.

Having lower volumes in -2 L likelihood with predictors than base model'd -2LL statistics indicate better model fit (Hemmert et al., 2018; Ward, 2008). This is because including predictors (independent variables) into base model that has only constant term, makes research models to explain more observations in the data. Since p values (Sig. column in Table 1) are significant at 5% level of significance (all p values are 0.000), it can be stated that the created research models perform better than base model when estimating SMEs' access to bank finance. Adding predictors into research models have made those models to represent more observations in the research data since the volumes in all-2 L likelihood with predictors are lower than the volume of the base model. For example, when adding patent as a predictor variable in the first research

model, -2 Log likelihood statistics have decreased by 1.322 (that is depicted under the column of Chi-square).

Table 1: Assessing model fit and Independence of Errors Assumption

Models	-2 Log likelihood				Cox-Snell R ² and Nagelkerke R ²		Independence of errors	
	Base model's -2 LL statistics	-2 L likelihood with predictors	Chi-Square	df	Sig	Cox-Snell	Nagelkerke	Durbin Watson Test Statistics
Model 1	482.694	481.372	1.322	1	0.000	0.003	0.004	1.986
Model 2	482.694	477.867	4.827	1	0.000	0.010	0.016	1.984
Model 3	482.694	480.699	1.995	1	0.000	0.004	0.007	1.971
Model 4	482.694	481.733	0.961	1	0.000	0.002	0.003	1.963
Model 5	482.694	475.328	7.366	1	0.000	0.015	0.024	1.997
Model 6	482.694	455.815	26.879	6	0.000	0.055	0.086	1.993

Notes: *p (sig)<0.05.

Concerning 6th research model, that includes 6 predictors (patent, trademark, investment, alliances, subsidies, relationship lending), adding more predictor variables into this model has made -2 log likelihood statistics to decrease by 26.879 that is more than other models. Therefore, having more predictors in the 6th research model has improved model fit more than other models.

Cox and Snell R² and the Nagelkerke R² that are called as Pseudo R², are other important parameters to consider when measuring overall model fit. Those parameters represent the percentages that show the variabilities in the dependent variable that independent variables cause. Higher percentages from those parameters express better model fit. Thus, according to Table 1, 6th research model shows better model fit comparing with other research models. Including more predictors has made this model to explain more variations in the dependent variable. This is because 8.6% (indicated under the column of Nagel-kerke) of variabilities in access to finance stem from the predictors of 6th research model, namely, patent, trademark, investment, alliances, subsidies and relationship lending. Although adding only one predictors in other research models (Model 1 to Model 5) can maximum explain 2.4% of variabilities in access to finance, those volumes prove the fact that those research models perform better than the base model when explaining variations in the dependent variable.

Concerning to The Independence of Errors assumption, this paper focuses on the results from Durbin-Watson Test Statistics. According to this test, residuals terms need to be independent and need to have no autocorrelation (Field, 2009). The volumes that are close to 2 represent that autocorrelation does not exist between residual terms. According to Table 1, the volumes from Durbin Watson Test statistics differ between 1.963 to 1.993 that are close to 2. Therefore, this research fulfills the Independence of Error Assumption.

Regarding Linearity Assumption, this paper pays attention to "interaction term between the predictor and its log transformation" (Field, 2009, p. 273). To not to violate this assumption, p

values for interaction terms (Sig. in the table) have to be higher than 5% significance level. According to Table 2, p values (Sig.) differ from 0.091(p value for the interaction term of subsidies) to 0.893 (p value for the interaction term of investment). Since all of the p values that are indicated under the column of Sig. are higher than 5% significance level, this paper fulfills the linearity assumption of logistic regression test.

