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CORRUPTION, ASYMETRIE D'INFORMATION ET GENRE : IMPACT SUR LA DEMANDE DE CREDIT BANCAIRE

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Résumé

Le découragement est un phénomène dans lequel les emprunteurs ayant des projets de qualités ne demandent pas de crédit par crainte que cette demande soit rejetée. Bien que ce dysfonctionnement de la demande de crédit affecte significativement le financement des entreprises, les études examinant en profondeur ses déterminants sont rares. En étudiant empiriquement l'impact sur le découragement de la corruption, du partage de l'information et du genre, cette thèse comble une partie de cette lacune. Nous mettons ainsi en lumière, d'une part, les effets significatifs de ces trois caractéristiques sur le découragement mais aussi, d'autre part, les mécanismes explicatifs à ses effets.

Le premier essai s'intéresse à l'effet de la corruption sur le découragement. En étudiant des PME travaillant dans les pays européens développés, Galli, Mascia et Rossi (2017) mettent en évidence un effet négatif de la corruption sur le découragement. Mais si les études faites sur l'offre de crédit, mettent aussi en évidence un tel effet, d'autres constatent que la corruption peut aussi « huiler les rouages » en facilitant l'accès au crédit dans les pays en voies de développement. Il est alors naturel de questionner l'existence d'un tel effet bénéfique pour la demande de crédit. En utilisant les données d'enquêtes sur les entreprises menées par la Banque mondiale pour 14 pays asiatiques en développement, nous constatons que si, globalement, la probabilité de découragement diminue lorsque les entreprises perçoivent une corruption plus élevée, cet effet dépend du niveau de développement du pays. Plus précisément, nous observons que dans les pays les plus développés la corruption entrave la demande de crédit alors qu'elle la facilite dans les pays les moins développés. Nous expliquons ces effets opposés par le poids de la réglementation gouvernementale. Dans les pays les moins développés, où la corruption est la plus répandue, les réglementations sont moins efficaces et plus bureaucratiques. Les entreprises situées dans ces pays peuvent alors considérer la corruption comme un moyen « efficace » pour contourner des réglementations trop contraignantes et augmenter ainsi leurs chances d'obtenir des prêts à moindre coût. En revanche, dans les pays plus développés, une application de la loi plus efficace augmente le risque de sanction, ce qui rend non efficace le recours à la corruption comme mécanisme « huilant les rouages » de la demande de crédit.

Le deuxième essai étudie l'effet du partage de l'information sur le découragement. Si Kon et Storey (2003) montrent théoriquement que le niveau d'asymétrie d'information a un effet

non linéaire sur le découragement des emprunteurs, cette conclusion n'a pas encore été confirmée empiriquement. C'est l'objectif de ce travail. Nous utilisons des données, d'une part, provenant d'enquêtes sur les entreprises faites dans 58 pays en développement, et d'autre part, issues du projet « Doing Business », complétées par Djankov, McLiesh et Shleifer (2007), sur le partage de l'information. Nous étudions deux mécanismes de partage d'information : les registres de crédits publics et ceux privés. En nous focalisant tout d'abord sur les premiers, nous observons que le partage de l'information atténue le découragement des emprunteurs. Dans de nombreux pays en développement, les registres de crédit publics servent à la surveillance des banques mais aussi de sources d'information dans décision d'octroi du crédit. De plus, ces registres étant des centres gérés par les banques centrales, l'information qu'ils fournissent est fiable. Elle permet donc d'atténuer l'asymétrie d'information et de réduire ainsi le nombre des emprunteurs découragés. L'effet du partage de l'informations via les registres de crédits privés est plus complexe puisque, comme prédit par Kon et Storey (2003), nous mettons en lumière une relation non linéaire entre ce partage et le découragement. Plus précisément, le partage d'information augmente le découragement des emprunteurs lorsque la couverture de l'information est faible, mais le réduit lorsque cette couverture dépasse un certain seuil. L'explication est la suivante. Dans les pays présentant une faible couverture de l'information, cette dernière est éclatée sur plusieurs bureaux de crédit privés. Il est donc difficile et coûteux pour les banques d'appréhender correctement la solvabilité des emprunteurs. En outre, l'absence de cadre juridique contrôlant les opérations des bureaux de crédit rend moins efficace le partage information ce qui augmente le coût de son acquisition sans améliorer sa pertinence, ce qui *in fine* décourage les emprunteurs. A contrario, les pays ayant une couverture informationnelle importante possèdent des systèmes efficaces de rapport de crédit. Ces systèmes permettent aux prêteurs d'évaluer correctement chaque demande de crédit, ce qui encourage les emprunteurs à mener à leur terme les demandes de financement.

Le troisième essai analyse l'impact de la corruption sur l'effet du genre sur le découragement. La question est pertinente. Les femmes représentent la moitié de la population mondiale mais elles souffrent d'un accès au financement plus faible que les hommes, ce qui limite leurs contributions au développement économique et social et accroît les inégalités entre les sexes. Bien qu'il existe un vaste champ de littérature qui examine l'impact du genre sur l'accès au financement, nous savons peu de choses sur l'effet de la corruption sur cet impact. En utilisant, comme dans les essais précédents, les données des enquêtes sur les entreprises pour 68 pays développés et en développement, nous observons que, en présence de corruption,

les dirigeantes d'entreprise sont plus découragées à demander un crédit que leurs homologues masculins. Nous apportons trois explications à cette observation. Premièrement, si les entreprises dirigées par des femmes sont généralement plus petites et dégagent moins de bénéfices, elles doivent néanmoins payer plus de pots-de-vin que les entreprises dirigées des hommes. Ainsi, la corruption affecte davantage les femmes et les empêche de demander des prêts bancaires. La seconde explication repose sur l'expérience dans la gestion des entreprises. Les femmes en possèdent moins. Elles sont donc moins bien armées que les hommes pour faire face à un environnement corrompu. Ainsi, dans un tel environnement, elles sont plus découragées que les hommes à demander un crédit. Le troisième facteur explicatif repose sur l'inégalité entre les sexes : cette inégalité accentue l'impact négatif de la corruption décourageant ainsi davantage les femmes dans leur demande de crédit.

Corruption, asymmetric information and gender: impact on the demand for bank credit

Abstract

Discouragement is a phenomenon in which good borrowers do not apply for credit for fear of rejection. It is a malfunction on the demand side of the credit market that significantly affects firms' credit access. However, studies that deeply investigate the effect of each determinant on discouragement are rare. Therefore, this thesis discovers the impact of corruption, information sharing, and gender on discouragement. We find not only the significant effects of these elements on discouragement but also the mechanisms to explain these effects.

The first essay exploits the effect of corruption on discouragement. On the supply side, corruption is found to constrain lending (sand the wheel) and to ease firms' access to credit (grease the wheel), while on the demand side, only the "sand the wheel" effect is revealed by Galli et al. (2017). Investigating SMEs in the developed countries in Europe, they find that corruption impedes firms to demand bank loans. Their findings stimulate our interests in the impact of corruption on discouraged borrowers in developing countries. Using data from Enterprise Surveys conducted by the World Bank for 14 Asian developing countries, we find that the probability of discouragement reduces when firms perceive higher corruption. More interesting, the effect of corruption on discouragement depends on the level of country development. In upper-middle income countries, firms are less likely to apply for bank loans, while in lower-middle income countries, firms demand more loans in the presence of high corruption. The mechanism to explain these opposite effects is the burden of government regulation. Regulations in lower-middle income countries are less efficient, more red tape. Besides, corruption is more prevalent, so the likelihood of being punished due to participating in corrupt activities is low. Firms located in these countries, therefore, find corruption as a way to overcome burdensome regulations and hopefully increase their chance to receive loans with lower costs. In contrast, law enforcement is more efficient in upper-middle income countries and there is a higher probability of being punished if firms engage in corrupt behavior. Hence, perceiving high corruption hampers firms from applying for credit.

The second essay investigates the effect of information sharing among banks on discouragement. Kon and Storey (2003) predict that imperfect information has a non-linear effect on discouraged borrowers. This prediction, however, has not been confirmed by an empirical study. We apply the data from Enterprise Survey for 58 developing countries

worldwide, and the data for credit information sharing from Doing Business and Djankov et al. (2007). We find that credit information sharing through public credit registries mitigates borrower discouragement. Public credit registries in many developing countries work both as bank supervision and as information sources for making lending decisions. Moreover, they are unique hubs of mandatary data operated by central banks, thereby the information is more reliable. Hence, they play a significant role in mitigating asymmetric information, leading to the reduction of discouraged borrowers. More interesting, we prove information sharing through private credit registries has a non-linear effect on discouragement. It increases discouragement when information coverage is low but reduces them when information sharing reaches a sufficient level. The explanation is that in countries having low information coverage, information is split into pieces by several private credit bureaus. Therefore, it is hard and costly for banks to shape a full picture of borrowers' creditworthiness. Furthermore, information sharing is less accurate because of the absence legal framework to monitor credit bureaus' operations. Because of those reasons, the application costs increase, and the screening errors are not improved, resulting in enhancement of borrower discouragement. Conversely, countries having high information coverage report effective credit report systems that assist lenders in their lending assessments. Therefore, discouraged borrowers decrease.

The third essay studies the gendered impact of corruption on discouragement. We are interested in this topic because women account for half of the world, so their contributions are important for economic and social development. However, women suffer from lower access to finance than men. This limits their contributions and increases gender inequality. Although there is an extensive body of literature that examines the impact of gender on access to finance, we know little about the impact of corruption on genders in their demand for credit. Using Enterprise Survey data for 68 developed and developing countries, we find women entrepreneurs are more discouraged from applying for credit than their men counterparts in the presence of corruption. This result is explained by three channels: First, women-owned firms are usually smaller, with lower profit, but they must pay more bribes than men-owned firms. Thus, corruption affects women more and hampers them from applying for bank loans. Second, women have less experience in management, and as such can have less experience to deal with corruption. Therefore, perceiving high corruption discourages them from applying for credit. Finally, the degree of gender equality influences the gendered impact of corruption with greater discouragement for women in a less gender equality society.

INTRODUCTION CHAPTER

1. Introduction

Asymmetric information is found as a plausible explanation for many observed market inefficiencies such as unemployment (Shapiro and Stiglitz, 1984), no equilibrium in a competitive insurance market (Rothschild and Stiglitz, 1976). In the credit market, asymmetric information is also confirmed to be the main reason for credit rationing and discouraged borrowers, two dysfunctions of the credit market.

Credit rationing is the phenomenon in which banks keep interest rates under the equilibrium level, even existence an excess demand for credit. Consequently, some good borrowers are rejected from loan applications even if they ready to pay higher interest rates (Stiglitz and Weiss, 1981). This phenomenon is explained by the asymmetric information between lenders and borrowers. Stiglitz and Weiss (1981) assume that lenders know the average return but do not have information about the riskiness of the borrower's projects. Therefore, if lenders increase interest rates, they may receive smaller returns than expected because higher interest rates will influence loan's riskiness by driving out the safer borrowers from the market or urging borrowers to take higher risk projects. Following the findings of Stiglitz and Weiss (1981), studies about credit rationing have blossomed and many aspects of this phenomenon have been uncovered. We can say that this is a long-established field of research related to the malfunction of the credit market at the supply side.

Statistics of the firm's credit access from Enterprise Surveys data in 89 countries interviewed for the period 2011-2018 reveal that 22% of firms applied and 78% did not apply for credit[1]. The large percentage of non-applicants raises questions: Who are these firms? Why they did not apply for credit? Whether they have enough funds or other reasons are hampering them from access to credit? For a long time, non-applicants were out of the attention of researchers. The possible reasons may be that there is no information about them, or they do not affect the bank risks. However, when we consider the aspect of economic development, if a significant percentage of firms did not look for the desired credit because they find it is hard to do so, this will inhibit economic growth.

Levenson and Willard (2000) were the first to refer to firm credit-worthy non-applicants, and he suggested that the credit rationing should be widened by including creditworthy firms

[1] These results are from the author's calculation. These countries are low, middle, and high-income.

which decide not to apply for desired external financing. Their idea, later, is developed in the theory of Kon and Storey (2003) who define discouraged borrowers as "*a good borrower may not apply for a loan to a bank, because they feel they will be rejected*". Kon and Storey (2003) predict three elements to affect the scale of discouragement: (1) the bank screening errors, (2) the application costs, (3) the difference between bank and moneylender interest rates. Increasing bank screening errors or application costs lead to a higher scale of discouragement, while the larger interest rate difference reduces the discouragement.

Since 1993, National Survey of Small Business Finances (SSBF) in the United States has added one question that helps to identify discouraged borrowers[2]. In 2002, Enterprise Surveys (ES) of the World Bank has included a question detailing the reasons why firms did not apply for credit. And the same goes for Survey on the Access to Finance of SMEs (SAFE) conducted by the European Central Bank since 2009. The availability of data allows for more understandings about discouraged borrowers. Later studies have confirmed that discouragement is an important phenomenon and deserves attentions. Levenson and Willard (2000); Freel et al. (2012); and Gama et al. (2017) reveal the number of discouraged borrowers is twice or even three times the number of borrowers whose loan applications are denied. Moreover, Ferrando and Mulier (2015) find that discouragement has strong negative effects on firms' investment growth, employment growth, and asset growth.

Although many aspects have been investigated, most studies about discouraged borrowers focus on finding determinants of discouragement. Studies explaining deeply the effect of each determinant are still rare. Besides, predictions in the discouraged borrowers theory of Kon and Storey (2003) still wait for confirmation from the empirical research. In such a situation, we find our research. Our purpose is to prove predictions from the theory of Kon and Storey (2003) by investigating the effect of corruption, information sharing, and the gendered impact of corruption separately on discouragement.

The next sections will be structured as followings: the second section is a literature review. The first part of the literature review section will summarize the key studies of asymmetric information to which our research belongs. After that, we discuss in detail discouragement and corruption that are important backgrounds for the thesis. The third section states the research questions. Following that, the methodology and data is explained in the

[2] "During the last three years, were there times when the firm needed credit, but did not apply because it thought the application would be turned down?" p.69, SSBF Survey Questionnaire 1993.

fourth section. The last section shows our findings and contributions to the literature and economic development.

2. Literature review

2.1 Contract theory

Contract theory is an enormous field of research including important theories that have impacted many research areas such as economics, finance, management, and corporate law. In this thesis, we discuss a part of contract theory related to asymmetric information arising from the agency relationship and solutions to alleviate the asymmetric information.

The agency relationship is the one in which one party (principal(s)) demands another party (agent(s)) to fulfill a duty on the former behalf, and this relationship is defined as a contract by Jensen and Meckling (1976). In some cases, the conflict of interest may arise from this relationship, because the agent act on his own interests instead of the principal's interests. This problem happens when the principal and the agent have different goals, but due to asymmetric information, the principal cannot determine whether the agent works appropriately or not (Eisenhardt, 1989). Information asymmetry can occur pre-contract and post-contract in form of hidden information referred to as adverse selection, or hidden actions as moral hazard (Bolton and Dewatripont, 2005). Hidden information relates to private information about the agent's abilities or characteristics hidden from the principal that he cannot completely verify. Hidden actions refer to the agent's actions departing from the expectations of the principal which he cannot detect. The following contents discuss in detail forms of asymmetric information and solutions to mitigate it.

The key paper in the economics of asymmetric information is published by Akerlof (1970). He discusses the concept of asymmetric information through the used automobile market, where used car sellers know the quality of cars they sell while buyers do not. Due to having no information about car quality, the buyers pay the same price for either bad (Akerlof called them "lemons") or good cars. In such a case, owners of good cars would deny selling their cars because the cars are paid undervalued. Hence, most of the cars traded in the market will be lemons. This argument proves that asymmetric information drives out good cars from the market, and if this process continues, it may lead to market non-existence (Akerlof, 1970). The phenomenon in which good agents quit the market because of information asymmetry is called adverse selection. This phenomenon is found in many other fields such as insurance,

credit, employment, etc. Adverse selection can be mitigated by "signaling" revealed by agents (Spence, 1973) or "self-selection mechanism" (Rothschild and Stiglitz, 1976).

Spence (1973) shows that agent's "signaling" can mitigate asymmetric information. He explained this concept through the job market. In this market, when an employer hires employees, he is uncertain of their productive capabilities. Without any information about employee productivity, the employer will pay the wage at the expected productivity level, and that wage is underpaid to high-productivity employees. Therefore, they have incentives to prove their competencies by signaling that they are high-productivity workers. As such, the asymmetric information between employer and employees reduces, and then the employer will offer wages to various levels of productive capabilities. The signal discussed in the model of Spence (1973) is education. Spence did not mention that education would increase productivity. However, education is used as a signal by high-productivity employees to distinguish them from low-productivity employees. The key assumption in the model of Spence (1973) is that cost of signaling is negatively correlated with productive capability. In detail, he assumed the marginal cost of education is lower for high-productivity employees. Therefore, high-productivity employees can acquire more education with less cost, while low-productivity employees cannot acquire the same level of education as the formers because it is too costly. Thus, high-productivity employees can use education as a signal and successfully distinguish themselves from the others.

Agent characteristics can also be revealed through the “self-selection mechanism” (Rothschild and Stiglitz, 1976). Analyzing the insurance market, Rothschild and Stiglitz (1976) proved that under imperfect information that insurers cannot distinguish low-risk customers from high-risk customers, the pooling equilibrium in which both groups of customers buy the same contract cannot exist. In that case, there may exist separating equilibria in which customers with different levels of risks will choose different contracts. Therefore, insurance companies can offer a range of different contracts, and the customer's choice of contract type would reveal their level of risks. Low-risk customers have more tendency to choose a contract with a low premium but high deductible, whereas high-risk customers favor a high premium but a low deductible contract.

The above discussions are related to adverse selection that happened pre-contract. Now we turn to post-contractual moral hazard and solutions to mitigate it. Moral hazard refers to an agent's hidden actions which conflict with the expectation of the principal, but because of asymmetric information, he cannot detect, or control. Arrow (1963) is among the firsts to

discuss the moral hazard in the medical insurance market. He mentions that if an insured individual (agent) can control the probability of an insured event occurring, then he will have incentives to get benefit from that. For example, the demand for medical care increases when people have medical insurance, because they may less take good care of themselves, or use expensive medical treatment when they are sick. Spence and Zeckhauser (1971) support Arrow's idea. Their model confirms that an insured individual may take actions to increase his payoff from an insurance company if the company (1) cannot observe insured individual actions, for example, the degree of care when he drives his car, or (2) can observe insured individual actions but cannot control the state of nature, for example, a medical insurance plan only regulates the amount to be spent, but not a medical condition.

To mitigate the moral hazard problem, the studies investigate characterizations of the optimal incentive contract. Jensen and Meckling (1976) considered a decision of a firm's owner (also as manager) to finance his project by equity or debt. They showed that in the case of outside equity finance, moral hazard may arise between the manager (agent) and shareholders (principals) because the manager is less incentive to put effort into the firm's activities when his equity share reduces. Besides, moral hazard also occurs with outside debt finance because it increases the incentive that the owner-manager invests in a risky project. If the project is successful, he only pays interest to debt holders and keeps most of the gains. However, if the result of the project is bad, debt holders will suffer most of the loss. Moral hazard induces costs related to (1) monitoring activities engaged by the principal to control the agent such as auditing, formal control systems, budget restrictions, etc., (2) bonding activities engaged by the agent to guarantee that the principal's interest will not diverge, or (3) residual loss incurred by the principal due to the agent makes sub-optimal decisions. Dealing with these problems, Jensen and Meckling (1976) suggested an optimal ownership structure between owner-manager and outsiders to minimize the costs incurred by agency problem. In addition, investigating the labor market, Shapiro and Stiglitz (1984) suggested an efficient wage model where firms pay higher than "going wage". Because of the higher wage, the demand for labor decreases, and unemployment appears in the market. Shapiro and Stiglitz (1984) explained that at such a high salary, employees have incentives to exert more effort in their work because if they shirk, they will be fired, resulting in losing high salaries and taking time to find a new job.

In the credit market, asymmetric information causes credit rationing on the supply side and discouraged borrowers on the demand side in which discouragement is our main investigating.

2.2 Discouraged borrowers

2.2.1 Define and measurements of discouraged borrowers

The term "discouraged" is first mentioned in the empirical study of Levenson and Willard (2000)[3] who suggest that the credit rationing should be widened by including creditworthy firms that decide not to apply for desired external financing due to the long waiting time for accepting. This waiting time impacts their ability to expand or even survive. Later, the term discouraged borrowers is used to design small business owners who need credit but do not apply for fear to be rejected (Cavalluzzo et al., 2002). Following these ideas, the first discouraged borrowers theory is developed by Kon and Storey (2003). They define "discouraged borrowers are good borrowers who do not apply for a bank loan because they feel they will be rejected". Discouragement in the model of Kon and Storey (2003) is explained by the application costs and bank screening errors, instead of waiting time for accepting mentioned in the study of Levenson and Willard (2000). An important point of Kon and Storey's model that they focus on good borrowers who need but do not apply for credit. The difficulty in access to finance of these borrowers reveals the malfunction of the credit market that impacts economic development.

Based on precedent studies, although later measurements of discouraged borrowers have common characteristics, they also vary greatly depending on the research's target and data availability. The consistent idea in all the empirical studies is that discouraged borrowers need credit, but they do not apply for fear of rejection. Han et al. (2009), however, include both good and bad borrowers who experience discouragement because they question whether discouragement is an efficient self-rationing mechanism. Measurements of discouraged borrowers also widen by including other reasons for not applying loans such as complicated procedure, high interest rate, high collateral, and corruption (M. Brown et al., 2011; Chakravarty and Xiang, 2013; Gama et al., 2017), or not the right time, do not want to take additional risks, did not know where to find the appropriate finance, too long/too much hassle procedure (R. Brown et al., 2018). In contrast to Kon and Storey (2003), some studies include high-risk borrowers or poor credit history in the measurements of borrower discouragement (R. Brown et al., 2018; Vincent, 2010). While all studies concur that discouraged borrowers need credit, Christensen and Hain (2015) include firms that do not seek external finance and do not apply due to the expectation of rejection. They call this phenomenon "hidden need" and

[3] Jappelli (1990) was the first to mention "discouraged borrowers" but the term was used for households.

consider these firms as discouraged borrowers. Finally, although many measurements are assigned for discouraged borrowers, they do not clearly distinguish between good and bad borrowers as defined by Kon and Storey (2003). Summarize measurements for discouraged borrowers is showed in Table 1.

In this thesis, following Kon and Storey (2003) and previous empirical studies of M. Brown et al. (2011), Chakravarty and Xiang (2013), Gama et al. (2017), we define discouraged borrowers are firms that need but do not apply for credit because of complex procedures, high interest rates, high collateral requirements, insufficient loan size & maturity, or fear of rejection. Moreover, to confirm our findings, we apply another measurement for discouraged borrowers: firms perceived as creditworthiness by a financial institution do not apply for loans not because they have sufficient capital, but because application procedures are complex, interest rates are unfavorable, collateral requirements are excessive, loan size and maturity are insufficient, or they do not think the application would be approved. This measurement captures the full definition of Kon and Storey (2003).

Table 1 – Definitions and measurements of discouraged borrowers

Author	**Definitions and measurements**
Levenson and Willard (2000)	Discouraged borrowers are creditworthy firms that decide not to apply for desired external financing due to the long waiting time for acceptance.
Cavalluzzo, Cavalluzzo and Wolken (2002); Freel, Carter, Tagg and Mason (2012); Ferrando and Mulier (2015); Mac an Bhaird, Vidal and Lucey (2016); Qi and Nguyen (2020)	Discouraged borrowers are firms who did not apply for loans because they think the loans would not be approved.
Kon and Storey (2003)	Discouraged borrowers are good borrowers who do not apply for a bank loan because they feel they will be rejected.
Han, Fraser and Storey (2009)	Discouraged borrowers are good and bad borrowers who do not apply for credit for fear of rejection.

