

How Prevalent Are Credit-Constrained Firms in the Formal Private Sector?

Evidence Using Global Surveys

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Abstract

This study develops a measure of firm-level credit constraints by leveraging refinements in survey instruments for a widely used database. Using data on more than 65,000 firms across 109 economies, the study uncovers several insights. Around 30 percent of firms in the formal private sector are credit constrained. Firms that are credit-constrained tend to be smaller and negatively correlated with performance. The more developed the economy, the

lower the share of credit-constrained firms. One striking finding is that 52 percent of firms do not apply for loans as they have sufficient credit. For some economies, this may be more indicative of poor opportunities for the expansion of firms and thus the lack of demand for credit. The findings suggest that for policies that improve access to credit to be effective, they should go hand in hand with interventions that provide opportunities for firms to expand.

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How Prevalent Are Credit-Constrained Firms in the Formal Private Sector? Evidence Using Global Surveys

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1. Introduction

Much effort has been undertaken to improve access to finance for businesses in the developing world, mostly targeting small and medium-sized firms. The International Finance Corporation has invested billions of dollars annually through financial institutions to provide access to finance to businesses.¹ The effectiveness of such ventures depends on part in the nature of these firms and to the extent to which they are credit constrained. On one hand, entrepreneurial businesses with intentions to expand will benefit from access to funds that will allow them to engage in productive ventures. On the other hand, prevailing institutional and infrastructure weaknesses in an economy may exclude the possibility of productive business ventures. Under this scenario firms may have no intentions to expand and thus have no need for additional finance. The goal of this study is to fill the gap in this critical piece of information - the prevalence of financially constrained firms in developing economies.

Why do credit-constrained firms exist? This is part of the larger question of why credit is rationed as explored by Stiglitz and Weiss (1981). Credit markets do not function well due to several reasons, including information asymmetries and lack of contract enforcement. In developing economies firms have limited credit history as well as lack of collateralizable assets. Banks may thus ration credit to avoid issues of adverse selection and moral hazard. Furthermore, banks face fixed costs in lending. Thus, disbursement of few loans of large amounts is more profitable than many loans of small amounts. Consequently, firms that are credit worthy and would be able to initiate productive activities may be rationed out of credit, justifying external credit interventions.

¹ https://www.ifc.org/wps/wcm/connect/Industry_EXT_Content/IFC_External_Corporate_Site/financial+institutions [Accessed, June 8th, 11:17 PM EST].

There are several ways in which credit-constraints are measured. Under perfectly competitive credit markets, financial information about the firm should have no bearing on investment decisions. Furthermore, according to the Miller-Modigliani theorem, firms should be indifferent between internal and external sources of finance and the liquidity of the firm should not matter. Thus, any finding that the level of liquidity matters for investment is indicative that firms are credit constrained (Bigsten et al, 2003). The alternative method is to measure credit-constraints through direct surveys of businesses. This comes in several forms (Hansen and Rand, 2014a, b). First, it is based on the use of perception-based questions that ask whether access to finance is a constraint for operations, with responses provided in a Likert scale (Beck and Demirgüç-Kunt, 2006; Asiedu et al., 2013; Ullah, 2020). Second, it is based on the use of financial services (Aterido et al., 2013; Ranasinghe and Restuccia, 2018). The third type of measure is based on direct credit application information (Bigsten et al., 2003). A fourth type of measure looks at both use of financial services and outcomes of credit applications but is limited due to the lack of information regarding partial approval of loan applications (Kuntchev et al., 2014). This study builds on the literature of direct measures of constraints by combining use of external finance and credit application information to construct a comprehensive measure of financial constraints. The measure is further refined by including information on partial or full approvals of loans due to refinement of the survey instrument that was unavailable in previous measures. The measure of credit constraint developed in this study is harnessed to provide insights on the private sector in other studies (EBRD-EIB-WB, 2016; EBRD-EIB-WB, 2022; Brancati et al., 2022).²

Our findings indicate that for 109 economies in the sample, about 30 percent of the firms are credit constrained. Credit-constrained firms tend to be smaller and geographically concentrated in Africa. Credit constrained firms are less productive than unconstrained firms after accounting for a host of factors. Regarding unconstrained firms, a surprisingly large number of firms claim to have sufficient capital with

² This study uses the World Bank Enterprises Surveys that are global to measure credit constrained firms. Other studies have used firm-level surveys specific to Europe to measure credit constraints with different survey instruments (Garcia-Posada Gómez, 2019; Casey and O'Toole, 2014).

no intention of seeking any external sources. This finding is critical for policy makers as it implies that increasing access to finance alone may not necessarily impact the private sector if it does not go hand in hand with other policies to address other constraints preventing firms from engaging in opportunities to expand.

The importance of credit constraints, and more broadly access to finance in the wider literature is related to the larger role of the business environment in influencing firm productivity. It has been noted in the literature that there is significant resource misallocation across firms due to firm-specific distortions (Hsieh and Klenow, 2009; Restuccia and Rogerson, 2008). These distortions are large and can explain productivity differences between economies. While these studies are silent on the specifics on the exact nature of the distortions, another strand of the literature has attempted to uncover what elements of the business environments may matter for these distortions and thus explain firm productivity (Commander and Svejnar, 2011). Some studies have found evidence that access to finance matters for performance (Aterido et al., 2011; Gatti and Love, 2008), while others show that property rights may matter more than finance (Johnson, et al., 2002). While our study does provide some inferential investigation into the relationship between credit constraints and firm performance, the main added value of this study is that it provides a more detailed investigation on the channels through which firms are categorized as credit constrained or unconstrained and quantifies their pervasiveness.

The key contribution of this study can be summarized as follows (i) it constructs a measure of firm-level credit constraints by building on existing measures by leveraging improvements in the survey instrument for a widely used database, (ii) it develops a number of significant insights on the composition of credit constrained and unconstrained and their relationship with development and firm performance, and (iii) the firm-level data underlying the analysis is nationally representative, which also allows for comparisons across firm size, sector and region.

The remainder of the paper is structured as follows. Section 2 describes the database. Section 3 details the construction of the credit constraints measure and how it builds on the existing measures in the literature. Section 4 provides insights into the patterns and composition of credit constrained firms, as well as the types of firms that tend to be credit constrained. Section 5 explores the correlation of credit constrained firms with economic and financial development while section 6 does the same with firm-level performance. Section 7 correlates the credit constraint measure with other firm-level financial variables. Section 8 concludes with policy recommendations.

2. Database

The source of the firm-level data is the World Bank Enterprise Surveys. The analysis covers over 65,000 firms for a cross-section of 109 economies between 2013 and 2022. The Enterprise Surveys (ES) confer several advantages for this analysis. The surveys are nationally representative, stratified by sector, firm size, and location (within country). The Enterprise Surveys (ES) use a standard survey instrument to collect data employing the same methodology across all countries, allowing for cross-country comparisons. This is a considerable advantage as many survey datasets have low country coverage, no comparability across countries, or both. The respondents to the surveys are mainly business owners and top managers of firms. The surveys have high coverage in terms of countries and an extensive module on access to finance, business environment and firm productivity. The Enterprise Surveys universe excludes extractive industries, agriculture, informal firms (i.e., firms that are not registered), fully government-owned enterprises and micro firms with fewer than five full time employees. The data have been widely used by several studies to explore the private sector in developing economies (Paunov, 2016; Besley and Mueller, 2018; Chauvet and Ehrhar, 2018; Hjort and Poulsen, 2019; Falciola et al., 2020).

The finance section of the surveys is extensive. It covers information on sources of financing used by firms for working capital and investment; whether firms have access to bank accounts and loans, and the type of collateral used to acquire these loans. In addition, the finance section has several questions on loan

applications and outcomes. Firms are asked whether they applied for loans. For firms that applied, the loan outcomes are recorded – whether it was approved in full, approved in part, rejected, or withdrawn. Firms that did not apply for loans are asked to provide the reasons why. The range of options include no need for a loan due to sufficient capital, complex procedures, unfavorable terms, high collateral requirements, insufficient size of loan and maturity, or the firm simply did not think it would be approved.

Steps are taken to ensure the quality of the data is of high standards. First, most questions are constrained to the last fiscal year to limit recall bias and match with the yearly reporting of the firm. Second, information was taken from financial books if available. If necessary, the accountant of the firm was interviewed on top of the manager to ensure accuracy. Third, extensive quality control was performed on intermediate batches of the data during the survey implementation phase. Several callbacks were made to firms if there were any inconsistencies in the information collected. Enumerators also provided information to their supervisors as to whether they deemed the information collected was trustworthy.

