CREDIT RISKS AND INTERNATIONALIZATION OF SMEs

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Abstract. The purpose of the paper is to identify common attributable factors causing credit risks to domestic and international SMEs of an emerging market in Turkey. We call domestic firms as the ones only making local sales and international firms as the ones also making sales abroad. Therefore in this study, cross-border sales are assumed to lead the firms to internationalization. We study totally 1,166 SMEs for the year 2007, which coincide with an economic expansion in Turkey. We find that different factors affect credit risks for the two types of firms. For domestic firms, our results present a direct relationship between the likelihood of corporate default and trade credits, corporate tax, financial expenses and net profit margin yet the relationship turns negative for gross profit margin. For international firms, likelihood of corporate default increases with the ratio of inventories to total assets but decreases with net profits and net sales.

Keywords: credit risks, logistic regressions, small and medium-sized enterprises, emerging market.

1. Introduction

With the introduction of Basel II principles, measurement of credit risk has become a globally major issue. Therefore, so as to avert corporate default, it is relatively more imperative in recent years for financial institutions and investors to correctly evaluate firms and select the ones to collaborate or invest in. Accordingly, most large banks have been developing systems to monitor firms with default potential and establish risk management systems. Westgaard and Van der Wijst (2001) also emphasize that pricing credit risk and allocating risk capital on the client level is an important activity for contemporary banking industry. The recent advent of credit derivatives illustrates the market's attempt to measure and control credit risk. Moreover, the recent credit crunch has diverted the attention to recognize which factors lead firms to default. Therefore, our objective in this paper is to find out common identifiable attributes leading to corporate failure of domestic and international SMEs.

Few studies elaborate the credit risks associated with SMEs. While, Cancer and Knez-Riedl (2005) discuss the creditworthiness of SME's business partners, Berger and Frame (2007) emphasize the importance of credit scoring on the credit availability of SMEs. However, SMEs cover more than 95 percent of the GNP of Turkey therefore understanding of their credit risk attributes poses a particular importance.

The most striking contribution of this study is investigating the default leading factors separately for domestic and international SMEs. In other words, we concentrate on the internationalization for making a distinction between SMEs while studying their credit risk characteristics. Specifically, in this study we assume that internationalization is attained through not limiting sales only to domestic market but also diffusing the sales to cross-border. Similarly, Sullivan (1994) notes that most prior studies use the foreign sales to total assets ratio to separate international firms from the domestic ones.

A distinction between domestic and international firms is firstly raised by Fatemi (1988), who defines international firms as the ones making sales abroad and the domestic firms as the ones only making sales to the local market. Furthermore, Lee and Kwok (1988) conclude that domestic and international firms have

different capital structures and hence Doukas and Pantzalis (2003) also highlight that different factors lead domestic and international firms to corporate default.

Previous studies reach differing conclusions on the interrelationship between internationalization and credit risks. Rugman (2009) and Caves (2007) indicate that since markets are not fully integrated, involvement in more than one national market serves to balance out regional macroeconomic trends that are less than perfectly correlated. In a recent study, Gao *et al.* (2008) find that geographically dispersed firms experience a far lower valuation discount rate than their geographically concentrated counterparts. More importantly, by only studying publicly traded firms on Istanbul Stock Exchange, Gonenc and Arslan (2003) emphasize that when compared with domestic firms, international firms, which make sales abroad, have lower default risk thanks to facing low fluctuations through making cash flow diversification. The authors also find that Turkish international and domestic firms have diverse capital structures due to this reason. It should be noted that a reason that may lead international firms to have different capital structures than those of the domestic firms is the off-the-record transactions. SMEs, especially the domestic ones, are known to hold off the record transactions which lead them to be less transparent and more credit constrained due to higher information asymmetry between them and the supplier of funds. However, due to their cross-border trades, international SMEs have relatively less off-the-record transactions since they are obliged to base their operations on documents, which leads them to be more transparent and hence less credit constrained. Consequently, international SMEs are implicitly expected to have lower credit risks than those of domestic SMEs.

