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Florian Léon & Laurent Weill

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Université de Strasbourg
Pôle Européen de Gestion et d'Economie
61 avenue de la Forêt Noire
67085 Strasbourg Cedex
http://large.em-strasbourg.eu/

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Institut de Finance
de Strasbourg

Islamic Banking Development and Access to Credit[1]

Florian Léon [#]
CERDI, Université d'Auvergne, Clermont-Ferrand

Laurent Weill[*]
EM Strasbourg Business School, University of Strasbourg

Abstract

The recent expansion of Islamic banks raises questions on its economic implications. The aim of this paper is to investigate the impact of Islamic banking development on access to credit. We combine data from a unique hand-collected database that covers Islamic banks over the period of 2000 to 2005 with firm-level data covering developing and emerging countries. We find that Islamic banking development has overall no impact on credit constraints, while banking development and conventional banking development alleviate obstacles to financing. However Islamic banking development exerts a positive impact on access to credit when conventional banking development is low. Hence we support the view that Islamic banking does not overall alleviate obstacles to financing, but it can act as substitute to conventional banking.

JEL Codes: G21, O16.
Keywords: Islamic finance, access to credit, credit constraints.

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[#] Email: florian.leon1@udamail.fr
[*] Corresponding author. Institut d'Etudes Politiques, Université de Strasbourg, 47 avenue de la Forêt Noire, 67082 Strasbourg Cedex. Email : laurent.weill@unistra.fr

I. Introduction

Islamic finance has considerably expanded with an increase of Islamic financial assets from $150bn in the mid-1990's to $1800bn at the end of 2013 (Kuwait Finance House, 2014), with Islamic banks being particularly active in Middle Eastern countries and in Southeast Asia but also in Africa (Sudan, Nigeria).

The implications of this expansion have then to be questioned. A few studies have provided evidence on this issue and tend to support the view of a positive influence of Islamic banking development on economic development.[2] A major potential effect of the growth of Islamic banking is its influence on access to credit, as countries with developed Islamic banking sectors are typically emerging countries in which access to credit is a major concern. Access to credit is a major issue for economic development. It enhances possibilities for individuals to launch a business and as such contributes to reduce poverty (Bruhn and Love, 2014). It contributes to favor firm growth (Beck and Demirgüc-Kunt, 2006) and helps therefore fostering economic growth.

The question we address in this paper is whether Islamic finance contributes to relax credit constraints for firms. Islamic finance proposes specific financing instruments which can influence access to credit. On the one hand, these financing instruments can relax credit constraints as they imply different requirements than those proposed in conventional banking. On the other hand, they can also deteriorate access to credit as they can be more expensive than the conventional financing instruments. In addition, Islamic banks face refinancing constraints which can reduce their lending possibilities.

To examine this question, we perform regressions of credit availability on a set of variables including the presence of Islamic banks in the country at the firm level for a sample of 15,309 firms from 52 countries for which we have information on credit constraints and on the presence of Islamic banks.

Data on Islamic banking presence come from a unique database, "IFIRST" ("Islamic Finance Recording and Sizing Tool") which provides the assets of all active Islamic banks worldwide over the period 2000-2005. In comparison with other sources of data, this database is exhaustive and does not suffer from misclassification issues. Firm-level variables come from World Bank Enterprise Survey which includes information on credit constraints at the firm level on a large set of countries. In line with Popov and Udell (2012), we define a firm as

[2] Gheeraert (2014) for financial development, Gheearaert and Weill (2015) for aggregate productivity, Imam and Kpodar (2015) for economic growth.

credit-constrained when it was either discouraged from applying a loan or was rejected when it applied.

Our paper therefore contributes to the debate on the economic impact of Islamic finance by using and linking unique datasets for credit constraints and for Islamic banking presence. To our knowledge, this is the first study analyzing the effect of Islamic banking presence on access to credit. As such it brings information on one key channel of transmission through which Islamic finance can influence economic development. This study has therefore major normative implications. As access to credit is a major question in developing countries, to know the potential influence of Islamic banking development on access to credit brings important information for policymakers to favor or to discourage this expansion.

The rest of the article is structured as follows. Section 2 develops the hypotheses on the impact of Islamic banking development on access to credit. Section 3 presents data and variables. Section 4 describes the methodology we apply. Section 5 displays the econometric results. Section 6 concludes.

2. The relation between Islamic banking development and access to credit

In this section we present the channels of transmission through which Islamic banking development can influence access to credit. To this end, we first explain the principles and the financing modes of Islamic finance. We then develop the hypotheses on this link.

2.1 Islamic finance

Islamic finance can be defined as finance that is compliant to Islamic law. A key principle is the prohibition of interest in financial transactions. The fact that the provider of funds is not allowed to charge interest does not mean that all forms of return are prohibited. Instead, interest is replaced by the concept of profit-and-loss sharing. This concept considers that both parties in a financial transaction are expected to share the returns from a project. In addition, contractual uncertainty is prohibited, meaning in practice that contract terms must be clearly defined, explicit, and without ambiguity. Finally, sinful activities such as gambling or pig farming cannot be financed.

In accordance with these principles, Islamic finance has developed specific financing products. First, two core financing products are partnership contracts between the lender and the borrower based on the profit-and-loss-sharing principle: *musharaka*, and *mudaraba*. A *mudaraba* contract is based on the fact that the lender provides the capital and the borrower provides the effort and know-how. Profits are shared between both parties, whereas losses are borne solely by the lender. Under a *musharaka* contract, profits and losses are shared between the lender and the borrower because all parties have made capital contributions.

Second, *murabaha* is a mark-up sale based on the fact that the lender buys a good and sells it to the customer in exchange for a price that includes the original cost and a specified margin. It must be stressed that the price can be paid in several installments, which makes *murabaha* quite similar to a loan with interest from the borrower's perspective. There are however differences between both forms of financing. On the one hand, there is no interest in the sense that the return applies to the sale of a good and not the sale of money. On the other hand, charging a penalty for default is prohibited.

Third, *ijara* mirrors the conventional leasing contract in Islamic finance. The lender buys a good and leases it to the customer for a given period and a given rent. Hence the bank does not make money from money in compliance with Islamic law as it converts money into tangible assets to make the transaction.

2.2 Hypotheses

A first view is that Islamic banking development promotes access to credit. It has its roots in the peculiar characteristics of Islamic financing instruments. First, Islamic finance supports the use of profit and loss sharing arrangements instead of debt-like instruments. As a consequence, Islamic banks can propose financings to borrowers who otherwise do not have access to credit, as the risk of repayment in these financings is not based on the borrower but on the project, which lowers the influence of borrower characteristics to obtain a loan.

Second, Islamic finance promotes risk-taking by banks and as such no collateral is supposed to be required when granting a loan. Therefore, as collateral requirements are a major obstacle to have financing, Islamic banking presence should favor access to credit.

This beneficial influence of Islamic banking development is also supported by the argument that Islamic banking increases the size of the financial intermediation sector by boosting savings mobilization and as such enhances all other things equal the possibilities to

have access to credit. Gheeraert (2014) provides evidence in favor of this view by showing that Islamic banking development fosters financial development.

The view that Islamic banking development favors access to credit is however challenged by a couple of arguments.

First, financings proposed by Islamic banks can be more expensive than those provided by conventional banks. Two reasons support this argument. On the one hand, Islamic banks can have greater costs than conventional banks. Empirical evidence shows that Islamic banks have lower cost performance than conventional banks in countries where both types of banks coexist (Srairi, 2010; Beck, Demirgüc-Kunt and Merrouche, 2013). The main motive is the fact that Islamic financings generate higher legal costs. The most commonly used instrument is *murabaha* which involves two sales transactions instead of one. The implementation of partnership financings based on profit and loss sharing requires the setting up of separate legal entities. In addition, partnership financings lead to higher costs for screening projects and for monitoring projects. Given that the risk is based on the project and not on the borrower, the bank has to bear additional costs in the evaluation of the project. Finally, Islamic banks are not allowed to charge interest penalties.