Vincent (2010)	Discouraged borrowers are high risk borrowers who do not apply for one of the following reasons: fear of being turned down, the difficulty of applying, and the length of the application procedure.
M. Brown et al. (2011); Chakravarty and Xiang (2013); Galli et al. (2017); Gama et al. (2017)	Firms are discouraged borrowers if they did not apply for bank loans because of complicated procedure, high interest rate, high collateral requirements, corruption, or fear of rejection.
Fraser (2014)	Discouraged borrowers are businesses that would like to borrow but did not apply for bank finance because either: they felt to be turned down, or they made informal enquiries but did not proceed with their application because the bank seemed reluctant to lend.
Christensen and Hain (2015)	Discouraged borrowers are firms that experienced or did not experience problems obtaining external finance or even do not seek external credit. However, their expectations of rejection hamper them from applying for credit.
Cowling, Liu, Minniti and Zhang (2016)	A discouraged borrower is defined as one with demand for but not applying for any finance either because the firm feared rejection, or the owner thought the finance was too expensive.
R. Brown, Liñares-Zegarra and Wilson (2018)	Discouraged borrowers are SMEs who need credit but did not apply because of too expensive cost, additional risk, not the right time, poor credit history, long/hassle decision process, or they do not know where to find the appropriate finance, or others.
Rostamkalaei, Nitani and Riding (2020)	Discouraged borrowers are firms that do not apply for credit because they thought they would be turned down, or this is not the right time to apply for borrowing.

Source: summary of the author

2.2.2 Predicted elements impact on borrower discouragement from the discouraged borrower theory of Kon and Storey (2003)

Kon and Storey's model assumes there are two types of firms: good and bad. Firms know their projects' probability of success, but banks do not know. The return from good firms' investment is certain X_G, while the return from bad firms' investment can be X_B if the

investment succeeds and zero if it fails. To simplify the model, firms are assumed to finance their projects through a bank, or an alternative source named moneylenders[4]. If firms finance their needs through a bank, they must pay the application costs K. These costs are paid whether the application is accepted or not. However, if firms use moneylender services, the application costs are zero, and all the applications are always accepted. The application costs can be financial costs such as costs to gather information required by banks; in-kind costs such as time to travel to banks, time to wait for the application process, time to meet bank officers; or psychic costs such as reluctance to provide information to outsiders, lack of knowledge and skills to complete application documents or reluctance to enter the bank.

Because of the imperfect information, banks cannot perfectly distinguish bad from good firms. Therefore, banks make errors in their screening: There is b_G probability that an application by a good firm is perceived by the bank as a bad firm, and g_B probability that an application by a bad firm is perceived by the bank as a good firm. Kon and Storey (2003) assume all firms know this information.

Using external finance, firms need to pay the interest rate D for a bank loan and D^* for a moneylender, where $X_B > X_G > D^* > D$. If firms finance their project through a moneylender, the net return after paying the interest D^* will be w. When a good firm applies for a bank loan, there are two possibilities: If it is accepted, the net return will be $X_G - D - K$ (with probability $1 - b_G$), but if it is rejected, it needs to re-finance the project through a moneylender and the net return will be $w - K$ (with probability b_G). Therefore, the net expected return of a good firm will be $(1 - b_G)(X_G - D - K) + b_G(w - K)$.

A good firm will apply for a bank loan if the net return receiving by financing its project through a bank is larger than the net return receiving by financing its project through a moneylender. Therefore, the condition for a good firm applying for a bank loan will be as the following:

$$(1 - b_G)(X_G - D - K) + b_G(w - K) > w$$

Rearranging this yield:

$$(1 - b_G)(X_G - D - w) > K$$

$$Or: \; X_G > D + w + K/(1 - b_G)$$

[4] "Moneylenders supply services desired by their clients without the costly apparatus of buildings, papers and staff, and they do this at low cost to borrowers because of proximity, their quick response to requests and the flexibility they permit in repayment" Hulme and Mosley (1996)

Where:

X_G : gross return of a good borrowers

D : bank interest payments

$K/(1 - b_G)$: the effective application cost, in which:

K : application cost

b_G : the probability that an application by good firm is perceived by the bank as bad firm

w : net return after interest payment of borrowers if they finance their project through a moneylender

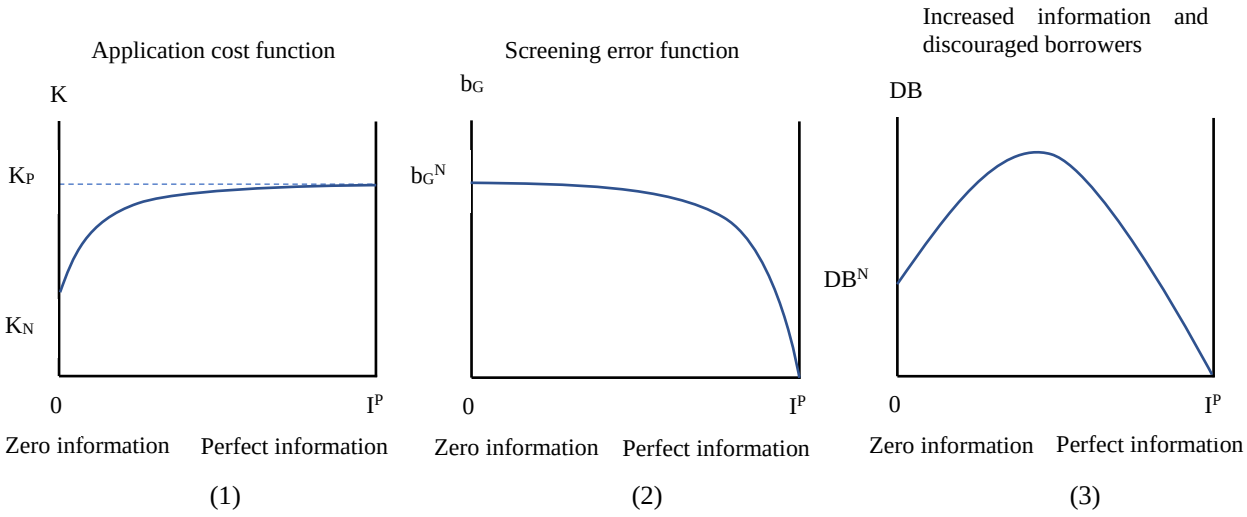
Since bank interest rates (D) and gross return (X_G) are common to all applicants, the probability that a good firm applies for credit will depend on three elements: the opportunity cost (w), application cost (K), and screening error (b_G). If interest rates charged by other sources are high relative to bank interest rates, the probability to apply for bank credit is higher. Moreover, an increase in application costs will hamper firms to look for their financial needs through banks. Finally, when banks make more mistakes in their lending decisions, bank application rates will decrease as well. Therefore, the scale of discouraged borrowers depends on the difference in interest rate between banks and moneylenders, application costs, and bank screening errors.

The source of discouragement is imperfect information. Increased information, overall, decreases the probability of discouragement. However, the impact of asymmetric information on discouraged borrowers is predicted to be non-linear. The reason is that information impacts both application costs and screening errors. The combination of these two effects creates the non-linear effect of information on discouraged borrowers. In detail, when banks have little information about firms and seem to make the lending decisions by random, firms will not prepare carefully for their application. Hence, the application costs are low. However, when banks have more information and they are better informed about firms' creditworthiness, firms need to invest for their application to enhance the chance to receive credit, thereby application costs increase, resulting in the increase of discouraged borrowers. In contrast, at the highest level of information asymmetry where banks have no information about firms, the bank screening error is at a maximum. Then, information needs to be increased up to a sufficient level to improve the screening error, resulting in the decrease of discouraged borrowers.

Combining these two opposite effects, we get the non-linear effect of information on discouraged borrowers (Figure 1). At the low level of information, increased information raises the application costs but does not significantly improve the screening error. Thereby, the probability of discouragement rises until the information reaches a sufficient level where the screening skill of banks is improved and dominates the increment of application costs. From that point, increased information reduces the discouraged borrowers.

Figure 1 - Impact of application costs, screening errors and increased information on discouraged borrowers

(1) Application cost function of the bank's information – (2) Screening error function of the bank's information – (3) The effect of increased information on discouraged borrowers - Kon and Storey (2003, p. 43-44)



K_N : minimum application cost

K_P : application cost at perfect information

b_G^N: maximum screening error

b_G : The probability that an application by good firm is perceived by the bank as bad

I^P : Perfect information

DB: Discouraged borrowers

(1) The firms have minimum application costs, K_N when banks have some information. Application costs then increase at a decreasing rate up to K_P under perfect information.

(2) Bank screening error is at a maximum b_G^N when banks have no information. Screening error then reduces at an accelerating rate, to zero under perfect information.

(3) Discouraged borrowers increase when banks have some information. They reach a maximum level at an intermediate level of information and decline to zero under perfect information.

2.2.3 Evidence from the empirical research

Since imperfect information lies at the heart of discouragement, factors related to asymmetric information such as entrepreneur characteristics, firm characteristics, and lending relationship have significant impacts on the probability of discouragement. Moreover, decisions to seek external financing are influenced by economic conditions and firms' perceptions about them. Therefore, economic conditions and firms' perceptions about their operation environment are other factors impacting discouraged borrowers.

Specifically, male managers are less discouraged than their female counterparts (Chakravarty and Xiang, 2013; Gama et al., 2017). The education and experience of managers also play a role in reducing the probability of discouragement (Chakravarty and Xiang, 2013; Fastenbauer and Robson, 2014; Gama et al., 2017).

Firm characteristics are key factors for lenders to distinguish between good and bad borrowers. Hence, younger, and smaller firms are more likely to be discouraged (Chakravarty and Xiang, 2013; Cole, 2016; Ferrando and Mulier, 2015; Fraser, 2014; Freel et al., 2012; Han et al., 2009). Foreign-owned firms and government-owned firms are revealed less seeking for credit (M. Brown et al., 2011; Xiang et al., 2015). Besides, firm location also impacts the probability of discouragement, because a shorter distance between lenders and borrowers reduces the information asymmetry and application costs (Gama et al., 2017; Kon and Storey, 2003).

Furthermore, the lending relationship plays an important role in alleviating asymmetric information (Berger and Udell, 1995; Boot, 2000; Sharpe, 1990). Hence, it should have a negative impact on discouraged borrowers. As expected, most studies reveal a stronger relationship between a lender and a firm can reduce the likelihood of the firm being discouraged (Chakravarty and Xiang, 2013; Chakravarty and Yilmazer, 2009; Freel et al., 2012). However, the opposite results are found by Han et al. (2009) and Vincent (2010). They confirm that discouraged borrowers have stronger relationships with financial institutions. In addition, a recent study of Qi and Nguyen (2020) reveals that government connections can reduce asymmetry information, and firms with government connections are less likely to be discouraged from applying for bank loans.

Since loan application decisions also depend on economic conditions, firms' perceptions of their operating environment have a significant impact on their decisions. Perceiving difficulties in credit access may discourage them from applying for loans (Mac an Bhaird et

al., 2016). In addition, the perception of corruption also impacts discouragement. Galli et al. (2017) show corruption hampers the demand for bank credit in developed countries.

Finally, Chakravarty and Xiang (2013), Gama et al. (2017) and Mac an Bhaird et al. (2016) observe a negative correlation between economic development and discouragement. Besides, Demirgüç-Kunt and Maksimovic (1998) conclude that the incidence of firms financing their growth by external sources is higher in countries having efficient legal systems. Their finding implies an efficient legal environment has a positive effect on the ability of firms to apply for loans and thus can affect levels of discouragement.

2.3 Corruption

2.3.1 Definitions

Corruption is a complex notion. "There is no single, comprehensive, universally accepted definition of corruption" (Langseth, 2006). However, understanding "what is corruption?" is critical to recognize, measure, and control it. The definition that "corruption is the misuse of public power for private profit" is used since 1931 (A. J. Brown, 2006) and it is still widely applied in later research (Akçay, 2006; Podobnik et al., 2008; Treisman, 2000). Nevertheless, public office-centred definition does not capture abuses in private business and other areas of social interaction (A. J. Brown, 2006). Therefore, International Transparency defines "corruption as the abuse of entrusted power for private gain".

In this thesis, we follow Pellegrini (2011), who defined "corruption is a behavior which deviates from the formal duties of a given role because of private-regarding (personal, close family, private clique) pecuniary or status gains; or violates rules against the exercise of certain types of private regarding influence. This includes such behavior as bribery (use of a reward to pervert the judgment of a person in a position of trust); nepotism (bestowal of patronage by reason of ascriptive relationship rather than merit); and misappropriation (illegal appropriation of public resources for private-regarding uses)."[5]

2.3.2 Impacts of corruption on economic development and society

Most studies have proved vigorous evidence that corruption harms economic development. Corruption is detrimental economic growth by reducing GDP growth rate (Abed and Davoodi, 2000; Gründler and Potrafke, 2019; Leite and Weidmann, 1999; Mauro, 1996; Mo, 2001; Podobnik et al., 2008; Tanzi and Davoodi, 2001). It enhances inflation (Al-Marhubi,

[5] Pellegrini, L. 2011 Corruption, Development and the Environment, Chap 2, Springer Science

2000; Ali and Sassi, 2016), hampers investment (Habib and Zurawicki, 2001; Mauro, 1996), reduces tax and government revenues (Ghura, 1998; Tanzi and Davoodi, 2001). Moreover, corruption increases inequality and poverty (Gupta et al., 2002) and distorts the allocation of resources. Shleifer and Vishny (1993) state that because of corruption, country's investment can shift away value projects, such as health and education, to accept useless projects, such as defense and infrastructure. These misallocations are confirmed in studies of Mauro (1998) and Gupta et al. (2001). Studies about the impacts of corruption are summarized in Table 2.

Table 2 - Impact of increasing corruption by one unit[6]

Author(s)	**Impact on**	**Findings**
Mauro (1996)	Real per capita GDP growth	–0.3 to –1.8 percentage points
Leite and Weidmann (1999)	Real per capita GDP growth	–0.7 to –1.2 percentage points
Tanzi and Davoodi (2001)	Real per capita GDP growth	–0.6 percentage points
Abed and Davoodi (2000)	Real per capita GDP growth	–1 to –1.3 percentage points
Mo (2001)	Real per capita GDP growth	−0.545 percentage points
Podobnik et al. (2008)	Annual norminal GDP per capita	-1.7 percentage points
Gründler and Potrafke (2019)[7]	Real per capita GDP growth	–17 percentage points
Al-Marhubi (2000)	Inflation	+0.17 to 0.26 points
Ali and Sassi (2016)	Inflation	Higher monetary expansion, so higher inflation rates
Mauro (1996)	Ratio of investment to GDP	–1 to –2.8 percentage points
Habib and Zurawicki (2001)	Foreign direct investment	−0.51 percentage points

[6] Corruption is measured on a scale of 0 (highly clean) to 10 (highly corrupt)

[7] Corruption is measured by reverse CPI (Corruption Perception Index) from 0 (no corruption) to 100 (high corruption). Result shows the effect of one standard deviation increased in corruption on real per capita GDP growth.

Ghura (1998)	Ratio of tax revenues to GDP	–1 to –2.9 percentage points
Tanzi and Davoodi (2001)	Measures of government revenues to GDP ratio	–0.1 to –4.5 percentage points
Besley and Persson (2014)	Share of taxes in GDP	Higher corruption, lower tax revenues
Gupta, Davoodi, and Alonso-Terme (2002)	Income inequality (Gini coefficient)	+4.4 Gini points
Gupta, Davoodi, and Alonso-Terme (2002)	Income growth of the bottom 20 percent of the population	-6 percentage points per year
Tanzi and Davoodi (1998)	Percent of paved roads in good condition	–2.2 to –3.9 percentage points
Mauro (1998)	Ratio of public education spending to GDP	–0.7 to –0.9 percentage points
Mauro (1998)	Ratio of public health spending to GDP	–0.6 to –1.7 percentage points
Gupta et al. (2000)	Child mortality rate	+1.1 to 2.7 deaths per 1,000 live births
Gupta, Davoodi and Tiongson (2000)	Primary student dropout rate	+1.4 to 4.8 percentage points
Tanzi and Davoodi (1998)	Ratio of public investment to GDP	+0.5 percentage points
Gupta, De Mello and Sharan (2001)	Ratio of military spending to GDP	+1 percentage point

Source: Akçay (2006), Transparency International (2001) and summary of the author.

However, there is also another strand of literature finds that in case of cumbersome regulations, corruption can improve efficiency and help growth (Huntington, 1968; Leff, 1964; Leys, 1965; Nye, 1967). This efficiency is shown by corruption can help get things done faster (Leys, 1965; Lui, 1985) or like competitive bidding, corruption can result in allocating contracts to the lowest cost firms (Beck and Maher, 1986; Lien, 1986). Latter empirical research also confirms these predictions. Houston (2007) finds corruption can play a significant

role in the expansion of economic effects when laws protecting property are weak. In line, Méon and Weill (2010) conclude that corruption can be positively correlated with efficiency in countries where institutions are ineffective. Corruption is also found to reduce the negative impacts of regulations and facilitate firm entry (Dreher and Gassebner, 2013).

2.3.3 Impacts of corruption on credit activities

Corruption is found to have both "sand the wheel" and "grease the wheel" effects on credit activities as well. Weill (2011a) finds corruption hampers bank lending overall. However, it can mitigate firms' financing obstacles when bank risk aversion increases. In another study, Weill (2011b) reveals corruption negatively affects lending to Russian households and firms. Park (2012) supports for "sand the wheel" hypothesis by showing that corruption deteriorates the quality of bank loans, while Anaere (2014) reveals banks are less likely to grant loans to firms and households in the private sector if the level of corruption in that country is high.

However, besides studies confirming detrimental effects of corruption on credit activities, grease the wheel effects are also found in other studies. Chen et al. (2013) show that bribery enables better economic performance firms to receive a larger amount of loans. In the line, Fungáčová et al. (2015) find a higher level of corruption can increase bank debt ratio and hence ease firms' access to credit.

Regarding the impact of corruption on borrower discouragement at the demand side, only Galli et al. (2017) find corruption has a significant detrimental effect on firms' application for bank loans. Their study on SMEs in Europe reveals that corruption impedes small firms from applying for credit, and the loan application discouragement is stronger in countries with high levels of corruption.

3. Research questions

The majority of studies about discouragement are interested in finding determinants of discouraged borrowers, while studies investigating the effect of each determinant on the scale of discouraged borrowers are rare. Therefore, we deeply investigate discouragement by focusing on some specific elements.

As we discussed previously in section 2.2.2, Kon and Storey (2003) predict that discouragement will be impacted by three main elements: the cost of the loan application, the imperfect screening of applicants by banks, and the difference between the interest rates of

banks and other moneylenders. They show that the level of discouragement increases with the first two characteristics and decreases with the last. Moreover, the heart of discouragement is asymmetric information. Increasing information will increase application cost at a diminishing rate until the information reaches the perfect level. In contrast, enhancing information improves bank screening errors. Combining these two opposite effects, Kon and Storey (2003) expect that the impact of information asymmetry on discouraged borrowers is non-linear. At a low level of information, the probability of discouragement increases, but a sufficient level of information could reduce it. We uncover these above predictions of Kon and Storey (2003) in three essays.

The first essay deals with the application cost and bank screening errors. Our main concern is the impact of corruption on the probability a firm applies for credit. Corruption may add an additional cost to the application, while it may also increase the chance to receive credit. Empirical studies on the supply side prove that the effect of corruption on lending is ambiguous. On one hand, corruption may "sand the wheel" and constrains lending, but on other hand, it may "grease the wheel" and enhances the chance of receiving the loans. On the demand side, however, understanding the effect of corruption on discouraged borrowers is scant. As our best knowledge, only Galli et al. (2017) prove that corruption impedes firms from applying for bank loans in developed countries. Literature reveals that discouraged borrowers are more pronounced in developing countries. Moreover, corruption is higher in developing countries while its impact on credit activity in these countries appears ambiguous. In developing countries, Asian countries are quite special because they locate in a region where culture has long featured corruption, but this does not appear to impede business (Kaufmann and Wei, 1999). Therefore, our first essay focuses on Asia and we find the answer for the question: Does corruption impact the demand for bank credit in Asian developing countries?

The second essay considers the simultaneous effects of application costs and bank screening errors on discouraged borrowers under the impact of credit information sharing. As the prediction of Kon and Storey (2003), information affects both application costs and bank screening errors, resulting in the non-linear effects on discouraged borrowers. While credit information sharing is confirmed as an effective remedy to mitigate constraints in credit access at the supply side, its effect on the demand side has not been investigated. Hence, we are the first to study this topic. Indeed, we would like to know: does credit information sharing reduce discouraged borrowers?

The first essay deals with the effect of corruption on discouragement. In the third essay, we go a step further by exploring the gendered impact of corruption on discouragement. It is confirmed that women entrepreneurs are more likely to report difficulties in access to finance than men entrepreneurs (IFC, 2011). This reduces their chances to grow business, thereby affecting their contributions to the economy such as job creation, poverty reduction, and economic growth. Moreover, it also impacts women's income, decreasing the effectiveness of efforts to mitigate the inequalities between women and men. Although studies about gender and access to finance have a long history and many aspects are discovered, we know little about the impact of corruption on genders in their demand for credit. Therefore, in the third essay, we find the answer for the question: Does corruption discourage more female entrepreneurs from applying for credit?

4. Methodology and data

4.1 Methodology

Due to our dependent variable – discouraged borrowers – being binary, all three essays are mainly based on Linear Probability Model and Logit Regression to exploit the research questions. Besides, in the first and the third essay, we additionally check the robustness of our main findings by performing the Heckman test to correct for sample selection. Furthermore, to deal with potential endogeneity that may arise because of omitted variables, errors in measuring variables, or simultaneous causality, we perform a two-stage least squares regression using instrumental variables in the second and the third essays.

4.2 Data

We mainly rely on the Enterprise Surveys (ES) data from the World Bank. The survey is a firm-level survey having been conducted since the 1990s to offer an expansive array of economic data including access to finance, corruption, infrastructure, crime, competition, and performance measures. It represents a sample of an economy's private sector. Hence, firms with 100% government or state ownership are not included. More than 90% of the questions objectively determine characteristics of a country's business environment, while the remaining questions show the respondents' opinions on obstacles to their firms' operation. Manufacturing and services are two interested sectors of the ES.

Private contractors rather than government agencies or organizations associated with the government have been hired by the World Bank to conduct the survey to mitigate biases in answering sensitive questions related to business-government relations and corruption.

Interviewers first use a screener questionnaire over the phone to check if enterprises are eligible and make an appointment. The interview is then conducted face-to-face with the owners or managers of each enterprise.

The survey applies the stratified random sample method. Following this method, the population is divided into homogeneous subgroups and simple random samples are selected from each group with sample sizes proportional to strata sizes to ensure representation of samples across the population. Firm size, business sector, and geographic region are used as strata for the survey.

The advantage of this source of data is that the information is abundant covering 164,000 firms in 144 countries. The individual country datasets, aggregated datasets, panel datasets, and all relevant survey documentation being published on the World Bank website are the genuinely nice data sources for research. Rich and detailed firms' information allowing measurements at the firm-level generates more interesting results. Interestingly, the survey also includes a question to assess the truthfulness of responses regarding opinions and perceptions. This provides researchers more options to test their findings.

Data for the first essay

The first essay examines the impact of corruption on the ability that firms demand credit. As we mentioned before, differently from other areas, Asia's culture has long featured corruption, but this does not appear to impede business. Therefore, we perform our analysis based on the firm-level data of 14 developing countries in the Asian region[8] surveyed from 2012 to 2016. Besides, to explain the main finding, we use Burdens of government regulation from the Global Competitive Index which measures the level of burden for businesses of complying with governmental administrative requirements (e.g. permits, regulations, reporting). The main finding is also confirmed by another measure for corruption at country level named the Corruption Perceptions Index from Transparency International.

Data for the second essay

The second essay investigating the effect of asymmetric information on discouraged borrowers, we use ES data of 58 developing countries worldwide surveyed from 2012 to 2018 (Table 3). Moreover, to capture information asymmetry, we rely on the private credit bureau

[8] Investigated countries are Cambodia, China, India, Indonesia, Lao PDR, Malaysia, Myanmar, Pakistan, Papua New Guinea, Philippines, Solomon Islands, Thailand, Timor-Leste, and Vietnam

coverage, the public credit registry coverage from Doing Business database, and the established year of the private credit bureau and the public credit registry from the data of Djankov et al. (2007). Other control variables at country level are extracted from the World Bank database and Orbis Bank Focus.

Table 3 - Countries in the sample of the second essay

Countries	
Albania	Lesotho
Armenia	Macedonia, FYR
Azerbaijan	Malaysia
Belarus	Mauritania
Bolivia	Moldova
Bosnia and Herzegovina	Mongolia
Bulgaria	Montenegro
Cambodia	Morocco
Cameroon	Myanmar
China	Namibia
Colombia	Nicaragua
Cote d'Ivoire	Nigeria
Djibouti	Pakistan
Dominican Republic	Papua New Guinea
Ecuador	Paraguay
Egypt, Arab Rep.	Peru
El Salvador	Philippines
Eswatini	Serbia
Georgia	Solomon Island
Ghana	Sudan
Guatemala	Thailand
Honduras	Timor-Leste
India	Tunisia
Indonesia	Turkey
Jordan	Ukraine
Kazakhstan	Uzbekistan
Kosovo	Vietnam
Lao PDR	Yemen, Rep.
Lebanon	Zambia

Data for the third essay

For the last essay, we based on ES data of 68 developed and developing countries surveyed in the period 2011-2018 (Table 4) to study whether corruption has a different impact on borrower discouragement for men and women. Besides measuring corruption at firm-level

from ES data, we also capture corruption at country level by applying the Control of Corruption Indicator from the Worldwide Governance Indicators. Moreover, the main finding is explained by using Global Gender Gap Index which examines the gap between men and women in access to resources and opportunities in a country. This index is from the World Economic Forum.

