

An Empirical Study of the Effect of Tax Inspections/Visits on Firm's Credit Constraints in Developing Economies

Meifang Xiang
Texas A&M University – Commerce

Using data largely consisting of SMEs from more than 130 countries, the study investigates the effect of government tax related inspections and/or visits on the probability of an SME being credit constrained. The results show that government tax inspections and/or visits are positively and significantly associated with an SME's probability of being credit constrained. The results also show that when country variables are included, despite the differences among various groups, government tax inspections and/or visits increase the probability for firms to reply with severe or major financing obstacles. The study is significant not only to the literature of a firm's credit constraint, but also to the literature of government-business relationships as well as to the literature of the strategic game between tax authorities and enterprise taxpayers. Hence, it is a study with important implications for policymakers, particularly in light of incoming hard times for businesses, SMEs in particular because of the pandemic.

Keywords: tax inspections, tax visits, financing obstacle, credit constraint

INTRODUCTION

Access to financing has been proven to be an important factor for firms to be successful in their operations, especially for small and medium-sized enterprises (SMEs, see Beck, Demirguc-Kunt, & Maksimovic, 2005; Scott & Dunkelberg 2003 as examples). For this reason, during the past few decades, there have been many researchers who have studied adverse selection (Berndt & Gupta, 2009; Slovin, Sushka, & Lai, 2000), firm's financing (Artikis, Chalevas, & Tzovas, 2010; Coleman & Robb, 2009; Foley-Fisher, Ramcharan, & Yu, 2016), and credit rationing (De Meza & Webb, 2000; Poncet, Steingress, & Vandebussche, 2010). Among them, one group focus exclusively on firm financing obstacles or credit constraint faced by SMEs (Beck & Demirguc-Kunt, 2006; Beck, et al. 2006A). Within this group, some focus on the impact of firm size on a firm's financing (Beck, et al., 2005). Some investigated the relationship between bank competition and firm financing (Beck, Demirguc-Kunt, & Maksimovic, 2004). Others studied discouraged borrowers (Chakravarty & Xiang, 2013; Han, Fraser, & Storey, 2009; Kon and Storey, 2003). However, among the many extant researches focusing on firm financing or credit rationing, there is very limited research relevant to the impact of government bureaucracy (like the inspections or visits from the tax officials) on a firm's financing. Dyreng, Hoopes, and Wilde (2016) studies the public pressure (or public scrutiny as they name it), and the impact of public pressure on firms' behavior. They provide evidence that public pressure from external groups can exert a significant influence on firms (or even scrutinize firms), and change their behavior. Following their study, government tax related inspections or visits, which are an obvious public pressure if not a public scrutiny,

may have impact on firm's behavior. For example, the obstacles they confronted, and whether the obstacles are severe. Not even to say, the information of the firm with tax inspections and/or visits may be transferred to the financial institutions (e.g., some documents may have to be provided via firm's financial institutions), and hence may directly or indirectly affect the decision for banks to make a loan decision. For this reason, it is necessary to examine the effect of government tax inspections and/or visits on an SME's probability to be credit rationed or constrained.

The purpose of the study is to investigate the impact of government tax inspections/visits on the probability for an SME's to be credit constrained. There has been very limited extant research focusing on the topic. The current study attempts to fill the gap of literature related with firm financing by using a multi-country dataset provided by the World Bank.

The study has the following main findings: 1). Tax related inspections and/or visits by government officials increase an SME's probability of being credit constrained. Those firms inspected or visited by government tax officials are more likely to be adversely affected by the visits, and hence are more likely to report with severe, very severe, or major financing obstacles. 2). In general, older, larger firms, and/or firms with foreign ownership are less likely to be credit constrained. Firms with relationships with financial institutions, firms whose financial statements were audited by externals, and/or firms with larger sales revenue are less likely to reply with severe, very severe, or major financing obstacles. While corruption obstacles, and/or recent purchases of fixed assets increase an SME's probability of being credit constrained. And 3). When country variables are included in the analysis, tax related inspections/visits and corruption obstacles are still positively and significantly related with firms' probability of being financing constrained. Firms operating in economies with a higher GDP are less likely to reply with severe or major financing obstacles. Moreover, when firms are categorized into different groups, tax related inspections and/or visits by government officials are positively and significantly related with an SME's probability of being credit constrained in a consistent manner.

There has been very limited extant research focusing on the topic and the current study is among the very first to fill the gap. In fact, there is a parallel literature on firm financing in developing economies. For example, Ayyagari, Demirgüç-Kunt, and Maksimovic (2011) examine the relationship between firm innovation and firm financing, firm governance, as well as firm competition. Beck, et al. (2004) investigate the impact of bank completion on firm financing. Chakravarty and Xiang (2013) concentrate exclusively on discouraged borrowers while Beck, et al. (2005) study how firm size affects a firm's probability of being credit rationed. The current study builds on the prior studies. However, it is different from all extant studies in that it examines the impact of government bureaucracy like tax related inspections and/or visits by tax officials on a firms' probability of being credit constrained. To the best of my knowledge, there is no extant research centered around it. It will not only be an intriguing study, but also significant to policy makers and/or government agencies when considering constructing policies to alleviate firm stress, which would be extremely useful during the current pandemic, in particular.

In the rest of the paper, Section II presents the literature. Section III introduces the data used in the study. Section IV discusses the empirical model. Section V presents both univariate and multivariate results. Section VI reveals the robustness analysis. The last section presents the discussion and the conclusion.

RELATED LITERATURE AND MOTIVATION

Binks and Ennew (1996) are among the very first group to study bank loans and credit constraint experienced by firms. They point out that credit rationing and/or credit constraints are mainly because of information asymmetries and adverse selection. They present that the negative adverse effect can be alleviated by firm growth (firm internal characteristics) and/or by developing a better relationship with banks (external factors). Following their study, there are many subsequent studies that examine the factors of firm financing and/or credit constraint. The rest of the section reviews the literature based on the two categories: internal firm characteristics and external factors having an effect on firm financing.

