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## Article

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RESEARCH

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# Credit rationing's determinants of Small and Medium Enterprises (SMEs) in Chittagong, Bangladesh

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## Abstract

Small and medium enterprises (SMEs) contribute immensely to Gross Domestic Product (GDP) and they have a significant influence in growth of economy. However, SMEs are constrained in their access to formal credit as financial institutions fail to grant credit due to information asymmetry. This study investigates the credit rationing of SMEs in the city of Chittagong. A sample of 200 firms was selected and analyzed using descriptive statistics and multinomial logit regression. The result suggests that 89 % of the firms obtained loan from microfinance institutions (MFIs). The firms that obtained their loan from banks are 60 % and 48 % of them received the less amount of credit than they desired. In our study, credit rationing was categorized in four types, 24 % of them were unconstrained non-borrowers, 28 % unconstrained borrowers, 19 % quantity rationed and 29 % risk rationed borrowers. Econometrics result shows that education, firm age, marital status, initial outlay, number of employees, and education do not have any impact on credit rationing. On the contrary, age and gender of the owners of the firms, heads of household, status of the living and work place and household size have impact on credit rationing.

**Keywords:** Credit rationing, Small and medium enterprises, Entrepreneur, Financial institutions, Chittagong, Bangladesh

## Background

Small and Medium Enterprises (SMEs) are a fundamental part of the economic structure in developing countries as they play a vital role in furthering growth, innovation and prosperity (Dalberg 2011). As a developing country, the role of SMEs is crucial for overall economic development in Bangladesh. To promote economic development and growth, Bangladesh government has emphasized the rapid growth of SMEs. The motivation behind this weight is that SMEs have a significant role in employment generation, poverty reduction, and overall economic growth, especially for a developing economy like Bangladesh (Akterujjaman 2010). In the process of SME sector development, financing is an important topic for research and an issue of great importance to the policymakers. Nowadays, credit programs for financing have been given due attention by donors and governments (Bigsten et al. 2003). This is due to the fact that credit markets are not functioning well in many developing countries. SMEs in developing countries have limited access to formal financial services due to the lack of collateral

and relatively high transaction cost for small loans (Doan et al. 2010). Yet, the majority of SMEs in developing countries are considered unworthy by formal Financial Institutions (FIs). Moreover, SMEs are strongly restricted in accessing the capital that they require for growth and expansion. Evidence shows that nearly half of SMEs in developing countries' access to finance is a major problem (Dalberg 2011). Therefore, improving the availability of credit facility is the key to the development of SMEs in developing countries and thereby realizing the potential contribution to the economy.

In particular, SMEs provide the necessary foundations for sustained growth and rising income in the less developed and transitional economies. A World Bank survey (2002) on the development of SMEs in Bangladesh reports that lack of finance is the crucial issue. In addition, Report on Contribution of Banks on SME Sector in Bangladesh asserts that SMEs have always been short of business support and regulatory and financial assistance. Mahmud (2006) found that SMEs of Bangladesh have very limited bank finance, which is only around 10 %, while self-finance remains the major source of their finance contributing 76.5 % of fixed capital and 51.8 % of working capital. In most of the cases, businesses started using own savings and borrowing from friends and relatives while banking source come after that. For SMEs, to build up fixed and working capital from banks is difficult since banks are not so willing to provide a loan of small size for the higher cost. Generally, the commercial banks provide credit only to the well established and large scale trading and manufacturing customers because it is easy to handle and convenient to support them. In spite of these difficulties, currently SME sector contributes about 25 % to GDP in Bangladesh economy (Ministry of Finance (MoF) 2012). Experts suggest that this rate has to be enhanced to at least 50 % for helping Bangladesh economy to achieve a sustainable mid-income country status.<sup>1</sup> Evidence also shows that one of the main reasons for the SMEs modest contribution to GDP and slow growth and development in Bangladesh is their credit constraints<sup>2</sup> (The Center for International Private Enterprise (CIPE) and US 2003).

Bangladesh government has taken various initiatives to develop SMEs in Bangladesh and to solve their financing problems. An SME cell was created in 2003 in the Ministry of Industries. The SME Foundation (SMEF), established in 2007, is an independent body for looking after the SME sectors in Bangladesh. In addition, various government organizations including specialized banks are engaged in providing credit to the SME sector. A specialized bank named BASIC Bank Limited (Bangladesh Small Industries and Commerce Bank Limited) was established in 1988 with the foremost objective of financing the small and cottage industries. Furthermore, Central Bank of Bangladesh has taken a good number of initiatives to promote SMEs lending and is committed to facilitating SMEs credit through refinancing window for real entrepreneurs who are directly involved in the SME sector. Parvin et al. (2012) found that the share of SMEs in total loan is lower in Bangladesh. Therefore, inadequate funding still remains a constraint for SMEs to grow in Bangladesh.

Credit constraint by formal financial institutions stifles the growth of SMEs. To fill the gap, in some developing countries, informal financial institutions have become successful in meeting the credit demand by SMEs. However, due to their limited resources they are restricted from effectively satisfying the credit needs of SMEs (Atieno 2001). SMEs are increasing in number and size, and the loan they demand has become beyond the capacity of informal financial institutions. Despite financing being a major factor

for potential growth of SMEs, several reports by researchers and consultants have showed that SMEs face credit constraints. During credit constraints, SMEs may not be able to invest, despite their willingness to invest unless they have an available internal source of finance. Hoassain (1998)) has reported in his research that the most critical constraint of small and medium scale manufacturers in Bangladesh is the lack of sufficient capital to operate the business. As a result, the economy lose some of the potential benefits of promising projects and the constraint of credits and credit constrained firms cannot contribute to employment generation and poverty alleviation. Therefore, understanding the factors that are responsible for credit constrains of SMEs is important. Thus, this study will identify the determinants of credit constraints and will suggest policy issues that might help to minimize the credit constraints of SMEs.

### **Research objective and questions**

The objective of the study is to help minimize the credit constraints of SMEs by investigating the determinants of credit rationing. Therefore, General Research Question (GRQ) to achieve the objective is: How do we investigate the determinants of credit rationing of SMEs? In doing so, it is also aimed at investigating the characteristics of SMEs and SME owners, the major source of credit for SMEs and identifying policy issues to enhance access to credit by SMEs. To achieve the above objectives, the study has answered the following Specific Research Questions (SRQ); SRQ1: What are the characteristics of SMEs in the study area? SRQ2: What are the major sources of credit for SMEs? SRQ3: What factors influence credit rationing of SMEs? SRQ4: What issues help to minimize the credit constraints and formulate effective credit policy of SMEs?

SMEs in both developed and developing countries greatly contribute to the creation of employment opportunities, and income generation. They are also known as sources of livelihood and as means of fighting poverty. SMEs have been treated as having higher potential for GDP growth to Bangladesh economy as well. However in most developing countries including Bangladesh SMEs have been facing problems of accessing credit due to limitations of credit market. The limitations in the credit market and the problem of asymmetric information have been leading to credit constraint also. Therefore, this study will try to investigate the major determinants of credit constraints that exist and are relevant to SMEs located in the business hub of Bangladesh (Chittagong). The findings from this study will feed into the policy arena in terms of improving access to formal credit markets and realization of the goals for the central bank of Bangladesh.