On the other hand, the finding of Burgman (1996) is contrary to those of the former studies. In specific, Burgman (1996) shows that through diversification of their operations, international firms do not have lower fluctuations in their earnings than those of the domestic ones. Besides, Eiteman *et al.* (2009) indicate that internationalization exposes firms to higher risks such as political risks and refinancing risks, which are likely to lead to higher credit risks.

Studies on credit risk of not only real sector firms but also publicly traded companies are even more limited in developing countries due to availability of reliable data. For this reason, there are very few studies predicting default of SMEs[1]. We tackle this problem thanks to the large database of Ankara Chamber of Commerce

(*ATO – Ankara Ticaret Odası*). Besides, a large number of observations, which is one of the strengths of this paper, is always useful for more efficient estimations for causing not only increase in degrees of freedom but also reduction in potential collinearity among regressors.

Moreover, understanding of financing structure of firms in emerging markets is far less developed than that in developed economies. Most studies on credit risks and defaults to our knowledge up to date are conducted on developed markets, which have diverse economic regimes and macro-economic indicators compared to those of emerging markets. Therefore strength of our paper is shedding light on financial peculiarities of emerging market firms through studying Turkish SMEs.

Last but not least, SMEs have less access to formal sources of external finance and this imposes a constraint on their growth (Beck, Demirguc-Kunt 2006). Through highlighting the credit risk attributes of both the domestic and international SMEs, they are enabled to be more financially transparent to the suppliers of external finance, and hence creditworthy SMEs are more likely to gain enhanced accession to the funds.

In this study, we develop a binary logistic model of corporate defaults based on the available theory. We use the financial data obtained from *ATO*, which also provides the data of default SMEs. We conduct our analyses for the year 2007, which coincides with the economic upturn stage of Turkey (See; Central Bank of Turkey 2007).

Our results conducted on 1,166 SMEs provide evidence that international and domestic firms are affected by different attributes in terms of credit risks. According to our multivariate analysis of domestic firms, the likelihood of credit risks increases with trade credits, corporate taxes, financial expenses and net profit margin. However, the likelihood of credit risks is found to be decreasing with gross profit margin. Furthermore for international firms while the inventories of total assets ratio is found to be positively associated with the likelihood of default, the association turns significantly positive for the net profits and net sales.

Our paper is organized as follows: Section 2 discusses the data used in the analysis. In Section 3, the model and the estimation procedure are presented and the results from the logistic analysis are discussed. Finally, Section 4 concludes the study.

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[1] Laitinen (1991) and Kiviluoto (1998) are to name the some.

2. Data

All the SMEs contained in our analyses are based in Ankara, the capital city of Turkey. Our data is collected in the year 2008 through cooperation with *ATO*, which is established in 1923 as a non-governmental and a non-profit institution with registered more than 135,000 member firms. Containing 61 sectoral committees, the objective of *ATO* is increasing the standards of the corporate activities of its members through providing them consulting services. In other words, *ATO* is organized to provide technical support to its member firms to enhance their corporate competitiveness and eventually contribute to the welfare of the Ankara city.

ATO has requested 18,000 of its member firms, fitting to the SME category, to send their balance sheets and income statements belonging to the year 2007 presented to tax office. 5,214 member SMEs have confirmed to send their requested documents. After truncating the firms having defective and incomplete information we are left with the sample size of 1,166 firms. After that we obtained from *ATO* the list of the firms that have defaulted their checks and promissory notes and uncovered them in the year 2008[2]. Put differently, while the financial data of the sample firms belong to the year 2007, the list of default ones belong to the year 2008.

Among the 1,166 SMEs, 1,074 of them are the domestic ones and 87 of them are default. Moreover, 192 SMEs are the international ones in the sample and 10 of them are acknowledged to be default. The percentage of default firms slightly outruns those of the international ones since 8.81% of the domestic firms are learned to be default whereas only 5.5% of the international firms are found to be default.

Table 1 presents the definition of the independent variables used in our analyses. Originally we had 26 independent variables yet our multicollinearity checks left us with 12 variables listed in the table. The variables are widely used in the previous studies on credit risks[3]. Following Altman and Sabato (2007) we took natural logarithm for the ratios of net sales to total assets and current assets to current liabilities, namely the current ratio.