Table 2: Linearity Assumption

Variable	B	S.E.	Wald	df	Sig.	Exp(B)
MODEL-1						
Linpatent	0.629	0.492	1.635	1	0.201*	1.876
MODEL-2						
Lintrademark	-0.399	0.699	0.356	1	0.551*	0.671
MODEL-3						
Lininvestment	0.426	0.299	2.023	1	0.155*	1.531
MODEL-4						
Linalliance	0.564	0.520	1.177	1	0.278*	1.758
MODEL-5						
Linsubsidies	-0.745	0.598	1.555	1	0.212*	0.475
MODEL-6						
Linpatent	-0.135	0.308	0.194	1	0.660*	0.873
Lintrademark	0.430	0.304	2.002	1	0.157*	1.537
Lininvestment	0.040	0.293	0.018	1	0.893*	1.040
Linalliance	-0.102	0.334	0.094	1	0.759*	0.903
Linsubsidies	0.603	0.357	2.854	1	0.091*	1.828
Linrlending	0.233	0.185	1.582	1	0.208*	1.262

Notes: *p (sig)> 0.05.

The last assumption of logistic regression that this paper will be focused on is multicollinearity. Since 6th research model have 6 independent variables, this paper will investigate multicollinearities between the independent variables of Model-6. The volumes from Variance inflation factors (VIF) and tolerance are included to evaluate this assumption. While the lower limit for tolerance parameter is 0.10, the upper limit for VIF score is 10. It means tolerance volumes lower than 0.10 and VIF scores higher than 10 indicate multicollinearities between predictor variables (Field, 2009). As presented in Table 3, the tolerance volumes vary between 0.672 to 0.968 and they are all higher than 0.10. Concerning VIF scores, they differ between 1.034 to 1.488 and they are all lower than 10. For these reasons, multicollinearities do not exist between predictor variables and this fact makes this paper to not to violate multicollinearity assumption of logistic regression test.

Table 3: Multicollinearity Assumption

Variables	Tolerance	VIF
patent	0.672	1.488
Trademark	0.690	1.450
investment	0.780	1.283

alliances	0.812	1.232
subsidies	0.858	1.165
relationship lending	0.968	1.034

Source: Own processing.

To hit the target of this paper, the researcher firstly employs stratified random sampling method to create the research sample. When creating the sample, the researcher has collected e-mail lists of SMEs from the various chambers of commerce in Turkey locating in different geographical regions. Thus, the stratas in random sampling approach, are based on 7 geographical regions of Turkey. Moreover, the sample size was determined in line with the percentage of active SMEs that operate in each geographical regions of Turkey. For instance, since the proportion of active SMEs in Marmara region to total number of SMEs is 38% (Turkish Statistical Institute, 2022), the researcher selected 185 SMEs that count 38.6% of whole research sample. The same approach was used when creating the reseach sample from other regions of Turkey.

After random selection, the researcher sent e-mails to those SMEs by adding the link of self-administered and internet mediated questionnaire. In this stage, the researcher applies purposive sampling to collect data from SMEs that have made credit application in last three years. Moreover, the researcher clearly explained the criteria regarding prospective respondents of the survey. According to the criteria, the respondents need to contact with bank officers and have knowledge about financial conditions and operations of SMEs. Thus, 522 respondents who are owner or executives of SMEs have fulfilled the survey. But due to having missing values, some questionnaires are excluded from the analyses and the responses of 479 owners and executives that work for 479 SMEs in Turkey are taken into consideration for the analyses of this research. Regarding details of the sample, 29.85% of the sample (143 SMEs) are microenterprises, 42.59% of enterprises (204 SMEs) are small-sized, and the remaining 27.56% of SMEs (132 SMEs) are sized as medium in consistent with the definition of European Commission.

4. RESULTS AND DISCUSSION

4.1. Results

Table 4 indicates the results of Binary Logistic Regression analyses for Model-1 and Model-2. Concerning the first model, patent is not a significant predictor to estimate access to bank finance, since p value is not significant at 5% level of significance (Model-1 : $\beta = 0.282$, Wald $\chi^2 = 1.346$, $p = 0.246 > 0.05$). Therefore, a relationship between patent ownership and access to bank finance does not exist. For this reason, this paper fails to support H1 hypothesis.