Table 4 - Countries in the sample of the third essay

Countries	
Albania	Lesotho
Argentina	Macedonia, FYR
Armenia	Malaysia
Azerbaijan	Mauritania
Belarus	Moldova
Bolivia	Mongolia
Bosnia and Herzegovina	Montenegro
Bulgaria	Morocco
Cambodia	Myanma
Cameroon	Namibia
China	Nicaragua
Colombia	Nigeria
Côte d'ivoir	Pakistan
Croatia	Papua New Guinea
Czech republic	Paraguay
Djibout	Peru
Dominican Republic	Philippines
Ecuador	Romania
Egypt	Russia
El Salvador	Serbia
Georgia	Slovakia
Ghana	Solomon Islands
Greece	Sudan
Guatemala	Swaziland
Honduras	Thailand
Hungary	Timor-Leste
India	Tunisia
Indonesia	Turkey
Israel	Ukraine

Jordan	Uruguay
Kazakhstan	Uzbekistan
Kosovo	Vietnam
Laos	Yemen
Lebanon	Zambia

5. Findings and contributions

This thesis contributes to literature new understandings about the effects of corruption, credit sharing information, and the gendered impact of corruption on discouraged borrowers.

The first essay answers the question "Does corruption impact the demand for bank credit in Asian developing countries?". We find that firms are more likely to apply for loans when they perceive higher corruption. Interestingly, the link between corruption and discouragement depends on the country's level of development. In lower-middle income countries, firms are more likely to apply for loans in the presence of high corruption, while the opposite result is observed in the group of upper-middle income. These opposite effects are explained by the burden of government regulations. In lower-middle income countries where there are large burdens in regulations, firms find corruption as a way to overcome these constraints. Because of less efficiency in law enforcement and the pervasion of corruption in these societies, the likelihood of being caught and punished due to engaging in corrupt activities is low. Hence, firms use corruption to save time, save application costs, and hopefully increase their chance to receive loans. Conversely, law enforcement in upper-middle income countries is more efficient. Therefore, firms face with a higher probability of punished if they participate in corrupt behaviors and this may hamper them from applying for credit in the presence of corruption. By these findings, we are the first to discover the "grease the wheel" impact of corruption on the demand for bank credit in developing countries. We also contribute new understandings about the mechanisms leading to failures in the credit market at the demand-side. Although we find firms are more likely to demand bank credit in the presence of high corruption, this result should be interpreted with caution. Besides good borrowers, the corrupt environment may also attract bad borrowers who take benefits of paying bribes to improve their chances of acceptance. This will increase lenders' screening costs to select good borrowers and increase the probability that lenders make errors in their lending decisions. Furthermore, enhancing demand for bank credit does not mean that corruption has a positive impact on economic and social development. Therefore, anti-corruption is always necessary.

Findings from our study suggest an implication in anti-corruption policies. Given that corruption is pervasive in developing countries, policies that directly target it can be costly and have a negative effect on discouragement but do not solve the root of the problem. Improving efficiency, reducing burdensome of the regulations combined with anti-corruption can be more appropriate policies to reduce corruption in developing countries.

The second essay studies the effect of asymmetric information on discouraged borrowers. Following Kon and Storey (2003) who expect that information will have a non-linear effect on discouraged borrowers, we investigate the impacts of two credit report systems - public credit registry and private credit bureau - on discouraged borrowers. Our result shows that overall, information sharing through credit report systems mitigates the probability of discouraged borrowers. This result is economically significant with information shared by public credit registries. Based on precedent studies, we found that public credit registries in many developing countries serve both as bank supervision and a source of information for bank's lending decisions. In addition, they are unique hubs of mandatory data operated by central banks. Hence, their information is more reliable, and it plays an important role in alleviating imperfect information, resulting in the decline of discouragement. Interestingly, another finding reveals information shared by private credit bureaus shows a non-linear effect on discouraged borrowers. Their information only benefits the credit market and reduces the probability of discouragement when it reaches a sufficient level. Under this level, it has a detrimental effect on discouraged borrowers. To explain this result, we find that: if private credit bureaus' operation is not efficient in terms of issuing less and inaccurate information, bank screening errors are not improved. Moreover, the costs to gather information, the time to make decisions, and paperwork all increase. These raise the application costs charging to borrowers. Both effects of bank screening errors and application costs lead to enhancement of borrower discouragement. Conversely, countries having efficient credit report systems reveal their systems assist lenders effectively in their lending assessments. Therefore, discouraged borrowers decrease. Findings from the second essay, on the one hand, add new understandings about the effects of sharing credit information on discouraged borrowers. On the other hand, our findings contribute a policy implication, especially for developing countries, that credit information systems need an efficient legal framework to establish, operate and collect credit information. As such, their information is accurate and abundant to benefit the credit market.

In the third essay, we investigate the gendered impact of corruption on discouraged borrowers. We find that female entrepreneurs are more discouraged from applying for credit

than their male counterparts. This result is supported by precedent studies that women seem to be more honest and more risk averse. Therefore, they are less likely to apply for credit in the presence of corruption. Interestingly, we find three channels to explain the gendered impact of corruption on borrower discouragement. First, we prove that women entrepreneurs suffer more from corruption. They must pay more informal payments to "get things done" than male entrepreneurs do, and this hampers them to apply for credit. Second, women have less experience in management, and as such can have less experience to deal with corruption. Finally, gender equality can mitigate the probability of women being discouraged. Specifically, women are more likely to apply for bank credit in countries with gender equality and vice versa. By these findings, we are the first to prove that corruption is a cause impeding woman from credit access. This result widens our understandings about the gendered impact of corruption on access to finance. More important, our result supports efforts against corruption to reduce the gender gap in credit access. Achievements in anti-corruption will increase the contributions of women in the economy and social development not only in developing countries but also in developed countries. Besides, our results also support efforts to achieve gender equality because these achievements improve human rights in general and reduce discouragement of women in access to finance when they perceive high corruption.

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CHAPTER 1 - DOES CORRUPTION IMPACT THE DEMAND FOR BANK CREDIT? A STUDY OF DISCOURAGED BORROWERS IN ASIAN DEVELOPING COUNTRIES

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Abstract:

Two dysfunctions can affect the credit market: credit rationing and discouragement. While the former has been studied in detail for more than 40 years, the latter has only been in the spotlight since 2003. In this paper, we contribute to the understanding of this "demand-side failure" by investigating the role played by corruption. In particular, using data from the Enterprise Surveys conducted by the World Bank, we highlight, on the one hand, a significant negative overall link between corruption and "discouraged borrowers" in developing countries, and on the other, the fact that this effect is non-linear and differs according to the level of economic development: in more (resp. less) developed countries, the higher the level of corruption, the more (resp. less) companies are discouraged from applying for loans. We also find that the burden of government regulation can explain this effect. To overcome this burden, firms see corruption as one way to reach their targets at lower costs.

JEL classification : D73,G21, G38, 053

Keywords: *discouraged borrowers, discouragement, corruption, developing countries, burden of regulation.*

1.1 Introduction

By financing economic agents (individuals, firms, states), credit activity is one of the main growth drivers of modern economies. Efforts to understand the mechanisms that can alter this activity and the solutions to remedy deficient credit allocation are thus an important field of financial research. Since the seminal article by Stiglitz and Weiss (1981), credit rationing has been seen as the main failure of the credit market, both theoretically and empirically (Bester, 1985; Petersen and Rajan, 1994).

Credit rationing is a supply-side dysfunction where banks, in information asymmetry, prefer to randomly reject certain credit applications rather than increase lending rates until the market reaches equilibrium. In parallel to this supply-side dysfunction, the credit market can also be affected by a demand-side failure in which firms with positive NPV[9] projects do not apply for loans for fear that they will be rejected. The study of such discouragement is relatively new compared to that of credit rationing. In 2000, Levenson and Willard were the first to refer to "discouraged borrowers"[10] and an explicit definition of this phenomenon is given by Kon and Storey (2003): "*a good borrower may not apply for a loan to a bank, because they feel they will be rejected*".[11] The severity of this demand-side failure is revealed by empirical research (Freel et al., 2012; Gama et al., 2017; Levenson and Willard, 2000). These authors find the number of discouraged borrowers is twice or even three times the number of borrowers whose loan applications are rejected. While these empirical studies were first conducted in developed countries, the recent availability of quality data on developing countries, such as those collected by the World Bank, has enabled empirical studies to be conducted on these countries (Chakravarty and Xiang, 2009, 2013; Gama et al., 2017; Tang et al., 2018). Interestingly, these studies show that "discouraged borrowers" are more pronounced in developing countries than in developed ones: the average number of discouraged borrowers as a percentage of all loan seekers in the latter is 16%[12] against 28%[13] in the former. These results confirm the theoretical analysis of Kon and Storey (2003) regarding the potential negative

[9] Net Present Value

[10] Before them this notion had only been used for households (Jappelli, 1990).

[11] Kon and Storey (2003), 'A theory of Discouraged Borrowers', pp. 37.

[12] This number is obtained by averaging the number of discouraged firms observed by Han et al. (2009) in the USA and the number observed by Mac an Bhaird et al. (2016) in Europe.

[13] This number is obtained by averaging the number of discouraged firms observed by Gama et al. (2017) in less developed European countries and the number observed by Chakravarty and Xiang (2013) in developing countries.

correlation between the magnitude of "discouraged borrowers" and the economic development in the country in which they reside.

In a not-yet published paper, Galli et al. (2017) enrich our understanding of "discouraged borrowers" by showing that micro, small, and medium-sized enterprises (SMEs) have a greater likelihood of "self-restraint regarding their loan applications" in higher corruption countries. Their study was conducted on 11 developed European countries.[14] This raises two questions. Why does corruption have such an influence in developed countries? Would the same result be observed in developing countries?

The second question has two main merits. First, corruption is higher in developing countries. But in particular, its impact on credit activity in these countries appears ambiguous. Although abundant research has confirmed that corruption harms economic development ("sands the wheels"), some studies also find that corruption can be beneficial in a second-best world ("greases the wheels") (Méon and Weill, 2010). Hence, an opposite result to that of Galli et al. (2017) could be observed in developing countries.

In analyzing the link between "discouraged borrowers" and the level of economic development in developing countries through the prism of corruption, this paper tries to answer the second question. Specifically, we use the Enterprise Surveys (ES) conducted by the World Bank from 2012 to 2016 for upper-middle and lower-middle income countries[15] in (1) East Asia & Pacific and (2) South Asia. The survey collected data based on how enterprises experience and perceive their operating environment. The dataset includes 14 countries – Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, the Philippines, Solomon Islands, Timor-Leste, Thailand, Vietnam, India and Pakistan. Of these, China, Malaysia and Thailand are upper-middle and the rest are lower-middle income countries.

This rich database enables us to highlight a significant negative overall link between corruption and "discouraged borrowers". However, on closer investigation of the data, we find that this link can differ considerably according to the country's level of development as measured by GDP per capita. In more developed countries, the higher the level of corruption,

[14] Austria, Belgium, France, Finland, Germany, Greece, Italy, Ireland, the Netherlands, Portugal, and Spain.

[15] Classification is based on the World Bank's criteria. Before July 01, 2017, upper-middle income countries had a GNI/capita range from USD 4,036–12,475, for lower-middle income countries this range was from USD 1,026–4,035, and for low-income countries it was below USD 1,026. Since July 01, 2017, the new respective thresholds are as follows: USD 3,956–12,235, USD 1,006–3,955 and USD 1,006.

the more firms are discouraged from applying for loans, while in less developed countries, firms are more willing to apply for credit if the level of corruption increases. This result makes a new contribution to our understanding of the mechanisms leading to credit market failure, especially at the demand-side level. We explain these opposite effects of corruption in terms of the burden of regulation. In lower-middle income countries, where law enforcement is not efficient enough, firms use corruption as a way to overcome burdensome regulations. This explanation is consistent with the idea that corruption can "grease the wheel" of the credit market. In contrast, in upper-middle income countries, law enforcement is more efficient, and a higher level of corruption discourages firms from applying for loans: it "sands the wheel".

In the next section, we outline our research framework. Section 1.3 presents our hypotheses. Section 1.4 outlines the data and methodology. After discussing the results in detail in Section 1.5, we conclude in Section 1.6.

1.2 Literature Review

1.2.1 Discouraged borrowers: a demand-side credit market failure

Although empirical research about discouraged borrowers has been conducted since the 1990s by Jappelli (1990) on households in the United States, by Mayank Raturi (1999) in Zimbabwe and by Levenson and Willard (2000) in the United States, the first theory was built later by Kon and Storey (2003), who define discouraged borrowers as good borrowers who do not apply for loans because they think they will be rejected. Their model builds around three main characteristics: the cost of the loan application, the imperfect screening of applicants by banks, and the difference between the refinancing rates of banks and other money lenders. They show that the level of discouragement increases with the first two characteristics and decreases with the last. Additionally, they observe that although discouragement decreases overall with information asymmetry, this relationship may not be linear.

Empirical research confirms the main effect of informational opacity on discouragement. First, all of these studies show that younger and smaller firms, usually the most opaque ones, are more likely to be discouraged. This result is verified both in developed countries (Cole, 2016; Ferrando and Mulier, 2015; Fraser, 2014; Freel et al., 2012; Han et al., 2009; Mac an Bhaird et al., 2016; Xiang et al., 2015) and developing countries (Chakravarty and Xiang, 2013).

It is now well established that the lending relationship mitigates informational asymmetries (Rajan, 1992; Sharpe, 1990). Hence, the impact of information asymmetry on discouraged borrowers can be studied through the effect of relationship lending on discouraged borrowers. Interestingly, the empirical results obtained using such an approach are conflicting. Chakravarty & Xiang (2009 and 2013), Chakravarty and Yilmazer (2009) and Freel et al. (2012) find that a stronger relationship between a lender and a firm can reduce the likelihood of the firm being discouraged. However, Han et al. (2009) conclude that risky borrowers are more likely to be discouraged when they establish longer relationships with banks. In line with Han et al. (2009), Vincent (2010) also confirms that discouraged borrowers have stronger relationships with financial institutions. During the time taken to build the relationship with its bank, the firm has a better understanding of its risk level as well as the credit allocation processes of the financial institution. Therefore, they know their capacity to successfully apply for loans, and that discourages them from applying. These contradictory conclusions could be explained in part by the non-linear relationship between information asymmetry and discouraged borrowers expected by Kon and Storey (2003).

By making it easier to collect soft information, a shortening of the distance between the company and the bank reduces the asymmetry of information. Distance between lenders and borrowers should therefore have a positive impact on discouragement, especially since, as Kon and Storey (2003) explain, a short distance can also reduce application costs for bank loans. Gama et al. (2017) confirm this positive impact of distance on discouragement. In using the variable "big city" to proxy for distance from borrowers to lenders, they find that firms located in big cities are less likely to become discouraged borrowers.

As the decision to apply for credit is made by firm managers, it can also be affected by their own characteristics. Chakravarty and Xiang (2009) and Gama et al. (2017) suggest that if the top manager is male, then the firm will be less self-rationing. Explaining this result, studies by Coleman (2000) and Treichel and Scott (2006) find that women are less self-confident, more risk-averse and want to keep control of their business. They feel that applying for loans will create more risks. Therefore, they are less likely to apply for credit than men. With regard to the owner's level of education, most research finds a positive relationship between it and credit availability (Krasniqi, 2010; Parker and Van Praag, 2006). Chakravarty and Xiang (2009) conduct research on developing countries and report that if top managers have a high level of education (university or higher level), their firm will be less self-discouraged from applying

for a loan. In line with Chakravarty and Xiang (2009), Fraser (2014) applies both quantitative and qualitative methods to SMEs in the UK and confirms that owners of discouraged firms have lower levels of education. In addition to gender and level of education, it appears owners of discouraged firms also have less professional experience. Fastenbauer and Robson (2014) carry out qualitative research in the UK and Austria and conclude that the owner's level of experience impacts on the probability of them applying for loans. Experienced owners understand the development of their firm. They can also more accurately evaluate the benefit they will get if they apply for loans. Hence, they are less self-discouraged. Recent research by Gama et al. (2017) confirms the effect of the owner's professional experience on discouragement.

Moreover, the environment in which firms operate also influences loan applications. Regarding economic conditions, Chakravarty and Xiang (2009) observe a negative correlation between growth rate (measured by GDP growth) and discouragement: higher growth rates reduce discouraged borrowers. Gama et al. (2017) find quite a similar result: that firms are less likely to be discouraged in countries with a high GDP per capita because in such countries firms face lower financing obstacles (T. Beck et al., 2006). Legal environment is another external characteristic which affects the credit market. We know that the size of credit markets in a given country depends on its creditor rights: when these rights are stronger, they lead to a more developed credit market (Djankov et al., 2007; La Porta, 1997, 1998) and a larger credit offer (Haselmann and Wachtel, 2010). In particular, findings by Demirgüç-Kunt and Maksimovic (1998) and Hernández-Cánovas and Koëter-Kant (2011) show that an efficient legal environment has a positive effect on the ability of firms to apply for loans and thus can affect levels of discouragement. Hence, Gama et al. (2017) expect the strength of legal protections for creditors and borrowers and the number of discouraged borrowers to have a negative correlation. However, their results run counter to their expectations. Reinforcing legal protections will increase the number of discouraged borrowers. To explain this result, they point out that the strength of legal protection is positively linked to collateral. Stronger legal protections increase collateral requirements and hence increase the incidence of discouraged borrowers.

Firms' perceptions of their operating environment also have a significant impact on the probability that they will apply for bank loans. These perceptions can relate to access to financing or levels of corruption in the economy. Mac an Bhaird et al. (2016) find that firms

will discourage themselves from applying for loans if they feel access to finance is a severe problem. The impact of corruption on discouragement will be discussed in detail in the following section.

Finally, beginning with the influence of banking concentration on credit activity (Boot and Thakor, 2000; Petersen and Rajan, 1995), Mol-Gómez-Vázquez et al. (2018) analyze the effect of banking concentration on discouragement. They show that while, overall, the market power of banks decreases discouragement, this relationship is not linear.

1.2.2 Corruption and credit activity

Corruption is a complex notion, and the simplistic approach based on the breaching of legal codes is unsatisfactory. In particular, as (Pellegrini, 2011) pointed out, such an approach does not permit comparative studies across countries with different legal environments. Transparency International defines corruption as "an abuse of entrusted power for private gain". In this paper, we follow (Pellegrini, 2011), who completes this definition by specifying that "corruption is a behavior which deviates from the formal duties of a given role because of private-regarding (personal, close family, private clique) pecuniary or status gains; or violates rules against the exercise of certain types of private regarding influence. This includes such behavior as bribery (use of a reward to pervert the judgment of a person in a position of trust); nepotism (bestowal of patronage by reason of ascriptive relationship rather than merit); and misappropriation (illegal appropriation of public resources for private-regarding uses)."[16]

A large majority of studies into corruption show that it has a negative impact on economic activity (Dutta and Sobel, 2016; Glaeser and Saks, 2006; Mauro, 1995; Park, 2012; Shleifer and Vishny, 1993). But, if corruption on the whole "sands the wheel" of economic activity, it appears that in some respects it could, on the contrary, "grease the wheel". Hence, bribery can help get things done faster by reducing bureaucratic delays (Leys, 1965; Lui, 1985) or, like competitive bidding, corruption can result in contracts being allocated to the lowest cost firms (P. J. Beck and Maher, 1986; Lien, 1986).

This opposition between "sanding" or "greasing" the wheel is also found when we study the role played by corruption in credit activity. As Weill (2011) points out, the impact of corruption on lending is ambiguous. On the one hand, it can be a constraint because it increases the cost of loans, but on the other, in a corrupt environment the borrower has an opportunity to

[16] Pellegrini, L. 2011 Corruption, Development and the Environment, Chap 2, Springer Science

bribe the loan officer "to enhance his chances of receiving the loan". Empirical results are more contrasted than those regarding economic activity. Weill (2011) shows that corruption negatively affects lending to Russian households and firms. In the context of Pakistan, Khawaja and Mian (2005) observe that while credit is more available for firms with political connections, these firms have "in fine" a higher default rate. These conclusions regarding the negative effects of corruption on lending are confirmed by Park (2012), who aggregates data from 76 countries and finds that corruption deteriorates the quality of bank loans.

In contrast to these results, Chen et al. (2013) show that corruption "greases the wheel" of Chinese banking. In particular, better performing Chinese firms are able to offer higher bribes and are thus rewarded with more bank credit. Chen et al. (2013) conclude that corruption could be "an efficient practice in a second-best world". China is not a special case: using a sample of firms from 14 transitions countries, Fungáčová et al. (2015) find higher levels of corruption can increase bank debt ratios and hence ease firms' access to credit.

1.2.3 Corruption and discouragement

As already explained, the consideration of "discouraged borrowers" in accessing financing is a recent development. It is therefore not surprising that research on the impact of corruption on discouraged borrowers is rare. To our knowledge, only Galli et al. (2017) have explicitly studied the link between corruption and discouragement. Galli et al. (2017) conducted research on SMEs in Europe and found that high levels of corruption impede firms from applying for bank loans and that the behavior of small firms is more effected by corruption than that of larger firms. In addition, the percentage of small firms refraining from applying for credit is higher in countries with high levels of corruption. To proxy for corruption, Galli et al. (2017) use perceptions of corruption at country level, as in the Corruption Perceptions Index launched by Transparency International and Control of Corruption from Worldwide Governance Indicators published by the World Bank. The other empirical studies dealing with corruption and discouraged firms add corruption only as a control variable (Chakravarty and Xiang (2009); Brown et al. (2011); Chakravarty and Xiang (2013)), and none of them finds statistical evidence that corruption impacts discouragement.

1.3 Research hypotheses

This paper seeks to determine the link between "discouraged borrowers" and the level of economic development through the prism of corruption. Galli et al. (2017) solve part of this

issue by showing that in developed countries higher corruption increases the probability of discouragement. But in these countries, corruption is low and under control, which is not the case in developing countries. The average figure in the Corruption Perceptions Index in the study by Galli et al. (2017) is 68, while in our sample of 14 developing countries it is 36.[17] This marks the pervasion of corruption in developing countries and confirms the conclusions of Treisman (2000) and Pellegrini (2011) about the negative correlation between the level of country development and corruption. Axelrod (1986) stated that a behavior will become a norm when it spreads in a population. Hence, in the context of corruption, when corruption is pervasive in society, it becomes a normal behavior. Feelings of guilt and the loss of reputation will decrease as the number of persons violating the rules increase (Andvig, 1991). In addition, the ability to be detected and punished is more difficult. Here, Della Porta (2017) confirms that those who remain honest will pay a higher price and even be "marginalized".

These arguments lead us to believe that corruption may have a different effect on the discouragement of firms in developing countries than that observed in developed countries, particularly since, as we pointed out in the literature review, corruption can increase the chance that will be granted loans, thereby "greasing the wheel" of lending activity. Hence, we expect corruption to reduce discouraged borrowers in developing countries.

Hypothesis 1: Corruption has a negative impact on discouraged borrowers in developing countries.

We can push the analysis leading to hypothesis 1 a step further. If a country's level of development affects the relationship between discouraged firms and corruption, we should also observe this effect in our sample. Indeed, this sample is made up of countries with varying levels of economic development. Consequently, if our approach is correct, the impact of corruption on discouraged borrowers should be different depending on these levels. More precisely, we expect the effect of corruption on discouraged borrowers to be positive in countries with higher levels of development.

Hypothesis 2: The effect of corruption on discouraged borrowers depends on the country's level of development, and in more developed countries corruption prevents firms from applying for loans.

[17] Corruption Perceptions Index is scaled from 0 to 100, where 0 is a perception of very severe corruption and 100 is the lowest perception of corruption.