This paper is organized into five sections. Section one includes introduction, statement of the problem, objectives, research questions and significance of the study. The second section deals with the theoretical framework with the review of relevant literature of the study. Section three discusses data and methods including study area. Section four covers the results and discussion and the final section (five) includes a conclusion.

### **Theory**

SME and Special Programs Department of Bangladesh Bank defines Small and Medium Enterprise as the business firm of service, business and industrial sector which is not a public limited company and rationed with its fixed assets other than land and building

(not above BDT<sup>3</sup> 200 million) and has limited employed manpower (not above 150). For the development of SME sectors, access to finance is vital. As SME entrepreneurs raise complain in many cases for the high rate of interest, Bangladesh Bank is committed to ease SME finance. SME finance is the funding of enterprises which represents a key function of the business finance market. The major functions of this market are supplying, acquiring and pricing of capital for SMEs. Generally, the business finance market supplies capital in the form of loan, credit and asset-based financing; say, factoring or invoice discounting and an enterprise can borrow fund in the form of bank loans from formal and informal financial institutions (FIs) to operate its business. A business finance market or credit market can be imperfect for asymmetric information that leads to credit rationing of a business. Asymmetric information makes credit market costly and difficult for banks to obtain correct information of borrowers (Stiglitz and Weiss 1981). In Bangladesh, we may classify the credit market into two ways, like rural and urban. A sizable part of the rural credit market is informal involving lending generally at the short term that includes traditional non-institutional ways of accumulating and extending capital. The major sources of informal lending are friends, relatives and kin members, landlords, neighbors, shopkeepers, marketing intermediaries, money lenders and other local income groups.

The term credit market is used to describe the place where investors with surplus capital provide their surplus capital to those who are in need of capital. This may be done directly, such as a person borrowing from a friend or relative or financial intermediaries such as banks, mutual funds, insurance companies may facilitate this process. The urban credit market has two components: money market, and capital market. Evidence shows that for the SME financing, money market or short-term financing is more appropriate. The main sources of short-term financing in Bangladesh are trade credit; bank credit; loans from NGOs; accruals; commercial paper and factoring. But all SMEs don't have access to credit market for various constraints. An SME is credit constrained or rationed if its terms of access to the credit market imply that it is unable or unwilling to exploit some socially profitable investment.

Credit rationing may be investigated at two stages: the first stage is loan quantity rationing and the second stage is loan size rationing. In the first stage, credit is granted to a group or an individual who is selected as creditworthy borrower while others are rejected as unworthy borrowers. In the second stage, borrowers get a smaller amount of loan than they desire (Baydas et al. 1994). Boucher et al. (2009) found five categories of borrowers in credit market: a) unconstrained borrowers or price rationed borrowers, b) unconstrained non-borrowers or price rationed non-borrowers, c) quantity rationed borrowers, d) risk rationed borrowers, and e) transaction cost rationed borrowers Table 1. In nature, unconstrained borrowers are not affected with credit limit by FIs. On the other hand, unconstrained non-borrowers are not interested in FIs loan although they are not affected by the credit limit. Again, the following three types of rationed borrower: quantity, risk, and transactional cost are non-price rationed borrowers (Boucher et al. 2009). The borrowers who apply to FIs for a loan but obtain either lower amount of loan than they desire or rejected are quantity rationed borrowers. Finally, the borrowers who voluntarily withdraw themselves from the credit market due to the risk associated with collateral and high transaction cost of the loan are risk and transaction cost rationed borrowers. If an SME faces any of these three aforesaid forms of non-price

rationed is considered as credit constrained borrower. Mostly, If SMEs are able to provide collateral; FIs allow credit even if uncertainty involves the firms in the credit arrangement.

The model DEM proposed by Boucher et al. (2009)) to classify subjects according to their status in credit market. In our case, we have used the DEM and distinguish four categories<sup>4</sup> of borrowers; price rationed borrowers (unconstrained borrowers), price rationed non-borrowers (unconstrained non-borrowers), quantity rationed, and risk rationed and transaction cost rationed. In the operationalization process, first we have identified SMEs under two categories that have applied for loan and those who have not. Then we have defined SMEs as constrained and unconstrained borrowers based on firms' characteristics in relation to credit market (Boucher et al. 2009). Again, a borrower can be constrained either for supply constraint or demand constraint. Supply side constrained or quantity rationed occurs if firms face an obligatory credit limit by FIs. However, if firms do not face a binding credit limit by FIs, it is called demand side constrained. When firms are not affected by credit limit, these SMEs are the unconstrained borrower. The DEM helps to get additional information on the credit market perceptions toward non-borrowers. This approach can help assess constraint status and acquire knowledge why some firms are chosen not to borrow even though these firms believe that they can qualify for a loan (Boucher et al. 2009). The DEM also helps to identify borrowers who have not applied for loan by asking qualitative questions (Boucher et al. 2009). Based on responses (as we did not find transaction cost rationed borrowers in the survey) we have classified SMEs into four credit rationing categories.

In a credit agreement, collateral is a borrower's pledge of a property to lenders that use to secure repayment of the loan. FIs closely monitor the value of an asset held as collateral and the value of collateral offered by the borrower may affect the credit rationing behavior of lenders. The availability of collateral can reduce the asymmetric information between borrowers and lenders (Chan and Kanatas 1985). Collateral can also solve the problems that arise due to the cost of monitoring of borrowers behavior and this cost depends on entrepreneur characteristics.

Entrepreneur characteristics like age, gender and education have an impact on credit constraints. Education can help the entrepreneur to improve skills with the financial market and prepare a good business plan. Therefore, educated entrepreneurs should have a low level of credit constraints. A study in Indonesia reveals that the number of women entrepreneur in SME is relatively low due to mainly low level of education, lack of training opportunities, and heavy household responsibilities (Tambunan 2011). Another study carried out in Nigeria reports that female entrepreneurs are constrained in credit due to their weak financial position and the lack of collateral. Yet in many countries, firms face difficulties in the credit market for the biases of entrepreneurs and characteristics of the firms.

Firm's characteristics such as firm age and size are the main factors in determining the credit rationing. In general, firm age is considered as a key indicator of a firm's quality since its longevity is an indication of survival ability, quality management and increased positive image (Diamond 1991). In the credit market, FIs do not prefer young firms as borrower because information asymmetry between financial institutions and young firms is more critical as banks do not have enough time to monitor such type of firms. Moreover, the young firms have relatively less opportunity to build up a good