When it comes to the second model, trademark ownership is significant predictor to estimate access to bank finance since p value for this variable is less than 5% significance level (Model-2: $\beta = 0.518$, Wald $\chi^2 = 4.914$, $p = 0.027 < 0.05$). Moreover, β coefficient also significantly differ from 0 and it is positive. Therefore, higher volumes in trademark ownership are related with more possibilities to access to bank finance. Regarding Odds Ratio, when trademarks ownership increases by one unit, the odds of occurrence for access to bank finace become greater by 1.679 times with 95% confidence interval (CI) between 0.824 and 2.132. The results from those parameters make this paper to support H2 hypothesis.

Table 4: Binary Logistic Regression Results for Model 1 and Model 2

Variable	β	SE	OR	95% CI	Wald statistic	p
Patent	0.282	0.243	1.325	[0.824 2.132]	1.346	0.246
Constant	1.176	0.199	3.242		34.900	0.000*
Model-1: Access to finance= 1.176 + 0.282*Patent						
Trademark	0.518	0.234	1.679	[1.062 2.654]	4.914	0.027*
Constant	1.040	0.182	2.829		32.766	0.000*
Model-2: Access to finance = 1.040 + 0.518*Trademark&Licence						

Notes: *p<0.05.

The results for R&D investments, alliances and subsidies are illustrated in Table 5. Since p values for R&D investments (p value for investment: 0.155 > 0.05) and alliances (p value for alliances: 0.332 > 0.05) are not significant at 5% significance level, this paper can not confirm the significant contributions of R&D investment of SMEs and their alliances with other institutions or firms on their bank credit access. For these reasons, this study fails to support H3 and H4 hypotheses.

Table 5: Binary Logistic Regression Results for Model 3, Model 4 and Model 5

Variable	β	SE	OR	95% CI	Wald statistic	p
Investment	0.331	0.233	1.393	[0.882 2.199]	2.020	0.155
Constant	1.163	0.181	3.200		41.232	0.000*
Model-3: Access to finance= 1.163 + 0.331*Investment						
Alliances	0.244	0.251	1.276	[0.780 2.088]	0.941	0.332
Constant	1.297	0.135	3.657		92.425	0.000*
Model-4: Access to finance = 1.297 + 0.244*Alliances						
Subsidies	0.709	0.273	2.033	[1.190 3.472]	6.750	0.009*
Constant	1.178	0.130	3.247		81.643	0.000*
Model-5: Access to finance = 1.178 + 0.709*Subsidies						

Notes: *p<0.05.

On the other hand, R&D subsidies is a significant indicator at 5% level of significance (Model-5 : $\beta= 1.178$, Wald $\chi^2 = 6.750$, $p= 0.009 < 0.05$). The value of β coefficient is also significantly different from 0 and proves the fact that R&D subsidies is significant predictor to guess credit access of SMEs. Thus, SMEs that have received R&D subsidies are more likely to access to finance. When the gained subsidies of SMEs increase by one unit, the odds of occurrence for access to bank finance will increase by 2.033 times with 95% confidence interval (CI) between 1.190 and 3.472. For these reasons, this paper supports H5 hypothesis.

The findings of this paper regarding Model-6 is depicted below in Table 6. Patent ownership, investments and alliances of SMEs are not significant predictors to estimate access to finance in Model-6 since p values for these independent variables are not significant at 5% significance level (p value for patent: 0.404, for investment: 0.996, for alliances: 0.748). These results make this paper to fail to support H6 hypothesis.

Table 6: Binary Logistic Regression Results for Model 6

Variable	β	SE	OR	95% CI	Wald statistic	p
Patent	-0.253	0.303	0.776	[0.428 1.407]	0.697	0.404
Trademark	0.581	0.289	1.787	[1.015 3.146]	4.045	0.044*
Investment	0.001	0.271	1.001	[0.589 1.702]	0.000	0.996
Alliances	-0.091	0.284	0.913	[0.523 1.594]	0.103	0.748
Subsidies	0.648	0.296	1.912	[1.070 3.417]	4.782	0.029*
R. Lending	0.365	0.093	1.440	[1.199 1.729]	15.273	0.000*
Constant	-0.200	0.362	0.819		0.306	0.580

Model-6 Access to Finance = $-0.200 - 0.253*Patent + 0.581*Trademark + 0.001*Investment - 0.091*Alliances + 0.648*Subsidies + 0.365*Relationshiplending$

Notes: *p<0.05.