1.4 Data and empirical strategy

1.4.1 Data

To test our two hypotheses, we use the Enterprise Surveys (ES) conducted by the World Bank. This is a project to gather data based on firms' experiences and perceptions of their operating environment. The survey uses the stratified random sample method to collect data. Following this method, the population is divided into homogeneous subgroups and simple random samples are selected from each group with sample sizes proportional to strata sizes to ensures representation of samples across the population. Firm size, business sector and geographic region are used as strata for the survey. To collect the data, interviewers first use a screener questionnaire over the phone to check if enterprises are eligible and make an appointment. The interview is then conducted face-to-face with the owner or manager of each enterprise.

The target regions of our research are (1) East Asia and Pacific and (2) South Asia. We chose these areas because they are the two fastest growing regions in the world[18], so capital for development is vital. Discouragement would therefore have a significant impact in these regions. Moreover, Asia is a special region whose culture has long featured corruption, yet this does not appear to hamper business (Kaufmann and Wei, 1999). Therefore, the effect of corruption in Asia may be different compared to other regions. The research period is from 2012 to 2016. During this 5-year period, the economy did not see much fluctuation, so there is less bias between countries surveyed in 2012 and those surveyed in 2016. In addition, there is only a slight difference between the 2012–2013 version of the survey and the 2014–2016 version. We can therefore collect as much common information as needed to build the research model.

Discussing the criteria for classifying countries, Nielsen (2011) states that for convenience, the term "developing countries" is used for middle and low-income countries. However, Rioja and Valev (2004) find that financial development and growth have a positive relationship in middle and high regions (countries with medium and high levels of financial development). This effect is stronger in middle regions and insignificant in low regions. This low or insignificant impact of financial development on growth in low-income countries is

[18] Over the 2008–2017 period, the 14 countries in our sample had average annual GDP growth of more than 5%, while the rate was 3% for all countries worldwide (source: International Monetary Fund, World Economic Outlook Database).

supported by Deidda and Fattouh (2002) and Rousseau and Wachtel (2002). Based on these studies, we expect the discouragement phenomenon to be a major constraint on the growth of middle-income countries. Therefore, our research focuses on middle-income countries which include upper-middle and lower-middle-income countries.

Finally, there are 14 countries across both regions: Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, the Philippines, Solomon Islands, Timor-Leste, Thailand, Vietnam, India and Pakistan. Of these, China, Malaysia and Thailand are upper-middle and the rest lower-middle income countries. Each country was surveyed once between 2012 and 2016. However, the survey can last from 1 to 3 years in one country. To ensure that the results are reliable, we take only responses rated by interviewers as truthful and somewhat truthful. If using only truthful responses, we lose almost half of our observations. Therefore, analysis based on truthful responses is only used for the robustness check to confirm our main findings.

In addition, we also obtained data from Transparency International and the World Economic Forum for country-level variables. From Transparency International, we extracted the Corruption Perceptions Index. This index measures corruption levels in the public sector through perceptions among business people and country experts. The index is averaged from different sources within a country. Selected sources must meet certain criteria to ensure the reliability, comparability and development of the index in the future. At least three sources are needed to calculate the Corruption Perceptions Index for one country. This index is scaled from 0 to 100, where 0 indicates perceptions of very severe levels of corruption and 100 is the lowest perception of corruption.

We also used data from the Global Competitive Index (GCI) published by the World Economic Forum. The GCI includes the set of institutions, policies, and factors collected from internationally recognized agencies to determine a country's level of productivity. From it we extracted the "burden of government regulation benchmark". This indicator measures the level of burden for businesses of complying with governmental administrative requirements (e.g. permits, regulations, reporting). The indicator is collected from the answers provided by leading business executives and ranks from 1 to 7, where 1 is extremely burdensome and 7 is not burdensome at all.

1.4.2 Variables

All the following variables are defined in Appendix 1.1.

1.4.2.1 Measuring borrower discouragement

Discouraged borrowers are observed by the answers provided by firms to the question: "What was the main reason why this establishment did not apply for any line of credit or loan?". If the answer is "No need for a loan – establishment had sufficient capital", the firm is not considered a discouraged borrower. Respondents are considered discouraged if their reasons for not applying are complex application procedures, unfavorable interest rates, excessive collateral requirements, insufficient loan size and maturity, or if they did not think the application would be approved.

The dependent variable is attributed a value of 1 if the firm is considered a discouraged borrower based on its answer and a value of 0 if it applies for loans. This measure of discouragement has been applied in many previous studies (Chakravarty and Xiang, 2009, 2013; Galli et al., 2017; Gama et al., 2017).

1.4.2.2 Measuring corruption

We use proxies for corruption. The first proxy is at firm level and based on the survey. Firms are required to choose the degree to which corruption is an obstacle to their operation. The levels of corruption range from 0 to 4, where 0 is "no obstacle" and 4 is "very severe obstacle". We define corruption as an explanatory variable with a value of 1 if the firm perceives corruption as a major or very severe obstacle and 0 for a perception as no obstacle or a minor or moderate obstacle. In the Enterprise Survey, perception of corruption is the most general question capturing the level of corruption in a country, and it is also the question that received the highest rate of answers. Therefore, choosing it as the main variable, we obtain the highest number of observations. In addition, perception of corruption is also widely used in research about corruption (Mo, 2001; Podobnik et al., 2008; Treisman, 2000; Weill, 2011).

Nevertheless, this proxy can be problematic when compared across countries. Tolerance towards corruption can vary from one country to the next (Cameron et al., 2005), so two countries with the same value for perceived corruption may have different levels of corruption. To overcome this disadvantage, we use another proxy in the survey at firm level for robustness of the main result. This variable is calculated by the number of times firms make gifts or informal payments to public officials divided by the number of times they apply or use public

services. This way, we measure experience of corruption instead of perceived corruption, so this variable looks at corruption from another angle. We also use the Corruption Perceptions Index published by Transparency International as a proxy for corruption at country level.

1.4.2.3 Control variables

The above literature review allows us to identify variables that can influence discouragement. In addition to fixed effects, these control variables can be classified into four categories: entrepreneur characteristics, firm characteristics, firm perceptions and macro elements.

- Entrepreneur characteristics

Gender is a dummy variable with a value of 1 if top managers are female and 0 otherwise. By following the conclusions outlined in the literature review, we expect that if top managers are female, the probability that borrowers are discouraged will increase.

Experience of top managers is measured by number of years working in the sector. Having experienced top managers may mitigate discouragement.

- Firm characteristics

Checking and savings account or overdraft facility: one way to measure the level of information a bank has about its customer is "scope", i.e. the number of lending and non-lending products cross-sold to the firm (Degryse et al., 2009). If a borrower buys most of its financial products such as its checking account, savings account, etc. from a bank, thus increasing the information exchanged between lender and borrower, information asymmetry is reduced (Steijvers and Voordeckers, 2009). This leads to a reduction in discouragement.

Location in main business city or in city with population over one million: financial institutions are usually located in cities with a high level of business activity and large populations. Firms located in these areas are therefore likely to be close to their lenders, who will have better information about them and can reduce screening errors.

Firm age: as long as firms operate in the market, it is possible for credit institutions to get sufficient information about them (Berger and Udell, 1995; Kysucky and Norden, 2015; Petersen and Rajan, 1994). Therefore, information asymmetry is reduced in the case of older firms, which are expected to display less discouragement.

Firm size is measured by the number of employees. There are three sizes: small (5 to 19 employees), medium (20 to 99 employees) and large (100 or more employees). Larger firms are expected to display less discouragement.

Trade credit is measured by the proportion of total annual purchases of material inputs bought on credit. Biais and Gollier (1997) and Voordeckers and Steijvers (2006) proved that trade credit can work as a signaling instrument to reduce information asymmetry such that trade credit can be expected to have a negative impact on discouragement.

Innovation is a dummy variable with a value of 1 if firms invest in formal research and development activities. Although R&D is strongly linked to information opacity, it is an activity that also requires financing. Therefore, a negative impact between innovation and discouragement is expected (Gama et al., 2017).

Foreign-owned firm is a dummy variable with a value of 1 if the percentage of the firm owned by foreign individuals, companies or organizations is greater than 50% and 0 otherwise. Like Brown et al. (2011) and Xiang et al. (2015), we expect foreign ownership to increase self-rationing because these firms rely more on internal funds from parent firms and apply less for external sources of finance.

Direct export is captured as a percentage of sales. Brown et al. (2011) finds exporting firms are more likely to apply for credit because they need capital to finance their operations. We expect direct export to have a negative impact on the probability that borrowers will be discouraged.

Internationally recognized quality certification is a dummy variable with a value of 1 if firms have obtained internationally recognized quality certification. This variable is expected to have a negative effect on discouragement because such certification can reduce information asymmetry.

Annual financial statements checked and certified by an external auditor is a dummy variable with a value of 1 if the firm's annual financial statements were checked and certified by an external auditor. This variable is also expected to have a negative relationship with the probability that borrowers will be discouraged.

Credit line is a dummy variable with a value of 1 if the firm has a line of credit or loan from a financial institution. Petersen and Rajan (1994) measure the information transparency in firms by credit line so we expect firms with a line of credit to be less self-rationing.

- Firm perceptions

Access to finance is a dummy variable with a value of 1 if the firm feels that access to finance is a major or very severe obstacle to their operations. We expect firms which feel access to finance is a problem to be less likely to apply for credit.

- Macro elements

GDP is GDP per capita at the time the survey was conducted in a country. Data are in current US dollars.

BURDEN measures the level of burden for businesses of complying with governmental administrative requirements, scaled from 1 to 7, where 1 is extremely burdensome and 7 is not burdensome at all.

- Fixed effects

Besides the above control variables, we also control for country, industry and year as fixed effects which eliminate time-invariant factors to reduce endogeneity bias. The model clusters standard errors by country.

1.4.3 Empirical strategy

In order to test our first hypothesis dealing with the impact of corruption on discouraged borrowers, we use the following equation.

$$DISCOURAGED_{i,k} = \alpha + \beta 1 \times CORRUPTION_{i,k} + \beta 2 \times ENTREPRENEUR\ CHARACT._{i,k} + \beta 3 \times FIRM\ CHARACT._{i,k} + \beta 4 \times ACCESS_{i,k} + FE(Country, industry, year) + \varepsilon_{i,k} \quad (1)$$

For the second hypothesis testing the impact of corruption on discouraged borrowers at different levels of country development, we add to equation (1) an interaction term between the corruption variable and GDP per capita.

$$DISCOURAGED_{i,k} = \alpha + \beta 1 \times CORRUPTION_{i,k} + \beta 2 \times GDP_{k,t} + \beta 3 \times GDP_{k,t} \times CORRUPTION_{i,k} + \beta 4 \times ENTREPRENEUR\ CHARACT._{i,k} + \beta 5 \times FIRM\ CHARACT._{i,k} + \beta 6 \times ACCESS_{i,k} + FE(Industry, year) + \varepsilon_{i,k} \quad (2)$$

For these equations, the following variables are used where subscript *k* indicates that they refer to the country in which firm *I* was interviewed.

- $DISCOURAGED_{i,k}$ indicates whether or not firm *I* is discouraged.
- $CORRUPTION_{i,k}$ is our main proxy of corruption as perceived by firm *i*.
- $ENTREPRENEUR\ CHARACT._{i,k}$ is a generic variable corresponding to the characteristic of the manager of firm *I* (GENDER and EXPERIENCE).
- $FIRM\ CHARACT._{i,k}$ is a generic variable corresponding to the characteristic of firm *I* (AI1, AI2, MAINCITY, CITY1M, AGE, SIZE, FFIRM, DIEXPORT, TRADECR, INNOVATION, CERTIFICATE, EXTERAUDIT and CREDITLINE).
- $ACCESS_{i,k}$ measures firm *i*'s perception of its operating environment.
- $GDP_{k,t}$ is the GDP at time *t* of the country where firm *I* is located.

In addition, to confirm the result, we divide the sample into two groups based on GDP per capita. The first group has a GDP per capita of more than USD 5800, and this group also represents upper-middle income countries based on the classification used by the World Bank. The second group has a GDP per capita of less than USD 3400 and belongs to the World Bank's category of lower-middle income countries. Using equation (1), we retest the impact of corruption on discouraged borrowers in two groups.

1.5 Results

1.5.1 Univariate analysis

- Discouraged borrowers in East Asia & Pacific and South Asia

In our sample, the percentage of firms not applying for credit is very high (the average is 85.1%[19]). Reasons for not applying are given in Table 1.2. About 53% of non-applying firms reveal that they have sufficient capital, so they do not need to apply for loans and are not discouraged borrowers. About 37% need capital but do not apply for credit because application procedures are complex, interest rates are unfavorable, collateral requirements are too high, loan size and maturity are insufficient, or they fear rejection. These firms are called discouraged borrowers and their magnitude confirms that in developing countries they are an important problem and merit attention.

[19] 16,082/18,875 (Table 1.1)

- Discouraged borrowers versus applicants

Interestingly, the statistics in Table 1.5 show significant differences between discouraged borrowers and applicants. Perceived corruption is more severe for discouraged borrowers than for applicants. Information asymmetry (measured by overdraft facility) seems higher for discouraged borrowers. Our proxy of distance between banks and firms (*city1m*) confirms this result: discouraged borrowers appear to be located further from their bank than others. Regarding firm characteristics, in line with the literature review, applicants are bigger and older. Their exports as a percentage of sales are higher. They invest more in innovation and use more trade credit. It also makes sense that more applicants have internationally recognized quality certifications than discouraged borrowers and their financial statements are checked more frequently by an external auditor. In addition, applicant firms have more lines of credit than discouraged borrowers and their top managers have more experience. Finally, the gender of borrowers seems to play a role since more of their top managers are women.

1.5.2 Multivariate analysis: findings from main model

The first column in Table 1.6 presents the results of a Logit regression for equation (1). As expected, we observe a negative link between corruption and discouraged borrowers. The higher the perceived levels of corruption, the more firms apply for loans. This result runs counter to the finding of Galli et al. (2017).

On the one hand, we can interpret this result as an indication that in developing countries corruption is more prevalent (Olken and Pande, 2012) and corrupt behavior is perceived by firms as less serious. Officials who engage in corrupt activities feel the loss of reputation less acutely when their actions are detected (Andvig, 1991). This means they are more likely to break the rules for their own benefit (Akerlof, 1980) and firms may use corruption as a way to achieve their targets at a lower cost because otherwise they will pay a higher price and even be "marginalized" (Della Porta, 2017). Therefore, it makes sense that high levels of corruption could make firms more likely to apply for loans, because corruption would increase the probability that they will be granted and reduce application costs.

On the other hand, the negative link between corruption and discouragement can also be interpreted on the basis that firms which perceive high corruption may be those willing to apply for loans when needed, because they may be bigger, have more connections and more

experience, etc. Under this interpretation, the relationship between corruption and discouragement is a correlation rather than a causal effect.

Indeed, as is often the case in empirical studies that seek to highlight some causal links, our results could be biased by not taking into account certain characteristics that would influence both the perception of corruption and the demand for credit. An example of such a characteristic is the firm's political connections. Hence, at this point, with the potential problem of omitted variables, we can only conclude that there is a negative correlation between the perception of corruption and discouraged borrowers.

Interestingly, the second hypothesis is also confirmed when the effect of corruption on discouraged borrowers depends on the country's level of development. Using an OLS regression, column 2 in Table 1.6 reveals the following dynamic: when GDP per capita equals 0, the link between corruption and discouragement is negative. This negative correlation diminishes with increasing GDP per capita and becomes positive when GDP per capita is high enough. We confirm this dynamic in three ways.

First of all, we perform a logit regression (column 3) and compute the marginal effect of the interaction using the methodology adopted by Norton et al. (2004). The results obtained for coefficients of variables $CORRUPT$ and $GDP \times CORRUPT$ present the same sign and are more significant.

Secondly, we split the sample into two groups: upper-middle and lower-middle income countries. Using logit regression, we test our first equation in each sub-sample. As expected, the coefficient of the variable $CORRUPT$ is positive and highly significant in upper-middle income countries (column 4, Table 1.6), while it is negative and highly significant in lower-middle income countries (column 5, Table 1.6).

Finally, we calculate the marginal effect of the interaction variable on discouragement. We find that when GDP per capita is less than about USD 2600, this marginal effect is negative and significant (Figure 1.1). That means below such a level of GDP, the higher the perceived levels of corruption, the more firms apply for loans. In contrast, at GDP per capita of more than about USD 6800, the more corruption there is, the more firms self-discourage from applying for loans and this result is significant at the 10% level (Figure 1.1).

The complete reverse sign of the perceived corruption coefficient according to the level of economic development suggests the existence of a causal link between the perception of

corruption and discouragement. As mentioned earlier, some omitted variables could bias the causal effect. However, the switch of sign observed through columns 2 to 5 of Table 1.6 weakens the possibility of such a scenario. In this case, for an omitted variable to distort the causality between our two key variables, its effects on these two variables would also have to depend on the country's level of development.[20] Although this possibility does not completely disappear, it becomes less likely and suggests that our results point toward a causal effect rather than a simple correlation.

In summary, for developing countries in our study, corruption appears to grease the wheel of credit activity: the ability of firms to apply for loans increases with perceived levels of corruption. However, the impact of corruption on discouraged borrowers depends on the country's level of development. In more developed countries, higher corruption is associated with a higher probability of discouragement, while in less developed countries, the opposite result is found.

For other control variables in the model, our findings are confirmed by the literature. Firms that use more financial services display less discouragement. This result is also found by Gama et al. (2017). Like Fastenbauer and Robson (2014), we find experienced top managers are more likely to apply for loans. Furthermore, firm characteristics that prove creditworthiness such as firm size *(SIZE)*; firms with internationally recognized quality certification *(CERTIFICATE)*; firms whose financial statements are checked and certified by an external auditor *(EXTERAUDIT)*; and firms with a line of credit from a financial institution *(CREDITLINE)* have significant negative impacts on discouraged borrowers. This is unsurprising given that creditworthy firms have less opaque information and their chances of being granted loans are also higher. Therefore, they are less likely to self-discourage. These results are backed up by Brown et al. (2011), Chakravarty and Xiang (2013) et Gama et al. (2017). In line with Brown et al. (2011) and Xiang et al. (2015), we also find foreign ownership *(FFIRM)* increases discouragement. Finally, firm characteristic variables related to expenses such as exports *(DIEXPORT)* and innovation *(INNOVATION)* have negative impacts on discouraged borrowers. These firms need more capital to finance their operations and so are more likely to apply for loans (Brown et al., 2011; Gama et al., 2017).

[20] The existence of political connections is a good example of characteristics that do not appear to be dramatically influenced by the level of economic development. Therefore, while they might skew the result obtained in column 1 of Table 1.6, it seems less likely that they could explain the switch of sign observed in the other columns.

1.5.3 Explanation for the impact of corruption on discouraged borrowers

Why does corruption seem to influence the discouragement of borrowers differently depending on the level of economic development? We believe that part of the answer lies in the effectiveness of the legal environment. There is a consensus in the literature that corruption is highly correlated with regulation. Poor enforcement of legal institutions leads to higher corruption (Tonoyan et al., 2010). Where there is poor enforcement of the law, bureaucrats can create a lot of red tape to make difficulties for enterprises (Banerjee, 1997). In this case, corruption, and bribery in particular, can help overcome such difficulties (Banerjee, 1997; Shleifer and Vishny, 1993). To confirm this explanation, we follow Kaufmann and Wei (1999) and use "burden of government regulation" as a benchmark to explain the impact of corruption on discouraged borrowers. Specifically, we test the following equation:

$$DISCOURAGED_{i,k} = \alpha + \beta 1 \times CORRUPTION_{i,k} + \beta 2 \times BURDEN_{k,t} + \beta 3 \times BURDEN_{k,t} \times CORRUPTION_{i,k} + \beta 4 \times ENTREPRENEUR\ CHARACT._{i,k} + \beta 5 \times FIRM\ CHARACT._{i,k} + \beta 6 \times ACCESS_{i,k} + FE(industry, year) + \varepsilon_{i,k} \quad (3)$$

Where $BURDEN_{k,t}$ measures the level of burden for businesses of complying with governmental administrative requirements.

As explained previously, we begin with an OLS regression (Table 1.7, column 1) and we confirm the results obtained with a Logit regression (Table 1.7, column 2). These two approaches generate the same results: the interaction between the corruption variable and the burden of government regulation reveals that corruption has a negative link to discouragement when regulations are extremely burdensome. Nevertheless, when they are less burdensome, this negative link is reduced and can even become positive. These results are very significant at the 1% level. In detail, the marginal effects displayed in Figure 1.2 show that if the value of the *BURDEN* variable is lower than 3.5, higher levels of corruption are associated with weaker discouragement. However, when this benchmark is higher than 3.9, the higher the corruption, the higher the probability of discouragement. Descriptive statistics (Table 1.3) show that upper-middle income countries have a *BURDEN* variable of more than 4, except Thailand (average 3.5), while for lower-middle income countries the figure is lower than 3.5, except Laos (3.9) and Indonesia (3.8).

The above findings confirm our interpretation of the opposite effects of corruption on discouraged borrowers: negative in lower-middle and positive in upper-middle income countries. More importantly, these effects can be explained by the burden of government regulations. In lower-middle income countries, where regulations are less efficient, firms may use corruption as a way to overcome burdensome regulations. This can save them time and give them a greater chance of achieving their targets at lower costs. In addition, the likelihood of being caught and punished is low for those on both the giving and receiving ends of corruption because of its pervasiveness across society. The "grease the wheel" hypothesis applies in this situation (Leys, 1965; Lui, 1985). In contrast, in upper-middle income countries, the enforcement of regulations is more efficient and higher levels of corruption discourage firms from applying for loans. This result is supported by Fungáčová et al. (2015) and Galli et al. (2017).

1.5.4 Robustness check

With a focus on the interaction between corruption and discouraged borrowers, our study clearly depends on the measures of these two parameters. In this section, we test alternative measures. Furthermore, one interesting aspect of the Enterprise Surveys (ES) conducted by the World Bank is that responses are rated by interviewers. With the goal of obtaining a maximum number of observations, we have only used those rated by interviewers as truthful or somewhat truthful. Here, we test whether our results are robust by using only truthful responses.[21] Finally, since China and India represent 60% of our sample, it is possible that the results obtained may be skewed by these two countries. For this reason, we repeat the study by excluding these two countries.

- *Applying other measurements for corruption*

To check the robustness of our model, we apply other ways to measure corruption. First, we capture it through the number of times firms offer gifts or informal payments to officials against the number of times they apply for or use public services (*GIFT*). The higher this rate, the more corruption suffered by firms. Second, we use the Corruption Perceptions Index (*CPI*) published by Transparency International.

[21] In our knowledge we are the first to implement some such robustness test in ES Survey.

Columns 1 and 4 in Table 1.8 confirm our main finding that in developing countries corruption has a negative impact on discouraged borrowers. Both variables *"GIFT"* and *"CPI"* display the expected sign, and this sign is highly significant regarding *"GIFT"* (column 1).

As for the effect of corruption depending on the level of economic development, for both variables *"GIFT"* and *"CPI"*, we obtain the expected signs (columns 2, 3, 5 and 6 in Table 1.8), and they are highly significant, except the variable *"GIFT"* in upper-middle income countries. We are therefore confident that our results obtained in the main analysis are due to corruption and not due to a specific measure thereof.

- *Applying other measures for discouraged borrowers*

Discouraged borrowers is the second key variable of our study. In this section we check the relevance of results obtained through two stricter alternative measures. The first is based on a strict application of the definition of discouraged borrowers. Kon and Storey (2003) define them as good borrowers who do not apply for loans because they think they will be rejected. Applying this definition, we capture discouraged borrowers as follows:

> *Firms have a line of credit from a financial institution and do not apply for loans not because they have sufficient capital, but because application procedures are complex, interest rates are unfavorable, collateral requirements are excessive, loan size and maturity are insufficient, or they do not think the application would be approved.*

When a firm has a line of credit from a financial institution, this can prove its creditworthiness in the eyes of that institution. Petersen and Rajan (1994) also measured firms' information transparency using lines of credit. Therefore, we classify firms with lines of credit as good borrowers and use the measurement of discouraged borrowers as outlined above. This captures the full definition of Kon and Storey (2003). The dependent variable is given a value of 1 if the firm is considered to be a discouraged borrower and a value of 0 if it applies for loans.

The result presented in column 1 of Table 1.9 reveals that although the link between corruption and discouragement is not significant, it is negative as expected. The results of other columns in Table 1.9 fully confirm our second hypothesis. The OLS and Logit regressions (columns 2 and 3, Table 1.9) display the same dynamic as that obtained in the main analysis. This dynamic is also confirmed when the study separates upper-middle and lower-middle income countries (columns 4 and 5, Table 1.9).