Internal Firm Characteristics and Firm Financing

Firm size and firm age are the two main factors that many researchers investigate. Binks and Ennew (1996) find that one reason growing firms still suffered from credit constraint is their youth. Beck, et al. (2005) do a thorough examination about the impact of firm size and its effect on firm financing. They show that the smallest firms are the weakest group when credit constraint is considered. Smaller firms are much more likely to be credit constrained than larger firms. They also point out that financial and institutional development can alleviate the level of credit constraint and it is, in general, the smallest firms who generally benefit most. Beck, et al. (2006A) study financing obstacles and provide evidence that firm size, firm age, and firm ownership are three important factors in explaining financing obstacles. They show that older, larger firms and/or firms with foreign ownership are less likely to face financing constraints. Chakravarty and Xiang (2013) support the conclusion and find that older and larger firms are less likely to be discouraged when considering applying for credit.

In the study of Beck, et al. (2006A), government ownership is not significant in explaining a firm's possibility of being credit constrained. However, Harrison and McMillan (2003) provide evidence that government owned firms are less likely to be credit constrained because of direct government fiscal budget support. Laeven (2003) draws similar conclusions with Harrison and McMillan (2003). In addition, Harrison and McMillan (2003) show that multinational and/or foreign owned firms are less likely to be credit constrained. Chakravarty and Xiang (2013) agree with Harrison and McMillan (2003) and provide evidence that government ownership and firms that are exporters are negatively associated with the probability of being credit constrained.

A firm's financial information is another factor included in the literature of firm financing. Chakravarty and Xiang (2013) examine firms' liability in their study to address the phenomenon of discouraged firms. The results show that firms with higher liability are more likely to be credit constrained. Using data from firms in America, Han, et al. (2009) include the growth in sale revenue, asset return rate, and the liability to assets ratio (capital structure) in the model to study discouraged firms. They show that riskier firms (e.g., firms with higher liability ratio, or lower sales growth rate) are more likely to be discouraged. By building a multi-stage model, Chakravarty and Yilmazer (2009) examine firm financing characteristics (e.g., firm's leverage, profit ratio, & total assets) and their results are consistent with Han, et al. (2009): Riskier firms, in general, firms with a lower profit ratio and/or firms with a higher debt ratio, are at a disadvantage to receive financing.

Moreover the characteristics related with firm owners and/or top managers are generally tested by many researchers. Chakravarty and Xiang (2013) examine the gender, education, and working experience of firm owners and top managers. They show that firms owned by females have more difficulty receiving financing than their peers. They also provide evidence that a top manager's education level is another useful factor in explaining firm's probability of being credit rationed.

External Factors Related With Firm Financing

External factors include the relationship between the government and firms (e.g., corruption obstacle), the relationship between businesses and banks, the level of competition, and whether the firm's financial statements have been audited by an external auditor. Using data from 1993, 1998, and 2003 waves of the Survey of Small Business Finances (SSBF) to build a multi-stage model, Chakravarty and Yilmazer (2009) show that a good relationship between businesses and banks (long relationships and the number of banks in which firms have a relationship) is helpful for firms to make a decision whether to apply for credit. In addition, a good relationship is also helpful for banks to make a decision whether to approve the loan or not. However, they do not provide evidence that a good relationship is helpful for firms to acquire a better loan rate. Chakravarty and Xiang (2013) also include the business-bank relationship in their study. They provide evidence that the relationship between firms and banks is significant in explaining a firm's probability of being credit constrained. The number of banks with which firms have a relationship is helpful in alleviating a firm's financing stress.

As early as the 1990s, Mauro (1995) studies the relationship between corruption and firm growth. He defines corruption as dishonest or fraudulent transactions. He provides evidence that corruption has a

negative effect on firm growth. Consistent with Mauro, Beck et al. (2006B) examine the impact of financing, legal, and corruption obstacles on firm growth. They point out that corruption includes informal payments, bribes paid, the untruthful behavior of bank managers, and the amount of time firm managers/owners spent with government officials or regulators. Their results show that higher level of corruption is generally connected with more constraint in firm growth. Chakravarty and Xiang (2013) also examine the impact of corruption on firms' credit constraint and find that corruption plays a role in explaining a firm's probability of being discouraged: Firms facing a severe corruption obstacle are more likely to be discouraged if applying for bank credit.

Credit Constraint and Country Characteristics

Country variables are included in many extant researches related to firm financing. Beck, et al. (2006B) include GDP per capita, institutional development, stock market and financial institutional development, and legal system efficiency in their study. They find that institutional development is the most important factor in explaining credit constraint among all country characteristics studied. Chakravarty and Xiang (2013) divide the countries included in their study into developing economies and developed economies, and address the differences in acquiring financing for each group. They find that the drivers for a firms' probability of being discouraged vary between developed and developing economies. They also examine the impact of some country characteristics (e.g., GDP, institutional development, & country growth rate), and show that country growth rate is negatively and significantly related with the probability of being discouraged when considering applying for credit. Using data from nearly 50 countries, Beck, Demirguc-Kunt, & Maksimovic (2008) study financing patterns around the world. They examine both firm characteristics and country variables (e.g., GDP per capita, inflation, country growth rate, private credit, & value traded). Their results show that property rights protection is helpful in closing the gap of getting financing among firms of different sizes. They also find that institutional development in financial and legal systems are the most useful way in alleviating financing obstacles of firms in various countries.