On the other hand, trademark ownership, R&D subsidies and relationship lending are all significant at 5% significant level ($p = 0.044, 0.029, 0.000 < 0.05$, respectively), therefore, they have significant influences on access to bank finance. Regarding the coefficients of these independent variables, they are different from 0 and they are positive ($\beta = 0.581$ for trademark, 0.648 for subsidies and 0.365 for relationship lending).

Concerning the coefficient volumes in the direct impact of trademark and subsidies (β values in the Model 2 and the Model 5= 0.518 and 0.709, respectively), the impact of the trademark in this multiple relationships has become stronger (Model 6, $\beta=0.581$), while the subsidies' has become weaker (Model 6, $\beta=0.648$). However, when comparing to bivariate and multivariate models, there are not any differences in the significance of the trademark and subsidies. This is because they are all significant in the bivariate and multivariate models, respectively (P values = 0.027 and 0.009 in the bivariate models, namely, Model 2 and Model 5, P values= 0.044 and 0.029, respectively, in the multivariate model, namely, Model 6). When it comes to other variables, such as patent, investment and alliances, they are all insignificant in the bivariate models (P values in Model 1, Model 3 and Model 4 = 0.246, 0.155, 0.332, respectively) and multivariate models (P values in Model 6 = 0.404, 0.996, 0.748, respectively)

On the other hand, since β coefficients are positive for trademark (0.581), subsidies (0.648) and relationship lending (0.365) in this multiple model, SMEs that have higher values from those predictor variables are associated with higher possibilities to access to finance. Moreover, it can be elucidated that SMEs that have trademarks, subsidies and have more contact with their lending officers are more likely to access to bank finance than their counterparts that do not have those factors.

Moreover, if SMEs' closeness of communication increases by one unit, their access to bank finance would increase by 0.365, when other predictor variables are held constant in Model-6. Corresponding with odds ratios, SMEs that increase their contacts with lending officers by one unit, 1.440 times more likely to access to finance comparing with SMEs that have not frequently contact with lending officers. Regarding subsidies and trademark ownership, when those variables increases by one unit, the odds of occurrence for access to finance become greater by

1.787 and 1.912 times with 95% confidence interval (CI) between 1.015-3.146 and 1.070-3.417, respectively.

4.2. Discussion

This paper finds significant and positive impacts of trademark ownership, received R&D subsidies and closeness of communication on access to bank finance. Therefore, the results of this paper regarding those variables are compatible with the findings of the studies of Li et al. (2019) (trademark and access to finance), Meuleman and Maeseneire (2012) (R&D subsidies and access to finance), Asnawi et al. (2014) (closeness of communication and access to finance).

On the other hand, this research does not find any significant effects of patent ownership, R&D investments, alliances with leading firms of SMEs on their access to bank finance. For this reason, the findings of this paper regarding those variables are not consistent with the results of the studies of Hoffmann and Kleimeier (2021) (patent and access to bank finance), Pereira and Suárez (2018) (R&D investments and access to bank finance), Wasiuzzaman et al. (2020) (alliances and access to finance). The reason of this result might be related with the closeness of communication between SMEs and banks. According to research data, only 20% of SMEs that have patents have close communication with banks. Regarding SMEs that have made R&D investments and have had alliances, just 21% and 23% of them have frequent contacts (several times a week) with banks, respectively. Since most of SMEs that have not had frequent contacts with banks, they might have not signalled their patent ownerships, R&D investments and alliances with leading firms during their interactions with banks. Since banks are not aware of those actions of SMEs, they might have not considered patent ownerships, R&D investments and alliances of those enterprises when making credit decision. Thus, this fact might be reason why those variables do not have impact on SMEs' credit access.