The second alternative proxy of discouraged borrowers follows Galli et al. (2017). Remember, we consider a firm to be discouraged if its reasons for not applying are complex application procedures, unfavorable interest rates, excessive collateral requirements, insufficient loan size and maturity, or if they did not think the application would be approved. But a stricter approach would be to consider that only the last reason indicates discouragement. Following this approach, we build another measure for discouraged borrowers, namely *FEAR*, with a value of 1 if firms did not apply for a loan because of fear they would be rejected and 0 if they did not apply for other reasons. But if we test our equations 1 and 2 with this new variable, we exclude all firms having applied for a loan (2842 observations), and thus the results obtained could be affected by sample selection bias. To overcome this issue, we use a Heckman selection model. The selection equation and the regression equation are as follows:

Selection equation[22]

$$NOAPP_{i,k} = \alpha + \gamma 1 \times CORRUPTION_{i,k} + \gamma 2 \times ENTREPRENEUR\ CHARACT._{i,k} + \gamma 3 \times FIRM\ CHARACT._{i,k} + \gamma 4 \times ACCESS_{i,k} + FE(Country, industry, year) + u_{i,k} \quad (4)$$

Where "$NOAPP_{i,k}$" is a binary variable with a value of 1 for non-applicants and 0 for applicants.

The regression equation is observed only if $NOAPP_{i,k} = 1$

$$FEAR_{i,k} = \alpha + \beta 1 \times CORRUPTION_{i,k} + \beta 2 \times ENTREPRENEUR\ CHARACT._{i,k} + \beta 3 \times FIRM\ CHARACT._{i,k} + \beta 4 \times ACCESS_{i,k} + \beta 5 \times \lambda_{i,k} + FE(Country, industry, year) + \varepsilon_{i,k} \quad (5)$$

$FEAR_{i,k}$ equals 1 for non-applicants who fear rejection and 0 for other non-applicants.

$\lambda_{i,k}$ *is Heckman's lambda.*

The results confirm our findings. The signs of the *CORRUPTION* variable are the same as the main models and they are highly significant for the whole sample (Column 1, Table 1.10) and for the lower-middle income countries (Column 3, Table 1.10).

[22] As explained by Kai and Prabhala (2007) in Chapter 2 of the Handbook of Empirical Corporate Finance: "Strictly speaking, exclusion restrictions are not necessary in the Heckman selection model because the model is identified by non-linearity" (page 45). Hence, we use the same set of variables in our selection equation and regression equation. However, we are aware that such a choice, even if supported by Kai and Prabhala (2007), is open to discussion. To ensure the robustness of the results obtained, we reapplied the Heckman test, this time incorporating the exclusion restriction into the selection equation. The variable added is the creditor's right, and the results (available on request) are similar.

- *Using only truthful responses*

To ensure the reliability of the results, we use only truthful responses in the survey to re-test our main findings. This removes 2847 observations from the model. However, the results obtained are the same as the main results and all hypotheses are confirmed. All the results are presented in Table 1.11.

- *Robustness check by excluding China and India from the sample*

China belongs to the group of upper-middle income countries and India belongs to the group of lower-middle income countries. These are two big countries compared to the rest, and the observations in these two countries dominate the sample. Therefore, to avoid bias, we retest our work by excluding China and India from the sample. We again find higher corruption prevents firms from applying for loans in upper-middle income countries but encourages them in lower-middle income countries. Our findings are robust when we interact corruption with GDP per capita and when we split the sample (Table 1.12). These results confirm that our findings are not driven by China and India alone.

1.6 Conclusions

Using the Enterprise Survey conducted by the World Bank in the period from 2012 to 2016 for upper-middle and lower-middle income countries in East Asia & Pacific and South Asia, we find a negative link between the firm's propensity to be discouraged from applying for credit and their perception of corruption. Interestingly, the link between corruption and discouragement depends on the country's level of development. High corruption appears to encourage firms in lower-middle income countries to apply for loans and discourage them from doing so in upper-middle income countries. This result is a new contribution to our understanding of the mechanisms that lead to credit market failure, specifically at the demand-side level. Moreover, we explain these opposite effects of corruption in terms of the burden of regulations. In lower-middle income countries, where regulations are less efficient, firms use corruption as a way to overcome burdensome regulations. This explanation is consistent with the idea that corruption can work as a lubricant to "grease the wheel" of the credit market by mitigating obstacles to accessing finance. In contrast, in upper-middle income countries, the enforcement of regulations is more efficient and higher levels of corruption discourage firms from applying for loans: it "sands the wheel" of the credit market.

Our findings are robust when we measure corruption in different ways both at firm level and country level. These results still hold when we use stricter ways to capture discouraged borrowers, and we also prove that our findings do not depend solely on China and India, two large countries that dominate the research sample.

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Table 1.1 – Discouraged borrowers in East Asia & Pacific and South Asia

Country	*Total*	*Do not apply*	*Apply*	*Discouraged borrowers*	*Loan seekers*	*DBs/Loan seeker*
	(1) = (2)+(3)	*(2)*	*(3)*	*(4)*	*(5) = (3)+(4)*	*(6) = (4) / (5)*
China	2,556	1,913	643	771	1,414	54.5%
Malaysia	911	673	238	200	438	45.7%
Thailand	767	706	61	349	410	85.1%
Cambodia	316	276	40	99	139	71.2%
Indonesia	1,255	1,092	163	546	709	77.0%
Laos	358	306	52	100	152	65.8%
Myanmar	579	502	77	156	233	67.0%
Papua New Guinea	65	49	16	11	27	40.7%
Philippines	986	804	182	66	248	26.6%
Solomon Islands	146	118	28	18	46	39.1%
Timor-Leste	109	92	17	35	52	67.3%
Vietnam	963	542	421	91	512	17.8%
India	8,777	8,010	767	3,050	3,817	79.9%
Pakistan	1,087	999	88	315	403	78.2%
All sample	***18,875***	***16,082***	***2,793***	***5,807***	***8,600***	***67.5%***

Table 1.2 – Main reasons for not applying for loans

Country	***Main reasons for not applying for loans/line of credit***							
	No need – sufficient capital	Complex application procedure	Unfavorable interest rates	High collateral requirement	Insufficient loan size/maturity	Did not think it would be approved	Other	Total
China	57.7%	11.2%	10.0%	8.6%	6.7%	4.3%	1.6%	100.0%
Malaysia	54.1%	5.9%	14.8%	6.1%	2.0%	1.5%	15.6%	100.0%
Thailand	49.1%	14.4%	18.3%	5.8%	4.7%	6.6%	1.1%	100.0%
Cambodia	61.6%	17.3%	10.7%	5.2%	2.2%	1.1%	1.8%	100.0%
Indonesia	41.9%	5.2%	25.6%	9.6%	6.0%	4.2%	7.6%	100.0%
Laos	54.3%	13.6%	8.3%	5.0%	1.0%	5.3%	12.6%	100.0%
Myanmar	64.7%	17.9%	5.0%	2.8%	2.6%	3.0%	4.0%	100.0%
Papua New Guinea	69.4%	6.1%	8.2%	2.0%	0.0%	6.1%	8.2%	100.0%
Philippines	88.5%	1.8%	3.8%	1.8%	0.4%	0.6%	3.1%	100.0%
Solomon Islands	82.2%	5.9%	1.7%	6.8%		0.8%	2.5%	100.0%
Timor-Leste	60.9%	14.1%	9.8%	7.6%	3.3%	3.3%	1.1%	100.0%
Vietnam	80.1%	5.6%	4.6%	4.1%	1.1%	1.5%	3.0%	100.0%
India	45.6%	7.7%	11.9%	9.9%	6.1%	3.1%	15.7%	100.0%
Pakistan	62.2%	5.9%	16.8%	6.5%	1.2%	3.0%	4.4%	100.0%
All sample	***53.1%***	***8.3%***	***12.3%***	***8.1%***	***4.8%***	***3.2%***	***10.2%***	***100.0%***

Table 1.3 – Descriptive statistic of main variables (* binary variable)

Country	*discouraged (*)*			*corruption(*)*			*gift*			*CPI*			*GDP*[23]			*BURDEN*		
	Obs	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**
China	1,414	0.55	0.50	1,389	0.01	0.08	975	0.10	0.27	1,414	39.0	0.0	1,414	6,338	0.0	1,414	4.16	0.00
Malaysia	438	0.46	0.50	389	0.15	0.36	191	0.25	0.39	438	49.6	0.5	438	9,587	69.7	438	4.95	0.04
Thailand	410	0.85	0.36	372	0.01	0.12	118	0.07	0.23	410	35.1	0.6	410	5,906	20.1	410	3.50	0.04
Cambodia	139	0.71	0.45	132	0.11	0.31	99	0.46	0.46	139	21.0	0.0	139	1,270	0.0	139	3.50	0.00
Indonesia	709	0.77	0.42	609	0.13	0.33	182	0.10	0.27	709	36.0	0.0	709	3,336	0.0	709	3.79	0.00
Laos	152	0.66	0.48	149	0.04	0.20	131	0.04	0.18	152	30.0	0.0	152	2,353	0.0	152	3.91	0.00
Myanmar	233	0.67	0.47	216	0.10	0.30	193	0.25	0.39	233	28.7	0.9	233	1,231	49.1	NA	NA	NA
Papua New Guinea	27	0.41	0.50	27	0.26	0.45	21	0.08	0.23	27	25.7	1.3	27	2,624	67.4	NA	NA	NA
Philippines	248	0.27	0.44	233	0.35	0.48	233	0.24	0.36	248	35.4	1.0	248	2,887	31.6	248	3.07	0.20
Solomon Islands	46	0.39	0.49	46	0.61	0.49	42	0.27	0.36	13	42.0	0.0	46	1,946	38.0	NA	NA	NA
Timor-Leste	52	0.67	0.47	52	0.12	0.32	50	0.31	0.35	52	29.1	2.6	52	1,312	40.4	NA	NA	NA
Vietnam	512	0.18	0.38	406	0.07	0.25	335	0.17	0.34	512	31.1	0.5	512	2,102	34.9	512	3.21	0.06
India	3,817	0.80	0.40	3,816	0.43	0.50	2,450	0.19	0.37	3,817	37.4	0.9	3,817	1,540	54.0	3,817	3.44	0.22
Pakistan	403	0.78	0.41	395	0.57	0.50	198	0.24	0.40	403	29.2	0.7	403	1,350	63.3	403	3.21	0.13

[23] As we wrote in page 55, the survey can last from 1 to 3 years. Hence even if each firm is interviewed only one times, some firms could be interviewed at the beginning of this 3 years and others at the ending, which explains why the variance of the GDP may be non-zero for some countries.

Table 1.4 – Correlation of main variables

This table reports the correlations between main variables. Definition of variables are provided in the Appendix 1.1. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	corruption	**gift**	**CPI**	**BURDEN**	**GDP**
corruption	1				
gift	0.11***	1			
CPI	-0.01	-0.06***	1		
BURDEN	-0.24***	-0.07***	0.70***	1	
GDP	-0.31***	-0.07***	0.60***	0.84***	1

Table 1.5 – Descriptive statistics of variables

This table summaries statistics of variables used in the models. The last column shows the significance of a two-sample t-test of a difference in means of variables between discouraged borrowers and applicants with equal variances. Definition of variables are provided in the Appendix 1.1. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

Variable	Obs	Mean	Std. Dev.	Min	Max	Discouraged borrowers		Applicants		T-test
						Mean	Std. dev	Mean	Std. dev	
discouraged	7370	0.69	0.46	0	1	1	0	0	0	
corruption	7370	0.27	0.44	0	1	0.29	0.45	0.23	0.42	***
gift	4938	0.23	0.39	0	1	0.22	0.39	0.23	0.39	
CPI	7657	36.56	4.45	21	50					
gender	7370	0.16	0.36	0	1	0.15	0.36	0.17	0.40	***
experience	7370	15.25	9.30	1	70	14.47	9.10	16.93	9.51	***
AI1	7370	0.88	0.33	0	1	0.88	0.32	0.87	0.33	
AI2	7370	0.44	0.50	0	1	0.42	0.49	0.48	0.50	***
city1m	7370	0.52	0.50	0	1	0.50	0.50	0.60	0.49	***
maincity	7370	0.69	0.46	0	1	0.71	0.46	0.65	0.48	***
age	7370	17.83	12.60	1	116	17.62	12.46	18.27	12.89	**
size	7370	1.93	0.77	1	3	1.83	0.76	2.13	0.76	***
ffirm	7370	0.02	0.14	0	1	0.01	0.12	0.03	0.17	***
diexport	7370	7.89	22.67	0	100	6.25	20.62	11.50	26.23	***
tradecr	7370	44.94	33.97	0	100	42.77	33.91	49.67	33.63	***
innovation	7370	0.27	0.45	0	1	0.24	0.43	0.34	0.47	***
certificate	7370	0.37	0.48	0	1	0.35	0.48	0.44	0.50	***
exteraudit	7370	0.64	0.48	0	1	0.62	0.48	0.69	0.46	***
creditline	7370	0.43	0.50	0	1	0.28	0.45	0.76	0.43	***
access	7370	0.16	0.37	0	1	0.16	0.37	0.15	0.36	
GDP	7370	3051.97	2297.59	1195.5	9648.6					
BURDEN	7063	3.64	0.44	2.72	4.99					

Table 1.6 – Main models

This table presents the results of the effect of corruption on discouraged borrowers. Column (1) tests the effect for the whole data (equation 1); column (2) & (3) interact corruption and GDP per capita (equation 2); columns (4) & (5) split the sample into 2 groups (upper-middle and lower-middle income countries) and test equation (1). Definitions of variables are provided in Appendix 1.1. Robust standard errors in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variable = *discouraged*				
	Full data	Interact GDP	Interact GDP	Upper	Lower
	(1) Eq.1	(2) Eq.2	(3) Eq.2	(4) Eq.1	(5) Eq.1
GDP		0.00001	0.00003		
		(0.00002)	(0.00008)		
corruption	-0.270**	-0.09810**	-0.66555***	2.217***	-0.337***
	(0.118)	(0.03272)	(0.19299)	(0.177)	(0.050)
corruption x GDP		0.00003*	0.00019**		
		(0.00001)	(0.00008)		
gender	-0.018	0.01575	0.05300	-0.014	0.070
	(0.121)	(0.02531)	(0.15194)	(0.218)	(0.125)
experience	-0.017***	-0.00299**	-0.01938**	-0.004	-0.019***
	(0.005)	(0.00130)	(0.00806)	(0.034)	(0.004)
AI1	0.157	0.08108**	0.51565**	-0.031	0.089
	(0.150)	(0.03139)	(0.20377)	(0.115)	(0.175)
AI2	-0.190**	-0.01157	-0.05926	-0.125	-0.111**
	(0.094)	(0.02376)	(0.13490)	(0.216)	(0.045)
city1m	0.001	-0.01962	-0.09851	0.499	-0.032
	(0.148)	(0.03882)	(0.24564)	(1.034)	(0.110)
maincity	-0.052	0.04051	0.25003	0.115	-0.165
	(0.162)	(0.04746)	(0.30218)	(0.451)	(0.129)
age	-0.002	0.00060	0.00450	-0.025	-0.002
	(0.003)	(0.00121)	(0.00725)	(0.020)	(0.004)
size	-0.239***	-0.04044**	-0.21666**	-0.123	-0.228**
	(0.087)	(0.01526)	(0.09339)	(0.099)	(0.101)
ffirm	0.393**	0.03130	0.25885	0.575***	0.620***
	(0.192)	(0.03148)	(0.16729)	(0.191)	(0.224)
diexport	-0.002**	-0.00060**	-0.00351***	-0.004*	-0.003**
	(0.001)	(0.00022)	(0.00134)	(0.002)	(0.001)
tradecr	-0.006	-0.00084	-0.00546	0.003	-0.009***
	(0.004)	(0.00066)	(0.00378)	(0.004)	(0.002)
innovation	-0.132***	-0.05115**	-0.33363***	-0.049	-0.116***
	(0.035)	(0.02061)	(0.11183)	(0.097)	(0.043)
certificate	-0.175***	-0.02835**	-0.17400***	-0.093	-0.175***
	(0.055)	(0.01218)	(0.06360)	(0.171)	(0.049)
exteraudit	-0.412*	-0.07755*	-0.49437*	-1.021***	-0.253
	(0.243)	(0.03815)	(0.26598)	(0.381)	(0.177)
creditline	-1.908***	-0.36907**	-2.03057***	-3.278***	-1.431***
	(0.563)	(0.12747)	(0.55916)	(0.620)	(0.346)
access	0.136	0.02529	0.15930	-0.061	0.209
	(0.196)	(0.03091)	(0.20247)	(0.567)	(0.216)
Constant	2.774***	0.88719***	2.18681***	2.495***	2.287***
	(0.322)	(0.11937)	(0.64248)	(0.835)	(0.246)
Observations	7,370	7,370	7,370	1,848	5,522
Correctly classified	81.94%		80.73%	85.50%	81.06%
R-squared		0.277			
Country FE	Yes			Yes	Yes

Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Cluster country	Yes	Yes	Yes	Yes	Yes
Method	LOGIT	OLS	LOGIT	LOGIT	LOGIT
Interaction Marginal Effect			0.00003**		

Table 1.7 – Interaction between corruption and burden of government regulation

This table presents the results of the regressions of the interaction between the "burden of government regulation" and corruption on discouraged borrowers (equation 3). Controls: we control for entrepreneur characteristics (*GENDER, EXPERIENCE*); firm characteristics (*AI1, AI2, CITY1M, MAINCITY, AGE, SIZE, FFIRM, DIEXPORT, TRADECR, INNOVATION, CERTIFICATE, EXTERAUDIT, CREDITLINE*) and firm perception (*ACCESS*). Definitions of variables are provided in the Appendix 1.1. Robust standard errors in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variable = *discouraged*	
	(1) Eq.3	(2) Eq.3
BURDEN	0.057	0.304
	(0.113)	(0.573)
corruption	-0.743***	-4.842***
	(0.168)	(1.084)
corruption x BURDEN	0.202***	1.325***
	(0.046)	(0.312)
Controls	Yes	Yes
Observations	7,063	7,063
Correctly classified		80.29%
R-squared	0.278	
Industry FE	Yes	Yes
Year FE	Yes	Yes
Cluster country	Yes	Yes
Method	OLS	LOGIT
Interaction Marginal Effect		0.197***

Table 1.8 – Robustness check: other proxies for corruption

This table presents the results of regressions examining the effect of corruption on discouraged borrowers by using other proxies for corruption. Columns (1), (2) and (3) test the impact of the number of times firms offer informal payments (gift) on discouraged borrowers. Column (1) conducts the test for the whole data; columns (2) & (3) split the sample into 2 groups (upper-middle and lower-middle income countries). Columns (4), (5) and (6) test the impact of the Corruption Perception Index (CPI) on discouraged borrowers. Column (4) conducts the test for the whole data; columns (5) & (6) split the sample into 2 groups (upper-middle and lower-middle income countries). Controls: we control for entrepreneur characteristics (*GENDER, EXPERIENCE*); firm characteristics (*AI1, AI2, CITY1M, MAINCITY, AGE, SIZE, FFIRM, DIEXPORT, TRADECR, INNOVATION, CERTIFICATE, EXTERAUDIT, CREDITLINE*) and firm perception (*ACCESS*). Definitions of variables are provided in Appendix 1.1. Robust standard errors in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variable = *discouraged*					
	Full data (1) Eq.1	Upper (2) Eq.1	Lower (3) Eq.1	CPI-Full data (4) Eq.1	CPI-Upper (5) Eq.1	CPI-Lower (6) Eq.1
gift	-0.185**	0.074	-0.224**			
	(0.089)	(0.048)	(0.090)			
CPI				0.036	-0.121***	0.124**
				(0.037)	(0.035)	(0.059)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,938	1,168	3,770	7,657	1,937	5,720
Correctly classified	80.88%	82.45%	80.37%	80.72%	85.23%	79.98%
Country FE	Yes	Yes	Yes			
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Cluster country	Yes	Yes	Yes	Yes	Yes	Yes
Method	LOGIT	LOGIT	LOGIT	LOGIT	LOGIT	LOGIT

Table 1.9 – Robustness check: changing the way to measure discouraged borrowers

This table presents the results of regressions examining the effect of corruption on discouraged borrowers by using other measurements for discouraged borrowers. Column (1) tests the effect for the whole data; columns (2) & (3) interact corruption and GDP per capita; columns (4) & (5) split the sample into 2 groups (upper-middle and lower-middle income countries). Controls: we control for entrepreneur characteristics (*GENDER, EXPERIENCE*); firm characteristics (*AI1, AI2, CITY1M, MAINCITY, AGE, SIZE, FFIRM, DIEXPORT, TRADECR, INNOVATION, CERTIFICATE, EXTERAUDIT*) and firm perception (*ACCESS*). Definitions of variables are provided in the Appendix 1.1. Robust standard errors in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variable = *discouraged1*				
	Full data (1) Eq.1	Interact GDP (2) Eq.2	Interact GDP (3) Eq.2	Upper (4) Eq.1	Lower (5) Eq.1
GDP		0.00000	0.00001		
		(0.00001)	(0.00005)		
corruption	-0.289	-0.18533***	-0.88288***	2.031***	-0.400***
	(0.188)	(0.03175)	(0.11446)	(0.066)	(0.104)
corruption x GDP		0.00006***	0.00028***		
		(0.00001)	(0.00004)		
Controls	Yes	Yes	Yes	Yes	Yes
Observations	3,755	3,755	3,755	901	2,854
Correctly classified	74.49%		73.58%	83.24%	71.97%
R-squared		0.208			
Country FE	Yes			Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Cluster country	Yes	Yes	Yes	Yes	Yes
Method	LOGIT	OLS	LOGIT	LOGIT	LOGIT
Interaction Marginal Effect			0.00005***		

Table 1.10 – Robustness check: Heckman test

This table presents the results of regressions examining the effect of corruption on discouraged borrowers by using other measurements for discouraged borrowers. Column (1) applies Heckman selection model to test the effect for the whole data. Columns (2) and (3) apply the same method and test on two separate groups (upper-middle and lower-middle income countries). Controls: we control for entrepreneur characteristics (*GENDER, EXPERIENCE*); firm characteristics (*AI1, AI2, CITY1M, MAINCITY, AGE, SIZE, FFIRM, DIEXPORT, TRADECR, INNOVATION, CERTIFICATE, EXTERAUDIT, CREDITLINE*) and firm perception (*ACCESS*). Definitions of variables are provided in the Appendix 1.1. Robust standard errors in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variable = *Fear*		
	Full data (1) Eq.5	Upper (2) Eq.5	Lower (3) Eq. 5
corruption	-0.015***	0.045	-0.016***
	(0.004)	(0.029)	(0.004)
Controls	Yes	Yes	Yes
Lambda	0.050*	-0.060	0.031
	(0.028)	(0.056)	(0.037)
Observations	15,751	3,382	12,369
Censored obs	2,319	743	1,576
Uncensored obs	13,432	2,639	10,793
Country FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Table 1.11 – Robustness check: using only truthful answers

This table presents the results of the effect of corruption on discouraged borrowers. Column (1) tests the effect of corruption on discouraged borrowers for the whole data; columns (2) & (3) interact corruption and GDP per capita; columns (4) & (5) split the sample into 2 groups (upper-middle and lower-middle income countries). The data includes only truthful answers. Controls: we control for entrepreneur characteristics (*GENDER, EXPERIENCE*); firm characteristics (*AI1, AI2, CITY1M, MAINCITY, AGE, SIZE, FFIRM, DIEXPORT, TRADECR, INNOVATION, CERTIFICATE, EXTERAUDIT, CREDITLINE*) and firm perception (*ACCESS*). Definitions of variables are provided in the Appendix 1.1. Robust standard errors in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variable = *discouraged*				
	Full data (1) Eq.1	Interact GDP (2) Eq.2	Interact GDP (3) Eq.2	Upper (4) Eq.1	Lower (5) Eq.1
GDP		0.00002*	0.00014*		
		(0.00001)	(0.00007)		
corruption	-0.512***	-0.14490***	-0.95441***	1.570*	-0.527***
	(0.139)	(0.03181)	(0.24256)	(0.858)	(0.047)
corruption x GDP		0.00003*	0.00023*		
		(0.00001)	(0.00012)		
Controls	Yes	Yes	Yes	Yes	Yes
Observations	4,523	4,523	4,523	1,278	3,245
Correctly classified	80.43%		79.64%	86.62%	78.89%
R-squared		0.279			
Country FE	Yes			Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Cluster country	Yes	Yes	Yes	Yes	Yes
Method	LOGIT	OLS	LOGIT	LOGIT	LOGIT
Interaction Marginal Effect			0.00004**		

Table 1.12 – Robustness check: excluding China and India from the sample

This table presents the results of the effect of corruption on discouraged borrowers. Column (1) tests the impact of corruption on discouraged borrowers for the data excluding China and India; columns (2) & (3) interact corruption and GDP per capita; Columns (4) & (5) split the sample into 2 groups (upper-middle income countries excluding China and lower-middle income countries excluding India). Controls: we control for entrepreneur characteristics (*GENDER, EXPERIENCE*); firm characteristics (*AI1, AI2, CITY1M, MAINCITY, AGE, SIZE, FFIRM, DIEXPORT, TRADECR, INNOVATION, CERTIFICATE, EXTERAUDIT, CREDITLINE*) and firm perception (*ACCESS*). Definitions of variables are provided in the Appendix 1.1. Robust standard errors in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variable = *discouraged*				
	Exclude Chi&Ind (1) Eq.1	Exclude Chi&Ind (2) Eq.2	Exclude Chi&Ind (3) Eq.2	Upper- Exclude China (4) Eq.1	Lower- Exclude India (5) Eq.1
GDP		0.00001	0.00004		
		(0.00001)	(0.00008)		
corruption	-0.051	-0.13391**	-0.91541***	2.037***	-0.410*
	(0.353)	(0.05320)	(0.29824)	(0.152)	(0.220)
corruption x GDP		0.00004***	0.00027***		
		(0.00001)	(0.00006)		
Controls	Yes	Yes	Yes	Yes	Yes
Observations	2,543	2,543	2,543	597	1,946
Correctly classified	81.71%		80.30%	85.76%	81.55%
R-squared		0.391			
Country FE	Yes			Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Cluster country	Yes	Yes	Yes	Yes	Yes
Method	LOGIT	OLS	LOGIT	LOGIT	LOGIT
Interaction Marginal Effect			0.00004***		

Figure 1.1 – Representation of marginal effect of corruption on the probability of discouragement at different levels of GDP per capita

Figure 1.1 represents the marginal effect of corruption (black line) on the probability of discouragement (equation 2). It is calculated for GDP values ranging from 1000 to 9500 with an increment of 200. Shaded areas highlight when the marginal effect is significant.