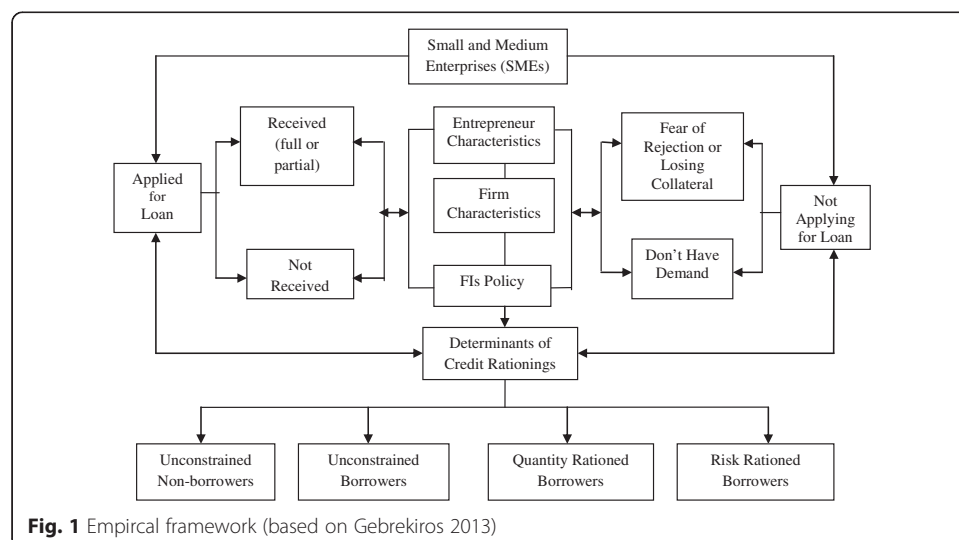
relationship with fund suppliers. An empirical study from Dunkelberg (1998) shows that due to less reputation and credit constraint, the information asymmetries of young firms are growing. To assess the creditworthiness, young firms are in difficult position for their poor image and goodwill. In addition, young firms have the high probability to be the default for high supervision cost and lower collateral values (Boocock and Woods 1997). Thus, relatively the new and younger firms use fewer FIs's loan than older firms (Nichter and Goldmark 2009) due to fear of losing their collateral or they have enough fund.

In the study, the dependent variable is 'credit rationing' and it has four categories: unconstrained non-borrowers, unconstrained borrowers, quantity rationed borrowers and risk rationed borrowers. Evidence shows that credit is rationing to SMEs due to entrepreneur characteristics, firm characteristics and institutional factors. Financial institutions' credit rationing behaviour theoretically is influenced by different factors such as age, gender, wealth, experience and credit history, interest rate, firm age, collateral, loan duration and amount of loan (Okurut et al. 2012). Entrepreneur characteristics include variables such as the age of the entrepreneur, gender, family size, the number of dependents, education and collateral. Enterprise characteristics include firm age, initial investment and working place. Lastly, the core concept of the paper has depicted as the empirical framework (Fig. 1).

SMEs located in Chittagong, some have applied to formal FIs and others did not apply because of their natures and demands. Firms that applied for a loan, all were not received the loan from FIs. A few SMEs have received the loan and others were totally rejected as they did not satisfy the requirements set by the FIs. Again, some SMEs have received the lower amount than the expected one. Finally, several SMEs were not applying either for the fear of rejection or losing collateral or they don't have demand.

## Methods

This study is based on Chittagong urban area. Chittagong is the central port and the commercial and manufacturing center of Bangladesh. In trying to answer the research question posed by the study, different methodological tools were used in the analysis.



Primary data were collected from the study area. A sample of 200 SMEs was selected for the study. The questionnaire was translated into Bengali. This Bengali version of the questionnaire was submitted to the entrepreneurs for better understanding and to get the real insights. The secondary data sources have included the published research paper, working papers, institutional report, magazines about SMEs and credit about Bangladesh and developing economies. The data are collected by employing the structured questionnaire administered by enumerators in association with the researchers on various socio-economic characteristics of the SMEs and credit rationing of SMEs.

In order to meet the objective of the study, the SMEs were sampled from different sub-sectors such as service, urban agriculture, manufacturing, and trade. To collect a representative sample, a stratified and clustered random sampling procedure was employed. More specifically, the city's four areas like Agrabad (Commercial Area), Nasirabad (Industrial Area), Khatungonj and Chaktai (Wholesale Area), and Hali Shahor (Retail and Residential Area) were considered as clusters, with further stratification within each area using SMEs key characteristics were assessed in the field. The criteria considered when selecting the area of the study were firm's economic status (income): which are high, medium and low income; location and size of the firm (capital and the number of workers). In stratifying the firms based on income, the convenient procedure used was to select firms based on traditional measurement of wealth: location and size of the business center. The questionnaire interview was administered from a total of 200 SMEs sampled from the city of Chittagong and the fieldwork was carried out during the period from October 04, 2014 to October 14, 2014. Of course before the final version of the survey, a pre-test survey was conducted in the same city. Respondents older than the age of 18 and who is the owner of the enterprise was chosen for the interview. Each interview on an average took 20 min. The questionnaire consists of four sections. Section one covers basic information about entrepreneur characteristics, section two includes questions dealing with firm characteristics and section three includes questions dealing with firms' source of finances, that is, whether they get loan from formal financial institutions (FIs) or informal institutions. The last section is about the general question. It deals with the difficulties they faced during loan application process.

In trying to answer the research question posed by the study and analyzing the data with SPSS software, we used descriptive statistics and multinomial logistic regression. Descriptive statistical tools were used to study SMEs characteristics and their major

**Table 1** Shows detail of the response of borrowers and their corresponding category

Responses	Constrained category
I have enough money	
I don't have physical project that repaid the loan	Unconstrained non-borrowers
I have received the amount that I desired from formal FIs	Unconstrained borrowers
I received loan from formal FIs but less than I desired	Quantity rationed borrowers
I applied for a loan to formal financial institutions but rejected	
I did not want to take risk of my collateral	Risk rationed borrowers
I did not apply because I was afraid to manage everything	
Formal FIs are strict to sanction loan	

Source: Boucher et al. 2009



source of finance. This analysis is intended to provide some insights into the importance of various characteristics and socio-economic factors related to credit with SMEs performance and growth. Discussion of the theoretical framework and methodology has laid a foundation for the discussion of descriptive statistics and empirical analyzes. The descriptive statistics present the characteristics of SMEs and the major sources of their financing. These statistics includes mean, standard deviation, minimum, and maximum values which were used to compare SMEs and the regression model has been used to find out the determinants of credit rationing of SMEs.

## Results and discussion

### Entrepreneurs' socioeconomic and firms characteristics

Table 2 shows a difference in mean between firms that applied for loan and those didn't apply from formal financial institutions. It also shows entrepreneurs' socio-economic characteristics. The variables age, education, household size are significant to apply for the loan from formal financial institutions. In this case, there is no difference between those entrepreneurs that applied and did not apply for the loan. In our study, the sampled firms comprises various age groups ranging from 23 to 62 years and the average age of the entrepreneurs is 39-year-old. The average education level (year of schooling) of the entrepreneurs is 12. The average household size is 6 for joint family structure. As we can see in (Appendix 1) the discrete variables, out of the total firms applied for loan from formal financial institutions most are male. There is no significant difference in gender in terms of applying or not. Most of the applicants are head of household and this is a significant indicator in terms of applying for loan. Most of the firm owners are married. Average age of the firms or experience of doing business is 10 years and the average initial capital of the firms is 0.6 million Bangladeshi Taka where 64 % of the total firms are working in the rental house (Appendix 1, Table 6).