3. Defining Credit Constrained Firms

Credit constraints are defined on a combination of the type of financing source (external vs. internal) and the outcome of loan applications. Credit constrained firms are further categorized into two types: Fully credit-constrained firms (FCC) and partially credit-constrained firms (PCC). Fully credit-constrained firms (FCC) are those that find it challenging to obtain credit. These are firms that largely have no source of external financing. In terms of loan outcomes, they typically fall into two categories: those that applied for a loan and were rejected; and those that were discouraged from applying either because of unfavorable terms and conditions or because they did not think the application would be approved. The terms and conditions that discourage firms include complex application procedures, unfavorable interest rates, high collateral requirements, and insufficient size of loan and maturity. Specifically, firms are categorized as FCC if they do not have access to external finance, and any of the following two conditions are met: (i) the firm did not apply for a loan for any reason other than the lack of need for it, that is unfavorable terms and

conditions or because they did not think the application would be approved or (ii) the firm applied for a loan but was rejected, including when having access to equity financing. Note that this means that firms that do get loan applications rejected and do use equity financing to finance investment are considered FCC. Thus, we treat equity financing under difficult conditions to be indicative of credit constraints. Note that in the survey instrument, the question on whether a firm received equity financing is only asked for firms that invested in fixed assets in the last fiscal year.³

Partially credit-constrained firms (PCC) are firms that have external financing but were discouraged from applying for a loan from a financial institution; or applied for a loan that was partially approved or rejected. They differ from FCC firms in that they either have external financing (excluding equity financing) or were partially approved for a loan (or both). Specifically, a firm is PCC if (i) the firm was partially approved for a loan (ii) the firm's application of for a loan was rejected but the firm has external finance excluding any equity finance. (iii) the firm has external finance but did not apply for a loan due to prevailing terms and conditions.

Credit unconstrained firms (UCC) are those that do not seem to have any difficulties accessing credit or do not need credit. Firms under this category encompass those that did not apply for a loan as they have sufficient capital and firms that applied for a loan and the application was approved in full. The definitions are visually presented in figure 6.

There are several improvements of this indicator over previous iterations in the literature. The indicator exhausts the finance questions in the survey that are based on the firms' experience. This is in contrast with measures that use firms' perceptions (Beck et al., 2005; Beck and Demirgüç-Kunt, 2006; Ayyagari et al., 2008; Asiedu et al., 2013; Ullah, 2020). Such studies use the following question in the survey *"To what*

³ Only about 3 percent of the full sample of analysis used equity finance to finance investments.

degree is Access to Finance an obstacle to the current operations of this establishment?” The response options are no obstacle, minor obstacle, moderate obstacle, major obstacle, and very severe obstacle. Firms that indicate access to finance is a major or very severe obstacle result in being classified as credit constrained firms. The limitation of this measure is that it is dependent on the perception of the respondent. What one respondent deems as a severe obstacle may not be consistent with another respondent. Thus, the measure is more vulnerable to measurement error.

Studies have developed direct credit constraint indicators based on the experience of the firm instead of perceptions. A few have focused on the use of financial services (Aterido et al., 2013; Ranasinghe and Restuccia, 2018). Others have focused exclusively on loan application outcomes (Muravyev et al.,2009; Bigsten et al., 2003; Gerlach-Kristen O'Connell, 2015). The measure proposed in this study builds on the literature that combines both aspects of direct measures – use of financial services and loan outcomes (Kuntchev et al., 2014; Hansen and Rand, 2014a, b). The contribution of the proposed holistic measure over the others is that it takes advantage of a recent refinement in the Enterprise Surveys questionnaire. The measure accounts for whether loans were fully or partially approved. Previous measures were based on older surveys that did not include this option, thus many partially approved loans were either classified as “approved”, “not approved” or received a response of “don’t know” depending on the subjective interpretation of the respondent. Thus, the proposed measure may be less vulnerable to measurement error.

However, there are limitations to the proposed credit constraint indicator. Like the previous iterations in the literature, the indicator does not incorporate any information on creditworthiness of the firm, and therefore among the credit-constrained firms there may be some that were rationed for good reasons, such as insufficiently productive projects or a bad repayment history. Under this scenario, our measure would be an over-estimate of the share of credit constrained firms in an economy. Furthermore, loan applicants may strategically expect that they may be partially approved for loans, and thus apply for a larger amount than needed. Such firms may be categorized as partially constrained, although they may be technically

unconstrained. Thus, we may have an overestimate of partially constrained firms. However, do note that one of the key findings is that the share of constrained firms is low and access to finance should be coupled with enabling factors that provide opportunities for businesses to growth. Thus, our findings would be even stronger if we accounted for the limitations of the credit constraints indicator

4. The Nature of Credit Constrained and Unconstrained Firms

On average 29.9 percent of firms in the formal private sector are credit constrained, with the rest (70.1%) being credit unconstrained (figure 1). Only 13.6 percent of firms are fully credit constrained, with 16.3 percent of firms are partially credit constrained. These patterns provide a surprising result - by and large lack of credit is a concern for less than one-third of the private sector. The composition of unconstrained firms can be broken down into those that are unconstrained as they had sufficient funds and those that are unconstrained as they were fully approved for the loan they applied for (figure 1). The former dominates - around 75.8 percent of unconstrained firms indicate they have sufficient funds while 24.2 percent of unconstrained firms were fully approved of loans. Further insights are provided by the information on loan applications. Around 51.5 percent of firms did not apply for a loan as they already had sufficient funds, 27 percent were discouraged from applying for loans due to the terms and conditions, and the remaining 21.5 percent applied for loans. It is also worth noting that 75.8 percent of firms that applied for a loan were fully approved. Around 9 percent were partially approved, and 8.7 percent were rejected. Credit constrained indicators developed in Kuntchev et al. (2014) may be misclassifying the partially approved firms as older survey instruments did not contain this information.

There are two potential implications of the large portion of firms that indicate they have sufficient funds. One is quite possibly that they are fully funded and thus any additional injection of liquidity is unlikely to have any effect on their performance. The other explanation could be that given other constraints in the economy, such firms have no intention to grow and have adapted to prevailing circumstances. Thus, since there are no avenues for growth, there is no need for additional financing to expand. The policy implication

may be that improved access to credit has to go hand in hand with other interventions that improve the external business environment.

The data allows to glean more information on the types of firms that are credit constrained. Small firms are more likely to be credit-constrained than large firms. Around 31.8 percent of small firms (5-19 employees) are credit-constrained, followed by 25.8 percent of medium firms (20-99 employees) and 18.8 percent of large firms (figure 2). Across all three size categories, the share of partially constrained firms is larger than the share of fully constrained firms. However, the variation across the different firm sizes is mostly dominated by differences in fully constrained firms across the three size categories. Among small firms, 15.2 percent are fully credit constrained, while 6.9 percent of large firms are fully credit constrained. In contrast, the figures for partially constrained small and large firms are 16.6 and 11.8 percent, respectively. Firms in the manufacturing sector are slightly more credit constrained than firms in the service sector. Around 31.4 percent of manufacturing firms are credit constrained, while 28.3 percent are credit constrained in the service sector. The composition of credit constrained firms is similar between the two sectors. In the manufacturing sector, 14.1 percent are fully credit constrained while 17.3 percent are partially credit constrained. In the service sector, 13.1 percent of firms are fully credit constrained while 15.2 percent of firms are partially credit constrained (figure 3).

The percentage of credit constrained firms varies by region (figure 4). As expected, firms in the Sub-Saharan Africa (AFR) region are the most credit constrained (48 percent) while firms in Europe and Central Asia (ECA) are the least credit constrained (19.2 percent). South Asia (SAR) has the second highest share of credit constrained firms (34.8 percent) followed by East Asia and the Pacific (EAP) with the third highest share of credit constrained firms (33.8 percent). In the Middle East and North Africa (MNA) and Latin America and Caribbean (LAC), the share of credit constraint firms is 27.4 and 25.4 percent, respectively. However, the composition of credit constrained firms differs between the regions. The share of fully and partially constrained firms is similar in AFR (23.8 and 24.2 percent respectively) and in SAR (17.1 and

17.7 percent respectively). The share of partially constrained firms outweighs the share of fully constrained firms in LAC (19.4 vs 6 percent) and ECA (10.9 vs 8.3 percent), and to a lesser extent MNA (14.6 vs 12.8 percent). Only in EAP is the share of partially constrained firms lower than fully constrained firms (15.5 vs 18.3 percent). This highlights the importance of partially constrained firms. Some caveats apply to these comparisons. For one, the regions did not have survey rollouts at the same time. Second, high income economies in ECA were surveyed, but many high-income economies are missing in MENA. As section 5 shows, there is a positive correlation between the prevalence of unconstrained firms and the level of development. Table A2 provides country-level information on the prevalence of credit constrained firms and the regional classification.