Descriptive statistics of the variables used in our analysis are presented in Table 2. The prediction that trade credit is a substitute for the insufficient bank finance is empirically confirmed by Atanasova and Wilson (2004), and Petersen and Rajan (1994, 1995) and Marotta (1997). The authors observe that credit con-

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[2] Checks are used as a proxy of promissory notes in Turkey.

[3] See; Altman (1968) and Shumway (2001) among others.

Table 1. Definitions of the Variables

Trade Credits	Trade Credits / Total Assets
Financial Expenses	Financial Expenses / Total Assets
Financial Fixed Assets	Financial Fixed Assets / Total Assets
Current Ratio	Natural Logarithm of (Current Assets / Current Liabilities)
Inventories	Inventories / Total Assets
Corporate Tax	Corporate Tax / Total Assets
Gross Profit Margin	(Net Sales – Cost of Goods Sold) / Net Sales
Net Profit Margin	Earning After Interest and Tax / Net Sales
Marketable Securities	Marketable Securities / Current Assets
Net Profit	Earning After Interest and Tax / Total Assets
Net Sales	Natural Logarithm of (Net Sales / Total Assets)
Financial Liabilities	Financial Liabilities / Total Assets

strained firms make a larger use of trade credit when credit conditions are tighter. Moreover, Petersen and Rajan (1997) stress that excessive trade credit could give a negative signal to the bank that the firms can not obtain credit at any bank. On average international firms are found to use slightly lower level of trade credits (0.211) than the domestic firms (0.299).

On average international firms are found to have higher financial expenses for assets ratio (0.080) and financial liabilities to total assets ratio (0.019) than those of the domestic firms (0.066 and 0.017, respectively). This result can be owed to the fact that, relative to the domestic firms, international firms are exposed to more risks hence make higher financial expenses for hedging purposes.

While the average net profit on assets ratio of international firms (0.088) and domestic firms (0.090) are very close to each other, both the average net profit margin and gross profit margin (0.047 and 0.230 respectively) are almost twice the values of those of domestic firms (0.026 and 0.128 respectively).

One of the striking results from the descriptive statistics is, while the average net sales to assets ratio of international firms (0.500) are far higher than those of the domestic firms (0.340), international firms hold on average lower level of inventories relative to their assets (0.199) than those of the domestic firms (0.269).

Table 2. Descriptive Statistics

	MEAN		STD. DEV		MIN		MAX	
	International	*Domestic*	*International*	*Domestic*	*International*	*Domestic*	*International*	*Domestic*
Trade Credits	0.211	0.299	0.235	0.270	0.000	0.000	0.930	1.000
Financial Expenses	0.080	0.066	0.117	0.131	0.000	0.000	0.623	0.935
Financial Fixed Assets	0.044	0.017	0.156	0.109	0.000	0.000	0.974	0.999
Current Ratio	0.497	0.475	1.133	−2.144	−5.484	−2.144	8.123	4.787
Inventories	0.199	0.269	0.199	0.369	0.000	0.000	0.964	0.881
Corporate Tax	0.026	0.039	0.044	0.078	0.000	−0.021	0.382	0.982
Gross Profit Margin	0.230	0.128	0.193	0.207	−0.460	−1.138	1.000	1.231
Net Profit Margin	0.047	0.026	0.138	0.963	−1.000	−0.326	0.543	0.906
Marketable Securities	0.163	0.080	0.274	2.338	−1.295	−0.995	1.000	1.000
Net Profit	0.088	0.090	0.196	0.203	−1.032	−1.339	1.337	3.174
Net Sales	0.500	0.340	1.056	0.989	−4.629	−3.471	4.032	5.658
Financial Liabilities	0.019	0.017	0.028	0.109	0.000	0.000	0.974	0.999

This result can be based on the fact that international SMEs have less off-the-record operations than the domestic firms. Furthermore, although the average current ratios of international (0.497) and domestic firms (0.475) are very similar to each other, international firms are found to be on average more liquid than domestic firms since the average ratio of marketable securities to total assets of the former (0.163) is almost double of the latter (0.080).