DATA DESCRIPTION

The firm-level survey data from the World Bank Enterprise Surveys (WBES) are used in this study. WBES is a rich multi-country dataset. The database originally consists of firm survey responses from over 140,000 firms in more than 140 countries. Many of the surveyed firms are SMEs operating in undeveloped countries. When collecting the information, the World Bank follows a uniform and stratified random sampling methodology. The purpose of the WBES is to use standardized survey instruments to benchmark the investment climate, in which each individual firm/economy around the world operates and to analyze firm operating performance. All surveys used in the current study were administered in one year within the wave of 2006-2019.

The WBES provide a wide variety of information related with a firm's investment climate and the operating performance. For example, it reports data on each firm's characteristics, ownership, type of industry in which it operates, competition it confronts, sources of both internal and external financing, relationship with its bank(s), and some information related with its financial status and operating results. It also provides information about the relationship between firms and the government, corruption information (e.g., corruption obstacle, informal gifts to government officials), and whether the firm has been visited by government officials. In addition, the WBES include information about the gender and education level of the owner(s) or top manager(s) and whether the firm has been reviewed by external auditors. In short, the survey provides detailed qualitative and quantitative information related with firms' investment decision and operating results.¹

There are 53,081 firms from 134 countries included in the current study. Table 1 shows the information about how the samples are selected. For example, if one country has been listed for more than one year, only the most recent year's survey data are used in the current study.

TABLE 1
OBSERVATION SELECTION

Items	Obs.
All firms in WBES core database (2006-2019 time period)	144,011
Less: Duplicated country information	60,946
Number of firms left	83,065
Less: Missing data on <i>Credit Constraint</i>	5,862
Firms with valid <i>Credit Constraint</i> information	77,203
Less: Missing data on <i>Tax Visit</i>	955
Firms with valid <i>Tax Visit</i> information	76,248
Less: Missing data on other control variables	18,217
Sample size for main tests	58,031

DEFINING THE CANDIDATE EXPLANATORY VARIABLES AND THE EMPIRICAL MODEL

Following the extant study of Beck, et al. (2006), Beck, et al. (2008), and Chakravarty and Xiang (2013), all of which focus on firm financing and credit constraint of SMEs operating in various economies around the world, the regression model of the current study is as follows:

$$\begin{aligned}
 \text{Credit_Constraint}_{i,k} = & \alpha + \beta_1 \text{Firm_Characteristics}_{i,k} + \beta_2 \text{Tax_Visits}_{i,k} + \beta_3 \text{Corruption_Obstacle}_{i,k} + \\
 & \beta_4 \text{Relationship} + \beta_5 \text{Performance} + \beta_6 \text{Auditing}_{i,k} + \beta_7 \text{Female_Owner}_{i,k} + \\
 & \gamma \text{Country}_k + \varepsilon_{i,k}
 \end{aligned}
 \tag{1}$$

In the model, *Credit_Constraint* is the dependent variable. It is defined as a dummy variable taking the value one if the firm replies that access to finance is the severe or major obstacle faced by the firm and zero otherwise.

The independent variables include firm characteristics variables, variables related with tax inspection, corruption obstacle variable, bank-firm relationship variable, firm finance and performance variable, external auditing variable, variables related with firm owners, and country variables. In fact, all variables included in the study have been used by the prior related studies (Beck, et al., 2006A; Beck, et al., 2008; Chakravarty & Xiang 2013).

The general firm characteristics include firm age, firm size, firm legal status, and firm ownership. *Ln_Age* is defined as the (natural) logarithm of the number of years the firm has been in business. It is anticipated that older firms are less likely to be credit constrained because when firms age, they are more likely to have more channels beneficial in receiving financing (Beck, et al., 2005). *Ln_Size* refers to the (natural) logarithm of the number of full-time employees. Following the study of Beck, et al., (2006), it is anticipated that smaller firms are more likely to be credit constrained. *Legal_Status* is defined as one of the following: public/listed company, privately traded company, sole proprietorship, partnership, and others coded as one to five, respectively. In general, sole proprietorship and partnership are more likely to be credit constrained compared to a public/listed company, which tend to have more channels and more resources to get the financing they need (Chakravarty & Xiang, 2013). Also, following Chakravarty and Xiang (2013), *Govern_Owned* and *Foreign_Owned* are two more firm characteristics included in the model. *Govern_Owned* is defined as a dummy variable taking the value one if the firm has at least 10% government ownership, and zero otherwise. Chakravarty and Xiang (2013) show that government owned firms are less likely to be credit constrained. Hence, it is expected to be negatively related with firm's probability of being credit constrained because of the government fiscal budget, and the priority in getting the loan or grant from various government organizations. *Foreign_Owned* is also defined as a dummy variable taking the value one if the firm has 10% or more owned by foreign individuals or organizations,

and zero otherwise. *Foreign_Owned* is expected to be less likely to be constrained because of more sources favorable in receiving loans than their peers (Beck, et al., 2006B; Chakravarty & Xiang, 2013).

Tax_Visit is defined as a dummy variable taking the value one if the firm was visited or inspected by tax officials during the surveyed year and zero otherwise. In general, the visits or inspections have, at least, the following direct or indirect effect: 1). The visits increase firm stress. 2). Firm owners or top managers need to spend more time and effort to handle the visits and to solve the possible problems initiated because of the visits. For this reason, they would have less time to spend on firm operation and product innovation. Hence, it is anticipated that *Tax_Visit* increases the possibility for firms to be credit constrained. *Corruption_Obstacle* is defined as a dummy variable taking the value one if the firm replied that corruption is a severe or very severe obstacle for the operation and growth of the firm and zero otherwise. Chakravarty and Xiang (2013) provide evidence that the corruption obstacle increases the probability for firms to be credit constrained. Hence, *Corruption_Obstacle* is anticipated to have a positive relationship with the probability for firms to be credit constrained.