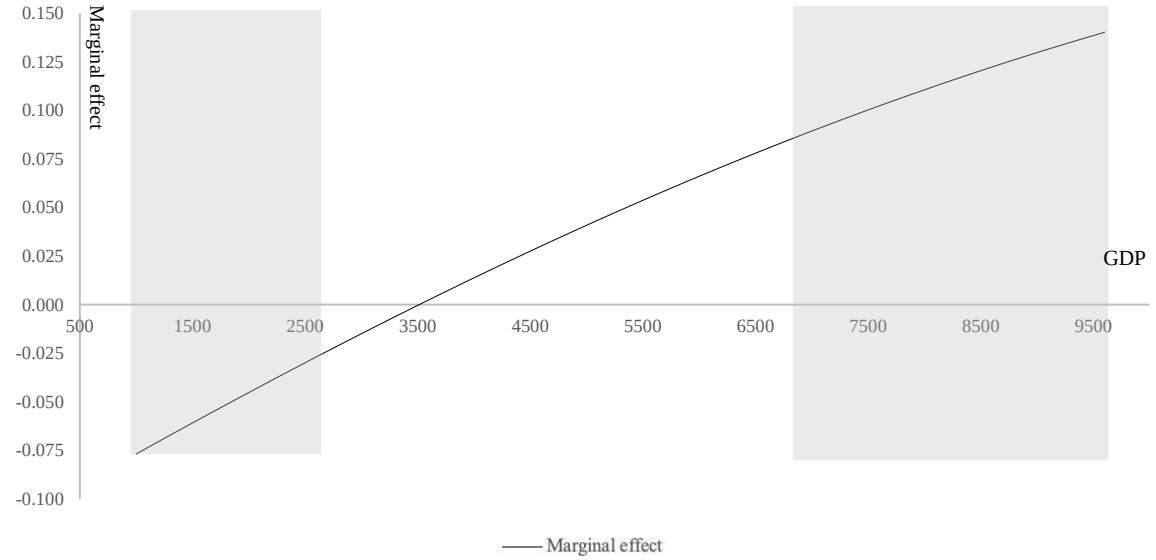
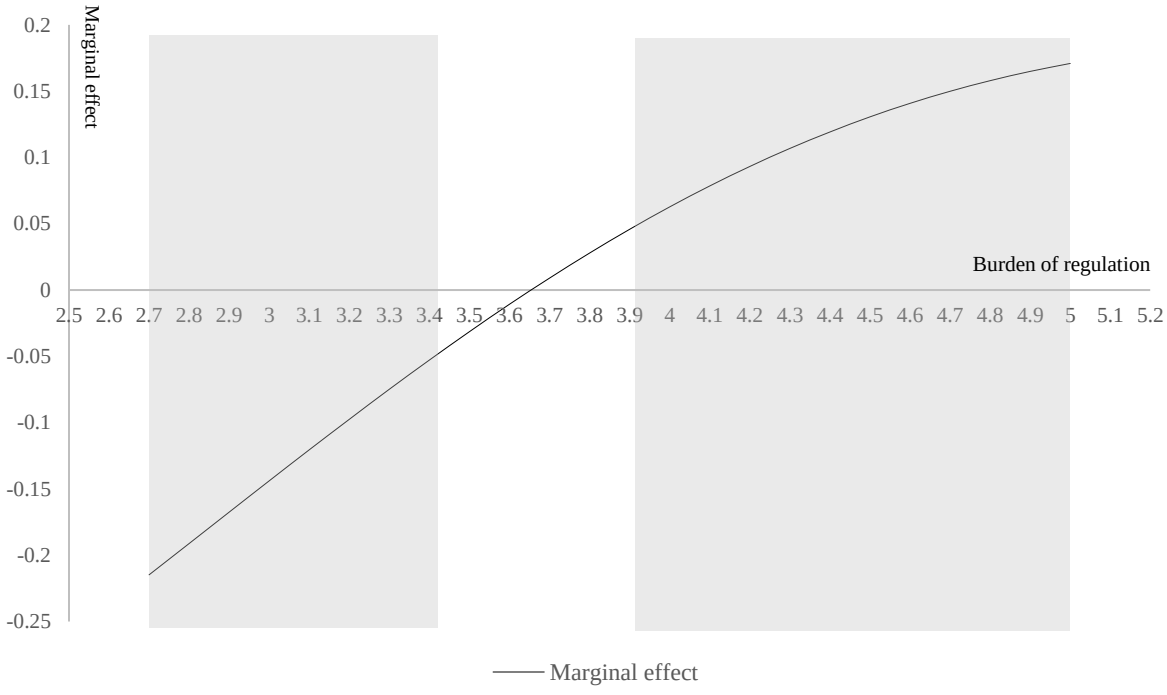


Figure 1.2 – Representation of marginal effect of corruption on the probability of discouragement at different levels of burden of government regulation

Figure 1.2 represents the marginal effect of corruption (black line) on the probability of discouragement (equation 3). It is calculated for BURDEN values ranging from 2.7 to 5 with an increment of 0.1. Shaded areas highlight when the marginal effect is significant.



Appendix 1.1 – Definitions of variables

Symbol	Explanation
DEPENDENT VARIABLES	
Discouraged firms	
discouraged	Dummy = 1 for discouraged borrowers and 0 for applicants
discouraged1	Dummy = 1 for discouraged borrowers who have credit lines and 0 for applicants
Fear	Dummy = 1 for non-applicants who did not think their application be approved and 0 for other non-applicants
NoApp	Dummy = 1 for non-applicants and 0 for applicants
INDEPENDENT VARIABLES	
Corruption	
corruption	Dummy = 1 if corruption is major obstacle and very severe obstacle and 0 otherwise
gift	Number of times gifts (informal payments) offered divided by number of times public services applied for
CPI	Corruption perception index ranges from 0-100, where 100 is clear from corruption
CONTROL VARIABLES	
Entrepreneur characteristics	
gender	Dummy = 1 if top managers are female and 0 otherwise
experience	Top manager's number of years' experience working in the sector
Firm characteristics	
AI1	Dummy = 1 if firm has a checking or savings account and 0 otherwise
AI2	Dummy = 1 if firm has an overdraft facility and 0 otherwise
city1m	Dummy = 1 if firm is located in city with population over 1 million
maincity	Dummy = 1 if firm is located in main business city
age	Firm age measured by number of years establishment has been operating
size	Firm size measured by number of employees: small (5–19), medium (20–99) and large (> 100)
ffirm	Dummy = 1 if percentage of firm owned by foreigners is greater than 50% and 0 otherwise
diexport	Direct exports as a percentage of sales
tradecr	Proportion of total annual purchases of material inputs purchased on credit
innovation	Dummy = 1 if firm invests in formal R&D activities and 0 otherwise
certificate	Dummy = 1 if firm has internationally recognized quality certification
exteraudit	Dummy = 1 if firm's annual financial statements are checked and certified by an external auditor
creditline	Dummy = 1 if firm has a line of credit or loan from a financial institution
Firm's perception of its operating environment	
access	Dummy = 1 if access to finance is major or very severe obstacle and 0 otherwise
Economic conditions	
GDP	GDP per capita
BURDEN	Burden of government regulation

CHAPTER 2 – DOES CREDIT INFORMATION SHARING REDUCE DISCOURAGED BORROWERS?

Abstract:

Information asymmetry is a fundamental problem creating malfunctions in the credit market. On the supply side, credit information sharing is recognized as an effective solution to mitigate asymmetric information. On the demand side, however, its impact on discouraged borrowers is missing in empirical research. Using data from Enterprise Survey of The World Bank and information sharing data from Doing Business for developing countries worldwide, this research highlights the effectiveness of information sharing in reducing discouraged borrowers, especially information sharing through public credit registries. More interestingly, the non-linear effect of increased information on discouraged borrowers, predicted in the theory of Kon and Storey (2003), is also found. There is evidence to confirm that information sharing through private credit bureaus discourages firms from applying for loans if their coverage is low, while it enhances the demand for bank credit if their coverage reaches a sufficient level.

JEL classification: G21, 050

Keywords: *discouraged borrowers, asymmetric information, information sharing, private credit bureau, public credit registry, developing countries.*

2.1 Introduction

In developing countries where not all have well-developed capital markets, the credit market plays a vital role in allocating resources. Thus, it plays a critical role in economic development. Efforts to understand the mechanisms that can alter credit activities and the solutions to remedy deficient credit allocation are thus an important field of financial research. Since the seminal article by Stiglitz and Weiss (1981) and later by Kon and Storey (2003), information asymmetry between borrowers and lenders is revealed as a fundamental problem creating malfunctions in the credit market both on the supply and demand side. Under imperfect information, adverse selection effects and adverse incentive effects may arise, resulting in quitting of safer borrowers from the credit market or taking riskier projects of approved borrowers (Stiglitz and Weiss, 1981). On the demand-side, information asymmetry hampers good borrowers from applying for loans because they are afraid to be rejected, and they are called discouraged borrowers (Kon and Storey, 2003). Solutions to mitigate imperfect information, therefore, are necessary.

On the supply-side, many remedies were found to deal with information asymmetry. At the firm level, by designing a contract structure between collateral and interest rate, lenders can recognize risk levels of borrowers (Besanko and Thakor, 1987; Bester, 1985), or by using relationship lending, the understanding between lenders and borrowers is improved (Berger and Udell, 1995; Boot, 2000; Petersen and Rajan, 1994). At the country level, both theory and empirical research confirm the effectiveness of sharing credit information on diminishing information asymmetry. Information sharing reduces adverse selection, mitigates moral hazard, lessens the information rents which lenders extract from customers, and decreases over-indebtedness (Bennardo et al., 2007; Padilla and Pagano, 1997, 2000; Pagano and Jappelli, 1993; Vercammen, 1995). On the demand side, however, understanding about the effect of asymmetric information is nascent. Kon and Storey (2003) predict that increased information will have a non-linear effect on discouraged borrowers. At a low level of information, under the impact of sharply increased application costs, the probability of discouragement increases. But at a sufficient level of information, discouragement reduces due to the dominant effect of improved bank screening error. However, this prediction has not been confirmed by empirical research. Therefore, in this paper, we study the impact of sharing credit information on discouraged borrowers. We expect to observe the non-linear effect of increased information on discouraged borrowers predicted in the theory of Kon and Storey (2003).

To investigate this expectation, we use the World Bank Enterprise Survey from 2012-2018 on 58 developing countries and information sharing data from Doing Business Database and Djankov et al. (2007). We first test the overall impact of sharing credit information on discouraged borrowers. We further perform a quadratic regression to test the non-linear effect of sharing credit information on discouragement. Logit and OLS estimators are applied in the models. Moreover, dealing with the potential endogeneity, we perform a two-stage least squares regression using instrumental variables.

We find that overall, information sharing reduces discouraged borrowers. This result is significant for information shared through public credit registries. More interestingly, findings also prove the existence of the non-linear effect of information sharing on discouragement. At low levels of information sharing, it increases discouragement, while the reverse effect is found at higher levels. The non-linear effect is highly significant with information shared through private credit bureaus and confirms the prediction in the theory of Kon and Storey (2003). Studies and reports about public credit registries and private credit bureaus show that in many developing countries, public credit registries are in charge of both bank supervision and supplying information for commercial banks in lending decisions. Moreover, they are unique hubs of mandatory data operated by central banks. Therefore, information shared by them is more accurate, and they play an important role in reducing information asymmetric, resulting in the decline of discouragement. In contrast, countries having a low level of private credit bureau coverage reveal that it is difficult for banks to shape a full picture about the creditworthiness of borrowers because credit information is cut into pieces, incomplete by several private credit bureaus. Furthermore, they also face difficulties in the absence legal framework for their operations and thus strongly affects the accuracy of information. Because of these reasons, bank screening errors have not been improved while application costs increase, resulting in enhancing discouraged borrowers. Conversely, countries owning high values of private credit bureau coverage report an effective credit report system supporting lenders in their lending assessments. Therefore, discouraged borrowers decrease.

Our study contributes to the literature in the following issues: First, although discouragement is a young field of research, its importance is gradually confirmed. Recent studies notice that the number of discouraged borrowers is twice or even three times the number of borrowers rejected from loan applications (Freel et al., 2012; Gama et al., 2017; Levenson and Willard, 2000). Understanding this phenomenon and its determinants, thereby is necessary. Second, we are the first to investigate the effect of sharing credit information through public

credit registries and private credit bureaus on discouraged borrowers. On one hand, it prolongs our understanding of the effect of asymmetric information on discouraged borrowers. On other hand, it proposes a policy implication to mitigate malfunctions in the credit market, especially on the demand-side.

The paper is structured as follows: in Section 2.2, the research framework is summarized. Section 2.3 discusses the hypotheses. Section 2.4 describes the data and econometric methodology. Section 2.5 presents the results in detail, and the conclusion is in Section 2.6.

2.2 Literature review

2.2.1 Discouraged borrowers

Kon and Storey (2003) define discouraged borrowers as good borrowers who do not apply for loans because they think they will be rejected. Their model builds around three main characteristics: the loan application cost, the imperfect screening by banks, and the difference between the lending rates of banks and other money lenders. They show that the level of discouragement increases with the first two characteristics and decreases with the last.

Empirical studies later have uncovered the determinants of discouragement. First, they find that entrepreneur characteristics such as gender, experience, and level of education affect the probability of discouragement (Chakravarty and Xiang, 2013; Fastenbauer and Robson, 2014; Gama et al., 2017). Second, evidence confirms the role of firm characteristics on discouraged borrowers. Firm age, firm size, creditworthiness, ownership structure, and firm location are revealed significantly impact on the probability of discouragement (Brown et al., 2011; Chakravarty and Xiang, 2013; Cole, 2016; Ferrando and Mulier, 2015; Fraser, 2014; Freel et al., 2012; Gama et al., 2017; Han et al., 2009; Xiang et al., 2015). Third, lending relationships play an important role in alleviating asymmetric information (Berger and Udell, 1995; Boot, 2000; Sharpe, 1990). Hence, it is found to have a negative impact on discouraged borrowers (Chakravarty and Xiang, 2013; Chakravarty and Yilmazer, 2009; Freel et al., 2012). Finally, firms' perceptions of their operating environment such as difficulties in credit access and perception of corruption also impact discouragement (Galli et al., 2017; Mac an Bhaird et al., 2016; Statnik and Vu, 2020).

2.2.2 Information sharing and credit activity

Information sharing is established by lenders gather their customer information into a pool and they use this information during the credit appraisal process. Access to information

in the pool is based on a reciprocal or fee principle. The collected information includes the firm's name and address; amount and type of loan; rating of loan and maturity day; type and value of collateral, etc (Miller, 2000).

Information is collected and stored by two types of institutions, public credit registry or private credit bureau. These two institutions are different in many aspects. Public credit registries are operated by central banks or bank supervisors. The requirement to supply credit information to them is mandatory to all supervised institutions (Miller, 2000). They assist bank supervision and improve the quality of credit data available for the financial sector. The majority of public credit registries only store information of loans whose values are over a threshold, and data sources mainly come from the commercial bank sector. They store both positive information such as loans in good or normal condition, and negative information on late payments or defaults. Access to information from them is often limited and based on reciprocal principles.

In contrast, private credit bureaus are operated by private firms or non-profit organizations. Their main purpose is to facilitate the exchange of credit information among banks and financial institutions. Therefore, they collect loans at any value, and sources of information are much more diverse (finance corporation, retail, merchants, etc…). Mostly, information from private credit bureaus is negative. Access to them is more open. They did not require lenders or others to provide data for having some access, but customers may pay a little fee.

Theories in this field prove that information sharing benefits credit market development because it alleviates asymmetric information. First, information sharing reduces adverse selection. In the model of Pagano and Jappelli (1993), they prove that information sharing can help lenders know more about borrowers who come from other areas. Lenders, therefore, make better lending decisions. Second, the exchange of information among lenders, especially information on defaults, will motivate borrowers to put more effort into their projects (Padilla and Pagano, 2000; Vercammen, 1995), because borrowers notice that their shared information about creditworthiness will affect their application in the future. Third, credit reporting lessens the information monopoly that lenders extract from customers during time building the relationship (Padilla and Pagano, 1997). All the above models assume that one borrower applies for credit with only one lender. However, in practice, one borrower may contact several lenders at the same time. The risk increases for lenders if one borrower gets credit approval from many sources and the total amount is over its need. If information is shared, lenders will

have sufficient information to make their decision, and over-indebtedness decreases (Bennardo et al., 2007)

Confirming predictions in theories, plenty of empirical research finds that information sharing increases credit market development, mitigates constraints in access to finance, lowers the default rates, and enhances credit availability.

At the country level, Djankov et al. (2007) confirm that information sharing enhances private credit in the whole model. However, when authors split the sample, they find that both public credit registry and private credit bureau have positive significant impacts on private credit in poorer, but not richer countries. This result confirms the important role of information sharing in poorer countries. Inline, Tchamyou and Asongu (2017) also reveal that information sharing increases formal financial sector development, but decreases informal or non-formal financial sector development.

At the firm-level, Galindo and Miller (2001), Love and Mylenko (2003), and Triki and Gajigo (2012) show that information sharing reduces credit constraints. In detail, Galindo and Miller (2001) find that the quality of credit registries mitigates financial constraints. Confirming partial results of Galindo and Miller (2001), Love and Mylenko (2003) reveal that firms face lower financial constraints and have a higher share of bank financing when private credit bureaus exist, but not significant for the existence of public credit registries. In parallel to Love and Mylenko (2003), Triki and Gajigo (2012) find that firms face fewer obstacles in access to credit if private credit bureaus collect both positive and negative information, and their research also bolds the role of private credit bureaus more than the role of public credit registries.

Besides reducing obstacles, information sharing helps lenders better identify borrowers, which leads to lower risks. Powell et al. (2004) reveal information from public credit registries increases the banks' ability to determine the likelihood of borrower default. At a different angle, using data from banks, Houston et al. (2010); Behr and Sonnekalb (2012) and Kusi et al. (2017) all confirm that information sharing reduces bank credit risk. Karapetyan and Stacescu (2013) have another explanation. They prove that when credit information is shared, banks can access hard information from this source. Therefore, they will invest more in soft information getting from relationship lending. That helps them make more accurate decisions in lending. Thus, the default rate will reduce.

In addition to lower default rates, Jappelli and Pagano (2002) confirm the important role of information sharing in increasing credit amount. This result is also found by Brown et al. (2009) and Luoto et al. (2007). Moreover, Brown et al. (2009) reveal that information sharing brings more benefits to opaque firms and small firms.

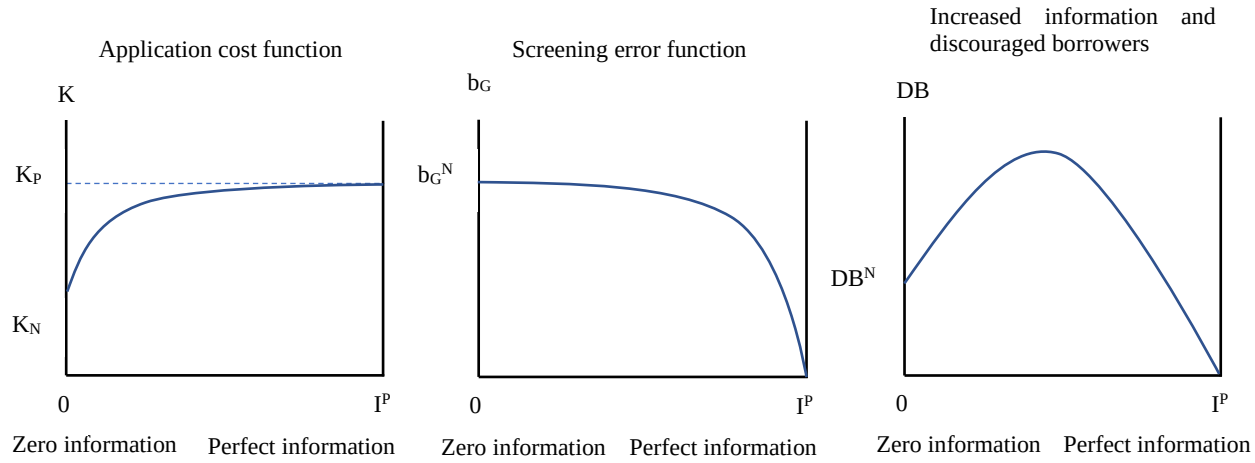
2.2.3 Information sharing and discouragement

Imperfect information lies in the heart of discouraged borrowers theory. Kon and Storey (2003) predict that increased information will have a non-linear effect on discouraged borrowers. They explain this effect through application costs and bank screening errors. First, increased information will raise application costs, lead to an increase in the number of discouraged borrowers. This effect is explained by without any information, banks will randomly choose their customers, so borrowers do not need to prepare carefully for their application, resulting in low application costs. Nevertheless, when banks receive more information about customers, borrowers need to invest more in their applications to increase their chance of getting credit. Hence, application costs will be higher, leading to an increase in the number of discouraged borrowers. Second, in the opposite effect, when banks accumulate sufficient information to compare between new applicants and their old customers, increased information will help banks to make more accurate lending decisions. This reduces bank screening errors, so discouraged borrowers will decrease.

The total effect of increased information on discouraged borrowers is combined by these two above effects and it is non-linear. At a modest level of information, the number of discouraged borrowers rises due to the increment of application costs and high screening errors. It then reaches a maximum level at an intermediate level of information, where the two contrasting effects are balanced. After that, it declines, because the screening skills of banks are improved and they dominate the increment of application costs (Figure 2.1 – Kon and Storey (2003, p. 43-44).

Figure 2.1 - Impact of application costs, screening errors and increased information on discouraged borrowers

Application cost function of the bank's information (1) – Screening error function of the bank's information (2) – The effect of increased information on discouraged borrowers (3)



K_N : minimum application cost

K_P : application cost at perfect information

b_G^N: maximum screening error

b_G : The probability that an application by good firm is perceived by the bank as bad

I^P : Perfect information

DB: Discouraged borrowers

(4) The firms have minimum application costs, K_N when banks have some information. Application costs then increase at a decreasing rate up to K_P under perfect information.

(5) Bank screening error is at a maximum b_G^N when banks have no information. Screening error then reduces at an accelerating rate, to zero under perfect information.

(6) Discouraged borrowers increase when banks have some information. They reach a maximum level at an intermediate level of information and decline to zero under perfect information.