5. Credit Constraints and Development

Developed economies tend to have better conditions for businesses to thrive. The high quality of infrastructure as well as other elements of the business environment create new opportunities of expansion. Furthermore, developed financial systems may provide better avenues of providing liquidity to firms. In table A2 we present the percentage of credit constrained firms for each economy of the sample. Israel, Spain, and Austria have the lowest percentage of credit constrained firms with 0.57, 0.70 and 2.47 percent respectively. At the other end of the spectrum are The Gambia (71.1 percent), Zimbabwe (69.88 percent) and Iraq (69.40 percent). Figure 5 correlates the prevalence of credit constrained firms with the level of development as proxied by real GDP per capita. Not surprisingly, richer countries tend to have a lower share of credit constrained firms than poorer economies.

We explore further if the depth of the financial sector is correlated with the prevalence of credit constrained firms. The depth of the financial sector is measured by domestic credit to the private sector in general (% of GDP) and domestic credit provided by banks to the private sector (% of GDP). As expected, we find a negative correlation between the percentage of credit constrained firms and the depth of the financial sector

(figure 5). The correlations of the credit constraint measure with the level of development and depth of the financial sector show that our measure of credit constraints exhibits the expected patterns.

6. Credit Constraints and Firm Performance

In this section we explore the relationship between firm performance and credit constraints. Firms that are credit-constrained may be less able to undertake productive ventures than those with access to credit. Therefore, credit-constrained firms may exhibit lower firm performance. While our analysis should not be interpreted as causal, we account for as much as possible for other explanations by including numerous controls, given the constraints in the data. The objective is to show that we get the correlations one would expect from a measure of credit constraints. We explore the relationship between firm performance and credit constraints by estimating the equation below for firm i :

$$\begin{aligned} Perf_i = & \beta_0 + \beta_1 CreditConst_i + \beta_2 Age_i + \beta_3 Size_i + \beta_4 Training_i + \beta_5 Multi_i + \beta_6 Manager_i \\ & + \beta_7 Fem_i + \beta_8 Exprt_i + \beta_9 Frgn_i + \beta_{10} BankAcct + \beta_{11} PowerOut_i \\ & + \beta_{12} Crime_i + \beta_{13} Website_i + Sector_r + Country_j + Year_t \\ & + \epsilon_i \end{aligned} \quad (1)$$

Where $perf$ is the proxy for firm outcomes including labor productivity, annual sales growth, and annual employment growth. For these outcome variables, equation 1 is estimated using OLS. We also include an estimation where the dependent variable is whether or not the firm purchased fixed assets over the last fiscal year. For this estimation we used a Probit model. The main variable of interest is our credit constraints indicator ($CreditConst$) that takes a value of 1 if the firm is credit constrained and 0 otherwise. We also include an additional set of estimations where we replace the credit constraint variable with both the partially credit constraint variable and the fully credit constrained variable. We account for several controls including firm age (Age), size ($Size$), whether the firm provides formal training ($Training$) whether the firm is part of a multi-establishment firm ($Multi$), manager experience ($Manager$), whether the manager

is female (*Fem*), export orientation (*Exprt*), foreign ownership (*Frgn*), whether the firms a checking of savings account (*BankAcct*), whether a firm experienced power outages (*PowerOut*), experienced crime (*Crime*), has their own website (*Website*), and sector (*Sector*), Year (*Year*) and country fixed effects (*Country*). ϵ_i is the standard error term with the usual desirable properties.

The rationale for our empirical specification is as follows. We account for the age and size of the firm, which have been shown to be important for firm performance (Harris and Robinson 2004; Huergo and Jaumandreu 2004; Biesebroeck 2005; Bigsten and Gebreyesus 2007; Haltiwanger et al. 2013). Scale economies enable large firms to be productive (Biesebroeck 2005), however other studies have argued that firm age matters more than size (Haltiwanger et al. 2013). Following most studies, we account for total employment, which we use as a proxy for firm size (Bardasi et al., 2011). We account for manager experience and whether firms offer formal training that tend to improve human capital capacity (Kinda et al, 2011; Carranza et al., 2018).

We capture foreign ownership and exporter status that have been found to influence firm productivity (Lopez 2005; Bernard et al. 2007). Exporting firms face more competitive markets while foreign owned firms have access to technology and human resource transfers that can improve firm performance (Dimelis and Louri, 2002; Guadalupe et al., 2012). Beyond our credit constraint measure, simply having access to finance as measured by an overdraft facility or credit line could improve firm performance (Gatti and Love, 2008). Access to finance is accounted for using a dummy variable that takes on a value of one if a firm has a checking or savings account, and zero otherwise. Access to internet or telecommunications may allow firms to reduce expenses on communication and access inputs efficiently thereby increasing productivity (Clarke et al., 2015). We proxy for this using a variable that captures whether a firm has its own website. Poor power infrastructure and can lower firm productivity (Cole et al., 2018). We account for this by using a variable capturing whether or not a firm experienced power outages. Crime has been found to raise the

cost of doing business for small firms (Motta, 2016). We account for crime using a binary variable that captures whether a firm experienced crime such as theft, robbery, vandalism, or arson. The regressions account for sector (2 Digit ISIC level), year, and country fixed effects. Thus, any economy-wide factors that are time invariant are accounted for in the estimations. Table A1 provides the summary statistics for all outcome variables and the covariates.⁴

Results

Table 1 presents the findings. Credit constrained firms are negatively correlated with labor productivity, annual sales growth, and employment growth. Credit constrained firms are also less likely to invest in fixed assets. In all cases the credit constrained firms coefficient is statistically significant at the 1 percent level. The goodness of fit of the regressions varies from 0.11 to 0.61. In table 2 we present the findings for fully credit constrained firms and partially credit constrained firms. The coefficients of both the fully credit constrained variable and the partially credit constrained variable are negative and statistically significant at the 5% level or better for the performance measures - labor productivity, annual sales growth, and employment growth. However, for the investment outcome variable, the coefficients for both partial and fully constrained firms are negative, but only the latter is statistically significant. The implication is that being fully credit constrained may hurt the ability of firms to invest, but not necessarily if a firm is partially credit constrained. This highlights the need to distinguish between partial and fully credit constrained firms.

Caution is due in interpreting these findings as causal. It is quite likely that poor performance is what leads firms to be credit constrained. Furthermore, poor credit worthiness may be correlated with firm performance resulting in the negative correlation observed. Thus, the measure of credit constraints is essentially capturing an omitted variable – creditworthiness. Both issues of simultaneity and omitted variables imply that our estimates are not causal, and it is beyond the scope of this study to obtain causal estimates.

⁴ Note that Bhutan 2015 is excluded from the regression sample as there is no data on whether the establishments are part of a larger firm (*multi-firm*). Main results are unchanged if the multi-firm variable is excluded (hence Bhutan is included). We opt to keep the multi-firm variable as it is a significant predictor of labor productivity.

However, other studies using similar data have found a robust negative relationship between access to finance and firm performance (Aterido et al, 2011; Ranasinghe and Restuccia, 2018).