On the other hand, Islamic banks can have greater market power than conventional banks. These institutions can benefit from a clientele with a more inelastic demand, as it is driven by religious principles.[3] Therefore, by increasing the cost of bank financings and hence loan prices, Islamic banking development can reduce the demand for such financings and hamper access to credit.

Second, Islamic banks have a larger share of liquid assets in their balance sheet and have thus lower lending possibilities. The reason is that they do not have access to the interbank market in many countries, as they cannot be involved in activities that include interest. In addition, Islamic banks suffer from the absence of a developed secondary market for *sukuk*, the sharia-compliant equivalent to conventional bonds. It therefore strengthens their requirements to have large liquidity buffers.

In summary, the practice of Islamic banks provides opposing arguments with respect to the impact of their expansion on access to credit. It is therefore of prime interest to provide an empirical investigation to contribute to this debate.

[3] This argument is however challenged by empirical evidence as Weill (2011) does not find support in a cross-country study comparing market power of Islamic banks and conventional banks.

3. Data and variables

3.1 Data

To explore the relation between Islamic banking development and firms' access to formal bank credit we combine data from two main sources: World Bank Enterprises Survey, and the IFIRST database.

Firm-level data were retrieved from the World Bank Enterprises Survey (WBES). WBES contains surveys regularly performed since 2005 which includes a variety of firm-level information, like ownership structure, industry, number of employees, and the credit experience of the firm in the year prior the survey.

This dataset is merged with information on the development of Islamic finance extracted from a new database. The most widely used source in empirical works on Islamic banking is Bankscope, a generalist database covering both conventional and Islamic banks. Unfortunately, there are serious data concerns in Bankscope database. It is not exhaustive insofar as not all banks around the world are included. In addition, Bankscope is subject to misclassification issues. The final list of Islamic banks in Bankscope includes banks which do not report any Islamic operations, and omits several important and internationally recognized Islamic banks (Cihak and Hesse, 2010).

To overcome both issues, we employ a comprehensive database previously used in two studies (Gheeraert, 2014; Gheeraert and Weill, 2015). The "Islamic Finance Recording and Sizing Tool" (IFIRST) provides reliable data on the Islamic banking industry from 2000 to 2005. This database was built in three steps. First, the exhaustive list of all active Islamic banks per year and per country was established. IFIRST defines an Islamic financial institutions as a financial institution whose products and operation are subject to approval and monitoring regarding Sharia-compliance, by a Sharia board. The list retains exclusively among Islamic financial institutions those operating in the retail banking segment.[4] Second, an annually updated series of financial information of each Islamic bank in the list was collected from a variety of internal and external sources such as annual reports, banks' website, press release, etc... When no information is available, IFIRST uses a gap-filling

[4] See Gheeraert (2014) for more details on classification criteria.

method, based on data on comparable Islamic banks in the country or region. Finally, aggregates on the available variables were computed like the total assets managed by or total credit granted by Islamic banks in country c in year t.

Our final dataset is limited to countries that have firm-level data from WBES and information on Islamic banking development from the IFIRST database. We restrict our sample of firms located in Africa, Asia, and Europe. In particular, we exclude Latin American firms because no Islamic bank operates in Latin America. Furthermore, we keep firm-level surveys that were carried out between 2006 and 2009 because information on Islamic banks in IFIRST database is available until 2005. Insofar as surveys before 2006 do not provide information on credit experience required to build our measure of credit access, we cannot use these surveys. Furthermore it seems irrelevant to use surveys after 2009. Indeed, one might expect that the development of Islamic banking in 2005 can reflect Islamic banking development in the following years. However, in a context of growth of Islamic finance around the world, data for 2005 are irrelevant to assess the development of Islamic banking in the 2010s. The window between 2006 and 2009 is therefore a good compromise between coverage and comparability of both datasets.

The final sample consists of 15,309 firms from 52 countries.[5] It presents the major advantage of gathering relatively homogeneous economies with and without Islamic banks. Table 1 displays the list of countries.

3.2 Variables

To identify credit constrained firms, we follow the methodology adopted by Popov and Udell (2012) and Léon (2015) by grouping firms that were turned down and firms that were discouraged from applying.

We refer to a number of questions regarding the credit experience of the firms in WBES. The first question is whether or not a firm applied for a loan (question k.16*: "In the last year, did this establishment apply for loans or lines of credit?"*). It is crucial to separate firms that did not apply for credit because they did not need it from those that did not apply because they were discouraged. In order to distinguish discouraged borrowers and non-borrowers among non-applicants, we turned to the subsequent question which asks for the

[5] Some additional filtering rules are applied. Firms with missing information for firm-level control variables were dropped. We also dropped observations when the interviewer did not believe that the responses were reliable and firms with more than 1,000 employees.

main reason for not applying (question k.17: *"What was the main reason the establishment did not apply for any line of credit or loan in the last year?"*).

Firms are considered as non-borrowers if they declared that they did not apply because they did not need a loan and as discouraged borrowers if they declared another reason. Among the applicants (firms which answer 'yes' in question k.16), a distinction is made between approved and denied applicants. A firm is declared as approved if at least one request was not turned down. From this classification, those firms that were either discouraged from applying for a loan or were rejected upon application are classified as credit constrained. This measure allows us to identify firms expressing a formal demand for funds that was not fulfilled by supply. Contrary to measures based on firms' use of formal loans, grouping both discouraged and rejected firms allows us to observe firms which select themselves out of the loan application process due to the absence of a demand for loans or as a result of being discouraged by market frictions in the credit market.

Our key interest variable is Islamic banking development. Using IFIRST, we are able to construct a measure of the level of development of Islamic banking across countries. This variable is defined as the ratio of Islamic private credit to GDP (*Islamic Credit*). The total credit provided by Islamic banks is obtained from the IFIRST database and information on GDP is extracted from World Development Indicators. We also consider measures for the credit provided by conventional banks and the total credit provided by both types of banks. To construct these variables, data from IFIRST and from Financial Structure Database (Beck, Demirgüç-Kunt and Levine, 2000) are combined. Total credit to GDP (*Total Credit*) is provided directly in this latter database. The ratio of conventional private credit to GDP (*Conventional Credit*) is inferred as the difference between total credit to GDP and Islamic credit to GDP.

We include a set of firm-level and country-level variables to control for observable heterogeneity. Firm-level variables are firm size measured by the log of the number of employees (*Size*), and firm age defined as the log of the age in year (*Age*). We also include dummy variables equal to one if the firm is an exporter (*Export*), owned by foreign investors (*Foreign*), owned by the government (*Government)*, operates in manufacturing (*Manufacturing*) or services (*Services*), and if the firm was audited in the past year (*Audited*), is privately held (*Private*) or listed (*Listed*). All firm-level variables are extracted from WBES. They have been shown to influence credit constraints (Beck et al., 2006).

Country-level variables include the real growth rate (*Growth*) and the inflation rate (Inflation) to capture macroeconomic conditions. Both variables come from the World

Development Indicators. We also consider the depth of credit information and the strength of legal rights, as they are often advanced to explain differences in access to finance. To control for both factors, we employ the measure of creditors' protection (*Creditor rights*) and depth of credit information (*Information*) calculated by Doing Business for each country. The summary statistics and pairwise correlations are respectively presented in Tables 2 and 3.