The majority of SMEs in Turkey are favoured by corporate tax exemptions to stimulate internationalization. In accord with this, average ratio of corporate tax to total assets for international SMEs is lower (0.026) than that of domestic firms (0.039).

Before moving to our estimations we perform a multicollinearity check on the data. We concentrate on the variance inflation factor (VIF), which detects the severity of multicollinearity. As a common rule of thumb if VIF exceeds 5, then multicollinearity is accepted to be high (Studenmund 2006). Table 3 shows that we do not detect a threat of multicollinearity for our analyses since VIF does not significantly exceed the value of 5 for any of the variables.

3. Estimation

Our estimation technique allows for a binary dependent variable, which rules out usual regression analysis including the linear probability model. Since the probabilities in our model are bounded by zero and unity, linear functions are inappropriate for our models given that they are inherently unbounded. Our logit model is formulated for a two-state dependent variable, namely: State 1 = Default Firms and State 0 = Non-Default Firms. Put differently, we assume that the dependent variable is a dummy variable which takes the value of unity if either a domestic or international firm has defaulted and uncovered checks and promissory notes, and zero otherwise.

A common representation of the logit model used in our estimation is as follows:

$$P^i_t = f(X^i_{t-1}, E_{t-1}), \qquad (1)$$

where P^i_t takes the value of 1, if i is found to be a non-default firm in year t and otherwise. Vector X^i_{t-1} represents financial characteristics of the firm. Vector E_{t-1} represents other attributes of the firm such as industry type, region etc. More explicitly, the probability

Table 3. Variance Inflation Factor

Variables	INTERNATIONAL		DOMESTIC	
	Parameter	St. Error	Parameter	St. Error
Trade Credits	−0.069 (−0.93)	0.074	0.160 5.08)***	0.031
Financial Expenses	−0.636 (−0.86)	0.743	0.946 (3.23)***	0.293
Financial Fixed Assets	0.240 (2.13)**	0.113	0.000 (0.01)	0.077
Current Ratio	−0.001 (−0.60)	0.002	0.000 (0.36)	0.000
Inventories	0.107 (1.24)	0.086	0.026 (1.24)	0.021
Corporate Tax	0.282 (0.74)	0.383	0.575 (5.37)***	0.107
Gross Profit Margin	−0.025 (−0.26)	0.096	−0.059 (−1.38)	0.043
Net Profit Margin	0.048 (0.30)	0.154	0.003 (0.33)	0.008
Marketable Securities	−0.013 (−0.20)	0.062	0.000 (0.15)	0.003
Net Profit	−0.111 (−0.93)	0.119	−0.026 (−0.58)	0.044
Net Sales	0.000 (0.04)	0.000	−0.002 (−0.83)	0.002
Financial Liabilities	0.289 (1.65)*	0.175	0.058 (0.84)	0.068

of default is a random event and unknown but can be estimated. The probability of being a default firm is:

$$P[Y^i = 1] = p_o. \qquad (2)$$

Furthermore, probability of not being a default firm is:

$$P[Y^i = 0] = 1 - p_o. \qquad (3)$$

The probabilities are determined by some firm specific variables and X^i are assumed to come from a logistic distribution function. Then, we can write the probability of being a default firm as a function of Xs as follows:

$$P\left[Y^i = 1 \mid X\right] = \frac{1}{1 + \exp\left(\sum_j X_j^i \beta_i\right)}. \qquad (4)$$

The probability of not being a default firm would be:

$$P\left[Y^i = 0 \mid X\right] = \frac{\exp\left(\sum_j X_j^i \beta_i\right)}{1 + \exp\left(\sum_j X_j^i \beta_i\right)}. \qquad (5)$$

Table 4 presents the results of the binomial logistic estimations of the domestic firms. 87 out of 1,074 firms are identified to be default hence the dependent variables for these firms take the dummy variable of 1 and the rest zero. Similar to linear regression, the analysis provides coefficient estimates, standard errors and test statistics for the null hypotheses that each coefficient is equal to zero. The test statistics are labelled as "Wald" and are calculated by dividing each coefficient by its standard error and squaring the result. We base our interpretation of our result on the odds-ratio. The numbers in the odds ratio column are amounts by which the odds favouring the dependent variable = 1 are multiplied per 1 unit increase in the explanatory variable.