7. Access to Finance Perception and Outstanding Loans

The credit constraints indicator developed in this study does not use two variables available in the surveys. The first is the perception of whether access to finance is an obstacle to operations, and the second is whether the firm has outstanding personal loans to finance business activities. The former is the perception-based variable to capture credit-constraints in several studies. The latter may indicate that a firm is in dire need for credit and thus the owner had to use personal loans. These variables could provide some additional insights on the credit constraint measure. We correlate these variables with our credit constraints variable and present the findings in table 3. Credit constrained firms are more likely to state that the lack of access to finance is a moderate or severe obstacle to operations. The coefficient is statistically significant at the 1 percent level. This is also the case for both partially and fully credit constrained firms (Table 3, column 4). Similarly, credit constrained firms are more likely to use personal loans. The coefficient of the credit constraint indicator is positive and statistically significant at the 1 percent level. However, when the credit constraint indicator is broken down into the partial and fully constrained subcategories, only the coefficient for being a partially constrained firm is statistically significant, while the coefficient of being fully constrained is not. This may suggest that partially constrained firms are able to use a mix of personal and external finance, while fully credit constrained firms do not have these options. This also highlights the importance of separating out partially and fully constrained firms in the analysis as they may be experiencing different circumstances and may require different approaches or policy interventions to alleviate their financing constraints. In general, these results are consistent with expectations and serve to some extent to validate the accuracy of the credit constraint measure constructed in this paper.

8. Conclusion

This study developed a new measure of credit constraints by leveraging refinements in a widely used survey instrument to collect firm-level data: the World Bank Enterprise Surveys. A few insights were provided. About only 30 percent of firms are credit constrained. These firms tend to be more prevalent in less developed economies and are negatively correlated with firm performance. A striking pattern is that credit unconstrained firms constitute mostly firms that state they have sufficient funds as opposed to those that have been successful in obtaining loans. A majority of the firms (51.5 percent) state they have sufficient credit, and thus do not need additional liquidity.

These findings have important implications for policy makers and various stakeholders. The study has shown that partially constrained firms and fully constrained firms may behave differently. The former are more likely to use a mix of internal and external financing than the latter, and in most regions partially credit constrained firms are more prevalent than the fully credit constrained firms. Furthermore, being partially constrained is less likely to hinder a firm from investing than being fully credit-constrained. Policy makers should be cautious about one-size-fits-all sorts of approaches to alleviating credit constraints. In addition, providing easier access to finance for firms is unlikely to improve outcomes if firms declare no need for it. A more nuanced approach is needed where the root cause of the lack of demand for credit is identified. This will differ considerably between richer and poorer economies. Developing economies suffer from a wide range of basic constraints that curtail the effectiveness of the business environment. Poor infrastructure, uncompetitive markets, and an unstable political climate are prominent constraints, to name a few. Such factors increase transaction costs and limit opportunities for firms to expand. Policies that provide more financing for firms in such environments are unlikely to have any effects. However, policies that improve access to finance in tandem with other interventions to improve the external operating environment of firms could be more effective. This would create expansion opportunities for firms while providing them the financial capacity to seize them.

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Table 1: Credit Constrained Firms and Performance

Model	OLS			Probit
Dependent Variable	Labor Productivity (Sales per Worker, USD)	Real Annual Sales Growth (%)	Annual employment Growth (%)	Firm purchased fixed assets Y/N
	(1)	(2)	(3)	(4)
Credit constrained firms Y/N	-0.265*** (0.027)	-2.646*** (0.534)	-1.192*** (0.393)	-0.129*** (0.026)
Log of age of firm	0.086*** (0.015)	-3.631*** (0.358)	-3.902*** (0.428)	-0.115*** (0.016)
Log of size	0.015 (0.012)	1.054*** (0.224)	1.921*** (0.151)	0.206*** (0.012)
Firm is part of a larger firm Y/N	0.138*** (0.034)	-0.008 (0.628)	-0.590 (0.418)	-0.048 (0.038)
Firm offers formal training Y/N	0.143*** (0.025)	1.215** (0.542)	0.519* (0.310)	0.285*** (0.028)
Top manager experience in sector (years)	0.001 (0.001)	-0.052** (0.021)	-0.052*** (0.015)	0.001 (0.001)
Female top manager Y/N	-0.019 (0.028)	-0.681 (0.560)	-0.656* (0.360)	-0.044 (0.029)
Direct exports 10% or more of sales Y/N	0.215*** (0.033)	0.465 (0.571)	0.199 (0.408)	0.096*** (0.033)
Foreign ownership Y/N	0.410*** (0.046)	-0.557 (0.660)	-1.317*** (0.506)	-0.081* (0.042)
Establishment has checking or savings account Y/N	0.398*** (0.039)	-0.127 (0.739)	-0.632 (0.479)	0.214*** (0.041)
Firm purchased fixed assets Y/N	0.130*** (0.024)	3.268*** (0.444)	2.170*** (0.288)	
Firm experienced power outage Y/N	0.024 (0.027)	-0.148 (0.462)	-0.269 (0.308)	0.223*** (0.026)
Firm experienced losses due to crime Y/N	0.079** (0.033)	0.390 (0.655)	-0.448 (0.388)	0.244*** (0.034)
Website Y/N	0.289*** (0.026)	0.689 (0.501)	-0.100 (0.422)	0.178*** (0.030)
Constant	9.149*** (0.319)	8.594 (6.012)	8.733** (4.012)	-1.796*** (0.365)
Sector (ISIC 2 digit) Fixed Effects	YES	YES	YES	YES
Country Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Number of observations	66,858	61,351	67,591	71,920
Adjusted R2	0.605	0.134	0.111	0.158

note: *** p<0.01, ** p<0.05, * p<0.1. Survey weights used. Standard errors clustered at the size by location by sector strata level

Table 2: Fully and Partially Credit Constrained Firms and Performance

Model	OLS			Probit
Dependent Variable	Labor Productivity (Sales per Worker, USD)	Real Annual Sales Growth (%)	Annual employment Growth (%)	Firm purchased fixed assets Y/N
	(1)	(2)	(3)	(4)
Fully credit constrained firms Y/N	-0.341*** (0.041)	-2.678*** (0.730)	-1.227** (0.545)	-0.240*** (0.038)
Partially credit constrained firms Y/N	-0.208*** (0.035)	-2.622*** (0.640)	-1.165** (0.456)	-0.049 (0.032)
Log of age of firm	0.087*** (0.015)	-3.631*** (0.357)	-3.902*** (0.428)	-0.115*** (0.016)
Log of size	0.014 (0.012)	1.054*** (0.223)	1.920*** (0.151)	0.205*** (0.012)
Firm is part of a larger firm Y/N	0.138*** (0.034)	-0.008 (0.628)	-0.590 (0.418)	-0.049 (0.038)
Firm offers formal training Y/N	0.143*** (0.025)	1.215** (0.542)	0.519* (0.310)	0.285*** (0.028)
Top manager experience in sector (years)	0.001 (0.001)	-0.052** (0.021)	-0.052*** (0.015)	0.001 (0.001)
Female top manager Y/N	-0.018 (0.028)	-0.680 (0.559)	-0.656* (0.360)	-0.043 (0.029)
Direct exports 10% or more of sales Y/N	0.214*** (0.033)	0.464 (0.573)	0.198 (0.409)	0.094*** (0.033)
Foreign ownership Y/N	0.411*** (0.046)	-0.556 (0.661)	-1.317*** (0.505)	-0.079* (0.043)
Establishment has checking or savings account Y/N	0.392*** (0.038)	-0.129 (0.740)	-0.634 (0.480)	0.206*** (0.041)
Firm purchased fixed assets Y/N	0.128*** (0.024)	3.267*** (0.443)	2.168*** (0.288)	
Firm experienced power outage Y/N	0.023 (0.027)	-0.148 (0.462)	-0.269 (0.308)	0.221*** (0.026)
Firm experienced losses due to crime Y/N	0.076** (0.033)	0.389 (0.656)	-0.449 (0.388)	0.240*** (0.034)
Website Y/N	0.288*** (0.026)	0.688 (0.500)	-0.100 (0.422)	0.177*** (0.030)
Constant	9.167*** (0.318)	8.601 (6.011)	8.741** (4.007)	-1.790*** (0.364)
Sector (ISIC 2 digit) Fixed Effects	YES	YES	YES	YES
Country Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Number of observations	66,858	61,351	67,591	71,920
Adjusted R2	0.605	0.134	0.111	0.159

note: *** p<0.01, ** p<0.05, * p<0.1. Survey weights used. Standard errors clustered at the size by location by sector strata level