2.3 Hypotheses

Theory predicts that increased information will have a non-linear effect on discouragement. It only reduces discouragement if it reaches a sufficient level (Kon and Storey, 2003). Moreover, there is a consensus in the theories of Kon and Storey (2003) on the demand-side and Pagano and Jappelli (1993); Padilla and Pagano (2000) on the supply-side that information sharing reduces information asymmetry. By increasing the amount of information

shared, this effect is stronger than the effect of increasing application costs (Kon and Storey, 2003).

In practice, the credit reporting industry has a long history. Public credit registries are first established in Europe in the 1930s, with the beginning of Germany in 1934. This policy became international in the 1990s. Private credit bureaus have begun their operation later, since 1989 (Miller, 2000). The financial market liberalization and technological innovation help credit reporting systems to develop worldwide. Moreover, the quantity of credit information shared is more abundant, and the information quality is improved.

Theory expects a sufficient level of information sharing can reduce discouragement. In practice, credit information sharing has started for a long time, and the amount of information is more and more plentiful. Therefore, we expect that the amount of credit information shared in many countries reaches a sufficient level to reduce discouraged borrowers. This expectation leads to the first hypothesis:

Hypothesis 1: Overall, information sharing reduces the probability of discouraged borrowers.

In our data, besides countries having effective credit report systems, there are still many countries having young systems whose coverage is low. Therefore, we expect to observe the non-linear effects of information sharing on discouragement predicted in the theory of Kon and Storey (2003) in our data set. At a low level of information shared, the effects of increasing application costs and the modest improvement of screening errors lead to an enhancement of the probability of discouraged borrowers. Nevertheless, at a sufficient level of information shared, screening errors are improved substantially, dominating the increment of application costs, resulting in reduction discouragement. Hence, we expect to observe hypothesis 2:

Hypothesis 2: the effect of information sharing on discouragement is non-linear. At a low level of information sharing, it discourages firms from applying for loans and vice versa.

2.4 Data and methodology

2.4.1 Data

Data is extracted from The Enterprise Surveys (ES) conducted by the World Bank. This is a project to gather data based on firms' experiences and perceptions of their operating environment. The survey collects data by using the stratified random sample method to ensure the representative of samples across the population. To collect the data, interviewers first use

a screener questionnaire over the phone to check whether enterprises are eligible and make an appointment. The interview is then conducted face-to-face with the owner or manager of each enterprise.

Precedent research states that the percentage of discouraged borrowers in developing countries is more pronounced than in developed ones (Chakravarty and Xiang, 2013; Gama et al., 2017). Besides, the research of Djankov et al. (2007) explains that information sharing is important to function the credit market in less developed countries where the legal systems have poor functions. Therefore, studying the effect of information sharing on discouraged borrowers in developing countries will contribute to literature an important understanding still lacking. This leads our study to focus on 58 developing countries worldwide surveyed from 2012 to 2018 (Appendix 2.2). Each firm attends the survey once during the period 2012-2018. However, the survey can last from 1 to 3 years in one country. The survey contains questions regarding opinions and perceptions, to ensure reliable results, only responses rated by interviewers as truthful and somewhat truthful are taken.

Information sharing is measured by the private credit bureau coverage and the public credit registry coverage from the Doing business database published by The World Bank. *They report the number of individuals and firms listed in a private credit bureau (or public credit registry) with current information on repayment history, unpaid debts, or credit outstanding. The number is expressed as a percentage of the adult population (% of adults)* (Doing-Business). We also base on the year in which credit registries are established to confirm our results. This data comes from Djankov et al. (2007). Missing values are updated from the Doing business database[24] and the reports of countries' central banks.

To mitigate biases by the existence of latent factors that impact both discouraged borrowers and information sharing, we control variables at the country-level as the following:

(1) "Domestic credit to the private sector (% of GDP)" issued by The World Bank. This indicator measures financial resources provided to the private sector by financial corporations, and it is scaled by GDP.

[24] Doing business reports the public credit registry's and private credit bureau's coverage. If the coverage value is zero in previous years, then changes to a higher value in a given year. That year is considered the founded year of credit registries.

(2) "Bank concentration" is measured by the Herfindahl-Hirschman index (HHI). This index is computed by summing the squares of the deposit market share of all commercial banks in a country. Data is collected from Orbis Bank Focus and calculated by this paper's author.

Finally, to mitigate endogeneity arising from omitted variable bias, the models are estimated using two instrumental variables - legal origins and latitude. Legal origin data is extracted from Djankov et al. (2007) and updated missing data with values from the CIA factbook. Latitude is collected from R. La Porta et al. (1999) and updated missing values from https://latitudelongitude.org/.

2.4.2 Methodology

Our main concern is the impact of information sharing on discouraged borrowers. To this end, we proxy the dependent variable, *discouraged*, based on firms' answers to the question: "What was the main reason why this establishment did not apply for any line of credit or loan?". *Discouraged* is a dummy variable equal to one if the firm did not apply for credit not because they had sufficient capital, but because they think application procedures are complex, interest rates are unfavorable, collateral requirements are excessive, loan size and maturity are insufficient, or they think the application would be rejected. It is equal to zero if the firm applied for a loan. This measure of discouragement has been applied in many previous studies (Chakravarty and Xiang, 2013; Galli et al., 2017; Gama et al., 2017; Statnik and Vu, 2020).

The key explanatory variable is information sharing captured by three measurements. The first is *pubinfo/priinfo* which is public credit registry/private credit bureau coverage. They are quantitative measurements for information sharing. These indicators range from 0 to 100, with higher values indicating more credit information shared. The second is *pcr/pb* which is a dummy variable equal to one if public credit registry/private credit bureau exists in a country, and zero otherwise. It is expected that more information is shared in countries where credit registries exist. Hence, the existence of credit registries is applied as a proxy for information sharing. The third is *agepcr/agepb* which is the ages of credit registries. They are calculated from the year a credit registry is established to the year the enterprise survey occurs. If there is no credit registry in a country, the variable will have a value of zero.

In line with former literature on borrower discouragement, we include a set of control variables: gender of top managers *(gender)*; experience of top managers (*experience)*; firm characteristics such as financial services used by firms *(AI1, AI2)*, their locations *(city1m,*

maincity), firm age *(age)*, firm size *(size)*, ownership *(ffirm)*, export activities *(diexport)*, trade credit *(tradecr)*, research and development *(innovation)*, information transparency *(certificate, exteraudit*), creditworthiness *(creditline)*, access to finance *(access).* All these variables are defined in Appendix 2.1.

To investigate the first hypothesis dealing with the impact of information sharing on discouraged borrowers, we use the model below:

$$discouraged_i = \alpha + \beta_1\, share\ info_k + \sigma B_i + \gamma Z_k + Year\ dummies + Industry\ dummies + \varepsilon_i \quad (1)$$

Where *i* is the firm, *k* the country, *B* the set of firm-level control variables, and *Z* the set of country-level control variables. Information sharing, $share\ info_k$, is proxied by three variables respectively: the coverage, the existence, and the age of credit registries. The model is first performed alternatively on public credit registry and private credit bureau data. Then, it is tested on public credit registry coverage and private credit bureau coverage together to confirm the result. We also control for industry and year as fixed effects to eliminate time-invariant factors. These fixed effects also control for industry-specific, and year-specific effects, which may bias the estimates.

We perform regressions alternatively with the logit model and the OLS model to check the robustness of our findings. The model clusters standard errors by country.

For the second hypothesis testing the non-linear effect of information sharing on discouraged borrowers, we test the quadratic function of public credit registry/private credit bureau coverage as the following model:

$$discouraged_i = \alpha + \beta_1\, share\ info_k + \beta_2\, share\ info_k^2 + \sigma B_i + \gamma Z_k + Year\ dummies + Industry\ dummies + \varepsilon_I \quad (2)$$

In addition, to confirm the non-linear effect of information sharing on discouragement, the sample is split into 2 groups at the 75th percentile of the coverage of information sharing and retest the equation (1).

2.5 Empirical results

2.5.1 Univariate analysis

With an average coverage is 27.18% of adults, private credit bureaus have higher coverage than public credit registries. In our data, private credit bureaus also operate in more

countries. However, they are younger with an average age is 9.97 years, while it is 14.67 years for public credit registries (Table 2.1). In general, at these average ages, credit registries are effective in mitigating asymmetric information. Therefore, the correlations between *discouraged* variable and proxies for credit information sharing (such as the coverage, the existence, and the age) reveal that information sharing reduces the probability of discouragement (Table 2.2).

Other statistical characteristics of discouraged borrowers and applicants reveal the significant difference between them. Discouraged borrowers, on average, are managed by less experience managers. Regarding firm characteristics, discouraged borrowers are more opaque information, younger, and smaller than applicants. Besides, their operation concentrates more on domestic. They use less trace credit and invest less in innovation. Finally, discouraged borrowers report more obstacles in access to finance, and they have much lesser credit lines compare to applicants. Detail descriptive statistic is shown in Table 2.1.

2.5.2 Multivariate analysis - findings from the main model

We test the first hypothesis that information sharing reduces the probability of discouraged borrowers by running the regression of information sharing through public credit registries/private credit bureaus separately on discouragement. Columns 1 to 3 and 8 to 10 - Table 2.3 applying both logit and OLS regressions reveal that the information sharing through public credit registries has a significant negative impact on discouraged borrowers. The existence, coverage, and age of public credit registries, all confirm this result. These findings support our expectation in the first hypothesis that information sharing is necessary for the credit market. It plays a role in reducing information asymmetry, leading to decrease discouraged borrowers. The same tests are conducted for data from private credit bureaus, and the results are shown in columns 4 to 6 and 11 to 13 - Table 2.3. Although the existence, coverage, and age of private credit bureaus have negative effects on discouraged borrowers, they are not significant. These results raise a doubt that the effect of information sharing through private credit bureaus on discouragement may not be linear. To check the robustness of these above findings, we control both public registry coverage and private bureau coverage in the same model. The results are shown in column 7 – Table 2.3 by logit and column 14 by OLS regression, and they confirm the former results.

Testing the non-linear effect, we apply quadratic functions for public credit registry/private credit bureau coverage variables. Columns 1 and 2 - Table 2.4 (using both OLS

and logit) state that public credit registry coverage has a significant negative impact on discouragement, but the effect of its square is not significant. This result and the marginal effect in Table 2.5 prove that information sharing through public credit registries has a negative effect on discouraged borrowers, so hypothesis 2 is not confirmed in this case.

Nevertheless, the estimations in columns 3 and 4 - Table 2.4 and the marginal effect in Table 2.6 reveal the non-linear effect of private credit bureau coverage on the dependent variable. When the coverage is smaller than about 25%, information sharing significantly increases discouraged borrowers, but at values higher than about 50%, information sharing through private bureaus reduces discouraged borrowers. Moreover, this non-linear effect is also confirmed when data is split into 2 groups: the low vs high coverage group (columns 5 to 8 - Table 2.4). The results are stable both with OLS and logit regressions. These results confirm the second hypothesis and also prove the prediction in the theory of Kon and Storey (2003).

Summarizing these results, in developing countries, information sharing through public credit registries reduces the probability that firms self-refrain from applying for credit, but information sharing through private credit bureaus has a non-linear effect on discouragement. It increases the probability of discouragement if private credit bureau coverage is low, while it decreases discouragement if the coverage reaches a sufficient level. This finding fits with the prediction in the theory of Kon and Storey (2003).

The effects of information sharing on discouraged borrowers are explained based on two contrasting effects discussed in the theory of Kon and Storey (2003): (1) increase application costs and (2) mitigate bank screening error. The application costs can be financial costs such as costs to gather information required by banks; in-kind costs such as time to travel to banks, time to wait for the application process, time to meet bank officers; or psychic costs such as reluctance to provide information to outsiders, lack of knowledge and skills to complete application documents or reluctance to enter the bank.

- *The explanation for effects of information sharing through public credit registries on discouragement*

One of the main characteristics of a public credit registry is that it was born to supervise bank activities. However, Powell et al. (2004) state that in many developing countries, besides bank supervision duty, public credit registries are also responsible for improving credit access, and evidence from other studies concur with their conclusion. For example, China has the largest public credit registry in the world. Originally, its purpose is bank supervision. However,

because of the development of the credit market, this institution collects the database similar to a private credit bureau and it stores loans with any value. Hence, the public credit registry in China is responsible for both bank supervision and supplying information for banks in their lending decisions (Jentzsch, 2008). Like China, public credit registries in Malaysia (Bin Saari, 2013), Indonesia, and Vietnam also have the same responsibility. In Europe, Jappelli and Pagano (2000) find that several public credit registries have more active roles and they work like private credit bureaus in many aspects. For example, in Bosnia, the establishment of public credit registry leads to large changes in the credit market. Public credit registry collects information on loans without threshold. Based on customers' credit history, it gives them credit scores[25] (Bos et al., 2016). Hence, it supports effectively banks in their loan approval decisions. Similarly, the public credit registry in Albania also has the same function that supplies information for banks in their lending decisions (Behr and Sonnekalb, 2012).

The above evidence reveals that in many developing countries, besides bank supervision function, public credit registries play an important role in supplying credit information for credit assessment. Information shared by them reduces information asymmetric, resulting in significantly reducing bank screening errors. These lead to decrease discouragement.

Moreover, public credit registries are single hubs of mandatory credit information. They are operated by central banks or bank supervisors. Therefore, the accuracy of the information is guaranteed. A report about public credit registries in Latin America reveals that public credit registries in all analyzed countries[26] issue accurate information (Saavedra and von Stauffenberg, 2012). So are Bosnia in Europe (Bos et al., 2016) and Malaysia in Asia (Bin Saari, 2013). Reliable information not only effectively supports banks in their lending decisions but also impacts application costs. It reduces application process time as well as paperwork. More importantly, it may reduce the psychic costs aspect of discouraged borrowers, mitigate their reluctance in contact with banks because they believe in banking activities. Based on these arguments, we believe that the negative effect of information sharing through public credit registries on discouraged borrowers is reasonable.

[25] This value-added is a distinctive characteristic of private credit bureaus.

[26] Countries in our data set as well as analyzed in the report of Saavedra and von Stauffenberg (2012) are Bolivia, El Salvador, Guatemala, Nicaragua, Peru, and the Dominican Republic.

- *The explanation for effects of information sharing through private credit bureaus on discouragement*

Overall, information sharing through private credit bureaus alleviates discouraged borrowers. However, at a low level of information sharing, the effect is positive. Explaining this result, we find that countries having a low level of private credit bureau coverage usually have more than one private credit bureau operating at the same time. Each of them has their own customers and stores information that they can collect to the best of their ability. Therefore, information exists in pieces, and lenders are hard to get a complete picture of a customer's creditworthiness. For instance, India has multiple private credit bureaus, so it is difficult for lenders to get comprehensive information about a borrower's indebtedness (India, 2018). Facing the same problem, with three private credit bureaus operating at the same time, credit reports in Morocco also exist in pieces, isolated and incomplete (India, 2018). So are El Salvador (WB, 2016) and Philippines (Asuncion, 2015). This shortcoming leads to two problems: first, bank screening errors are not improved, and second, the application cost is high due to increasing costs gathering information, longer time to make the decision and increase paperwork as well. Both problems result in raising discouraged borrowers.

In countries having low coverages, furthermore, private credit bureaus face difficulties in insufficient legal frameworks for their operations. This strongly affects the accuracy of information. Philippines has no data protection law and no specific government agency in charge of private credit bureau operations (Asuncion, 2015). The inaccuracy of credit information in Guatemala comes from lacking credit bureau law and the absence of penalties for institutions making errors (Saavedra and von Stauffenberg, 2012). Unreliable information shared affects both bank screening errors and application costs. Lenders may base on their own process to collect information for their lending decisions. This takes more time, excessive paperwork, resulting in raising application costs, but may not avoid errors in lending decision. Therefore, a low level of information sharing increases the probability of discouraged borrowers.

In contrast, countries having high private credit bureau coverages (Malaysia, Thailand, Bolivia, Colombia, Peru, Dominican Republic) confirm that they have reliable systems (Bin Saari, 2013; Kunvipusilkul, 2009; Saavedra and von Stauffenberg, 2012). Accuracy and sufficient data from private credit bureaus effectively support lenders in their lending assessments. The dominant effect of reducing information asymmetry in these countries mitigates discouraged borrowers.

As the above analyses, there is evidence to confirm the existence of the non-linear effect of information sharing on discouraged borrowers.

2.5.3 Addressing the endogeneity

Many elements affect both discouragement and information sharing such as the credit market development, the credit policies, the competition, and other unobserved factors. Although we control country-level variables to mitigate the biases because of latent factors and add fixed effects to eliminate time-invariant factors, our estimation can be biased because of omitted variables. To deal with the potential endogeneity, we retest our findings using two instrumental variables.

Djankov et al. (2007) reveal a link between legal origins and information sharing. They find that French and German civil law countries have a higher probability of establishing public credit registries, while private credit bureaus are more frequent in common law countries. Moreover, the legal origin was spread through colonization (R. La Porta, Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W., 1998), so it is considered an exogenous variable. Therefore, the legal origin can be a good substitution for information sharing.

Moreover, Beck et al. (2003) found initial endowments are important implications for financial intermediary development. Their conclusions are drawn from the endowment theory which argues that disease and geographical environment influence financial development. Following them, we use latitude as another instrumental variable for information sharing[27].

The main model reveals the negative effect of information shared through public credit registries and the non-linear effect of information shared through private credit bureaus on discouragement. Re-confirm these results, we use instruments to substitute for credit registries coverage and perform two-stage least squares (2SLS) regressions on equations (1) and (2).

Table 2.8 reporting the first stage regressions shows that instrumental variables significantly explain the endogenous variables, and the F-statistics reject the hypotheses that instruments are weak. Therefore, we use these instrumental variables in our models. Results in Table 2.7 confirm both hypotheses. Columns 1 - Table 2.7 state that information shared through public credit registries reduces discouraged borrowers. Column 2 - Table 2.7 proves the non-

[27] Latitude is an absolute value and scaled from 0 to 1. The data source is from R. La Porta et al. (1999), and missing values are updated from https://latitudelongitude.org/. We do not use mortality as an instrument because missing values are quite large in our data set.

linear effect of information sharing on discouragement. These results are similar to the previous findings.

Nevertheless, estimating a model using instrumental variables will be less efficient than using OLS estimator if variables are exogenous. Therefore, we conduct the tests of endogeneity for suspected variables. The tests highly reject the hypothesis that suspected endogenous variables are exogenous[28]. These results confirm our findings in using instrumental variables to deal with endogeneity.

2.5.4 Robustness checks

To check the robustness of our findings, we add other measures for discouraged borrowers. Furthermore, the Enterprise Survey of The World Bank contains questions regarding firms' opinions and perceptions about their operating environment and their responses are rated by interviewers. In the main model, to ensure the results are reliable and to obtain the maximum number of observations, responses rated truthful and somewhat truthful are kept. Here, the results will be re-tested, applying only truthful responses.

- *Measure discouraged borrowers by each reason for not applying for loans*

In the survey, firms answer many reasons for not applying for credit. To investigate how information sharing impacts each reason, we measure discouraged borrowers with values from one to five for each reason respectively which hampers a firm from applying for loans: complex application procedures, unfavorable interest rates, excessive collateral requirements, insufficient loan size and maturity, or it does not think the application would be approved. This variable is given a value of zero if a firm applies for credit.

We first perform the multinomial logit regression on equation (1) using the above definition for discouraged borrowers. The reference group is credit applicants. Results in Table 2.9 reveal that information shared through public credit registries decreases the probability of discouragement for all reasons, while private credit bureaus reduce the probability of discouraged borrowers if the reasons for not applying are complex procedures, high collateral requirements, and firms fear to be rejected. These results one more time confirm the negative effect of information sharing on borrower discouragement.

We then perform the multinomial logit regression on the quadratic function of private credit bureau coverage to test the non-linear effect. This non-linear effect exists due to the

[28] To save space, these tests will be supplied as the requirement.

combination of two opposite effects of increasing loan application costs and decreasing the bank screening errors when information increased. Based on these predictions of Kon and Storey (2003), we expect to observe the significance of the non-linear effect on reasons that relate to application costs. Results in Table 2.10 show that the non-linear effect is significant if the reasons for not applying are complex application procedure, excessive collateral requirement, and insufficient loan size and maturity. Interestingly, these reasons correlate to application costs. Therefore, these findings not only confirm the non-linear effect but also agree with predictions in Kon and Storey's theory.

- *Measure discouraged borrowers as good borrowers who do not apply for credit*

Furthermore, following Statnik and Vu (2020), we measure the dependent variable using a stricter method. Discouraged borrower will be a firm that has a credit line from a financial institution, so it is considered a good borrower. This firm needs credit, but it does not apply for a loan because it is afraid of complex application procedures, unfavorable interest rates, excessive collateral requirements, insufficient loan size and maturity, or it does not think the application would be approved. This measurement of discouraged borrowers captures the full definition of Kon and Storey (2003). The dependent variable is given a value of one if the firm is a discouraged borrower as the above define and a value of zero if it applies for loans.

Columns 1 to 3 - Table 2.11 confirm the first hypothesis that information sharing has a negative impact on discouragement. Moreover, columns 4 to 7 confirm the prediction in the theory of Kon and Storey (2003). Using both Logit and OLS regressions, and confirming by splitting the sample, the findings reveal the non-linear effects of information sharing on discouraged borrowers. At a low level of private credit bureau coverage, reporting credit information increase discouraged borrowers, but the effect reverses when the coverage reaches a sufficient level.

- *Robustness check using only truthful responses*

To ensure reliable results, we use only truthful responses in the survey to re-test our main findings and this removes 5285 observations from the model. Results in columns 1 to 3 - Table 2.12 state the significant negative effects of information sharing on discouraged borrowers, and columns 4 to 7 reveal the different effects of information sharing on discouragement. These results in line with the previous findings.

2.6 Conclusions

This paper investigates the impact of sharing credit information on discouraged borrowers. Using firm-level data from the Enterprise Survey of World Bank and information sharing data from the Doing Business Database and Djankov et al. (2007), we find on overall, sharing information reduces discouraged borrowers. This result is economically significant with data from public credit registries. More interestingly, the non-linear effect of increased information on discouraged borrowers is found and this effect is proved by the data related to private credit bureaus. When private credit bureau coverage is low, it increases the probability of discouragement, but at a sufficient level of coverage, information sharing effectively reduces information asymmetric, resulting in a decrease of discouraged borrowers. These findings are robust after solving for endogeneity and applying other robustness checks.

Explaining these effects, studies about credit report systems reveal that besides bank supervision role, public credit registries in many developing countries are in charge of supplying information for lenders in their credit assessment. Furthermore, public credit registries are single hubs of mandatory information operated by central banks. Therefore, information from them is reliable. All these elements affect both bank screening errors and application costs, resulting in mitigating discouraged borrowers. Some studies at the supply-side did not find the significant effect of information sharing through public credit registries on alleviating credit constraints. By this research, we confirm their important role in mitigating the probability of discouragement at the demand-side.

Moreover, the non-linear effect of information shared through private credit bureaus on discouragement is also confirmed. When less information is shared, it is unreliable, incomplete, and split into pieces. Hence, it plays less role in reducing bank screening errors, while it costs more time and effort for lenders to collect information for lending decisions, thereby the probability of discouragement increases. In contrast, with a high level of information shared, countries report that they have a reliable and effective credit report system to support lenders. This mitigates the probability of discouragement.

By investigating applicants, former theories and empirical studies contribute understandings about the role of information sharing to mitigate information asymmetry at the supply-side. Our paper wider these understandings by adding the contribution of information sharing to reduce discouraged borrowers at the demand-side. We bold the role of improving

the quality and coverage of the credit report system to effectively contribute to alleviating asymmetry information, leading to diminishing malfunctions of the credit market.