### Application for credit

A total of 200 SMEs were successfully interviewed from the city of Chittagong. As Table 7 (Appendix 2) shows, out of the total 200 SMEs, 55.5 % applied for the loan from formal financial institutions within the last three years and 44.5 % did not apply. This implies that the majority of the firms applied for the loan due to different reasons. Some of the firms did not want loan. Either they had enough money or they feared to lose their collateral. Again, the majority (51 %) of the SMEs applied for the loan from banks and only 4.5 % SMEs applied for the loan from Micro Financial Institutions (MFIs).

**Table 2** Entrepreneurs socioeconomic characteristics

Applied, N = 111			Not applied, N = 89		Significance of differences T-value	Total, N = 200		
Characteristics	Mean	St. Dev	Mean	St. Dev		T-value	Mean	St. Dev
Age	38.90	8.024	39.26	8.79	22.55*	65.79*	38.89	8.36
Education	13.22	3.13	12.64	3.49	24.47*	55.05*	12.96	3.30
HH size	6.43	2.90	7.46	3.06	20.34*	32.11*	6.89	3.01

\* 1 % level of significant. Source: Own Survey, 2014

As Table 8 (Appendix 3) shows out of the total 111 firms that applied for the loan from formal financial institutions, almost all of them got credit. Firms that applied but were rejected are few in number. This implies that the majority of the firms that applied for the loan from formal financial institutions, either from bank or MFIs got the loan. Having said this, out of the total 96 firms that applied and received, above average of the firms got in full amount and small number of the firms did not get the full amount. This implies the highest shares of firms were unconstrained borrowers and not restricted by the credit limit.

As mentioned above out of the total 111 firms that applied for the loan, most of them received credit from the formal financial institution. Table 9 (Appendix 4) shows that the higher number of firms applied for the loan for the purpose of their business expansion, of course, few firms were applied for the purpose of starting new business. Therefore, the motive of loan for business expansion means that the loan was mainly used for income generation activities. Most firms financed their business from own savings, friends or family and banks. A few firms also financed their business from MFIs, Credit Organizations, and Money Lenders (Table 10, Appendix 5). This implies that the major source of finance for SMEs are friends and family as many of the small firms do not have collateral that can be provided for banks and also they do not meet the requirements that are set by banks. In short, the major sources of finance for SMEs in Chittagong were from formal FIs, mainly banks. The number of firms that were financed from their own saving was also large. The share of informal institutions in this case family or friends, money lenders and credit organization or cooperative society that financed for SMEs was also huge. This indicates that informal institutions are also greatly contributing to the development of SMEs and creating employment opportunities.

#### Distribution of credit constraints

Table 11 (Appendix 6) presents credit rationing status for sampled 200 SMEs. Out of the total 200 SMEs, 24 % of the SMEs were unconstrained non-borrowers, 28 % of them unconstrained borrowers, 19 % of them quantity rationed and 29 % of them risk rationed borrowers. In the study, 29 % of the samples are risk rationed borrower that reports either firms are rejected from formal FIs or did not apply for the loan, because, either they have enough money to run their business or the firms were not as such promising or the firms did not have enough market to pay back the loan or they are highly risk averse. The unconstrained borrowers mean those firms that applied and received the amount they desired. Quantity rationed firms were those firms that applied for the loan and got less credit than they desired.

As Table 3 below shows trading is the highest share and they engaged mainly in local wholesalers, retailers, input suppliers and international trade. Out of the total firms that

**Table 3** Cross tabulation between sector and credit constraints

Rationed category	Trading	Manufacturing	Services	Agricultural	Total
Unconstrained borrowers	42	00	11	03	56
Unconstrained Non-borrowers	38	06	02	03	49
Quantity rationed	28	03	06	00	37
Risk rationed	46	04	04	03	57
Total	154	13	23	09	199

Source: Own Survey, 2014

engaged in trading, most of them were risk rationed borrowers. Service is the second highest in our sample. The firms classified as services were local beauty parlor, boutique, salon and cybercafé. Here also most of the firms were unconstrained borrowers. Manufacturing is the third highest in our sample. The firms that are operating in manufacturing are timber work, metal work, handicrafts, goldsmith, and textile. Still, the higher share of the manufacturing firms is unconstrained non-borrowers and not found any unconstrained borrower in this sector. Urban agriculture share is small in comparison with the other sectors. We sampled only nine firms of urban agriculture since these sectors are not yet expanded and of course it might be categorized as medium and large scales since it demands huge capital to start. Of the total urban agriculture equal of them were unconstrained borrowers and non-borrowers and risk rationed borrowers.

In our study, we also assessed credit constrained with firms that had applied for loans in previous years. As a result 110 firms, they had applied for the loan and 89 firms they had not applied for the loan in previous years. As Table 12 (Appendix 7) shows out of the total firms that had applied with formal financial institutions, most of them (57 %) are risk rationed borrowers. This implies that most of the firm owners are not interested to receive the loan from credit market for collateral risk and fear of repayment. The number of firms that had applied in previous years is unconstrained borrowers which are also high. From the total firms that had not been experienced in previous years, most of them (49 %) are unconstrained non-borrowers. The share of quantity rationed borrower is also quite high in number.

#### **Reasons for not applying to formal FIs**

As above mentioned of the total firms in our study, 111 of them applied and 89 did not apply due to different reasons. They answered multiple reasons and majority of the firms (23.6 %) did not apply for the loan from formal FIs because the interest rate was high. 18.1 % of the firms also did not apply because of lack of collateral that can pledge to financial institutions. Some SMEs did not apply due to formal FIs are strict and some have enough money that can run for their business. Few firms were not also applying due to high application cost and don't not have any feasible project (Appendix 8).

#### **Reasons not to give loan by formal FIs**

SMEs from different sectors applied to formal FIs but failed to get a loan from different reasons. In the last three years 111 firms applied but 96 firms received a loan from FIs. Fifteen SMEs did not receive a loan from FIs and concerned FIs provided the list of reasons not to sanction the loan to SMEs. Table 16 (Appendix 11) shows that major (33 %) SMEs could not receive a loan for their risky business. For the lack of the sound financial statement, FIs did not give the loan to 28 % SMEs. 17 % of SMEs did not get a loan in the last three years for FIs' sector biases. Another mentionable ground not to give loan is the lack of proper collateral (14 %). Few SMEs (8.0 %) are rejected for the poor repayment history and the lack of personal guarantor.

#### **Sectors need to improve**

We asked the owner of SMEs to present some recommendations, based on their experiences, to improve the current credit policy of Formal FIs. 41 % of firm owners

recommend declining high-interest rate. Second highest, 26 % of SMEs faced problems in processing their loan application packs. So they urged to reduce the number of required documentation and the paper works. A major part of total firms (20 %) encountered the collateral problem and time constraints. So they suggest to be flexible in collateral and to develop a borrower-friendly repayment procedures. In fine, they (6.0 % owner of SMEs) recommend to offer and provide the long term loan.