The relationship variable *Bank_Relationship* is defined as a dummy variable taking the value one if the firm replied having at least one checking or saving account with its financial institutions, and zero otherwise. Cole (2013) include some bank-firm relationship variables when studying the financing pattern of US firms. He shows that the bank-firm relationship is helpful in alleviating a firm's financing stress. Both Chakravarty and Yilmazer (2009) and Chakravarty and Xiang (2013) examine the bank-firm relationship (e.g., checking or saving account, the number of banks with which the surveyed firm has relationship). Their results are consistent with Cole (2013). Therefore, it is anticipated that *Bank_Relationship* is negatively related with the probability for a firm to be credit constrained.

The performance variables include *Ln_Sales* and *Fixed_Asset_Purchase*. *Ln_Sales* is defined as the (natural) logarithm of the surveyed year's sales revenue. *Fixed_Asset_Purchase* refers to the percentage of the surveyed firms that purchased fixed assets (e.g., equipment, building, land, & machinery). Chakravarty and Yilmazer (2009) include profit margin, total assets, average return, and investment return to examine a firm's financing problems. Their results show that the financial characteristics are closely related with firm's credit rationing. Chakravarty and Xiang (2013) also examine the impact of total liability on the probability for a firm to be discouraged. They show that firm debt is positively and significantly related with firm's probability of being credit rationed or discouraged if applying for credit. In general, more sales revenue means more internal resources for a firm's operation, which decreases the need for financing. Hence, it is expected that *Ln_Sales* is negatively related with the probability of being credit constrained. *Fixed_Asset_Purchase* means the firm needs more funding to invest more on things like equipment. It is anticipated that *Fixed_Asset_Purchase* has a positive relationship with the probability of a firm being credit constrained.

Auditing is defined as a dummy variable taking the value one if a firm's financial statements were reviewed by an external auditor, and zero otherwise. It is anticipated that firms with financial statements audited by an external auditor are less likely to be credit constrained.

Last but not least, the owner related variable is named as *Female_Owner*. *Female_Owner* is defined as a dummy variable taking the value one if any of the principle owners is female and zero otherwise. Chakravarty and Xiang (2013) include the gender of the owners' education level and working experience in their study, when examining discouraged firms. They find that male owners, owners with higher education, and owners with a longer working experience in the same industry are less likely to be discouraged. Based on the extant study, it is anticipated that firms with female owner(s) are more likely to be credit constrained.

RESULTS

Univariate Results

Table 2 includes two panels: Panel A provides information about the basic statistics of the main explanatory variables, and Panel B presents the *t*-test results. In Panel B, the average firm age of the group of firms without credit constraint is higher than the average of the group with credit constraint. The

same is true for the average firm size and sales revenue. All three variables (*Ln_Age*, *Ln_Size*, & *Ln_Sales*) are significant at the 1% level in the *t*-test.

TABLE 2 PANEL A
SUMMARY STATISTICS OF EXPLANATORY VARIABLES

Variable	Mean	Median	SD	Max	Min	Obs.
<i>Credit Constraint</i>	0.298	0	0.457	1	0	58,031
<i>Ln Age</i>	3.072	3.044	0.542	5.459	0.693	58,031
<i>Ln Size</i>	3.343	3.045	1.323	10.309	0.693	58,031
<i>Legal Status</i>	2.821	3	0.872	5	1	58,031
<i>Govern Owned</i>	0.014	0	0.117	1	0	58,031
<i>Foreign Owned</i>	0.091	0	0.287	1	0	58,031
<i>Tax Visit</i>	0.568	1	0.495	1	0	58,031
<i>Corruption Obstacle</i>	0.374	0	0.483	1	0	58,031
<i>Bank Relationship</i>	0.883	1	0.321	1	0	58,031
<i>Auditing</i>	0.548	1	0.498	1	0	58,031
<i>Ln Sales</i>	16.819	16.588	3.116	32.053	0	58,031
<i>Fixed Asset Purchase</i>	0.407	0	0.491	1	0	58,031
<i>Female Owner</i>	0.328	0	0.469	1	0	58,031
<i>Ln GDP Per Capita</i>	8.952	9.086	0.831	10.395	6.597	57,381
<i>Transition Country</i>	0.210	0	0.408	1	0	58,031

TABLE 2 PANEL B
***t*-TEST RESULTS (*n*=58,031)**

	Mean (With <i>Credit Constraint</i>)	Mean (Without <i>Credit Constraint</i>)	SD	<i>t</i> -Value
<i>Ln Age</i>	3.028	3.091	0.540	12.76***
<i>Ln Size</i>	3.094	3.449	0.012	29.80***
<i>Ln Sales</i>	16.371	17.010	3.102	22.67***

Note: ***, **, and * indicate statistical significance at the 0.01, 0.05, or 0.10 level, respectively.

Table 3 presents the correlation information of the main variables used in the study. From the table, *Ln_Age* and *Ln_Size* are negatively and significantly (both at the 1% level) correlated with the probability of a firm being credit constrained. *Foreign_Owned*, *Bank_Relationship*, *Auditing*, and *Ln_Sales* are also negatively and significantly (all at the 1% level) correlated with the dependent variable *Credit_Constraint*. Firms with foreign owners, better bank relationships, financial statements audited by externals, and a larger sales revenue are less likely to be credit constrained. At the same time, *Tax_Visit* is positively and significantly (at the 1% level) correlated with *Credit_Constraint*. Similar to *Tax_Visit*, *Corruption_Obstacle* is also positively and significantly (at the 1% level) correlated with *Credit_Constraint*. In addition, Table 3 provides no excessive significant correlation between the main independent variables. However, there are some factors (e.g., firm characteristics) that are correlated with each other. For example, older firms tend to be larger. Government owned firms are more likely to be publicly listed companies. Firms reported with tax inspections/visits are less likely to be audited by externals. For this reason, to better determine which characteristics explain variations in credit constraint, it is necessary to conduct a multivariate analysis.