Table 3: Credit Constrained Firms and Other Firm-Level Financial Indicators

Model	Probit			
Dependent Variable	Outstanding Personal Loans Used To Finance Business Activities Y/N	Access to Finance is a Major Constraint Y/N	Outstanding Personal Loans Used To Finance Business Activities Y/N	Access to Finance is a Major Constraint Y/N
	(1)	(2)	(3)	(4)
Credit constrained firms Y/N	0.327*** (0.036)	0.757*** (0.031)		
Fully credit constrained firms Y/N			0.087 (0.059)	0.689*** (0.041)
Partially credit constrained firms Y/N			0.469*** (0.038)	0.806*** (0.036)
Log of age of firm	-0.096*** (0.021)	-0.073*** (0.019)	-0.095*** (0.021)	-0.072*** (0.019)
Log of size	-0.070*** (0.015)	-0.017 (0.014)	-0.076*** (0.015)	-0.019 (0.013)
Firm is part of a larger firm Y/N	-0.047 (0.042)	-0.046 (0.039)	-0.050 (0.042)	-0.047 (0.039)
Firm offers formal training Y/N	0.116*** (0.035)	-0.004 (0.032)	0.118*** (0.035)	-0.004 (0.032)
Top manager experience in sector (years)	0.001 (0.002)	0.003** (0.001)	0.001 (0.002)	0.003** (0.001)
Female top manager Y/N	-0.005 (0.040)	-0.001 (0.037)	-0.003 (0.040)	-0.001 (0.037)
Direct exports 10% or more of sales Y/N	0.054 (0.039)	0.120*** (0.043)	0.049 (0.039)	0.119*** (0.043)
Foreign ownership Y/N	-0.241*** (0.058)	-0.266*** (0.049)	-0.235*** (0.059)	-0.264*** (0.049)
Establishment has checking or savings account Y/N	0.120** (0.053)	-0.011 (0.045)	0.099* (0.053)	-0.017 (0.045)
Firm purchased fixed assets Y/N	0.109*** (0.034)	0.091*** (0.028)	0.102*** (0.034)	0.088*** (0.028)
Firm experienced power outage Y/N	0.079** (0.033)	0.098*** (0.030)	0.076** (0.034)	0.096*** (0.030)
Firm experienced losses due to crime Y/N	0.256*** (0.042)	0.204*** (0.041)	0.249*** (0.043)	0.202*** (0.041)
Website Y/N	0.043 (0.034)	-0.019 (0.034)	0.045 (0.034)	-0.020 (0.034)
Constant	-1.953***	-0.241	-1.948***	-0.234

	(0.404)	(0.311)	(0.399)	(0.312)
Sector (ISIC 2 digit) Fixed Effects	YES	YES	YES	YES
Country Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Number of observations	69,810	71,076	69,810	71,076
Adjusted R2	0.108	0.202	0.114	0.202

note: *** p<0.01, ** p<0.05, * p<0.1. Survey weights used. Standard errors clustered at the size by location by sector strata level

Table A1: Summary Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
Credit constrained firms Y/N	66,858	0.30	0.46	0	1
Fully credit constrained firms Y/N	66,858	0.14	0.34	0	1
Partially credit constrained firms Y/N	66,858	0.16	0.37	0	1
Labor Productivity (Sales per Worker, USD)	66,858	10.11	1.86	-5.03	18.15
Real Annual Sales Growth (%)	61,077	0.74	22.91	-99.95	100.00
Annual employment Growth (%)	63,543	3.66	15.57	-97.04	100.00
Firm purchased fixed assets Y/N	66,858	0.41	0.49	0	1
Outstanding Personal Loans Used To Finance Business Activities Y/N	65,051	0.13	0.34	0	1
Access to Finance is a Major Constraint Y/N	66,108	0.21	0.41	0	1
Log of age of firm	66,858	2.69	0.78	0	5.40
Log of size	66,858	2.71	1.04	0	8.85
Firm is part of a larger firm Y/N	66,858	0.19	0.39	0	1
Firm offers formal training Y/N	66,858	0.31	0.46	0	1
Top manager experience in sector (years)	66,858	19.82	11.49	1	60
Female top manager Y/N	66,858	0.18	0.38	0	1
Direct exports 10% or more of sales Y/N	66,858	0.13	0.34	0	1
Foreign ownership Y/N	66,858	0.09	0.29	0	1
Establishment has checking or savings account Y/N	66,858	0.88	0.33	0	1
Firm purchased fixed assets Y/N	66,858	0.41	0.49	0	1
Firm experienced power outage Y/N	66,858	0.47	0.50	0	1
Firm experienced losses due to crime Y/N	66,858	0.15	0.36	0	1
Website Y/N	66,858	0.53	0.50	0	1

Note: Sample defined by the labor productivity regressions (Table 1, column 1)

Table A2: Credit Constrained Firms Around the World

Region	Economy	Year	Credit constrained firms (%)	Partially credit constrained firms (%)	Fully credit constrained firms (%)
ECA	Albania	2019	11.99	8.33	3.66
LAC	Argentina	2017	32.94	21.48	11.47
ECA	Armenia	2020	38.02	10.49	27.53
ECA	Austria	2021	2.47	1.42	1.05
ECA	Azerbaijan	2019	20.59	5.58	15.01
SAR	Bangladesh	2022	30.16	22.12	8.04
ECA	Belarus	2018	28.39	7.56	20.83
ECA	Belgium	2020	5.08	4.34	0.74
AFR	Benin	2016	50.43	12.63	37.80
SAR	Bhutan	2015	25.92	15.68	10.24
LAC	Bolivia	2017	30.54	20.52	10.01
ECA	Bosnia and Herzegovina	2019	17.86	7.61	10.25
ECA	Bulgaria	2019	27.06	18.85	8.20
AFR	Burundi	2014	38.99	31.61	7.37
EAP	Cambodia	2016	32.49	15.81	16.68
AFR	Cameroon	2016	50.31	33.10	17.21
AFR	Chad	2018	36.75	21.09	15.65
LAC	Colombia	2017	27.43	25.09	2.35
ECA	Croatia	2019	7.65	3.59	4.06
ECA	Cyprus	2019	21.97	14.81	7.17
ECA	Czechia	2019	4.57	3.10	1.47
AFR	Côte d'Ivoire	2016	52.77	18.33	34.44
ECA	Denmark	2020	5.83	5.02	0.81
MNA	Djibouti	2013	13.09	8.53	4.56
LAC	Dominican Republic	2016	6.28	5.13	1.15
LAC	Ecuador	2017	29.61	25.89	3.72
MNA	Egypt, Arab Rep.	2013	27.28	10.32	16.95
MNA	Egypt, Arab Rep.	2016	24.46	8.21	16.25
MNA	Egypt, Arab Rep.	2020	24.59	14.66	9.93
LAC	El Salvador	2016	26.26	19.86	6.40
ECA	Estonia	2019	12.37	7.19	5.18
AFR	Eswatini	2016	42.89	25.57	17.33
AFR	Ethiopia	2015	53.14	17.11	36.03
ECA	Finland	2020	8.78	8.22	0.55
ECA	France	2021	8.08	4.33	3.75
AFR	Gambia, The	2018	71.10	20.49	50.61
ECA	Georgia	2019	16.88	8.84	8.04
ECA	Germany	2021	7.58	6.17	1.41
ECA	Greece	2018	25.69	9.52	16.17
LAC	Guatemala	2017	17.07	6.68	10.39
AFR	Guinea	2016	42.88	20.45	22.42
LAC	Honduras	2016	41.81	35.53	6.28
ECA	Hungary	2019	8.55	4.90	3.65
SAR	India	2022	27.10	17.78	9.32
EAP	Indonesia	2015	50.57	30.40	20.17
MNA	Iraq	2022	69.40	14.83	54.57
ECA	Ireland	2020	13.34	10.29	3.05
MNA	Israel	2013	0.57	0.39	0.18
ECA	Italy	2019	33.42	25.09	8.33
MNA	Jordan	2013	36.18	19.74	16.43
MNA	Jordan	2019	19.42	15.68	3.74