4. Methodology

The objective of this paper is to evaluate the impact of Islamic banking development on firms' credit availability. The first specification examines the overall influence of banking development on credit availability. Given the binary nature of the dependent variable, a binary model is better suited than a linear model. We use the following probit regression:

$$Pr(Y_{fc} = 1) = \Phi(\alpha + \beta Total\ Credit_c + \Theta F_{fc} + \Gamma C_c)$$

where subscripts *f* and *c* refer to firm and country respectively. Φ is the standard normal cumulative distribution. Y is a dummy variable equal to one if a firm is credit constrained and 0 if a firm has a loan or indicates that it does not need one. F is a matrix of firm characteristics and C is a matrix of country-level control variables. Standard errors are clustered at the country-level. We add time dummy variables for the year of the survey. We expect that $\beta < 0$;[6] in other words, we expect that the likelihood to be credit constrained is reduced when the ratio of private credit to GDP increases.

The second specification constitutes the crux of our analysis. Our aim is to assess the impact of Islamic banking development on access to credit. We remove the variable for total credit to GDP and include variables for each type of banking development, namely Islamic and conventional private credit. We therefore estimate the following model:

$$Pr(Y_{fc} = 1) = \Phi(\alpha + \beta_1 Islamic\ Credit_c + \beta_2 Conventional\ Credit_c + \Theta F_{fc} + \Gamma C_c)$$

The impact of Islamic banking development on credit availability is given by the sign of the coefficient β_1. If $\beta_1 < 0$ a higher ratio of Islamic private credit to GDP reduces the likelihood that a firm suffers from credit constraints. The effect of conventional credit to GDP is given by the sign of β_2.

[6] We report marginal effects in different tables. In the probit model, the sign of a coefficient is the same than the sign of its marginal effect (at the notable exception of interactions).

The final specification considers the possibility of substitution or complementary between both types of banking development. To test this, we include an interaction term between Islamic banking and conventional banking.

$$Pr(Y_{fc} = 1) = \Phi(\alpha + \beta_1 Islamic\ Credit_c + \beta_2 Conventional\ Credit_c + \beta_{12} Islamic\ Credit_c * Conventional\ Credit_c + \Theta F_{fc} + \Gamma C_c)$$

Unfortunately, we cannot directly infer the results by scrutinizing the signs of β_1 and β_{12} in non-linear model (Ai and Norton, 2003; Greene, 2010). We therefore use a graphical analysis reporting the marginal effect of Islamic private credit on the likelihood to be credit constrained according to the level of conventional private credit. The marginal effect of Islamic finance is calculated as follows:

$$\frac{\partial \Pr(Y_{fc} = 1)}{\partial Islamic\ Credit_c} = (\beta_1 + \beta_{12} Conventional\ Credit_c) * \Phi'(A)$$

where

$A = (\alpha + \beta_1 Islamic\ Credit_c + \beta_2 Conventional\ Credit_c + \beta_{12} Islamic\ Credit_c * Conventional\ Credit_c + \Theta F_{fc} + \Gamma C_c)$ and $\Phi'(A)$ is the standard normal density function.

5. Results

This section presents our results for the impact of Islamic banking development on access to credit. We start with the main estimations and afterwards provide additional estimations. Finally we perform some robustness tests.

5.1 Main estimations

Our main results are displayed in Table 4. We present the estimations with two specifications, one with *Total Credit*, the other with *Islamic Credit* and *Conventional Credit*.

We first observe that *Total Credit* has a negative effect on credit constraints. Indeed, this variable has a significant and negative coefficient. This finding then supports the view that financing constraints are alleviated in countries where banking is more developed. It is in agreement with Beck et al. (2006) who show that greater bank lending, measured by the ratio of private credit to GDP, is associated with lower credit constraints.

Second, we find that *Conventional Credit* has a significantly negative impact on credit constraints while no significant coefficient is observed for *Islamic Credit*. Hence, the positive influence of banking development to relax financing constraints only goes through the development of conventional banking. Greater presence of conventional banks facilitates the financing of firms, while higher Islamic banking development has no impact on credit availability.

Therefore our main conclusion is the absence of influence of Islamic banking development on credit constraints. Our findings do not support the view that Islamic banking development would promote access to credit. As explained above, Islamic banking development can have a beneficial and a detrimental influence on access to credit. Our conclusion is that overall there is a lack of impact, which can result from the fact that these opposite influences tend to offset.

With respect to the control variables, we observe that the results are in line with former literature on credit constraints (e.g., Beck et al., 2006). Size, foreign ownership, and private ownership have all significant and negative coefficients, which mean that larger firms and firms in foreign or in private hands have lower credit constraints. In addition, to be audited also enhances the access to credit. Regarding the country-level variables, we find that better protection of creditors also reduces credit constraints, while the opposite is observed for higher inflation.

Our main estimations indicate that Islamic banking development does not influence access to credit. However this impact can be conditional to the level of conventional banking development. In that case, the lack of impact observed overall would hide an influence of Islamic banking development but only for some countries.

Islamic banking and conventional banking can act as substitutes. Islamic banking can contribute to favor access to credit in countries with low development of conventional banking. In such countries, Islamic banking can offset the reluctance of conventional banks to grant credit because of the peculiar features of Islamic financing products or the different objectives of Islamic banks.

We then consider the possible interactions between Islamic and conventional financial development, through the inclusion of interaction between the size of Islamic private credit (*Islamic Credit*) and the size of conventional private credit (*Conventional Credit*).

Following Greene (2010), a graphical approach is more appropriate to analyze the results. It is displayed in Figure 1 where we report the marginal effect of Islamic finance on credit access according to the size of conventional private credit (relative to GDP).

We retain three cases to calculate the marginal effect. First, the black line reports the marginal effect of Islamic financial development for countries without Islamic finance (e.g., Morocco). Second, the dash line for countries in which Islamic credit represents 5% of GDP (e.g., Bangladesh). Third, the grey line for countries in which Islamic credit represents 20% of GDP (e.g., Jordan). Other variables are set at their means.

We find that Islamic financial development exerts a positive impact on access to credit when the level of conventional banking development is low, especially for countries without Islamic finance (black line).[7] Indeed an increase in the size of Islamic finance reduces the likelihood that a firm was credit constrained in countries with a level of conventional banking development below 60% of GDP. The positive effect of Islamic financial development turns to a negative one for countries with a level of conventional private credit exceeding 60% of GDP. In other words, there is substitution between Islamic and conventional credit.

This finding is of prime interest as it provides support to the beneficial influence of Islamic banking development on access to credit. While no impact was observed when considering all countries together, we now observe that a positive influence emerges when considering only countries with low level of conventional banking development. This conclusion then provides support for the expansion of Islamic banking to favor access to credit. However this implication is conditional to a low development of conventional banking. Once a country has a very developed conventional banking industry, the beneficial impact of Islamic banking development is no more observed. In other words, Islamic banking development favors access to credit but only in countries in which banking development is still low.

[7] Insofar as the dependent variable is a dummy variable equal to one if the firm is credit constrained, a negative marginal effect reflects a positive impact on access to credit (a negative impact on the likelihood to be credit constrained).

5.2 Additional estimations

Our main finding is that Islamic banking development does not exert any influence on credit constraints. We can however question if this finding stands for all types of companies. Namely the influence of Islamic banking development can be observed for some specific types of companies, while nothing is observed when considering all companies together.

In line with our hypotheses, Islamic banking development can favor more access to credit for opaque companies. A large strand of literature (e.g., Berger, Klapper and Udell, 2001) has shown that credit rationing affects more companies which are considered as opaque by banks. This opacity is associated with greater information asymmetries between the bank and the company which contribute to reduce the propensity of the bank to grant credit.