Concerning the nonexistence of positive impacts of alliances on credit access of SMEs, another reason might be related with the overdependence of SMEs to their partners that are prominent in their sector. Since SMEs are highly dependent to their partners, banks might perceive that partner firms of SMEs can acquire them in future and this fact might make SMEs to face with more obstacles in their credit access (Wasiuzzaman, 2019). Moreover, when partner firms of SMEs face with a financial problem, SMEs might be negatively affected more than their partner firms due to having lack of financial power.

Since access to finance is major obstacle for SMEs to cope with, and since SMEs have some characteristics to over come those barriers, policy makers should provide some platforms for those businesses to signal their characteristics. For instance, government can create an identification system for SMEs and give access to financing institutions to see the details about those firms' characteristics, including their patent, and trademark application, intellectual properties, R&D subsidies, R&D investments, and alliances. In this case, information asymmetries among SMEs and financing institutions become reduced and those institutions become informed about quality of those firms. Thus, SMEs become more likely to receive credits. There can be other details about SMEs that are registered in this system such as their credit ratings that are evaluated by public institutions. Such implementations by policy makers can also reduce the concerns of financing institutions regarding default problems of SMEs.

On the other hand, the protection of intellectual property rights by governments is another crucial factor for foreign and local businesses to make some inventions and develop their products. If firms do not feel secured, they might be not interested in investing money for their R&D activities. To motivate and stimulate the intention of businesses, governments should make businesses sure about their legal structure that protects intellectual properties of businesses. When those businesses receive such supports from the governments, their willingness to create and improve new products and services would be increased. Therefore, firms might improve their sales and revenues by differentiating their products from their rivals and also GDP of countries increase.

5. CONCLUSION

Information asymmetry between banks and SMEs has been main reason for credit access obstacles that banks create for SMEs. To minimize this information gap between the sides of lending activities, SMEs can signal their entrepreneurial abilities and activities to banks and they can have frequent contacts with bank officers. In this regard, this paper aims to analyze whether SMEs receive bank credit access in case of sending EO signals and having close interactions in lending relationship with banks or not.

In line with this target, the researcher analyzes 479 SMEs in Turkey. To evaluate the impacts of patent, trademark ownership, R&D investments, R&D subsidies, alliances with prominent businesses, closeness of communication) on access to bank finance, this paper runs Binary Logistic Regression Analyses. The results confirm the positive effects of trademark ownership, received R&D subsidies by SMEs and closeness of communication between banks and SMEs and access to bank finance. On the other hand, the nonexistence of significant effects of patent ownership, R&D investments and alliances on SMEs' bank credit access have been also validated by the analyses.

Since this paper focuses on the importance of signaling entrepreneurial behaviors and having closer contacts in lending relationship, it provides some options for SMEs to find new solutions for their credit access problems. Moreover, since this paper draws attention to some entrepreneurial actions such as patent, trademark ownership, R&D investments and subsidies and alliances of SMEs with prominent firms, financing institutions especially, banks might consider those indicators in their credit evaluation methods. Since hybrid evaluation methods has become popular, soft information that this paper pays regard to might be included by banks to their credit evaluation approaches to face with reduced credit default problems. Although, this paper makes those significant contributions, this paper also has some limitations. The research sample only includes SMEs in Turkey and the respondents are only firms' executives, therefore, this paper only looks at this issue from the perspective of SMEs. Moreover, this paper also only focuses on bank financing. For these reasons, further studies can also analyze the perspective of financing institutions when studying for this issue and might focus on how financing institutions receive those signals regarding EO. Moreover, researchers can also analyze SMEs and larger enterprises from different countries to explore signaling abilities of those businesses depending on their size and countries. Except bank financing, other external financing options and importance of signaling EO with lending relationship might be investigated by further studies too.

ACKNOWLEDGEMENT

The article came into being within the project no. 2019-20-D2-B05 entitled 'KOBİ'lerin Girişimci Davranışlarının ve Bankalarla Karşılıklı İlişkilerinin Krediyeye Erişimdeki Rolü ' financed by Doğuş University conducted by Mehmet Civelek in the years of 2020 and 2023.

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