TABLE 3
CORRELATION MATRIX OF MAIN VARIABLES (n=58,031)

Variable	Credit_Constraint	Ln_Age	Ln_Size	Legal_Status	Govern_Owned	Foreign_Owned	Tax_Visit	Corruption_Obstacle	Bank_Relationship	Auditing	Ln_Sales	Fixed_Asset_Purchase	Female_Owner	Ln_GDP_Per_Capita
Ln_Age	-0.053***													
Ln_Size	-0.023***	0.267***												
Legal_Status	0.014***	-0.083***	-0.093***											
Govern_Owned	-0.006	0.042***	0.079***	-0.040***										
Foreign_Owned	-0.035***	-0.002	0.164***	-0.057***	0.098***									
Tax_Visit	0.039***	-0.014***	0.086***	0.016***	0.001	0.052***								
Corruption_Obstacle	0.095***	0.024***	-0.019***	0.013***	-0.016***	-0.018***	0.005							
Bank_Relationship	-0.040***	0.083***	0.160***	-0.047***	-0.003	0.032***	0.023***	0.006						
Auditing	-0.074***	0.140***	0.312***	0.052***	0.022***	0.094***	0.165***	0.027***	0.180***					
Ln_Sales	-0.094***	0.149***	0.501***	-0.013***	0.010**	0.107***	0.049***	-0.024***	0.071***	0.187***				
Fixed_Asset_Purchase	0.003	0.047***	0.205***	-0.068***	0.007*	0.074***	0.109***	0.004	0.100***	0.109***	0.121***			
Female_Owner	-0.011**	0.061***	0.056***	-0.053***	0.031***	0.005	-0.022***	-0.029***	0.062***	0.026***	0.008**	0.075***		
Ln_GDP_Per_Capita	-0.007*	0.129***	0.076***	-0.276***	-0.006	-0.067***	-0.168***	-0.066***	0.063***	-0.059***	-0.055***	0.054***	0.093***	
Transition_Country	-0.037***	-0.112***	0.010**	-0.199***	0.053***	-0.035***	0.013***	-0.161***	0.031***	-0.171***	-0.016***	0.051***	0.093***	0.314***

Note: ***, **, and * indicate statistical significance at the 0.01, 0.05, or 0.10 level, respectively.

Multivariate Results

Baseline Results

The basic regression results are presented in Table 4. The results in Column (1) of Table 4 show that firm size and firm age are negatively and significantly (both at the 1% level) related with a firm's probability of being credit constrained. Specifically, larger and older firms are less likely to be credit constrained. Beck, et al. (2006) examine the impact of firm size on firm financing. Their results are consistent with the results reported here. Table 4 also shows that firms with foreign ownership are less likely to be credit constrained. Both tax related inspections/visits by tax officials and corruption obstacles are positively and significantly (both at the 1% level) related with a firm's probability of being credit constrained. This means firms that replied with tax related inspections or visits are more likely to be credit constrained. Firms replied with severe corruption obstacles are also more likely to be credit constrained. Chakravarty and Xiang (2013) include corruption obstacles when examining discouraged borrowers, and their results also show that the corruption obstacle increases the probability for firms to be credit rationed.

TABLE 4
REGRESSION RESULTS OF FIRMS REPLIED WITH CREDIT CONSTRAINT

Variable	(1)	(2)
<i>Ln_Age</i>	-0.077 (0.018)***	-0.064 (0.018)***
<i>Ln_Size</i>	-0.159 (0.009)***	-0.139 (0.009)***
<i>Legal_Status</i>	0.013 (0.011)	-0.031 (0.012)***
<i>Govern_Owned</i>	0.114 (0.082)	0.094 (0.083)
<i>Foreign_Owned</i>	-0.135 (0.034)***	-0.203 (0.036)***
<i>Tax_Visit</i>	0.240 (0.019)***	0.188 (0.020)***
<i>Corruption_Obstacle</i>	0.429 (0.019)***	0.395 (0.019)***
<i>Bank_Relationship</i>	-0.104 (0.029)***	-0.078 (0.029)***
<i>Auditing</i>	-0.206 (0.020)***	-0.230 (0.020)***
<i>Ln_Sales</i>	-0.028 (0.003)***	-0.036 (0.003)***
<i>Fixed_Asset_Purchase</i>	0.130 (0.019)***	0.144 (0.019)***
<i>Female_Owner</i>	0.001 (0.020)	0.029 (0.020)
<i>Ln_GDP_Per_Capita</i>		-0.166 (0.013)***
<i>Transition_Country</i>		-0.103 (0.026)***
Intercept	<0.001	<0.001
Number of Observations	58,031	57,381
Adjusted R^2	0.045	0.050

Note: The regressions are estimated with Logistic regression. *Credit_Constraint* is the dependent variable. Standard errors are in parentheses. ***, **, and * indicate that the coefficient is significant at the 0.01, 0.05, or 0.10 level, respectively.

Additionally, Table 4 shows that firms with decent firm-bank relationships (e.g., having at least one checking and/or saving account) are less likely to reply with severe or major financing obstacles (significant at the 1% level). These results are consistent with the study of Chakravarty and Yilmazer (2009). They build a multi-stage model to examine firm-bank relationships and finance rationing. They show that a better firm-bank relationship is helpful in alleviating a firm's financing stress. Similar to firm-bank relationships, whether a firm's financial statements have been audited by externals is also negatively and significantly (at the 1% level) related with a firm's probability of being credit constrained. Moreover, the variable of sales revenue enters the regression with a negative signal (significant at the 1% level), showing that firms with a larger sales revenue tend to be less likely to reply with severe or major financing obstacles. On the contrary, whether the firm purchased fixed assets during the surveyed year has a positive signal and enters the regression significantly at the 1% level. Firms who purchased fixed assets (e.g., land, equipment, machinery, & building) tend to need more financing than their peers without purchasing new fixed assets. Hence, firms who purchased fixed assets are more likely to reply with severe or major financing obstacles.