However opaque companies which particularly suffer from credit rationing can benefit more from Islamic banking development because of the specific features of Islamic financing instruments. Namely profit and loss sharing arrangements result in the fact that information asymmetries on the nature of the borrowing firm are less important as only the financed project generates the returns.

We investigate this hypothesis by proceeding to additional estimations. We check if firms associated with greater opacity benefit more from Islamic banking development to get access to credit. In this aim, we create subsamples of companies based on three criteria commonly used in the literature to define opacity of a borrowing firm: age, size, and being audited. An older firm is supposed to have transmitted information on former financed projects than a recently created firm. Greater firm size is commonly associated with lower information asymmetries, as more information is spread or is available for larger companies. Finally, being audited means by definition lower uncertainty on what is going on the firm.

We divide the sample in two groups based on these three criteria. For age, we distinguish between firms with age lower or equal to 10 years and firms with age greater than 10 years. For size, we separate firms with a number of employees lower or equal to 15 employees and firms with more than 15 employees. For being audited, we simply distinguish firms which have been audited with those which have not been audited.

The estimations for these subsamples are presented in Table 5. Overall we observe no difference with the results obtained on the full sample. We still observe a negative and significant influence of *Conventional Credit* for all subsamples. It then shows that

conventional banking development generates lower credit constraints for all firms, and not only for the ones supposed to be the most affected by these constraints.

By age and by size, *Islamic Credit* is still not significant for both subsamples, meaning that younger firms and smaller firms do not benefit more from Islamic banking development than other firms. These results support our key finding that Islamic banking development does not affect credit constraints. However we observe one interesting difference by the fact to be audited. Whereas *Islamic Credit* is not significant for audited firms, it is negative and significant coefficient for non-audited firms. This finding is in line with the hypothesis that firms facing greater information asymmetries should benefit more from Islamic banking development.

These estimations therefore provide limited evidence that Islamic banking development reduces credit constraints for more opaque firms in line with the view that these financial institutions favour more access to credit to firms being more hampered by information asymmetries. It has nonetheless to be stressed that this conclusion is only observed with the fact to be audited, but not with age or with size.

5.3 Robustness tests

We check the robustness of our results in different ways.

First, we use alternative measures for credit constraints in our estimations. The way we define that a firm is credit-constrained can influence the results. As a consequence, we utilize our dataset to consider two alternative dependent variables: a dummy variable equal to one if a firm has a loan and zero otherwise in model 1, a dummy variable equal to one if a firm declared that access to financing is a major obstacle or a very major obstacle to its current operations. The results are reported in Table 6.

In model 1 we observe a significantly positive coefficient for *Total Credit* in the first specification and for *Conventional Credit* in the second specification, while *Islamic Credit* is still not significant. These results mean that conventional banking development contributes to favor the fact that a firm has a loan. Hence these results corroborate those obtained with the main dependent variable.

However in model 2, we find a different result. Namely, we still observe the same findings for total banking development and conventional banking development which favor access to credit. *Total Credit* in the first specification and *Conventional Credit* in the second

specification have significantly negative coefficients. But *Islamic Credit* is also significantly negative, which means that greater Islamic banking development reduces the fact that firms declare that access to financing is an important obstacle to their current operations.

This latter result means that we observe some support for the beneficial influence of Islamic banking development on access to credit. Interestingly it is found when the question deals with access to finance as an obstacle, while no significant influence is observed when the question is related to the fact that the firm manager is asked if a firm that desired bank credit refused to apply for a loan or applied but was turned down.

In addition, we use both alternative measures for credit constraints to check the robustness of our result regarding the substitution between Islamic credit and conventional credit. We add an interaction term in the specification using loan use as a measure of credit access. The computation of marginal effect is obtained as previously. We find very similar results: although Islamic finance exerts a positive role on the likelihood to have a loan, this role is weakened by the rise of conventional banking development. The impact of Islamic banking development on loan use turns to a negative effect for a level of private credit around 50% of GDP (for comparison the turning point in the baseline model is 60% of GDP). We present these results in Figure 2.

When the dependent variable is the firm's perception of obstacle, we get very close results as displayed in Figure 3. The development of Islamic finance has a positive effect on credit access for a low level of conventional finance but it becomes detrimental for countries with a level of conventional private credit exceeding 60% of GDP.

Second, we check robustness of our results to the choice of country-level control variables. The set of country-level control variables can influence the results in various ways, like omitting variables or correlations with Islamic banking development.

To this end, we first run our estimations again by considering five specifications: without country-level control variables, and with the alternative inclusion of one of the four country-level control variables. The estimations are reported in Table 7. We then test the inclusion of additional country-level control variables in the estimations. In addition to the set of four country-level control variables used in the main estimations, we consider the inclusion of one of the four following variables: the share of Muslims in the population (*Muslims*), GDP per capita (*GDPpc*), an index capturing perceptions of the extent to which agents have confidence in and abide by the rules of society (*Rule of Law*), and the percentage of foreign banks assets among total bank assets (*Foreign*). The results are displayed in Table 8.

All these estimations confirm the absence of impact of Islamic banking development on credit constraints, but also the negative relation between banking development and credit constraints on the one hand, between conventional banking development and credit constraints on the other hand.

Third, our results might be subject to a selection issue. For firms without a need for credit, we cannot determine whether or not they would have been constrained if they expressed a demand for loans. The sub-sample of firms with a need for external funds might differ from firms without a need for bank loans. We take into account selection issue by using a probit model with sample selection (PSS). The PSS model is the equivalent of Heckman's selection model except that the outcome equation is a probit equation instead of a linear equation. The selection equation (need for credit) is completely observed but the outcome equation (credit availability) is observed only for firms expressing a demand for loans. As in the Heckman's procedure, exclusion variables are included in the selection equation. Relevant exclusion variables have to influence the need for loans but not directly impact access to finance. In line with previous papers (Popov and Udell, 2012; Léon, 2015), exclusion variables are the perceived degree of competition from the informal sector and the share of goods paid after the delivery.[8] The results are displayed in Table 9. The Wald test comparing the simple probit and the PSS model is reported at the bottom of the table. We cannot reject the null hypothesis indicating that both estimators provide close results and that our findings are not altered by selection issue. Despite this change in the specification of the model we still find that *Islamic Credit* is not significant while *Conventional Credit* is positive and significant. In other words, this estimation confirms our main findings.

Fourth, unobservable characteristics might impact both the likelihood to have Islamic banks and the likelihood of being credit constraints. To control for potential endogeneity we use an instrumental approach. The share of Islamic private credit relative to GDP is instrumented by the share of Muslims, the distance from the country to Bahrein and a dummy variable equal to one if the country is an oil exporter. These variables are strongly correlated with the share of Islamic private credit (Imam and Kpodar, 2013) that is confirmed by the first stage F-statistic. Table 9 reports these estimations. The Wald test of exogeneity, reported at the bottom of the table, points out that the endogeneity does not seem to be an issue. The

[8] We test different sets of exclusion variables without altering our results.

simple probit and IV-probit provide close results. We observe that findings are similar to our main results.

6. Conclusion

In this paper, we investigate the influence of Islamic banking development on access to credit. The expansion of Islamic finance raises questions and their presence in emerging markets in which access to credit is a major concern stresses the importance of the impact of the growth of Islamic banking on this question.

We find that Islamic banking has overall no impact on credit constraints, while conventional banking development alleviates obstacles to financing. We consequently do not support the view that Islamic banking development would be associated as a whole to better access to credit thanks to the specific characteristics of this form of banking.