#### **The association between the supply and demand side factors of SME's credit rationing**

To justify the reasons not to sanction loan given by FIs (section 4.5) and the suggestions given by SME owners about the areas that need to be improved by FIs (section 4.6), we asked some personnel of FIs<sup>5</sup> in the second phase with a structured questionnaire. In the first phase of data collection, SME owners mentioned several reasons for not giving loan by formal FIs - lack of sound financial statement, sector biases of FIs, lack of proper collateral, poor payment history, risks in business, and lack of personal guarantor. But the FIs do not agree wholly with all these reasons. From their point of view, some reasons for not giving loan to SMEs may possibly be the lack of proper financial statements and collateral, poor repayment history, sector biases and the lack of personal guarantee. In the year 2008, De la Torre and colleagues carried out a research on SME financing and they found that FIs dissuade a loan to SME owners for the opaqueness and informal environment of business, absence of the financial statement, lack of collateral, and information asymmetry. In the first stage of data collection, we also asked SME owners to give various suggestions based on their experiences in business financing to improve credit policy of FIs that can help SME owners to receive the loan from formal FIs. In reply, SME owners have recommended declining interest rate, reducing the number of required paper documents, flexibility in collateral and introducing a borrower-friendly repayment procedure. Subsequently, FIs also acknowledge aforesaid borrowers' recommendations.

Based on the result of cross analysis of supply and demand side of the SME loan constraints, through close observations on credit market and face to face interview with the credit officer of FIs, we found some additional problems regarding credit rationing. The Major problems for which FIs are less interested in providing SME loans are - less confidence in SME owners and risk of fund diversion despite central bank's pressure to provide more loans to SMEs. The key reason of less confidence in borrowers is because of hiding information about their purpose. Women entrepreneurs are applying for SME loan at lower interest rate, but users are male entrepreneurs. Furthermore, the borrowers do not use the whole amount in pursuing SME business for which the loan default rate in SME financing is higher than other sectors. It is also the main reason of not obtaining their desired amount from the FIs that they have applied for. According to FIs personals, if there is any possibility to divert the fund in unproductive sector, FIs become conservative in providing borrower's desired amount. In SME financing, a few lenders depend on the third party to sell and recover their classified loan. On the contrary, some banks are managing credit functions by their own resources. Major FIs are biased on manufacturing and agricultural business and there are no flat interest rates and uniform individual bank credit policy on SME financing. The NGOs charged relatively higher (27 %) interest rate that may lead to increase the credit constraints and

the ultimate result is either rejection or getting lower amount than the desired one. FIs state that collateral, historical repayments, the market reputation of the clients, and personal guarantor are more important to obtain the desired amount of loan from FIs.

### Regression analysis

Before running a model, in our case the multinomial logit, explanatory variables were checked for multicollinearity (Verbeek 2008). Multicollinearity is a problem when the explanatory variables in multiples regression model are highly correlated and provide irrelevant information about the response. The existence of multicollinearity in the model may cause large variance, large t-value, and ambiguous results. Two popular methods to detect the presence of multicollinearity are Variance Inflation Factor (VIF) and Tolerance (TOL). A common rule of thumb is that if VIF is 10 or greater and a TOL of 0.10 or less may indicate the presence of multicollinearity. So our result is free from multicollinearity problem (See Appendix 15).

The software SPSS, 20 version is used to estimate the parameter coefficients and predicted the marginal effect. The direct interpretation of the coefficient estimated from multinomial logit model is deceptive. Therefore, the marginal effect is used to explain the determinants of variables on credit rationing. The interpretation of the parameter estimated from a multinomial logit is explained with respect to the baseline scenario specified, the output of three different categories can be outlined (Appendix 13). This means that each of the credit rationing categories can act a base case with the reference to risk rationed borrowers and allow interpretation of the coefficients in terms of the base case. The dependent variable, credit rationing has four categories: 1 = unconstrained non-borrowers, 2 = unconstrained borrowers, 3 = quantity rationed borrowers and 4 = risk rationed borrowers (reference case). The result of the marginal effect is shown in the following Table 4.

The main objective of this study is to investigate the determinants of credit rationing in small and medium enterprise. To begin with, age category 1 and 2 (1 = 23 to 30 years and 2 = 31 to 40 years) has a negative significant impact on being quantity rationed borrower. As the age of the younger firm's owner increases the probability<sup>6</sup> (8 % for the age group 1 and 19 % for the age group-2) of being quantity rationed borrower decreases in comparison to the reference group. This implies that financial institutions like to extend the loan to the middle aged group than the younger. As our data shows, the average age of the sample is 39 years old, this is believed to be the most economically active and expecting to make a profit and repay their loan. In the second order, head of household (category 0 = no) has a positive significant effect on being quantity rationed borrower. This indicates that firm owners who are not the head of household have 93 % probability to get the lower amount of credit than expected from Financial Institutions.

Firm age category 1 (1 to 5 years) has a positive significant effect on being quantity rationed borrower. This implies that more inexperience in doing business increases the probability of being quantity rationed borrowers. Firm owners who have 1 to 5 years experiences in business, 89 % probability support that they will be quantity rationed borrower. In case of living place, category 1 (own house) has a negative significant impact on being unconstrained borrower and quantity rationed borrowers. Entrepreneurs

**Table 4** Marginal effect estimation after multinomial logit regression

Variables	Unconstrained borrowers	Unconstrained non-borrowers	Quantity rationed borrowers
Age of the Owner	1 = .13 (.801)	1 = .071 (.760)	1 = -2.42 (1.187)**
	2 = .15 (.602)	2 = -.09 (.604)	2 = -1.46 (.856)***
	3 = -.54 (.768)	3 = -.461 (.757)	3 = .25 (.895)
Gender	0 = .001 (1.002)	0 = 1.09 (.920)	0 = -1.47 (1.193)
Married	0 = -.47 (.905)	0 = .38 (.800)	0 = 1.31 (.978)
Head of HH	0 = .38 (.712)	0 = -.12 (.689)	0 = 2.62 (.949)*
Education	1 = .20 (.556)	1 = -.19 (.542)	1 = -.59 (.730)
	2 = .18 (.549)	2 = -.23 (.538)	2 = -.72 (.729)
Firm age	1 = -.58 (.782)	1 = -.73 (.744)	1 = 2.07 (1.180)***
	2 = .14 (.699)	2 = -.37 (.670)	2 = 1.47 (1.096)
	3 = 1.02 (.776)	3 = .45 (.747)	3 = 1.60 (1.243)
Initial outlay	1 = -.111 (.592)	1 = -.32 (.563)	1 = .12 (.713)
	2 = .64 (.564)	2 = .27 (.575)	2 = -.33 (.772)
Housing	1 = -1.19 (.499)*	1 = 1.10 (.471)	1 = -1.38 (.638)**
Number of employee	1 = -.77 (.671)	1 = -.21 (.663)	1 = -2.34 (.834)*
	2 = .05 (.632)	2 = -.09 (.643)	2 = -1.46 (.773)**
Work Place	1 = .823 (.477)	1 = 1.10 (.471)*	1 = -.52 (.657)
Size of the family	1 = .68 (.800)	1 = -.33 (.777)	1 = 3.58 (1.285)*
	2 = 1.23 (.718)*	2 = .10 (.673)	2 = 2.90 (1.146)***
	3 = .53 (.774)	3 = .48 (.687)	3 = 1.74 (1.321)

N = 200, Standard error is in parenthesis, \* 1 % significant level, \*\* 5 % significant level, \*\*\* 10 % significant level. The reference category is: risk rationing. Pseudo R<sup>2</sup> = 0.432

Source: Own Survey, 2014

who are living in their own dwelling place, 77 % probability supports that they will not be the unconstrained borrower. Anyway, the own house can reduce 20 % probability of being unconstrained. This implies ownership of house of an entrepreneur can't be only guaranteed to be unconstrained borrower; other factors like education, initial investment, marital status, the number of the employee also influence to be an unconstrained borrower. Number of employee, category 1 and 2 (1 to 8 in number) has a negative significant effect on quantity rationed borrower. As the number of the employee of a firm increases the probability (9 % for group-1 and 19 % for group-2) of being quantity rationed borrower decreases. This implies that efficient firms need more employees and have the better opportunity to earn more. This earning capacity makes them capable to repay the loan. So, they can receive their desired loan amount from FIs.