Column (2) in Table 4 presents the results when a couple of country variables (*Ln_GDP_Per_Capita* & *Transition_Country*) are added. *Ln_GDP_Per_Capita* is defined as the (natural) logarithm of the average GDP per Capita during the period 2006 -2019. The GDP per Capita information is, generally, provided by the World Bank.² *Transition_Country* refers to a dummy variable taking the value one if the country is in the process of making the transition to a market economy, and zero otherwise.³ In Column (2), when the two country variables are included, the results are very similar to the results of the basic regression reported in Column (1): Larger firms, older firms, firms that are publicly listed, and firms with foreign ownership are less likely to reply with severe financing obstacles. Consistent with the basic results, the results also show that firms that replied with tax inspections/visits and/or corruption obstacles have a higher probability of being credit constrained. Moreover, firms with a better firm-bank relationship, financial statements that were audited by externals, a larger sales revenue are less likely to reply with severe financing obstacle. Also consistent with the results reported in the baseline regression, firms that purchased large property, plant, and equipment are more likely to be credit constrained. As to the country variables, both *Ln_GDP_Per_Capita* and *Transition_Country* enter the regression with a negative signal (significant at the 1% level), showing that firms operating in more developed economies and transition economies are less likely to reply with severe financing obstacles. The results of GDP per Capita are consistent with Chakravarty and Xiang (2013).

In summary, the basic results show that older firms, larger firms, firms with foreign ownership, firms with a decent firm-bank relationship, firms with financial statements audited by externals, and firms with a large sales revenue are less likely to be credit constrained. However, firms that replied with tax inspections/visits by government officials, severe corruption obstacles, and firms that recently purchased property, plant, and equipment are more likely to be credit constrained. This section also show that when a few country variables are included in the regression, the results are very similar to those reported in the baseline results. Both GDP per Capita and country's transition status are important factors in explaining a firm's likelihood of being credit constrained.

Tax Administration Obstacle Across Countries

Within the prior section, when country variables are included in the analysis, the results show that country variables are significant. In this section, to better examine a firm's probability of being credit constrained, all surveyed firms are categorized into several different groups via two country scales (*Income_Group* and *Transition_Country*).

The first scale used here is *Income_Group*. According to the World Bank's 2018 GNI per capita scale and calculated using the World Bank Atlas method, which decreases fluctuations by using a three year moving, average, price-adjusted conversion factor, all firms around the world can be categorized into five groups: high income, \$50631.00; upper middle income, \$19028.90; middle income, \$12,983.20; lower middle income, \$7655.10; and low income, \$2,287.80.⁴ Based on the scales, *Income_Group* is defined as the Higher Income Group and the Lower Income Group. The Higher Income Group includes the high

income, upper middle income, and middle income groups while the rest of the two groups (lower middle income and low income) belong to the Lower Income Group. The regression results of the Higher Income Group and the Lower Income Group are reported in the first two columns of Table 5.

TABLE 5
FIRMS REPLIED WITH CREDIT CONSTRAINT ACROSS COUNTRY GROUPS

Variable	(1) Lower Income Group	(2) Higher Income Group	(3) Transition	(4) Non- transition
<i>Ln_Age</i>	-0.102 (0.021)***	-0.027 (0.034)	0.003 (0.051)	-0.102 (0.019)***
<i>Ln_Size</i>	-0.189 (0.011)***	-0.090 (0.017)***	-0.025 (0.021)	-0.192 (0.010)***
<i>Legal_Status</i>	0.061 (0.014)***	-0.095 (0.023)***	-0.098 (0.026)***	0.001 (0.013)
<i>Govern_Owned</i>	-0.050 (0.097)	0.539 (0.156)***	0.046 (0.137)	0.015 (0.104)
<i>Foreign_Owned</i>	-0.081 (0.040)**	-0.320 (0.074)***	-0.401 (0.091)***	-0.099 (0.038)***
<i>Tax_Visit</i>	0.250 (0.023)***	0.141 (0.036)***	0.144 (0.043)***	0.263 (0.021)***
<i>Corruption_Obstacle</i>	0.296 (0.022)***	0.787 (0.036)***	0.416 (0.048)***	0.410 (0.021)***
<i>Bank_Relationship</i>	-0.092 (0.034)***	-0.033 (0.056)	-0.169 (0.070)**	-0.046 (0.032)
<i>Auditing</i>	-0.253 (0.024)***	-0.070 (0.038)*	-0.057 (0.047)	-0.286 (0.022)***
<i>Ln_Sales</i>	-0.036 (0.004)***	-0.009 (0.07)	-0.020 (0.008)**	-0.028 (0.004)***
<i>Fixed_Asset_Purchase</i>	0.112 (0.023)***	0.123 (0.036)***	0.190 (0.043)***	0.117 (0.022)***
<i>Female_Owner</i>	0.024 (0.024)	-0.036 (0.037)	0.022 (0.043)	0.011 (0.023)
Intercept	<0.001	<0.001	<0.001	<0.001
Number of Observations	41,422	16,609	12,212	45,819
Adjusted R^2	0.052	0.054	0.022	0.055

Note: The regressions are estimated with Logistic regression. *Credit_Constraint* is the dependent variable. Standard errors are in parentheses. ***, **, and * indicate that the coefficient is significant at the 0.01, 0.05, or 0.10 level, respectively.