However we observe that Islamic banking development exerts a positive impact on access to credit when conventional banking development is low. We therefore provide support to substitution effect between Islamic banking and conventional banking.

The normative implications of our findings are that taking measures that favor Islamic banking development could enhance access to credit. However these measures are only relevant in countries in which the development of conventional banking is still low. If the country has already reached a high level of conventional banking development, the expansion of Islamic banks does not contribute to relax credit constraints. In other words, Islamic banking expansion would generate benefits in terms of access to credit for developing and emerging countries until a certain level but not for developed countries and the most advanced emerging countries in terms of financial development.

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Table 1
List of countries

This table provides the list of countries with the year of the data and with the number of firms. Countries with Islamic banks are in bold.

Country	Year	Number of firms	Country	Year	Number of firms
Albania	**2007**	**119**	Latvia	2009	153
Algeria	**2007**	**379**	Lesotho	2009	69
Angola	2006	354	Lithuania	2009	151
Armenia	2009	203	Macedonia	2009	207
Bangladesh	**2007**	**1,157**	Madagascar	2009	266
Botswana	2006	134	Mali	2007	418
Bulgaria	2007	388	**Mauritania**	**2006**	**197**
Burkina Faso	2006	107	Mauritius	2009	149
Burundi	2006	206	Moldova	2009	234
Cameroon	2006	106	Mongolia	2009	288
Congo	2009	61	Morocco	2007	178
Croatia	2007	377	Mozambique	2007	383
Czech Republic	2009	112	Nigeria	2007	1,852
Côte d'Ivoire	2009	421	**Pakistan**	**2007**	**521**
DR Congo	2006	296	Poland	2009	198
Estonia	2009	141	Romania	2009	262
Ethiopia	2006	310	Russia	2009	621
Gabon	2009	77	Rwanda	2006	155
Gambia	**2006**	**114**	**Senegal**	**2007**	**403**
Georgia	2008	198	Slovakia	2009	128
Ghana	2007	401	Slovenia	2009	173
Guinea Bissau	2006	143	Swaziland	2006	127
Hungary	2009	112	Tanzania	2006	331
Jordan	**2006**	**132**	**Turkey**	**2008**	**666**
Kazakstan	**2009**	**304**	Uganda	2006	396
Kyrgyzstan	2009	142	Zambia	2007	289

Table 2
Descriptive statistics

This table provides the descriptive statistics for all variables included in the estimations

Variable	Obs	Mean	Std. Dev	Min	Max
Constrained	15309	0.6409	0.4798	0	1
Employees	15309	59.9552	122.6134	1	1000
Age	15309	14.0783	13.0049	1	184
Government	15309	0.0060	0.0773	0	1
Foreign	15309	0.9045	0.2939	0	1
Private	15309	0.4297	0.4951	0	1
Public	15309	0.0406	0.1974	0	1
Export	15309	0.1097	0.3125	0	1
Audited	15309	0.3755	0.4843	0	1
Manufacturing	15309	0.5519	0.4973	0	1
Services	15309	0.3700	0.4828	0	1
Total Credit	52	23.1923	18.2935	1.58	76.95
Islamic Credit	52	0.6641	2.6419	0	17.6147
Conventional Credit	52	22.5282	17.3997	1.58	72.35
Growth	52	7.2242	5.5969	0.1638	22.9638
Inflation	52	6.0022	3.4226	-0.9417	18.2615
Information	52	0.6923	1.6514	0	5
Creditor rights	52	5.1154	2.2374	2	10

Table 3: Correlations

Correlations between firm-level variables

	Const.	Size	Age	Government	Foreign	Private	Listed	Export	Audited	Manufacturing	Services
Constrained	1										
Size	-0.4262	1									
Age	-0.1813	0.3387	1								
Government	-0.0211	0.0913	0.0645	1							
Foreign	0.0338	-0.1412	-0.0387	-0.2393	1						
Private	-0.3147	0.376	0.1327	-0.0009	-0.0865	1					
Listed	-0.1121	0.2532	0.1622	0.0568	-0.0389	-0.1786	1				
Export	-0.1987	0.3658	0.1391	0.0295	-0.105	0.1974	0.0824	1			
Audited	-0.297	0.4199	0.1913	0.0619	-0.1551	0.2889	0.1438	0.1992	1		
Manufacturing	-0.054	0.2316	0.1239	0.0157	-0.0215	0.0617	0.0331	0.1813	0.0336	1	
Services	0.0692	-0.2866	-0.1577	-0.0211	0.0078	-0.084	-0.0543	-0.1707	-0.054	-0.8507	1

Correlations between country-level variables

	Constrained	Total Credit	Islamic Credit	Conventional Credit	Inflation	Growth	Information	Creditor rights
Constrained	1							
Total Credit	-0.5402	1						
Islamic Credit	-0.0537	0.4023	1					
Conventional Credit	-0.5598	0.9903	0.2711	1				
Inflation	0.3767	-0.3021	-0.0573	-0.3089				
Growth	-0.0997	-0.054	0.0643	-0.0666	0.289	1		
Information	-0.3301	0.1678	-0.0938	0.1906	-0.1578	0.0572	1	
Creditor rights	-0.3431	0.108	-0.2053	0.1447	-0.0182	-0.0122	0.1265	1

Table 4
Main estimations

Probit estimations are performed. The dependent variable is a dummy variable equal to one if a firm that desired bank credit refused to apply for a loan or applied but was turned down. *Total Credit* is the size of private credit relative to the domestic GDP, *Islamic Credit* the size of Islamic private credit relative to the GDP and *Conventional Credit* the size of conventional private credit relative to the GDP. Dummy variables for years are included but not reported and the description of control variables is given in the text. Table reports marginal effects (column ME) and associated z-score. *, **, *** denote an estimate significantly different from 0 at the 10%, 5% or 1% level. The Wald-test compares a model with a constant only and the unrestricted model. Under the null hypothesis, the unrestricted model does not provide more information than the model with a constant only. Standard errors are adjusted for clustering at the country-level.

	Model 1		Model 2	
	ME	z-stat	ME	z-stat
Total Credit	-0.0033***	(-3.59)		
Islamic Credit			-0.0094	(-0.99)
Conventional Credit			-0.0029**	(-2.49)
Size	-0.0819***	(-10.72)	-0.0805***	(-13.67)
Age	-0.0094	(-1.20)	-0.0090	(-1.16)
Government	0.0142	(0.42)	0.0097	(0.29)
Foreign	-0.0359*	(-1.91)	-0.0332**	(-1.96)
Private	-0.0938***	(-5.63)	-0.0976***	(-6.29)
Listed	-0.0308	(-1.08)	-0.0337	(-1.25)
Export	0.0015	(0.12)	0.0015	(0.12)
Audited	-0.0759***	(-6.01)	-0.0761***	(-6.07)
Manufacturing	-0.0238	(-0.91)	-0.0212	(-0.90)
Services	-0.0469**	(-2.02)	-0.0456**	(-2.01)
Growth	-0.0066	(-1.33)	-0.0063	(-1.26)
Inflation	0.0091***	(3.40)	0.0090***	(3.48)
Information	-0.0028	(-0.45)	-0.0039	(-0.62)
Creditor rights	-0.0139*	(-1.89)	-0.0142**	(-1.97)
Number of observations	15,309		15,309	
Number of countries	52		52	
Pseudo R^2	0.237		0.238	
Wald test	1887.5***		2114.0***	