In the second last order, we see that workplace category 1 (factory owners) has a positive significant impact on being unconstrained non-borrower. As the ownership of workplace increases the probability (75 %) of being unconstrained non-borrower also increases. This implies that entrepreneur who has own factory or office doesn't need a further loan from financial institutions. A possible reason can be that they have enough money or they don't have feasible projects to pay back the loan amount. The final stage shows that the category 1 and the category 2 of the family size have a positive significant effect on quantity rationed borrower. As the family size (family member 0 to 7) increases the probability (97 % for category 1 and 95 % for category 2) of being quantity rationed borrower increases. A possible reason can be on an average those who have



more family members will have higher consumption. The income they get from their firm may also be allocated for consumption. Through time, the firm will be in economic distress and finally they will not receive their desired amount of loan from FIs.

The first point of discussion is related to the data set and strategic sample of the study. The internal validity is ensured by making use of the formulation of the research framework and data sources. The DEM clearly defines and categorizes the dependent variables examined by this study and the supply sides' (FIs) entrepreneurial initiatives have tradeoff with the recommendations given by the demand side (SME owners). Moreover, the conservative manner of entrepreneurs to disclose the relevant information is another barrier to get the real insights. A second point of discussion is the consideration of the time value of money of initial investment. One who had established his business 50 years ago with only BDT five thousand initial outlay, needs at least BDT one million to establish the same venture. So the impact of the initial investment of old and new firms on credit rationing is irrelevant. The final point of discussion is that the survey has been made only in the Chittagong city. It may reduce external validity, but descriptive analysis, the association between the supply and demand side factors of SME's credit rationing and statistically significant results can ensure reliability. However, the study will create an avenue to entrepreneurship development and will contribute to reducing credit constraints of SMEs in the developing countries like Bangladesh.

## Conclusion

This paper examines the determinants of credit rationing of SMEs. A field survey was conducted and a total of 200 SMEs were randomly selected from the city and interviewed with the structured questionnaire. To answer the research questions posted by the researchers both descriptive and econometrics method of analyses were used. The main research questions answered by the researchers are as follows: What are the characteristics of SME owners and SMEs? The average age of firm owners is 39 years of old, 90 % of the firms are owned by male and 10 % of them by female entrepreneurs, 87 % of the firm's owners are married and the average years of schooling is 12. On the other hand, average age of firms is 10 years and the average initial outlay of the firms are BDT six lacs (0.6 million) where 64 % of total firms are doing their business in the rental house. What are the major sources of finance? The major sources of finance for SMEs are friends and family (33 %), 32 % from their own savings, 21.5 % from banks, 5 % from loan organizations, 4 % from MFIs, 2 % from money lenders and 2.5 % from selling assets. This shows the majority of the SMEs is financed from informal sources; of course, the share of formal financial institutions is also high.

The third and most important question was the determinants of credit rationing of SMEs. Out of the sampled 200 SMEs, 111 of them applied for loan and 89 did not apply for the loan from formal FIs. Descriptive statistics was used to examine the credit rationing category's firms. 111 firms applied for the loan, out of total 96 received loan and 15 of them were rejected. Again, out of the 96 firms 50 received full amount applied for but 46 of the firms received less than the amount requested. Firms received lesser amounts than desired for their risky ventures (33 %), lack of sound financial statement (28 %), business sector bias (17 %) and lack of collateral (14 %). Using DEM, we also categorize firms based on their response to a qualitative question. So as per DEM, 25 % of the firms were unconstrained non-borrowers, 28 % unconstrained

borrowers, 19 % quantity rationed borrowers and 28 % risk rationed borrowers. After DEM, we employed multinomial logit regression to see the determinants of credit ration of SMEs. The result shows that education, firm age, marital status, initial outlay, the number of employees and education do not have any impact on credit rationing. Age and gender of the owners of the firms, the status of the house, heads of household, workplace and household size have the impact on credit rationing. From the discussion in our study, the issues that we raised in terms of policy from the descriptive results and cross analysis are: interest rate, application cost, the number of paper documents, rigid rules and regulations, loan disbursement procedure, loan amount and duration, collateral, financial statement, project feasibility, risk management techniques and irretrievable risky business.

## Endnotes

<sup>1</sup>Millennium Development Goals (MDG).

<sup>2</sup>Evidences show that credit constraints are evolved from the supply side (sources) and the demand side (SMEs).

<sup>3</sup>BDT stands for Bangladeshi Taka indicating Bangladeshi currency.

<sup>4</sup>In our study, we do not have any transaction cost rationed borrower therefore, we consider four types of credit constrained.

<sup>5</sup>Banks and NGOs those reject SME owners in sanctioning loan or providing fewer amounts than they desired.

<sup>6</sup>Probability =  $\exp(B)/[1 + \exp(B)]$

## Appendix 1

**Table 5** Entrepreneurs socioeconomic characteristics of discrete variable

Characteristics	Applied for loan, <i>N</i> = 111	Not applied for loan, <i>N</i> = 89	Chi square
Gender	Male 99 and female 12	Male 81 and female 8	0.182
House Hold Head (HHH)	110 (72 HHH and 38 non HHH)	88 (14 non HHH, 74 HHH)	8.768 <sup>a</sup>
Marital Status	111 (18 non married, 93 married)	89 (9 non married, 80 married)	2.48

<sup>a</sup> 5 % level of significant, Source: Own Survey, 2014

**Table 6** Characteristics of the firms

Particulars	Frequency	Mean/Percentage	Std. deviation/Percentage
Age of the firms	200	9.85	6.89
Initial outlay of the firm	198	597,111.111	601224.67
Status of work place	200	36 % own	64 % rented

Source: Own Survey, 2014

## Appendix 2

**Table 7** Firms applied for loan

Loan received formal	Frequency	Percentage	Cumulative
No	89	44.5	44.5
Yes	111	55.5	100
Total	200	100	

Source: Own Survey, 2014

## Appendix 3

**Table 8** Firms applied for loan and received

Loan received formal	Frequency	Percentage	Cumulative
No	15	13.5	13.5
Yes	96	86.5	100
Total	111	100	

Source: Own Survey, 2014

## Appendix 4

**Table 9** Purpose of the loan

Purpose of the loan	Frequency	Percentage	Cumulative
Expansion	80	72.7	72.7
Start of business	30	27.3	100
Total	110	100	