Region	Economy	Year	Credit constrained firms (%)	Partially credit constrained firms (%)	Fully credit constrained firms (%)
ECA	Kazakhstan	2019	29.13	7.96	21.17
AFR	Kenya	2018	37.94	23.90	14.04
ECA	Kosovo	2019	26.09	21.10	4.99
ECA	Kyrgyz Republic	2019	17.69	7.14	10.55
EAP	Lao PDR	2016	39.37	8.61	30.76
EAP	Lao PDR	2018	37.67	17.57	20.10
ECA	Latvia	2019	17.64	14.15	3.48
MNA	Lebanon	2013	26.39	12.23	14.16
MNA	Lebanon	2019	31.34	14.72	16.62
AFR	Lesotho	2016	27.84	20.31	7.53
AFR	Liberia	2017	41.43	24.07	17.36
ECA	Lithuania	2019	19.54	12.51	7.02
ECA	Luxembourg	2020	10.53	6.49	4.04
AFR	Madagascar	2022	50.42	26.86	23.57
EAP	Malaysia	2015	38.80	28.57	10.23
EAP	Malaysia	2019	13.40	9.85	3.55
AFR	Mali	2016	54.65	36.67	17.97
MNA	Malta	2019	6.94	5.41	1.52
AFR	Mauritania	2014	45.21	21.90	23.31
ECA	Moldova	2019	50.08	29.16	20.92
EAP	Mongolia	2019	48.85	17.86	30.99
ECA	Montenegro	2019	23.71	19.89	3.82
MNA	Morocco	2013	13.18	8.54	4.64
MNA	Morocco	2019	46.52	35.84	10.69
AFR	Mozambique	2018	50.45	25.97	24.49
EAP	Myanmar	2014	39.30	8.60	30.71
EAP	Myanmar	2016	31.59	15.21	16.38
ECA	Netherlands	2020	10.14	8.16	1.98
LAC	Nicaragua	2016	24.71	20.59	4.13
AFR	Niger	2017	42.11	26.42	15.69
ECA	North Macedonia	2019	26.72	15.59	11.14
SAR	Pakistan	2022	56.21	15.31	40.90
EAP	Papua New Guinea	2015	27.27	14.89	12.39
LAC	Paraguay	2017	10.66	8.10	2.56
LAC	Peru	2017	19.30	17.25	2.05
EAP	Philippines	2015	17.12	9.91	7.20
ECA	Poland	2019	11.14	9.85	1.29
ECA	Portugal	2019	12.74	5.10	7.63
ECA	Romania	2019	42.23	32.04	10.19
ECA	Russian Federation	2019	45.67	32.52	13.15
AFR	Rwanda	2019	53.71	37.01	16.70
MNA	Saudi Arabia	2022	14.57	9.93	4.65
AFR	Senegal	2014	56.37	28.60	27.77
ECA	Serbia	2019	12.12	9.65	2.47
AFR	Sierra Leone	2017	68.10	20.40	47.70
ECA	Slovak Republic	2019	21.10	13.11	7.99
ECA	Slovenia	2019	6.52	5.17	1.35
EAP	Solomon Islands	2015	15.41	10.10	5.30
AFR	South Africa	2020	11.70	3.23	8.47
ECA	Spain	2021	0.70	0.69	0.01
LAC	Suriname	2018	47.37	32.40	14.97
ECA	Sweden	2014	5.90	4.78	1.12

Region	Economy	Year	Credit constrained firms (%)	Partially credit constrained firms (%)	Fully credit constrained firms (%)
ECA	Sweden	2020	5.36	2.63	2.73
ECA	Tajikistan	2019	20.50	5.75	14.75
EAP	Thailand	2016	56.42	19.35	37.07
EAP	Timor-Leste	2015	41.60	24.65	16.95
EAP	Timor-Leste	2021	35.72	6.27	29.45
AFR	Togo	2016	45.17	25.22	19.94
MNA	Tunisia	2013	28.54	21.58	6.96
MNA	Tunisia	2020	45.54	34.91	10.63
ECA	Türkiye	2019	42.21	20.21	22.00
ECA	Ukraine	2019	55.38	22.28	33.10
LAC	Uruguay	2017	16.56	14.17	2.38
ECA	Uzbekistan	2019	26.15	10.58	15.57
EAP	Vietnam	2015	15.15	10.58	4.57
MNA	West Bank and Gaza	2013	21.77	14.94	6.82
MNA	West Bank and Gaza	2019	21.58	12.16	9.42
MNA	Yemen, Rep.	2013	49.36	14.07	35.29
AFR	Zambia	2019	57.96	20.18	37.79
AFR	Zimbabwe	2016	69.88	39.03	30.85