The first two columns of Table 5 show that for both Higher and Lower Income Groups, larger firms and firms with foreign ownership are more likely to reply with severe financing obstacles. Both variables are significant at the 1% level, and enter the regression with a negative signal. Firms that replied with tax inspections/visits or severe corruption obstacles are more likely to be credit constrained for both Higher Income Group and Lower Income Group (Both variables are positive and significant at the 1% level.) Moreover, for both groups, firms that recently purchased fixed assets are more likely to be credit constrained (significant at the 1% level). However, there are some differences between the Higher Income Group and the Lower Income Group. For example, in the Higher Income Group, firms with government

ownership are more likely to be credit constrained which may be because of better institutional development in comparatively developed economies. Hence, the firms with government ownership may not be at an obvious advantage over their peers. In the Lower Income Group, firms with a larger sales revenue are less likely to be credit constrained. However, this variable is not significant at the Higher Income Group.

Transition_Country is the second scale used to categorize the firms into the Transition group and Non-transition group. The regression results are reported in Columns (3) and (4) of Table 5. For both groups, firms that replied with tax inspection/visits or severe corruption obstacles are positive and significant (both at the 1% level). Specifically, firms that replied with tax visits by government officials are more likely to be credit constrained. At the same time, there are some differences between the Transition group and Non-transition group based on the results shown in the last two columns of Table 5. For example, firms operating in transition economies that have better firm-bank relationships tend to have lower probability of being credit constrained. But, for firms operating in non-transition economies, firms whose financial statements are audited by external have lower probability of replying with severe or major financing obstacles.

In summary, when countries are categorized into various groups, the results show that there are various differences between different groups. However, in all regressions included the current study, tax inspections/visits and the corruption obstacle consistently enter the regression significantly and positively.

ROBUSTNESS

In this section, a few robustness tests are presented to provide more support to the results reported in the prior section. Three robustness tests are presented in Table 6.

TABLE 6
ROBUSTNESS CHECKS

Variable	(1)	(2)	(3)
<i>Ln_Age</i>	-0.105 (0.021)***	-0.018 (0.023)	-0.078 (0.019)***
<i>Ln_Size</i>	-0.170 (0.011)***	-0.151 (0.012)***	-0.158 (0.009)***
<i>Legal_Status</i>	0.032 (0.013)**	0.026 (0.015)	0.031 (0.012)***
<i>Govern_Owned</i>	0.160 (0.092)	0.251 (0.104)	0.149 (0.084)
<i>Foreign_Owned</i>	-0.118 (0.041)***	-0.141 (0.043)***	-0.183 (0.037)***
<i>Tax_Visit</i>			0.226 (0.020)***
<i>Times_of_Tax_Visit</i>		0.008 (0.003)***	
<i>Informal_Payments</i>	0.007 (0.002)***		
<i>Corruption_Obstacle</i>	0.386 (0.022)***	0.425 (0.025)***	0.415 (0.019)***
<i>Bank_Relationship</i>	-0.163 (0.034)***	-0.013 (0.039)	-0.105 (0.029)***
<i>Auditing</i>	-0.125 (0.023)***	-0.196 (0.027)***	-0.200 (0.021)***

<i>Ln_Sales</i>	-0.025 (0.004)***	-0.034 (0.005)***	-0.025 (0.004)***
<i>Fixed_Asset_Purchase</i>	0.129 (0.023)***	0.086 (0.025)***	0.128 (0.020)***
<i>Female_Owner</i>	-0.006 (0.024)	0.036 (0.026)	0.004 (0.020)
<i>Country_Growth_Rate</i>			-0.016 (0.005)***
<i>Inflation</i>			0.003 (0.001)***
Intercept	<0.001	<0.001	<0.001
Number of Observations	42,304	31,925	55,676
Adjusted R^2	0.040	0.044	0.046

Note: The regressions are estimated with Logistic regression. *Credit_Constraint* is the dependent variable. Standard errors are in parentheses. ***, **, and * indicate that the coefficient is significant at the 0.01, 0.05, or 0.10 level, respectively.

First, *Informal_Payments* is used in the regression instead of *Tax_Visit*. *Informal_Payments* is defined based on the survey question “We’ve heard that establishments are sometimes required to make gifts or informal payments to public officials to ‘get things done’ with regard to customs, taxes, licenses, regulations, services etc. On average, what percent of total annual sales, or estimated total annual value, do establishments like this one pay in informal payments or gifts to public officials for this purpose?” Hence, *Informal_Payments* is defined as the percentage of total annual sales paid as informal payment to government officials. The results in Column (1) of Table 6 are very similar to those of the basic regression presented in Table 4. For example, firms with financial statements audited by externals are less likely to be credit constrained. *Corruption Obstacle* is positively and significantly related with firm’s probability of being credit constrained. Moreover, *Informal_Payments* is positively and significantly related with firm’s probability of being credit constrained.

Second, *Times_of_Tax_Visit* is used instead of *Tax_Visit*. *Times_of_Tax_Visit* is defined based on the survey question “Over the last 12 months, how many times was this establishment either inspected by tax officials or required to meet with them?” It is defined as the number of times of tax related inspections or visits that government officials have completed during the surveyed year. The results in Column (2) of Table 6 are consistent to the base results reported in Table 4. For example, firms with foreign ownership are less likely to reply with severe or major financing obstacles. As to the variable *Times_of_Tax_Visit*, it enters the regression positively and significantly (at the 1% level), similar to that of *Tax_Visit* in the baseline results in Table 4.

Last but not least, *Country_Growth_Rate* and *Inflation* are used to replace the two country variables (*Ln_GDP_Per_Capita* and *Transition_Country*) used in Table 4. *Country_Growth_Rate* refers to the average GDP growth rate during the period of 2006 -2019, and the GDP growth information is provided by the World Bank.⁵ *Inflation* is defined as the average inflation rate during the period of 2006 -2019. The information related with inflation are also collected and issued by the World Bank.⁶ For example, firms with a higher sales revenue are less likely to be credit constrained, and firms that purchased fixed assets in the surveyed year are more likely to reply with severe or major financing obstacles. The results in Column (3) of Table 6 also show that firms operating in economies with a higher average country growth rate are less likely to be credit constrained while firms operating in economies with a higher inflation rate are more likely to reply with severe financing obstacles.