Table 4. Binomial Logit Estimations for Domestic Firms

Variables	Coefficient	St. Error	Wald	Odd. Ratio
Constant	−3.372***	0.338	99.790	0.034
Trade Credits	2.106***	0.480	19.217	8.214
Financial Expenses	10.209***	3.066	11.088	27138.3
Financial Fixed Assets	−3.534	3.962	0.796	0.029
Current Ratio	0.045	0.163	0.075	1.046
Inventories	0.340	0.226	2.276	1.406
Corporate Tax	5.924***	1.283	21.304	373.952
Gross Profit Margin	−2.186**	0.925	5.585	0.112
Net Profit Margin	1.480**	0.724	4.178	4.394
Marketable Securities	0.002	0.053	0.001	1.002
Net Profit	−0.483	0.887	0.297	0.617
Net Sales	−0.191	0.140	1.852	0.826
Financial Liabilities	1.250	0.941	1.764	3.489
Goodness of Fit Tests	Value	p-value		
Cox and Snell – R2	0.056	n/a		
Nagelkerke – R2	0.130			
-2 Log Likelihood	542.212	0.00		
Number of Observations	1,074			

Before interpreting the results, the overall fit of the model is assessed with several goodness of fit tests, such as the Nagelkerke test and the Cox & Snell test. The significance of the model is reflected in the result of the likelihood test. Overall tests clarify the success of our model. While interpreting the impact of the variables we consider the absolute strength of their respective odds ratios. The cut-off accuracy rate of estimation is 10%. Our analysis successfully estimates 75.8% of the non-default firms and 63.2% of the default firms hence the overall percentage of accuracy of our estimations is 74.8%.

First of all, in accord with the previous literature, ratio of trade credits to total assets is found to be increasing the likelihood of default for domestic SMEs. Therefore the firms, which are unable to resort to bank loans, opt for trade credits in order to obtain external finance. Especially a unit increase in the trade credits increases the likelihood of default for domestic firms by 8 units.

Secondly, the ratio of taxes to total assets is also found to be positively associated with the likelihood of credit default. This result acts as an early signal for domestic SMEs to control their corporate tax policies. Another explanation for this result is probably these firms keep their operations on-the-record, unlike the general behaviour of SMEs, therefore are adversely affected by the high level of the corporate tax rate.

Interestingly, financial expenses for total assets ratio are directly related to the likelihood of the escalation of credit risks. In other words, the domestic firms that incur higher costs for acquiring external finance are found to be likely to be more prone to credit risks. This result is the direct reflection of the pecking order theory of Myers (1984). Even the odds ratio is very high and hence emphasizes the sharp impact of the financial expenses. Besides, one should also take it into consideration that since the sample period coincides with the economic expansion, in which real interest rates of bank loans in Turkey are roughly around 15–20%, the cost of external finance is also high because of the supply side factors.

The most striking result out of our analyses for the domestic firms is, while the gross profit margin is negatively related to the likelihood of being a default firm, the relationship turns positive for the net profit margin. In other words, gross profit margin is derived from the profits generated from the core activities of the firm. On the contrary, net profit margin is comprised of the profit generated from the activities excluding the main operations. Therefore, it is deduced that domestic firms that focus on their main activities for purposes of making profit are less likely to be subject to credit risks.

Besides, another explanation of the positive association between net profit margin and credit risks can be based on the government's tax inspection on firms that announce loss on the accounting year. In other words, the usual corporate tax inspection of government roughly covers 4% of the SMEs in Turkey. In order to avoid the inspection, SMEs in Turkey usually attempt to avoid the loss through spurious reporting manipulations on their activities out of their main operations.

Table 5 presents the estimation results for the international firms. The overall fit of the model is assessed with several goodness of fit tests such as the Nagelkerke and Cox & Snell tests. The significance of the model is reflected in the result of the likelihood test. Overall, the tests clarify the success of our model.