Table 5
Subsamples

Probit estimations are performed. The dependent variable is a dummy variable equal to one if a firm that desired bank credit refused to apply for a loan or applied but was turned down. *Total Credit* is the size of private credit relative to the domestic GDP, *Islamic Credit* the size of Islamic private credit relative to the GDP and *Conventional Credit* the size of conventional private credit relative to the GDP. Dummy variables for years and firm-level (*Size, Age, Government, Foreign, Private, Listed, Export, Audited, Manufacturing, Services*) and country-level control variables (*Growth, Inflation, Information, Creditor Rights*) are included but not reported while their description is given in the text. Table reports marginal effects (column ME) and associated z-score. *, **, *** denote an estimate significantly different from 0 at the 10%, 5% or 1% level. The Wald-test compares a model with a constant only and the unrestricted model. Under the null hypothesis, the unrestricted model does not provide more information than the model with a constant only. Standard errors are adjusted for clustering at the country level.

	by age		by size		by audit	
	Lower or equal to 10 years	Greater than 10 years	Lower or equal to 15 employees	Greater than 15 employees	Audited	Non-audited
	(1)	(2)	(3)	(4)	(5)	(6)
Islamic Credit	-0.005	-0.0127	-0.0042	-0.0130	-0.0064	-0.0148*
	(-0.54)	(-1.26)	(-0.67)	(-1.10)	(-0.76)	(-1.68)
Conventional Credit	-0.0029***	-0.0029***	-0.0032***	-0.0025*	-0.0026**	-0.0037***
	(-2.93)	(-2.22)	(-3.03)	(-1.81)	(-2.27)	(-3.24)
Firm-level variables	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.
Country-level variables	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.
Number of observations	7,342	7,967	7,962	7,342	5,749	9,560
Number of countries	52	52	52	52	52	52
Pseudo R^2	0.238	0.208	0.180	0.125	0.131	0.233
Wald test	801.8***	1162.3***	1912.1***	1159.2***	908.9***	1934.3***

Table 6
Estimations with alternative measures of credit access

Probit estimations are performed. In model 1, the dependent variable is a dummy variable equal to one if a firm has a loan and 0 otherwise. In model 2, the dependent variable is a dummy variable equal to one if a firm declared that access to financing is a major obstacle or a very major obstacle to its current operations. *Total Credit* is the size of private credit relative to the domestic GDP, *Islamic Credit* the size of Islamic private credit relative to the GDP and *Conventional Credit* the size of conventional private credit relative to the GDP. Dummy variables for years are included but not reported. and the description of control variables is given in the text. Table reports marginal effects (column ME) and associated z-score. *, **, *** denote an estimate significantly different from 0 at the 10%, 5% or 1% level. The Wald-test compares a model with a constant only and the unrestricted model. Under the null hypothesis, the unrestricted model does not provide more information than the model with a constant only. Standard errors are adjusted for clustering at the country-level.

	Model 1: Loan				Model 2: Credit as an obstacle to growth			
	ME	z-stat	ME	z-stat	ME	z-stat	ME	z-stat
Total Credit	0.0049***	(4.20)			-0.0040***	(-3.60)		
Islamic Credit			0.0022	(0.21)			-0.0149*	(-1.70)
Conventional Credit			0.0051***	(3.92)			-0.0032**	(2.49)
Size	0.0863***	(11.94)	0.0869***	(12.93)	-0.0433***	(-5.44)	-0.0412***	(-5.79)
Age	0.0197**	(2.39)	0.0199**	(2.42)	-0.0040	(-0.38)	-0.0032	(-0.31)
Government	-0.0311	(-0.92)	-0.0331	(-0.95)	0.0496	(0.91)	0.0410	(0.79)
Foreign	0.0545***	(3.04)	0.0557***	(3.16)	0.0523**	(2.24)	0.0561**	(2.38)
Private	0.0993***	(5.92)	0.0975***	(6.44)	-0.0212	(-1.04)	-0.0265	(-1.36)
Listed	0.0174	(0.55)	0.0158	(0.51)	0.0027	(0.08)	-0.0017	(-0.05)
Export	0.0143	(1.01)	0.0143	(1.01)	-0.0041	(-0.24)	-0.0039	(-0.23)
Audited	0.0817***	(6.06)	0.0816***	(6.04)	-0.0123	(-0.66)	-0.0129	(-0.72)
Manufacturing	0.0175	(0.73)	0.0187	(0.82)	-0.0082	(-0.47)	-0.0041	(-0.25)
Services	0.0454**	(2.13)	0.0461**	(2.23)	-0.0518**	(-2.52)	-0.0496***	(2.64)
Growth	0.0042	(0.81)	0.0043	(0.86)	-0.0110***	(-2.82)	-0.0106***	(-2.79)
Inflation	-0.0104***	(-4.14)	-0.0104***	(-4.15)	0.0067***	(2.75)	0.0065***	(2.75)
Information	0.0019	(0.29)	0.0014	(0.20)	-0.0172*	(-1.83)	-0.0192**	(-2.04)
Creditor rights	0.0116*	(1.68)	0.0115	(1.62)	-0.0172***	(-2.85)	-0.0176***	(-3.02)

Number of observations	15,281	15,281	15,011	15,011
Number of countries	52	52	52	52
Pseudo R^2	0.289	0.289	0.063	
Wald test	1443.6***	1740.5	180.7***	

Table 7
Alternative set of control variables 1

Probit estimations are performed. The dependent variable is a dummy variable equal to one if a firm that desired bank credit refused to apply for a loan or applied but was turned down. Total Credit is the size of private credit relative to the domestic GDP, Islamic Credit the size of Islamic private credit relative to the GDP and Conventional Credit the size of conventional private credit relative to the GDP. Dummy variables for years and firm-level control variables (*Size, Age, Government, Foreign, Private, Listed, Export, Audited, Manufacturing, Services*) are included but not reported. Description of firm-level and country-level control variables is given in the text. Table reports marginal effects (column ME) and associated z-score. The Wald-test compares a model with a constant only and the unrestricted model. Under the null hypothesis, the unrestricted model does not provide more information than the model with a constant only. Standard errors are adjusted for clustering at the country level.

	Model 1					Model 2				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Total Credit	-0.0041***	-0.0043***	-0.0031***	-0.0039***	-0.0041***					
	(-4.59)	(-4.80)	(-3.35)	(-4.49)	(-4.57)					
Islamic Credit						-0.0044	-0.0037	-0.0036	-0.0068	-0.0047
						(-0.51)	(-0.41)	(-0.46)	(-0.76)	(-0.57)
Conventional Credit						-0.0041***	-0.0043***	-0.0031***	-0.0037***	-0.0041***
						(-4.56)	(-4.93)	(-3.18)	(-4.30)	(-4.41)
Growth		-0.0071					-0.0072			
		(-1.01)					(-1.01)			
Inflation			0.0077**					0.0078**		
			(2.32)					(2.32)		
Information				-0.0283***					-0.0288***	
				(-2.46)					(-2.86)	
Creditor rights					-0.0034					-0.0034
					(-0.31)					(-0.31)
Firm-level variables	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.
Number of observations	15,309	15,309	15,309	15,309	15,309	15,309	15,309	15,309	15,309	15,309

Number of countries	52	52	52	52	52	52	52	52	52	52
Pseudo R^2	0.204	0.206	0.211	0.212	0.204	0.204	0.206	0.211	0.212	0.204
Wald test	868.6***	886.1***	998.8***	831.7***	947.9***	982.4***	967.7***	1102.0***	993.6***	1058.3***

Table 8
Alternative set of control variables 2

Probit estimations are performed. The dependent variable is a dummy variable equal to one if a firm that desired bank credit refused to apply for a loan or applied but was turned down. *Total Credit* is the size of private credit relative to the domestic GDP, *Islamic Credit* the size of Islamic private credit relative to the GDP and *Conventional Credit* the size of conventional private credit relative to the GDP. % Muslims is the share of Muslims in the population. GDPpc is the GDP per capita. Rule of Law is an index capturing perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Foreign is the percentage of foreign banks assets among total bank assets. Dummy variables for years and firm-level (*Size, Age, Government, Foreign, Private, Listed, Export, Audited, Manufacturing, Services*) and country-level control variables (*Growth, Inflation, Information, Creditor Rights*) are included but not reported while their description is given in the text. Table reports marginal effects (column ME) and associated z-score. The Wald-test compares a model with a constant only and the unrestricted model. Under the null hypothesis, the unrestricted model does not provide more information than the model with a constant only. Standard errors are adjusted for clustering at the country-level.