Figure 1: The Composition of Credit Constraint Status and Loan Status

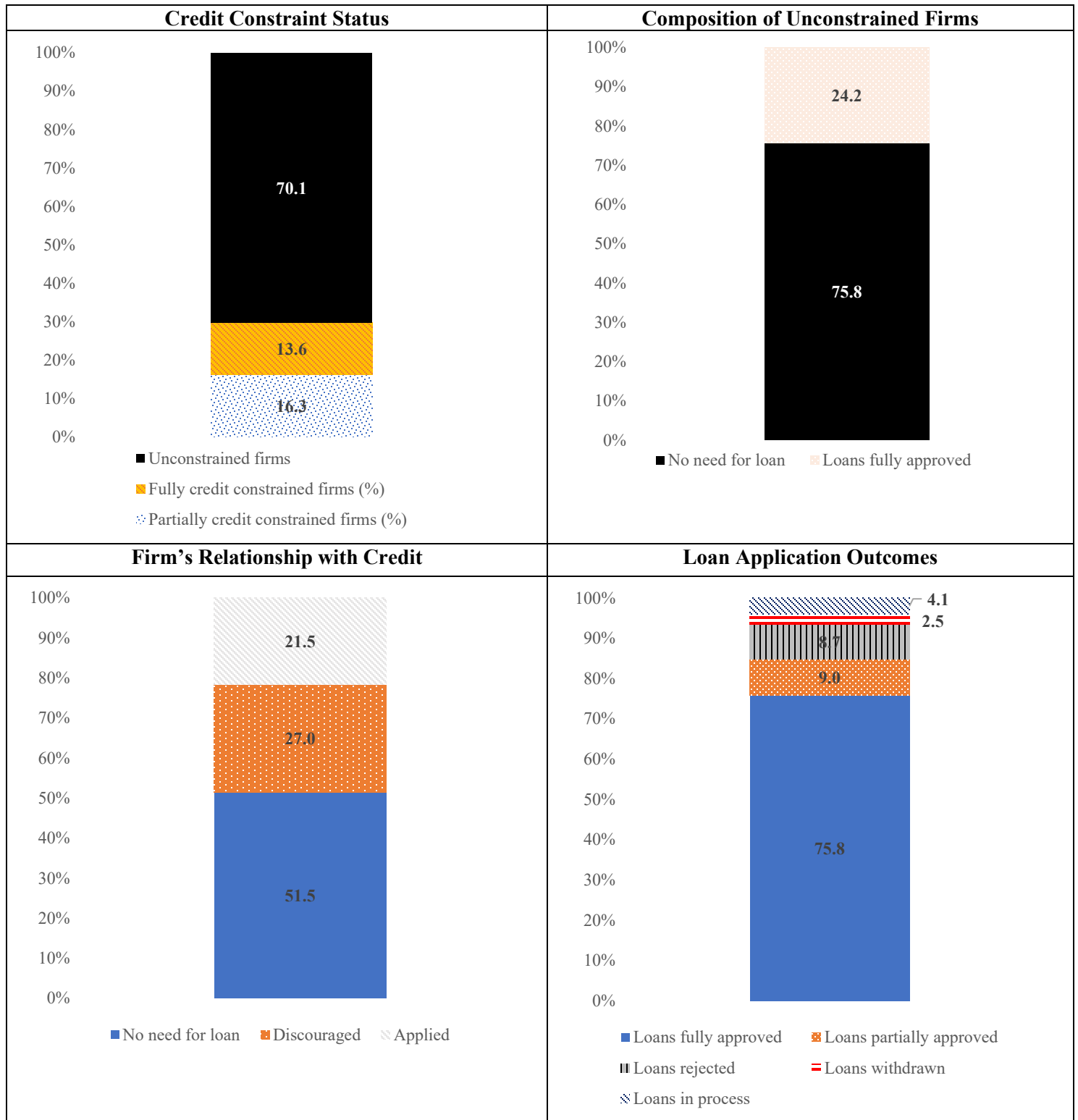


Figure 2: Credit Constrained Firms by Size

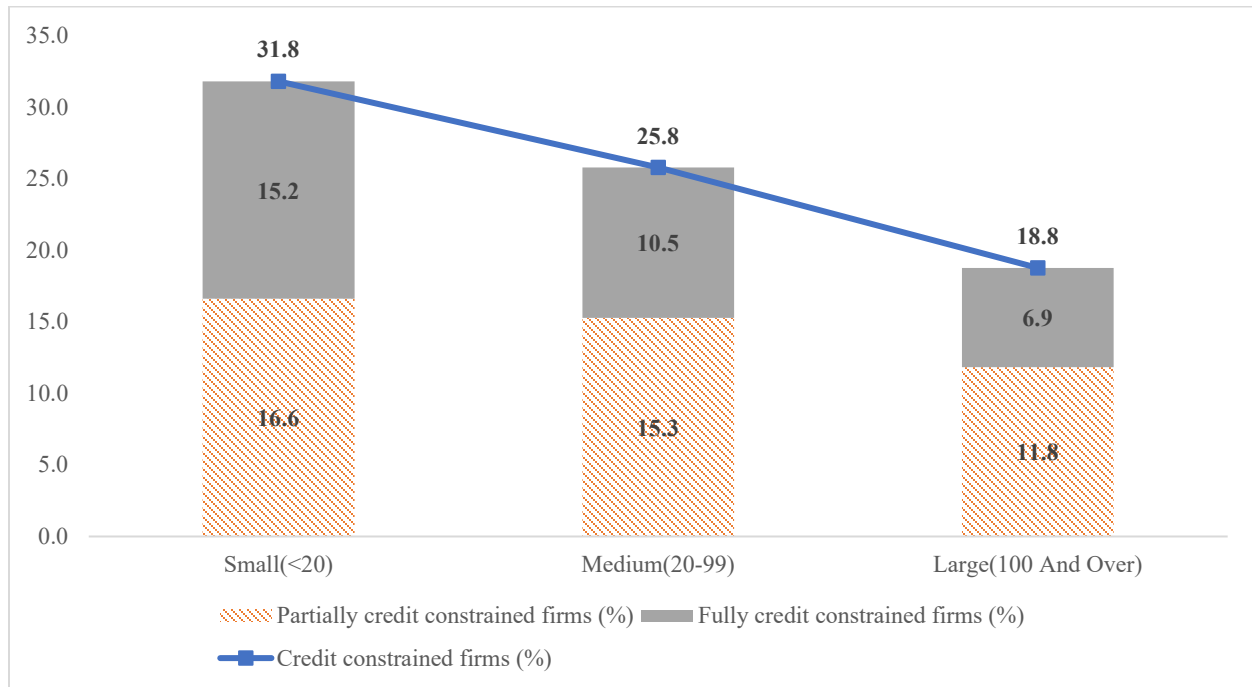


Figure 3: Credit Constrained Firms by Sector

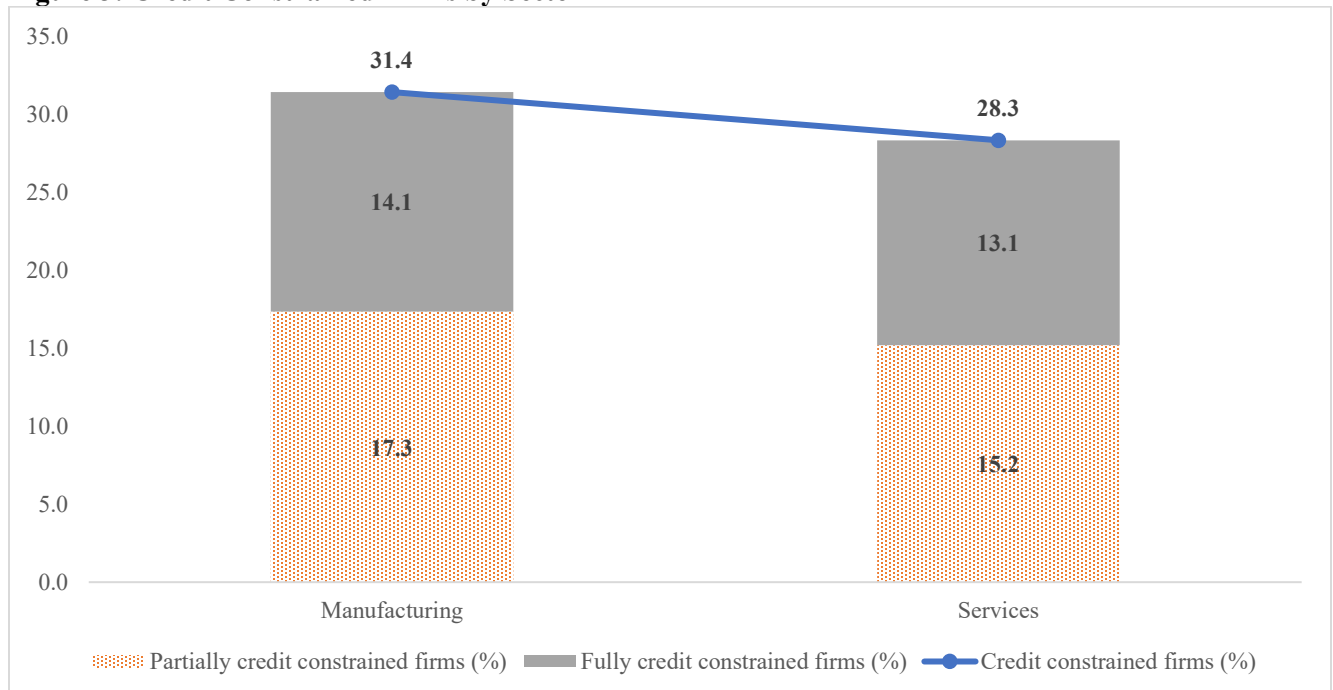
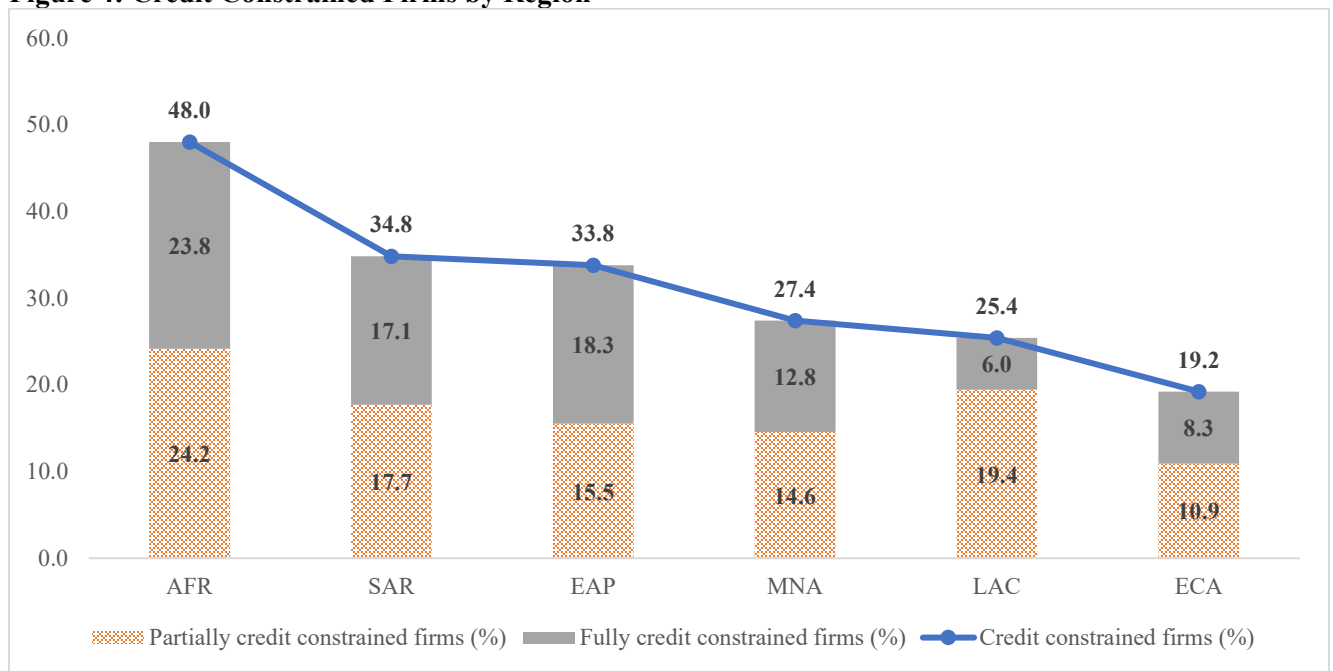