Table 5. Binomial Logit Estimations for International Firms

Variables	Coefficient	St. Error	Wald	Odd. Ratio
Constant	−4.197***	1.347	9.716	0.015
Trade Credits	-0.334	2.129	0.025	0.716
Financial Expenses	−5.928	17.825	0.111	0.003
Financial Fixed Assets	1.711	1.788	0.916	5.537
Current Ratio	−1.227	0.768	2.551	0.293
Inventories	4.459**	1.921	5.387	86.438
Corporate Tax	11.215	7.152	2.459	74211.8
Gross Profit Margin	−2.004	3.104	0.417	0.135
Net Profit Margin	5.305	5.027	1.114	201.393
Marketable Securities	0.903	1.490	0.368	2.468
Net Profit	−5.693*	3.388	2.823	0.003
Net Sales	−0.880*	0.477	3.408	0.415
Financial Liabilities	1.711	1.788	0.916	5.537
Goodness of Fit Tests	Value	p-value		
Cox and Snell – R2	0.094	n/a		
Nagelkerke – R2	0.279	n/a		
-2 Log Likelihood	59.710	0.00		
Number of Observations	192			

Here 10 out of 182 international firms are found to be default. The binary dependent variable in the analyses takes the value of one if the firm has defaulted and zero otherwise. Minding that the cut-off rate of the estimation accuracy is 10%, our analysis successfully estimates 86.8% of the non-default firms and 60% of the default firms, and hence the overall percentage of accuracy of our estimations is 85.4%.

The set of results we obtain for the international firms differ from those of the domestic firms to a large extent and hence confirm our intuition that the credit risk attributes of domestic and international firms are different from each other. First of all, the ratio of inventories to total assets is found to be positively associated with the likelihood of being a default firm. In other words, high level of inventories signals a high level of credit risks for international firms. This is due to the mismanagement of the inventory policies by firms that receive large orders from international markets.

Secondly, net profit ratio, which is measured as the ratio of earnings after interest and tax to total assets, is found to be negatively associated with the likelihood of being a default firm. Lastly, the ratio of net sales to total assets is another statistically significant variable that is negatively related to the probability of being a default firm. These two indicators suggest that small-scale-exporters can easily adapt to the changing conditions in the international markets.

4. Conclusions

Acknowledging the factors leading to corporate default has gained a tremendous importance within the past one year. However, the common identifiable attributes leading to corporate failure are not sufficiently understood not only for developed markets but also for SMEs activating in the emerging markets. This paper goes one step further and studies the factors leading to corporate default for domestic and international SMEs of an emerging market. We focus on the distinction between the firms with international activities and the ones that do not have them because we obtain evidence from the previous literature that internationalization leads to either lower probability of corporate default thanks to diversification of cash flows or higher credit risk exposure to political and financial risks. In accord with this we provide evidence in this study that credit risk attributes of domestic firms differ from those of international firms. Put differently, these two groups of firms must be evaluated separately for the consideration of the default probabilities of each group of firms.

We study 1,166 SMEs for the year 2007, therefore our data is not only very rich in quantity but also timely. The sample is obtained from *ATO* and from this institution we also acquired the identity of the default firms in the year 2008. We use binary logistic regression methodology for our estimations in which dependent variable is a binary one taking the value of one if the firm is default and zero otherwise.

Our estimations show that trade credits and corporate tax rate are positively related to the likelihood of being a default firm. Moreover, confirming the pecking order hypothesis, we also find a positive relationship between the ratio of financial expenses to total assets and the probability of credit risks. The most interesting outcome of our results for the domestic firms is, while the gross profit margin is negatively related to the likelihood of corporate default, the relationship turns positive for the net profit margin. Therefore we deduce that the domestic firms refraining from their core activities for profit generation purposes are highly likely to end up being default.

Our results for the international firms reveal that there is a positive relationship between the ratio of inventories to total assets and the likelihood of corporate default. Finally, both the net profit, measured as the ratio of earnings after interest and tax to total assets, and the ratio of net sales to total assets are found to be negatively associated with the likelihood of credit risks for international firms. To conclude, off-the-record transactions are found to be playing an indirectly significant role in escalating the credit risks of both the domestic and international SMEs.

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