	Model 1				Model 2			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Total Credit	-0.0032***	-0.0036***	-0.0031**	-0.0029***				
	(-3.75)	(-3.06)	(-2.46)	(-3.15)				
Islamic Credit					-0.0184	-0.0087	-0.0102	-0.0081
					(-1.56)	(-1.02)	(-1.04)	(-0.92)
Conventional Credit					-0.0021**	-0.0031**	-0.0024*	-0.0027**
					(-2.07)	(-2.47)	(-1.85)	(-2.27)
% Muslims	0.0005				0.0011**			
	(0.94)				(2.28)			
Ln(GDPpc)		0.0108				0.0064		
		(0.49)				(0.34)		
Rule of Law			-0.0118				-0.0216	
			(-0.30)				(-0.67)	
Foreign				0.0005				0.0004
				(0.70)				(0.60)
Firm-level variables	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.
Country-level variables	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.	Incl.

Number of observations	15,309	15,309	15,309	14,936	15,309	15,309	15,309	14,936
Number of countries	52	52	52	50	52	52	52	50
Pseudo R^2	0.238	0.237	0.237	0.231	0.241	0.238	0.238	0.232
Wald test	2058.5***	2190.2***	1947.9***	1927.1***	2102.2***	2322.9***	2058.1***	2018.1***

Table 9
Alternative econometric methods

Probit estimations are performed. The dependent variable is a dummy variable equal to one if a firm that desired bank credit refused to apply for a loan or applied but was turned down. *Total Credit* is the size of private credit relative to the domestic GDP, *Islamic Credit* the size of Islamic private credit relative to the GDP and *Conventional Credit* the size of conventional private credit relative to the GDP. Dummy variables for years are included but not reported and the description of control variables is given in the text. Model 1 is obtained by using a Probit with sample selection (PSS) model. Exclusion variables are the perceived degree of competition from the informal sector and the share of goods paid for after the delivery. The Wald test compares the pooled estimator (probit) with the PSS model. Under null hypothesis, the PSS estimator is not different from the classical probit model. Model 2 controls for endogeneity by employing a probit model with endogenous regressors. The share of Islamic private credit relative to GDP is instrumented by the share of Muslims, the distance from the country and Bahrein and a dummy equals to one if the country is an oil exporter. The Wald test of the exogeneity tests the relevance of the instrumented probit. Under the null hypothesis, a regular probit model provides sufficient is more appropriate. The F-statistic is the value of the F-statistic of excluded instruments in the first stage equation. Instruments are considered as weak is the F-stat is below 10. Standards errors are adjusted for clustering at the country-level.

	Model 1 : Sample selection		Model 2 : Instrumentation	
	ME	z-stat	ME	z-stat
Islamic Credit	-0.0085	(-0.90)	0.0029	(0.05)
Conventional Credit	-0.0030**	(-2.50)	-0.0118**	(2.53)
Size	-0.0807***	(-11.93)	-0.2954***	(-13.76)
Age	-0.0102	(-1.25)	-0.0353	(-1.38)
Government	-0.0006	(-0.02)	0.0551	(0.42)
Foreign	-0.0298*	(-1.72)	-0.1389**	(-2.21)
Private	-0.0996***	(-5.98)	-0.3166***	(-5.65)
Listed	-0.0292	(-1.09)	-0.1049	(-1.14)
Export	0.0031	(0.23)	-0.0004	(-0.01)
Audited	-0.0794***	(-5.75)	-0.2615***	(-5.83)
Manufacturing	-0.0266	(-1.00)	-0.0885	(-0.97)
Services	-0.0511**	(-2.01)	-0.1676**	(-2.00)
Growth	-0.0057	(-1.11)	-0.0239	(-1.34)
Inflation	0.0093***	(3.42)	0.0332***	(3.34)
Information	-0.0036	(-0.53)	-0.0083	(-0.36)
Creditor rights	-0.136*	(-1.81)	-0.0489*	(-1.76)
Number of observations	14,508		15,309	
Number of countries	52		52	
Wald test (rho=0)	0.42			
Wald test of exogeneity			0.71	
F-stat 1st stage			3733.6	

Figure 1
Interaction between Islamic credit and conventional credit

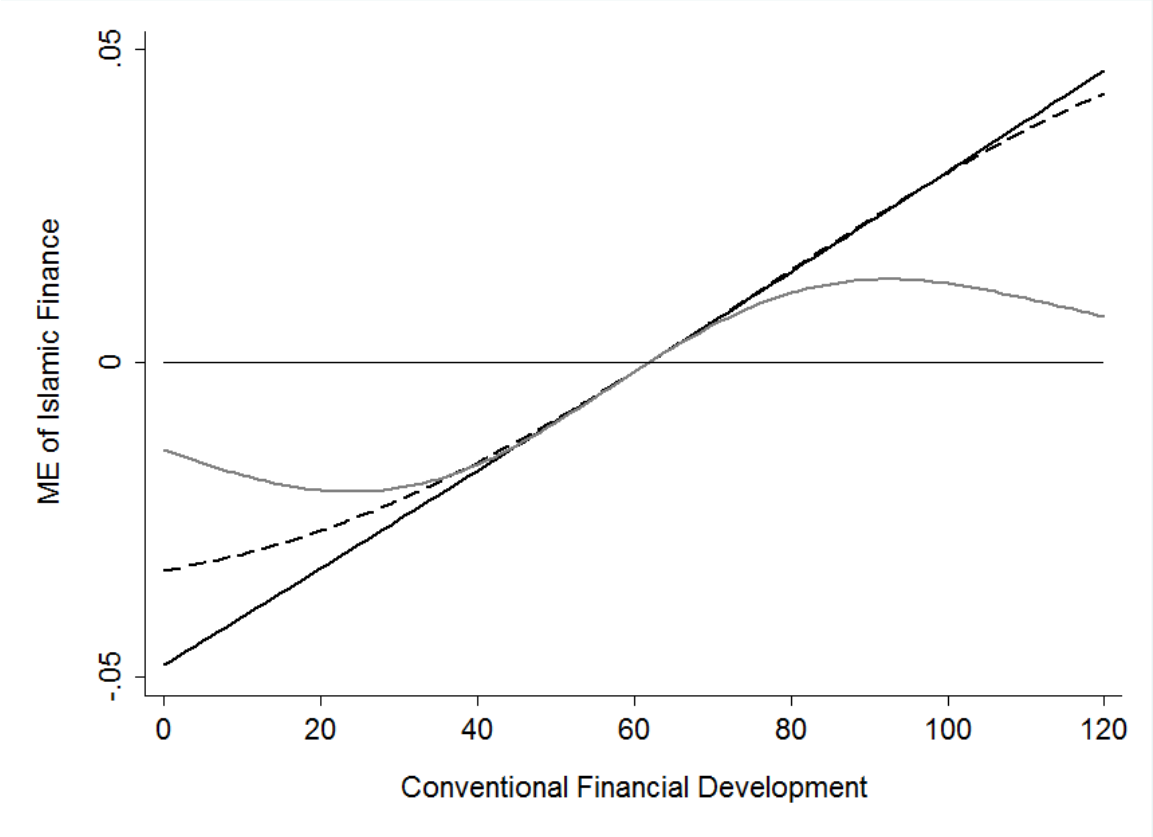


Figure 2
Interaction between Islamic credit and conventional credit:
Use of the alternative measure for loan use

The figure displays the results when the dependent variable is a dummy variable equal to one if a firm has a loan and 0 otherwise.