Source: Own Survey, 2014

## Appendix 5

**Table 10** Source of finance

Sources of finance	Frequency	Percentage	Cumulative
Bank	78	21.5	21.5
MFIs	14	3.9	25.4
Money Lender	8	2.2	27.6
Own saving	115	31.8	59.4
Friends/Family	121	33.4	92.8
Credit Organisation	18	5.0	97.8
Others	8	2.2	100
Total	362	100	

Source: Own Survey, 2014

## Appendix 6

**Table 11** Distribution of credit constrained

Credit rationed category	Frequency	Percentage	Cumulative
Unconstrained borrowers	56	28.1	28.1
Unconstrained non-borrowers	49	24.6	52.8
Quantity rationing	37	18.6	71.4
Risk rationing	57	28.6	100
Total	199	100	

Source: Own Survey, 2014

## Appendix 7

**Table 12** Cross tabulation between credit constraints with experience

Ration category	Experience (Firms applied in previous years)		
	No	Yes	Total
Unconstrained borrowers	01	55	56
Unconstrained Non-borrowers	48	01	49
Quantity rationed	00	37	37
Risk rationed	40	17	57
Total	89	110	199

Source: Own Survey, 2014

## Appendix 8

**Table 13** Frequencies not to apply to formal FIs

Why not apply formal institutions	Frequency (Responses, N = 87)	Percentage	Cumulative
Loan was not needed	29	14.6	14.6
Have enough money	18	9.0	23.6
Don't want risk collateral	36	18.1	41.7
Formal institution too strict	34	17.1	58.8
Interest rate is high	47	23.6	82.4
High application cost	12	6	88.4
No feasible project	04	2	90.4
Fear of repayment	16	8	98.4
Other reasons	03	1.5	100
Total	199 times	100	

Source: Own Survey, 2014

## Appendix 9

**Table 14** Reasons not to give loan from formal FIs

Reasons not to give loan	Responses	
	N	Percent
Lack of Collateral	13	13.8 %
Lack of sound financial statement	26	27.7 %
Poor repayment history	1	1.1 %
Sector Bias	16	17.0 %
Risky Venture	31	33.0 %
Other reasons	7	7.4 %
Total	94	100 %

Source: Own Survey, 2014

## Appendix 10

**Table 15** Firms recommendation to Fls

Frequencies of Firms recommendations to Fls

		Responses		Percent of cases
		N	Percent	
Recommendation to Fls <sup>a</sup>	Collateral	90	20.3 %	45.5 %
	Interest rate	183	41.2 %	92.4 %
	loan duration	27	6.1 %	13.6 %
	repayment	27	6.1 %	13.6 %
	application	115	25.9 %	58.1 %
	others	2	0.5 %	1.0 %
Total		444	100.0 %	224.2 %

a. Dichotomy group tabulated at value 1

Source: Own Survey, 2014

## Appendix 11

**Table 16** Applied and received from formal Fls

Applied and received from formal Fls \* Which formal Fls applied Cross tabulation

Count

		which formal Fls applied		Total
		Banks	MFIs	
applied and received from formal Fls	no	40	1	41
	yes	61	8	69
Total		101	9	110

Source: Own Survey, 2014

## Appendix 12

**Table 17** Desired amount received from Fls

received desired amount from formal Fls

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	46	23.0	47.9	47.9
	yes	50	25.0	52.1	100.0
	Total	96	48.0	100.0	
Missing	System	104	52.0		
Total		200	100.0		

Source: Own Survey, 2014

## Appendix 13

**Table 18** Case process summary of multinomial logit analysis

Case processing summary		N	Marginal percentage
What is the distribution of credit constraints?	unconstrained borrowers	55	27.9 %
	unconstrained non-borrowers	49	24.9 %
	quantity rationing	37	18.8 %
	risk rationing	56	28.4 %
age of the entrepreneur	23 to 30	39	19.8 %
	31 to 40	85	43.1 %
	41 to 45	30	15.2 %
	46 to 62	43	21.8 %
gender of the entrepreneur	female	20	10.2 %
	male	177	89.8 %
marital status	non married	27	13.7 %
	married	170	86.3 %
nr. of year of schooling	1 to 10	54	27.4 %
	11 to 12	57	28.9 %
	13 to 16	86	43.7 %
head of household	no	52	26.4 %
	yes	145	73.6 %
nr. of household member	0 to 4	52	26.4 %
	5 to 7	67	34.0 %
	8 to 10	53	26.9 %
	11 to 15	25	12.7 %
age of the firm	1 to 5	58	29.4 %
	6 to 10	70	35.5 %
	11 to 15	40	20.3 %
	16 to 50	29	14.7 %
initial outlay of the firm	5000 to 200000	63	32.0 %
	200001 to 600000	74	37.6 %
	600001 to 3100000	60	30.5 %
number of employee	1 to 4	81	41.1 %
	5 to 8	64	32.5 %
	9 and above	52	26.4 %
status of work place	own	72	36.5 %
	rented	125	63.5 %
place live in	own	131	66.5 %
	Rented	66	33.5 %
Valid		197	100.0 %
Missing		3	
Total		200	
Subpopulation		192 <sup>a</sup>	

a. The dependent variable has only one value observed in 190 (99.0 %) subpopulations  
Source: Own Survey, 2014



## Appendix 14

**Table 19** Parameter Estimates (Multinomial Logit Analysis)

Parameter estimates									
What is the distribution of credit constraints? <sup>a</sup>		B	Std. error	Wald	df	Sig.	Exp(B)	95 % Confidence interval for exp(B)	
								Lower bound	Upper bound
unconstrained borrowers	Intercept	-.084	1.085	.006	1	.938			
	[age = 1]	.131	.801	.027	1	.870	1.140	.237	5.478
	[age = 2]	.155	.602	.066	1	.797	1.167	.359	3.796
	[age = 3]	-.543	.768	.500	1	.480	.581	.129	2.618
	[age = 4]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[gender = 0]	.001	1.002	.000	1	.999	1.001	.140	7.133
	[gender = 1]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[marriage = 0]	-.472	.905	.272	1	.602	.624	.106	3.673
	[marriage = 1]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[education = 1]	.205	.556	.136	1	.712	1.228	.413	3.654
	[education = 2]	.186	.549	.115	1	.735	1.205	.411	3.534
	[education = 3]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[headofhh = 0]	.380	.712	.286	1	.593	1.463	.363	5.904
	[headofhh = 1]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[sizeoffamily = 1]	.683	.800	.728	1	.394	1.979	.412	9.501
	[sizeoffamily = 2]	1.231	.718	2.938	1	.087	3.424	.838	13.990
	[sizeoffamily = 3]	.536	.774	.479	1	.489	1.709	.375	7.795
	[sizeoffamily = 4]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[ageoffirm = 1]	-.585	.782	.558	1	.455	.557	.120	2.582
	[ageoffirm = 2]	.140	.699	.040	1	.841	1.150	.292	4.524
	[ageoffirm = 3]	1.024	.776	1.741	1	.187	2.783	.608	12.731
	[ageoffirm = 4]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[initialinv = 1]	-1.114	.592	3.545	1	.060	.328	.103	1.047
	[initialinv = 2]	.644	.564	1.306	1	.253	1.904	.631	5.750
	[initialinv = 3]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[nr.ofemployee = 1]	-.773	.671	1.329	1	.249	.462	.124	1.718
	[nr.ofemployee = 2]	.056	.632	.008	1	.929	1.058	.306	3.652
	[nr.ofemployee = 3]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[workplace = 1]	.823	.477	2.973	1	.085	2.277	.894	5.802
	[workplace = 2]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[living = 1]	-1.199	.499	5.766	1	.016	.302	.113	.802
	[living = 2]	0 <sup>b</sup>	.	.	0	.	.	.	.
unconstrained non-borrowers	Intercept	.330	.996	.110	1	.740			
	[age = 1]	.071	.760	.009	1	.926	1.073	.242	4.762
	[age = 2]	-.092	.604	.023	1	.879	.912	.279	2.980
	[age = 3]	-.461	.757	.370	1	.543	.631	.143	2.783
	[age = 4]	0 <sup>b</sup>	.	.	0	.	.	.	.