Figure 4: Credit Constrained Firms by Region



The regions are: East Asia & Pacific (EAP), Europe & Central Asia (ECA), Latin America & Caribbean (LAC), Middle East & North Africa (MNA), South Asia (SA), Sub-Saharan Africa (AFR)

Figure 5: Correlation of Credit Constrained Firms with Macro-Indicators

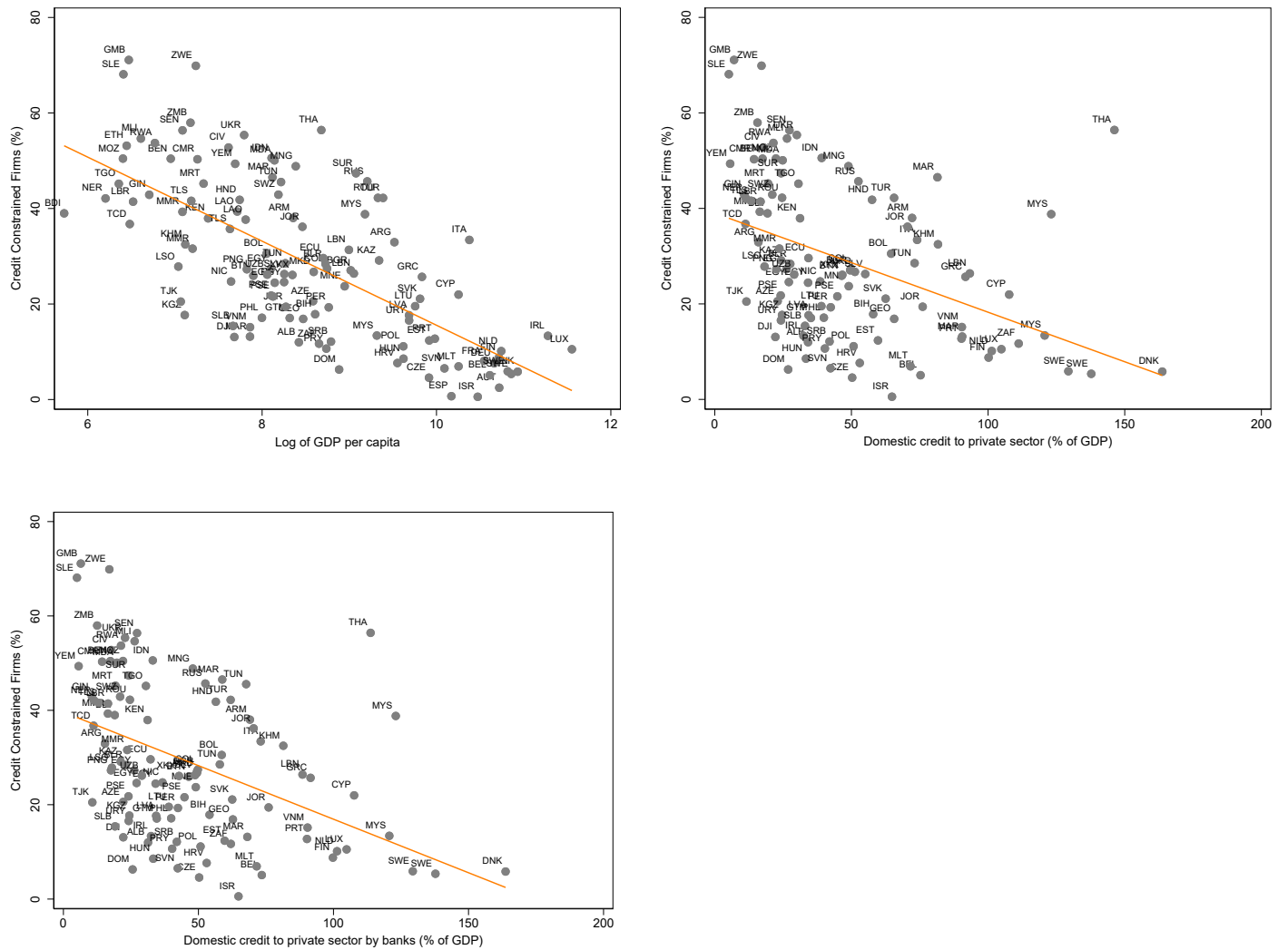
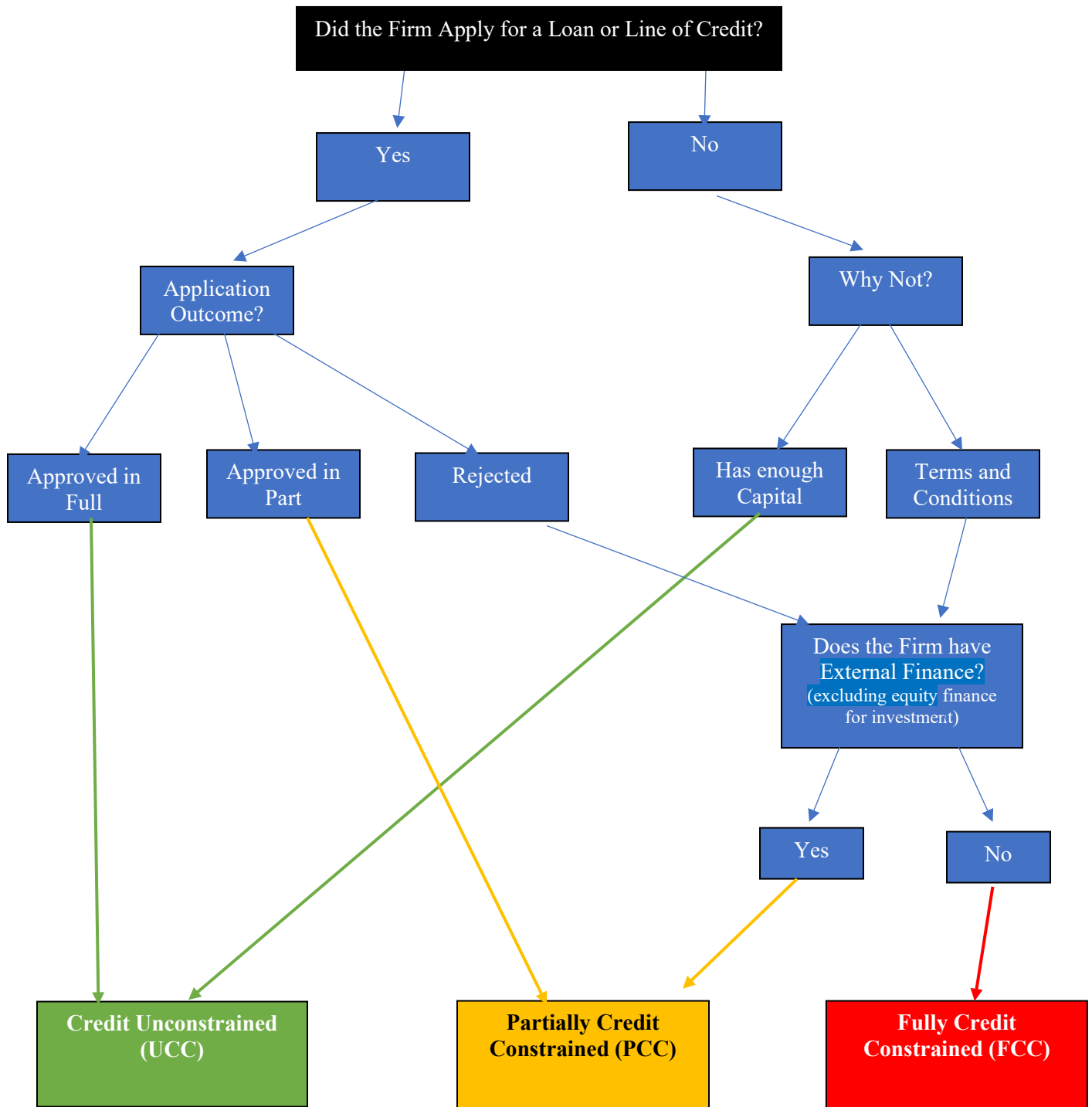


Figure 6: Defining Credit Constraint Firms



Note: The treatment of equity financing used for investment is not included in the flow chart. Firms that do get loans rejected, and do have equity financing, are considered fully credit constrained (FCC). Firms that that have had a loan rejected and do have external finance apart from equity financing are considered partially credit constrained (PCC)