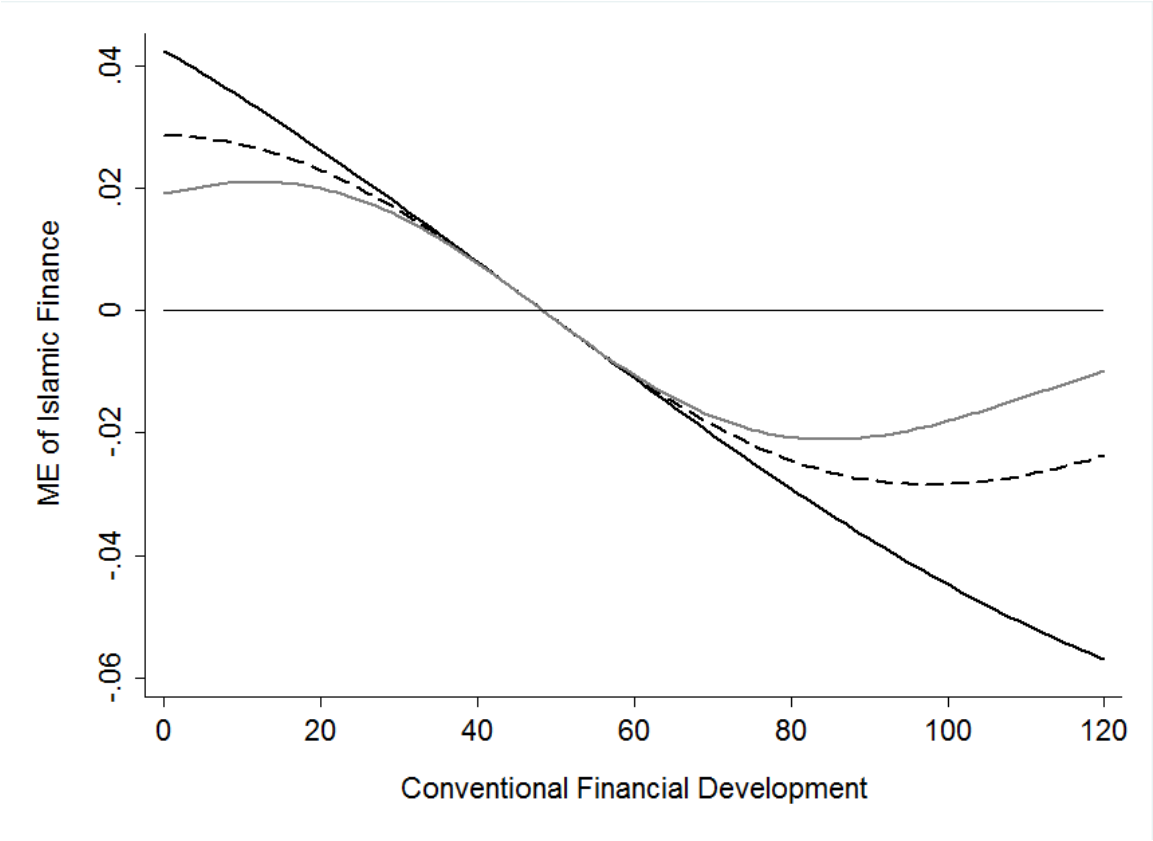
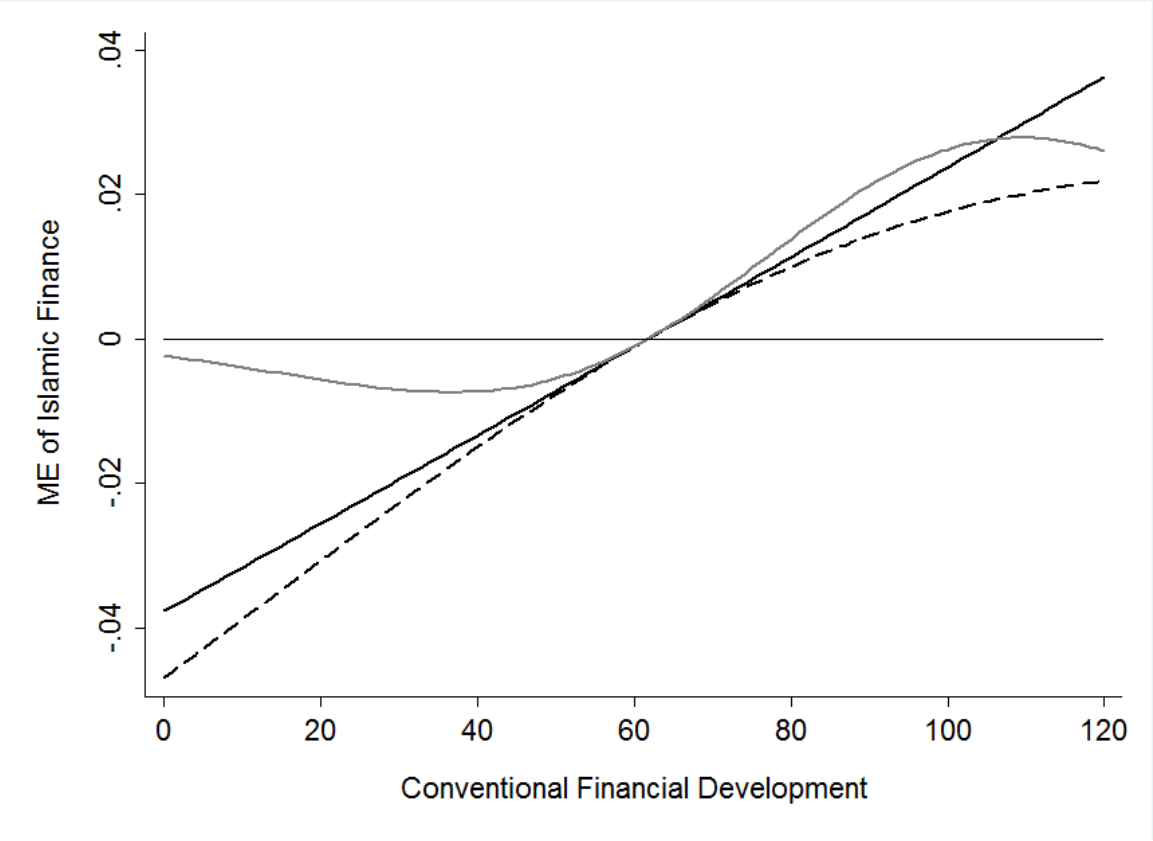


Figure 3
Interaction between Islamic credit and conventional credit:
Use of the alternative measure for perception of financing obstacles

The figure displays the results when the dependent variable is a dummy variable equal to one if a firm declared that access to financing is a major obstacle or a very major obstacle to its current operations.



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Université de Strasbourg
Pôle Européen de Gestion et d'Economie
61 avenue de la Forêt Noire
67085 Strasbourg Cedex

http://large.em-strasbourg.eu/