**Table 19** Parameter Estimates (Multinomial Logit Analysis) (Continued)

quantity rationing	[gender = 0]	1.090	.920	1.404	1	.236	2.974	.490	18.039
	[gender = 1]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[marriage = 0]	.380	.800	.225	1	.635	1.462	.305	7.014
	[marriage = 1]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[education = 1]	-.194	.542	.128	1	.721	.824	.285	2.384
	[education = 2]	-.237	.538	.195	1	.659	.789	.275	2.262
	[education = 3]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[headofhh = 0]	-.122	.689	.031	1	.860	.886	.230	3.415
	[headofhh = 1]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[sizeoffamily = 1]	-.335	.777	.186	1	.666	.715	.156	3.281
	[sizeoffamily = 2]	.102	.673	.023	1	.879	1.108	.296	4.142
	[sizeoffamily = 3]	.484	.687	.496	1	.481	1.623	.422	6.238
	[sizeoffamily = 4]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[ageoffirm = 1]	-.734	.744	.972	1	.324	.480	.112	2.064
	[ageoffirm = 2]	-.377	.670	.317	1	.573	.686	.184	2.550
	[ageoffirm = 3]	.456	.747	.373	1	.541	1.578	.365	6.818
	[ageoffirm = 4]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[initialinv = 1]	-.320	.563	.323	1	.570	.726	.241	2.189
	[initialinv = 2]	.271	.575	.222	1	.638	1.311	.425	4.046
	[initialinv = 3]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[nr.ofemployee = 1]	-.211	.663	.101	1	.750	.810	.221	2.967
	[nr.ofemployee = 2]	-.091	.643	.020	1	.887	.913	.259	3.217
	[nr.ofemployee = 3]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[workplace = 1]	1.105	.471	5.520	1	.019	3.021	1.201	7.596
	[workplace = 2]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[living = 1]	-.633	.513	1.525	1	.217	.531	.194	1.450
	[living = 2]	0 <sup>b</sup>	.	.	0	.	.	.	.
	Intercept	-1.755	1.628	1.162	1	.281			
	[age = 1]	-2.429	1.187	4.190	1	.041	.088	.009	.902
	[age = 2]	-1.463	.856	2.917	1	.088	.232	.043	1.241
	[age = 3]	.251	.895	.079	1	.779	1.286	.223	7.427
	[age = 4]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[gender = 0]	-1.472	1.193	1.521	1	.217	.230	.022	2.379
	[gender = 1]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[marriage = 0]	1.318	.978	1.814	1	.178	3.735	.549	25.420
	[marriage = 1]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[education = 1]	-.591	.730	.656	1	.418	.554	.132	2.316
	[education = 2]	-.722	.729	.981	1	.322	.486	.116	2.028
	[education = 3]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[headofhh = 0]	2.625	.949	7.645	1	.006	13.801	2.147	88.708
	[headofhh = 1]	0 <sup>b</sup>	.	.	0	.	.	.	.
	[sizeoffamily = 1]	3.582	1.285	7.767	1	.005	35.950	2.895	446.446
	[sizeoffamily = 2]	2.909	1.146	6.440	1	.011	18.339	1.939	173.448

**Table 19** Parameter Estimates (Multinomial Logit Analysis) (Continued)

[sizeoffamily = 3]	1.740	1.321	1.737	1	.188	5.700	.428	75.870
[sizeoffamily = 4]	0 <sup>b</sup>	.	.	0	.	.	.	.
[ageoffirm = 1]	2.078	1.180	3.103	1	.078	7.990	.791	80.677
[ageoffirm = 2]	1.476	1.096	1.813	1	.178	4.373	.511	37.461
[ageoffirm = 3]	1.604	1.243	1.666	1	.197	4.974	.435	56.816
[ageoffirm = 4]	0 <sup>b</sup>	.	.	0	.	.	.	.
[initialinv = 1]	.120	.713	.028	1	.867	1.127	.279	4.562
[initialinv = 2]	-.331	.772	.184	1	.668	.718	.158	3.260
[initialinv = 3]	0 <sup>b</sup>	.	.	0	.	.	.	.
[nr.ofemployee = 1]	-2.348	.834	7.923	1	.005	.096	.019	.490
[nr.ofemployee = 2]	-1.464	.773	3.591	1	.058	.231	.051	1.051
[nr.ofemployee = 3]	0 <sup>b</sup>	.	.	0	.	.	.	.
[workplace = 1]	-.520	.657	.626	1	.429	.595	.164	2.156
[workplace = 2]	0 <sup>b</sup>	.	.	0	.	.	.	.
[living = 1]	-1.382	.638	4.701	1	.030	.251	.072	.876
[living = 2]	0 <sup>b</sup>	.	.	0	.	.	.	.

a. The reference category is: risk rationing

b. This parameter is set to zero because it is redundant

Source: Own Survey, 2014

## Appendix 15

**Table 20** Multicollinearity test

Coefficients <sup>a</sup>							
Model	Unstandardized coefficients		Standardized coefficients	t	Sig.	Collinearity statistics	
	B	Std. error				Tolerance	VIF
(Constant)	2.697	.672		4.012	.000		
age of the entrepreneure	.037	.093	.033	.400	.690	.727	1.376
gender of the entrepreneure	.244	.335	.063	.728	.467	.651	1.535
marital status	-.188	.289	-.055	-.652	.515	.679	1.473
nr. of year of schooling	.035	.105	.024	.330	.742	.888	1.126
head of household	.054	.251	.020	.215	.830	.547	1.830
nr. of household member	.026	.089	.022	.293	.770	.868	1.153
age of the firm	-.188	.091	-.164	-2.067	.040	.776	1.288
initial outlay of the firm	-.188	.108	-.127	-1.744	.083	.919	1.088
number of employee	-.011	.113	-.008	-.101	.920	.806	1.240
status of work place	.488	.180	.200	2.710	.007	.890	1.124
place live in	-.396	.182	-.159	-2.177	.031	.908	1.102

a. Dependent Variable: What is the distribution of credit constraints?

Source: Own Survey, 2014

**Competing interests**

The authors declare that they have no competing interests.

**Authors' contributions**

MZH carried out the data analysis and drafted the manuscript while NS has collected data from the demand side and TT has collected data from supply side of SMEs loan. NS and TT also contributed in drafting the section 4.7 (The Association Between the Supply and Demand Side Factors of SME's Credit Rationing). All authors read and approved the final manuscript.

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