To sum up, the robustness analysis shows that the results are consistently similar to the results presented in the baseline results. Hence, it supports the results reported in the current study.

DISCUSSION AND CONCLUSION

Using evidence from a survey of more than 58,000 firms which covers 134 countries ranging from 2006 - 2019, the study addresses the impact of government tax inspections and/or visits on the probability of a SME to be credit constrained. The results show that government tax inspections and/or visits are positively and significantly associated with a SME's probability of being credit constrained. Firms inspected or visited by government tax officials are more likely to be have their financing adversely affected by the inspections or visits. The study also presents that older firms, larger firms, firms with foreign ownership, firms with a decent firm-bank relationship, firms with financial statements audited by externals, and firms with a larger sales revenue are less likely to be credit constrained. Moreover, firms that replied with severe corruption obstacles or firms that recently purchased property, plant, and equipment are more likely to be credit constrained. When country variables are included in the regression, the results are very similar to those reported in the baseline results. Moreover, firms operating in more developed economics are less likely to be credit constrained.

The study makes multiple contributions. First, the results complement and extend the literature about credit rationing and credit constraint. There are lots of extant research focusing on firm's financing and/or credit rationing. The current study is among the very first group to examine the effect of government tax inspections or visits on firm's probability of being credit constrained. Second, it offers the empirical evidence that government tax related inspections or visits can have a negative effect on an SME's financing by increasing the probability for them to be credit constrained. Therefore, the study provides evidence that, at this critical time during the pandemic, government authorities may need to be more considerate by balancing number of inspections and the power of regulation.

I have to admit that the study is not perfect because of the following reasons: 1). There is very limited information provided by firms about the rejection of their loan application in the current edition of the WBES. For this reason, the indirect variable (firms that replied with financing obstacles) is used instead of the result of a loan application. It may not be as accurate if loan rejection could've been used. 2). Some factors that were not included in the study may affect a firm's credit constraint. For example: political stability, culture related factors, or religion related reasons. Unfortunately, there is no available data to pursue research like that. 3). Last but not least, the majority of the firms operate in developed economies. Whether the results can be expanded to the developed economies, or if there are any differences between the firms in different economies when facing government tax related inspections or visits, it has to be left for future researchers to work on.

ENDNOTES

1. More information can be found at <https://www.enterprisesurveys.org/methodology/>.
2. <https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD>
3. According to IMF and the World Bank, the list of transition countries can be obtained from: https://en.wikipedia.org/wiki/Transition_economy.
4. <https://databank.worldbank.org/data/download/GNIPC.pdf>
5. <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG>
6. <https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?end=2019&start=2019&view=bar>

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APPENDIX

Definition of Variables

Variable	Definition	Source
<i>Credit_Constraint</i>	=1 if firm replied with major or severe or very severe financing obstacle; =0, otherwise	WBES
	<u>Firm Characteristics</u>	
<i>Ln_Age</i>	Natural logarithm of the number of years the firm operated in this country	WBES
<i>Ln_Size</i>	Natural logarithm of the number of both permanent and temporary employees of the firm	WBES
<i>Legal_Status</i>	=1 if publicly traded company; =2 if private shares traded or non-traded company; =3 if sole proprietorship; =4 if partnership; =5, other	WBES
<i>Govern_Owned</i>	=1 if the firm is with 10% or more owned by government; =0, otherwise	WBES
<i>Foreign_Owned</i>	=1 if the firm is with 10% of more owned by foreign individuals, companies, or organizations; =0, otherwise	WBES
<i>Tax_Visit</i>	=1 if firm replied that tax administration is the major/very severe/biggest obstacle to its operation; =0, otherwise	WBES
<i>Times_of_Tax_Visit</i>	Number times firm was inspected by tax officials or required to meet with them	WBES
<i>Informal_Payments</i>	=1 if firm replied that gift or informal payment is expected in meetings with tax officials; =0, otherwise	WBES
<i>Corruption_Obstacle</i>	=1 if firm replied that corruption is the major/very severe/biggest obstacle to its operation; =0, otherwise	WBES
<i>Bank_Relationship</i>	=1 if firm replied with at least one checking or saving account; =0, otherwise	WBES
<i>Auditing</i>	=1 if the firm's financial statement is checked and certified by an external auditor; =0, otherwise	WBES
<i>Ln_Sales</i>	Natural logarithm of firm's most recent year's sales revenue	WBES
<i>Fixed_Asset_Purchase</i>	Percentage of firms to purchase fixed assets (e.g., equipment, building, land, & machinery)	WBES
<i>Female_Owner</i>	=1 if any of the owners are female; =0, otherwise	WBES
	<u>Country Characteristics</u>	
<i>Ln_GDP_Per_Capita</i>	Natural logarithm of the average GDP per Capita during 2006 -2019	World Bank
<i>Income_Group</i>	According to the World Bank, economies are divided into groups according to 2018 GNI per capita scale: high income, \$50631.00; upper middle income, \$19028.90; middle income, \$12,983.20; lower middle income, \$7655.10; and low income, \$2,287.80. It is calculated using the World Bank Atlas method, which smooths exchange rate fluctuations by using a three year moving average, price-adjusted conversion factor. In the current study, there high/upper middle and middle are categorized as Higher Income Group while the lower middle and low income are defined as Lower Income Group.	World Bank
<i>Transition_Country</i>	=1 if transitional country; =0 if otherwise	World Bank, IMF
<i>Country_Growth_Rate</i>	Average GDP growth rate during 2006 -2019. More information please see https://data.worldbank.org/indicator/ny.gdp.mktp.kd.zg	World Bank
<i>Inflation</i>	Average inflation rate during 2006 -2019. More information please see https://data.worldbank.org/indicator/fp.cpi.totl.zg	World Bank