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Table 2.1 – Descriptive statistics of variables

This table summaries statistics of variables used in the models. The last column shows the significance of a two-sample t-test of a difference in means of variables between discouraged borrowers and applicants with equal variances. Definition of variables are provided in the Appendix 2.1. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

Variable	Obs	Mean	Std. Dev.	Min	Max	Discouraged borrowers		Applicants		T-test
						Mean	Std. dev	Mean	Std. dev	
discouraged	15054	0.55	0.50	0	1	1	0	0	0	
priinfo	15054	27.18	30.48	0	100					
pubinfo	15054	14.86	19.14	0	63.6					
pb	15054	0.75	0.43	0	1					
pcr	15054	0.54	0.50	0	1					
agepb	15054	9.97	10.09	0	54					
agepcr	15054	14.67	18.48	0	63					
gender	15054	0.15	0.36	0	1	0.15	0.36	0.15	0.36	
experience	15054	17.79	10.66	1	70	15.77	9.73	20.20	11.20	***
AI1	15054	0.89	0.32	0	1	0.86	0.35	0.92	0.27	***
AI2	15054	0.48	0.50	0	1	0.36	0.48	0.62	0.48	***
maincity	15054	0.55	0.50	0	1	0.60	0.49	0.50	0.50	***
city1m	15054	0.44	0.50	0	1	0.41	0.49	0.48	0.50	***
age	15054	18.67	13.91	1	163	17.22	12.49	20.41	15.26	***
size	15054	1.81	0.77	1	3	1.68	0.74	1.96	0.79	***
ffirm	15054	0.04	0.19	0	1	0.03	0.16	0.05	0.22	***
diexport	15054	7.68	21.89	0	100	5.81	19.52	9.93	24.26	***
tradecr	15054	44.51	35.02	0	100	38.46	33.95	51.78	34.90	***
innovation	15054	0.23	0.42	0	1	0.19	0.39	0.27	0.45	***
certificate	15054	0.29	0.45	0	1	0.26	0.44	0.32	0.47	***
exteraudit	15054	0.60	0.49	0	1	0.55	0.50	0.65	0.48	***
creditline	15054	0.50	0.50	0	1	0.24	0.43	0.80	0.40	***
corruption	15054	0.35	0.48	0	1	0.34	0.48	0.35	0.48	
access	15054	0.24	0.43	0	1	0.25	0.43	0.23	0.42	***
HHI	15054	0.14	0.10	0.061	0.929					
CreditGDP	15054	57.70	33.44	5.64	149.77					

Table 2.2 – Correlations between main variables

This table reports the correlations between main variables. Definition of variables are provided in the Appendix 2.1. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	discouraged	**pubinfo**	**priinfo**	**pcr**	**pb**	**agepcr**	**agepb**	**HHI**	**CreditGDP**
discouraged	1								
pubinfo	-0.244***	1							
priinfo	-0.227***	-0.047***	1						
pcr	-0.258***	0.715***	-0.056***	1					
pb	-0.020**	-0.366***	0.510***	-0.417***	1				
agepcr	-0.215***	0.478***	-0.098***	0.732***	-0.252***	1			
agepb	-0.203***	-0.076***	0.670***	-0.186***	0.567***	-0.116***	1		
HHI	-0.109***	0.031***	0.022***	0.106***	-0.205***	0.068***	-0.119***	1	
CreditGDP	-0.047***	0.324***	-0.058***	0.183***	-0.260***	0.026***	-0.119***	-0.142***	1

Table 2.3 – Main estimations: Testing the first hypothesis

This table presents the results of the effect of information sharing on discouraged borrowers. Columns (1) to (3), and (8) to (10) report the effects of the coverage, the existence, and the age of public credit registries by logit and OLS estimators. Columns (4) to (6), and (11) to (13) report the effects of the coverage, the existence, and the age of private credit bureaus by logit and OLS estimators. Columns (7) and (14) report the effect the coverage of both private and public registries. Firm controls: *gender, experience, AI1, AI2, city1m, maincity, age, size, ffirm, diexport, tradecr, innovation, certificate, exteraudit, creditline, corruption, access.* Country controls: *HHI, CreditGDP*. Definitions of variables are provided in the Appendix 2.1. Robust standard errors in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variable = discouraged						
	Logit estimators						
	Public credit registry			Private credit bureau			Both
	coverage	existance	age	coverage	existance	age	coverage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PubInfo	-0.022***						-0.022***
	(0.008)						(0.008)
pcr		-0.919***					
		(0.282)					
agepcr			-0.020***				
			(0.007)				
PriInfo				-0.004			-0.006*
				(0.003)			(0.003)
pb					-0.153		
					(0.325)		
agepb						-0.018	
						(0.015)	
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	15,054	15,054	15,054	15,054	15,054	15,054	15,054
	OLS estimators						
	(8)	(9)	(10)	(11)	(12)	(13)	(14)
PubInfo	-0.004**						-0.004**
	(0.001)						(0.001)
pcr		-0.152***					
		(0.053)					
agepcr			-0.003***				
			(0.001)				
PriInfo				-0.001			-0.001
				(0.001)			(0.001)
pb					-0.026		
					(0.054)		
agepb						-0.003	
						(0.002)	
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.391	0.393	0.391	0.378	0.378	0.379	0.392
N	15,054	15,054	15,054	15,054	15,054	15,054	15,054

Table 2.4 – Main estimations: Testing the second hypothesis

This table presents the results of regressions examining the non-linear effect of information sharing on discouraged borrowers. Columns (1) to (4) report the non-linear effect by using the quadratic function of public credit registry/private credit bureau coverage; Columns (5) to (8) confirm the non-linear effect by splitting the sample into two groups low vs high private credit bureau coverage. Firm controls: *gender, experience, AI1, AI2, city1m, maincity, age, size, ffirm, diexport, tradecr, innovation, certificate, exteraudit, creditline*, *corruption, access*. Country controls: *HHI, CreditGDP*. Definitions of variables are provided in the Appendix 2.1. Robust standard errors in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variable = discouraged							
	Whole data				Split on the value of priinfo			
	pubinfo2	pubinfo2	priinfo2	priinfo2	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
pubinfo	-0.04449***	-0.00715**			-0.006	-0.022***	-0.001	-0.003***
	(0.01667)	(0.00308)			(0.009)	(0.004)	(0.002)	(0.001)
pubinfo2	0.00044	0.00007						
	(0.00030)	(0.00005)						
priinfo			0.03012**	0.00461**	0.056***	-0.009**	0.010***	-0.001**
			(0.01294)	(0.00224)	(0.012)	(0.004)	(0.002)	(0.001)
priinfo2			-0.00039***	-0.00006**				
			(0.00014)	(0.00002)				
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Method	Logit	OLS	Logit	OLS	Logit	Logit	OLS	OLS
R2		0.392		0.385			0.355	0.465
N	15,054	15,054	15,054	15,054	10,530	4,524	10,530	4,524

Table 2.5 – Marginal effect of public credit registry coverage

This table presents the average marginal effect of the public credit registry coverage on the probability of discouragement showed in column 1 table 2.4. dy/dx for factor levels is the discrete change from the base level.

Number of observations = 15054

pubinfo_at	dy/dx	Delta-method Std. Err.	z	P>z	[95% Conf.	Interval]
0	-0.0068	0.0026	-2.59	0.010	-0.0120	-0.0017
5	-0.0063	0.0024	-2.65	0.008	-0.0109	-0.0016
10	-0.0056	0.0021	-2.74	0.006	-0.0097	-0.0016
15	-0.0050	0.0018	-2.82	0.005	-0.0084	-0.0015
20	-0.0043	0.0015	-2.79	0.005	-0.0073	-0.0013
25	-0.0036	0.0014	-2.5	0.012	-0.0064	-0.0008
30	-0.0029	0.0015	-1.93	0.053	-0.0058	0.0000
35	-0.0022	0.0017	-1.28	0.200	-0.0055	0.0011
40	-0.0015	0.0020	-0.73	0.464	-0.0054	0.0025
45	-0.0008	0.0024	-0.32	0.750	-0.0054	0.0039
50	0.0000	0.0028	-0.02	0.986	-0.0055	0.0054
55	0.0007	0.0032	0.21	0.837	-0.0056	0.0070
60	0.0014	0.0037	0.37	0.709	-0.0058	0.0086

Table 2.6 – Marginal effect of private credit bureau coverage

This table presents the average marginal effect of the private credit bureau coverage on the probability of discouragement showed in column 3 table 2.4. dy/dx for factor levels is the discrete change from the base level.

Number of observations = 15054

priinfo_at	dy/dx	Delta-method Std. Err.	z	P>z	[95% Conf.	Interval]
0	0.0048	0.0022	2.16	0.031	0.0004	0.0092
5	0.0042	0.0020	2.11	0.035	0.0003	0.0080
10	0.0035	0.0017	2.05	0.040	0.0002	0.0069
15	0.0029	0.0015	1.96	0.050	0.0000	0.0058
20	0.0023	0.0012	1.82	0.068	-0.0002	0.0047
25	0.0016	0.0010	1.6	0.109	-0.0004	0.0037
30	0.0010	0.0008	1.24	0.216	-0.0006	0.0027
35	0.0004	0.0007	0.63	0.527	-0.0009	0.0018
40	-0.0002	0.0006	-0.31	0.758	-0.0013	0.0009
45	-0.0008	0.0005	-1.44	0.149	-0.0018	0.0003
50	-0.0014	0.0006	-2.31	0.021	-0.0026	-0.0002
55	-0.0020	0.0007	-2.73	0.006	-0.0035	-0.0006
60	-0.0026	0.0009	-2.87	0.004	-0.0044	-0.0008
65	-0.0033	0.0011	-2.89	0.004	-0.0055	-0.0010
70	-0.0039	0.0014	-2.86	0.004	-0.0066	-0.0012
75	-0.0045	0.0016	-2.83	0.005	-0.0077	-0.0014
80	-0.0052	0.0018	-2.8	0.005	-0.0088	-0.0016
85	-0.0058	0.0021	-2.79	0.005	-0.0099	-0.0017
90	-0.0064	0.0023	-2.8	0.005	-0.0109	-0.0019
95	-0.0070	0.0025	-2.85	0.004	-0.0118	-0.0022
100	-0.0075	0.0025	-2.96	0.003	-0.0125	-0.0025

Table 2.7 – Instrumental variable results

This table presents the instrumental variable (IV) results. Columns (1) and (2) report the effect of public credit registry/ private credit bureau coverage on discouragement using legal origins and latitudes as IVs. Firm controls: *gender, experience, AI1, AI2, city1m, maincity, age, size, ffirm, diexport, tradecr, innovation, certificate, exteraudit, creditline, corruption, access*. Country controls: *HHI, CreditGDP*. Definitions of variables are provided in the Appendix 2.1. Robust standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variable = discouraged	
	IVs = legal origin and latitudes	
	(1)	(2)
pubinfo	-0.010***	
	(0.004)	
priinfo	0.002	0.01420**
	(0.003)	(0.00706)
priinfo2		-0.00011*
		(0.00006)
Firm controls	Yes	Yes
Country controls	Yes	Yes
Industry FE	Yes	Yes
Year FE	Yes	Yes
Method	2SLS	2SLS
R2	0.326	0.340
N	15,054	15,054

Table 2.8 – First stage regressions of instrumental variables

This table presents the results of the first stage regressions of instrumental variables (legal origins and latitude). Firm controls: *gender, experience, AI1, AI2, city1m, maincity, age, size, ffirm, diexport, tradecr, innovation, certificate, exteraudit, creditline, corruption, access.* Country controls: *HHI, CreditGDP*. Definitions of variables are provided in the Appendix 2.1. Robust standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variables		
	pubinfo	*priinfo*	*priinfo2*
	(1)	(2)	(3)
german	23.206*	37.354	5017.966*
	(12.551)	(25.905)	(2618.716)
french	17.573***	-10.171	-75.695
	(5.747)	(6.454)	(567.298)
social	13.875	22.581*	2098.014*
	(10.105)	(13.473)	(1132.105)
lat	5.681	-47.092*	-5714.007**
	(28.797)	(28.101)	(2877.931)
Firm controls	Yes	Yes	Yes
Country controls	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
F-statistic for weak IV	31.68	28.83	21.79
R2	0.430	0.581	0.575
N	15054	15054	15054

Table 2.9 – The effect of information sharing on each reason of discouragement

This table presents the results of the multinomial logit regression examining the effect of information sharing on each reason of discouragement. The reference group is applicants for credit. Firm controls: *gender*, *experience*, *AI1*, *AI2*, *city1m*, *maincity*, *age*, *size*, *ffirm*, *diexport*, *tradecr*, *innovation*, *certificate*, *exteraudit*, *creditline*, *corruption*, *access*. Country controls: *HHI*, *CreditGDP*. Definitions of variables are provided in the Appendix 2.1. Robust standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variable = discouragedMul				
	Complex procedure	Unfavorable interest	High collateral	Insufficient size/maturity	Fear rejection
VARIABLES	(1)	(2)	(3)	(4)	(5)
pubinfo	-0.031***	-0.015**	-0.028***	-0.029**	-0.022***
	(0.008)	(0.007)	(0.010)	(0.013)	(0.007)
priinfo	-0.006*	-0.002	-0.008*	-0.007	-0.011**
	(0.004)	(0.004)	(0.005)	(0.006)	(0.005)
Firm controls	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	15,054	15,054	15,054	15,054	15,054

Table 2.10 – The non-linear effect of private credit bureau coverage on each reason of discouragement

This table presents the results of the multinomial logit regression examining the non-linear effect of private credit bureau on each reason of discouragement. The reference group is applicants for credit. Firm controls: *gender, experience, AI1, AI2, city1m, maincity, age, size, ffirm, diexport, tradecr, innovation, certificate, exteraudit, creditline, corruption, access*. Country controls: *HHI, CreditGDP*. Definitions of variables are provided in the Appendix 2.1. Robust standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variable = discouragedMul				
	Complex procedure	Unfavorable interest	High collateral	Insufficient size/maturity	Fear rejection
	(1)	(2)	(3)	(4)	(5)
priinfo	0.042***	0.020	0.037***	0.070***	0.006
	(0.012)	(0.014)	(0.014)	(0.021)	(0.014)
priinfo2	-0.001***	-0.000	-0.001***	-0.001***	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Firm controls	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	15,054	15,054	15,054	15,054	15,054

Table 2.11 – Other measurements for discouraged borrowers

This table presents the results of regressions examining the effect of information sharing on discouraged borrowers by using another measurement for discouraged borrowers. Columns (1) to (3) report the effects of the coverage, the existence, and ages of public credit registries. Columns (4) and (5) report the non-linear effect by using the quadratic function of private credit bureau coverage. Columns (6) and (7) confirm the non-linear effect by splitting the sample into two groups low vs high private credit bureau coverage. Firm controls: *gender, experience, AI1, AI2, city1m, maincity, age, size, ffirm, diexport, tradecr, innovation, certificate, exteraudit, corruption, access*. Country controls: *HHI, CreditGDP*. Definitions of variables are provided in the Appendix 2.1. Robust standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variable = discouraged1						
	Public credit registry			Private credit bureau			
	coverage	exist	age	priinfo2	priinfo2	priinfo-low	priinfo-high
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
pubinfo	-0.017*					0.009	-0.017***
	(0.010)					(0.011)	(0.005)
priinfo	-0.002			0.03820**	0.00551**	0.099***	-0.006*
	(0.004)			(0.01504)	(0.00252)	(0.020)	(0.003)
priinfo2				-0.00045***	-0.00006**		
				(0.00017)	(0.00002)		
pcr		-0.895***					
		(0.323)					
agepcr			-0.027***				
			(0.007)				
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Method	Logit	Logit	Logit	Logit	OLS	Logit	Logit
R2					0.139		
N	8,866	8,866	8,866	8,866	8,866	5,673	3,193

Table 2.12 – Data includes only truthful responds

This table presents the results of regressions examining the effect of information sharing on discouraged borrowers by using only truthful reponds. Columns (1) to (3) report the effects of the coverage, the existence, and ages of public credit registries. Columns (4) and (5) report the non-linear effect by using the quadratic function of private credit bureau coverage. Columns (6) and (7) confirm the non-linear effect by splitting the sample into two groups low vs high private credit bureau coverage. Firm controls: *gender, experience, AI1, AI2, city1m, maincity, age, size, ffirm, diexport, tradecr, innovation, certificate, exteraudit, creditline, corruption, access.* Country controls: *HHI, CreditGDP*. Definitions of variables are provided in the Appendix 2.1. Robust standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variable = discourage						
	Public credit registry			Private credit bureau			
	coverage	exist	age	priinfo2	priinfo2	priinfo-low	priinfo-high
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
pubinfo	-0.022***					-0.009	-0.020***
	(0.008)					(0.008)	(0.006)
priinfo	-0.004			0.03005**	0.00482**	0.060***	-0.005
	(0.004)			(0.01279)	(0.00228)	(0.011)	(0.005)
priinfo2				-0.00036***	-0.00006**		
				(0.00014)	(0.00002)		
pcr		-0.898***					
		(0.288)					
agepcr			-0.022***				
			(0.007)				
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Method	Logit	Logit	Logit	Logit	OLS	Logit	Logit
R2					0.380		
N	9,911	9,911	9,911	9,911	9,911	6,622	3,289

Appendix 2.1 – Definitions of variables

Symbol	Explanation
DEPENDENT VARIABLES	
Discouraged firms	
discouraged	Dummy = 1 for discouraged borrowers and 0 for applicants
discouraged1	Dummy= 1 for discouraged borrowers who have credit lines and 0 for applicants
discourageMul	Dummy=1 to 5 for each reason for non-applying for a loan and 0 for applicants
INDEPENDENT VARIABLES	
pubinfo	Public credit registry coverage
priinfo	Private credit bureau coverage
pcr	Dummy=1 if public credit registry operates in country and 0 otherwise
pb	Dummy=1 if private credit bureau operates in country and 0 otherwise
agepcr	Age of PubCR (from the year PubCR is established to the year Enterprise Survey takes place)
agepb	Age of PriCB (from the year PriCB is established to the year Enterprise Survey takes place)
CONTROL VARIABLES	
Entrepreneur characteristics	
gender	Dummy = 1 if top managers are female and 0 otherwise
experience	Top manager's number of years' experience working in the sector
Firm characteristics	
AI1	Dummy = 1 if firm has a checking or savings account and 0 otherwise
AI2	Dummy = 1 if firm has an overdraft facility and 0 otherwise
maincity	Dummy = 1 if firm is located in main business city
city1m	Dummy = 1 if firm is located in city with population over 1 million
age	Firm age measured by number of years establishment has been operating
size	Firm size measured by number of employees: small (5–19), medium (20–99) and large (> 100)
ffirm	Dummy = 1 if percentage of firm owned by foreigners is greater than 50% and 0 otherwise
diexport	Direct exports as a percentage of sales
tradecr	Proportion of total annual purchases of material inputs purchased on credit
innovation	Dummy = 1 if firm invests in formal R&D activities and 0 otherwise
certificate	Dummy = 1 if firm has internationally recognized quality certification
exteraudit	Dummy = 1 if firm's annual financial statements are checked and certified by an external auditor
creditline	Dummy = 1 if firm has a line of credit or loan from a financial institution
Firm's perception of its operating environment	
corruption	Dummy = 1 if corruption is major obstacle and very severe obstacle and 0 otherwise
access	Dummy = 1 if access to finance is major or very severe obstacle and 0 otherwise
INSTRUMENTAL VARIABLES	
legal	Legal origins
latitude	The absolute value of a country's latitude, scaled to a value from 0 to 1

Appendix 2.2 – List of countries in the sample

Countries in the sample	
Albania	Lesotho
Armenia	Macedonia, FYR
Azerbaijan	Malaysia
Belarus	Mauritania
Bolivia	Moldova
Bosnia and Herzegovina	Mongolia
Bulgaria	Montenegro
Cambodia	Morocco
Cameroon	Myanmar
China	Namibia
Colombia	Nicaragua
Cote d'Ivoire	Nigeria
Djibouti	Pakistan
Dominican Republic	Papua New Guinea
Ecuador	Paraguay
Egypt, Arab Rep.	Peru
El Salvador	Philippines
Eswatini	Serbia
Georgia	Solomon Island
Ghana	Sudan
Guatemala	Thailand
Honduras	Timor-Leste
India	Tunisia
Indonesia	Turkey
Jordan	Ukraine
Kazakhstan	Uzbekistan
Kosovo	Vietnam
Lao PDR	Yemen, Rep.
Lebanon	Zambia

CHAPTER 3 - DOES CORRUPTION DISCOURAGE MORE FEMALE ENTREPRENEURS FROM APPLYING FOR CREDIT?

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Abstract

There is evidence of a gender gap in access to finance. In this paper, we test the hypothesis that corruption discourages more female than male entrepreneurs from applying for credit. We use data on access to credit and corruption at the firm level for a large dataset of firms from 68 countries worldwide. We demonstrate that female entrepreneurs are more discouraged by corruption to ask for credit than male borrowers. We find evidence for three explanations for the gendered impact of corruption on borrower discouragement: women-managed firms suffer more from corruption than men-managed firms, women have less experience in management than men and as such can have less experience to deal with corruption, and gender inequality in society enhances the discouragement of female borrowers. Thus, our findings provide evidence that corruption enhances the gender gap in access to finance, enhancing gender inequality in participation in economic activity.

JEL Codes: D73, G21, J16.

Keywords: gender, access to credit, borrower discouragement, corruption.

3.1 Introduction

Access to finance is critical to firm growth (Beck and Demirgüc-Kunt, 2006; Oliveira and Fortunato, 2006). However, evidence has demonstrated that women entrepreneurs suffer from lower access to finance than male entrepreneurs (Aristei and Gallo, 2016; Asiedu et al., 2012; IFC, 2011). This lower access to finance reduces the opportunities of women entrepreneurs to grow their businesses, thereby affecting their contributions to the economy such as job creation, poverty reduction, and economic growth, and hampers their income, constituting an impediment to gender equality.

Several explanations have been proposed to explain this gender gap in access to finance. The gap might be due to supply-side discrimination such that female-managed firms are less likely to obtain credit than those managed by men (Muravyev et al., 2009). The gap can also result from the demand-side: women entrepreneurs can self-refrain from applying for a credit because they anticipate rejection from the bank (Moro et al., 2017; Ongena and Popov, 2016). The demand-side mechanism raises questions on what shapes the perceptions of women entrepreneurs to expect higher rates of loan rejection. The objective of this paper is to investigate whether corruption has a different impact on borrower discouragement for men and women. We test the hypothesis that corruption discourages more female borrowers than male borrowers and therefore that a greater degree of corruption results in a higher gender gap in access to finance. This hypothesis is based on the results in the literature on behavior differences between men and women. In the presence of greater corruption, women would apply less for credit than men because women are more risk averse (Byrnes et al., 1999; Croson and Gneezy, 2009) and tend to be more honest (Grosch and Rau, 2017; Muehlheusser et al., 2015) than men and have less experience in managing corrupt practices than men (Rheinby and Chene, 2016; Swamy et al., 2001).

To investigate this hypothesis, we use the Enterprise Surveys data on access to credit and corruption at the firm level on a large dataset of firms from 68 countries. Each country participates in the survey once during the research period 2011–2018. We first examine whether corruption exerts a different influence on borrower discouragement for male and female entrepreneurs. We further test three explanations for why corruption can have a gendered impact on borrower discouragement. First, we analyze whether women suffer more from corruption than men. The differentiated impact of corruption on the behavior of men and women would then be the outcome of objective differences between genders in terms of how corruption affects their activity. Second, we consider the possible impact of experience: the

higher impact of corruption on discouraging female borrowers might be due to their having less experience in managing corruption than men. Third, we investigate the influence of culture in terms of gender equality. Lower gender equality can enhance the differences in behavior between men and women and as such can increase the differences in terms of reaction in borrower discouragement to the degree of corruption.

We perform ordinary least squares (OLS) and logit regressions to examine the gendered impact of corruption on discouraged borrowers. To manage potential endogeneity, we perform a two-stage least squares regression using instrumental variables. We additionally perform a set of OLS regressions to investigate the relevance of the explanations for this gendered impact.

Our primary finding is that female entrepreneurs are more discouraged than men in the presence of high levels of corruption. Further, we find evidence for the three tested explanations of this higher discouragement. First, female-managed firms pay more bribes than male-managed firms do, supporting the view that women suffer more from corruption than men and as such can have greater incentives to reduce their loan applications in the presence of corruption. Second, women have less experience in management than men, which can affect their experience in managing corruption. Third, lower gender equality favors higher discouragement for female entrepreneurs than for male entrepreneurs.

Our contribution to the literature is twofold. First, we contribute to the nascent strand of literature on the influence of institutions on the gender gap in access to finance. Galli et al. (2018) and Wellalage et al. (2019) have investigated the influence of corruption on the gender gap in access to finance. Using data for 11 European countries, Galli et al. (2018) find no impact of corruption on the gender gap, while Wellalage et al. (2019) show that corruption reduces the gender gap in a dataset from five South Asia countries. Our work provides a much broader investigation of the gendered impact of corruption on borrower discouragement by performing analyzing a large dataset of 19,366 firms from 68 countries. Our results are thus not restricted to one geographic area. Our framework allows us to investigate the different channels through which corruption can differentially affect the borrower behavior of men and women. Our analysis is thus not limited to testing the existence of the gendered impact of corruption but also considers in depth the underlying mechanisms. Through this analysis, our work contributes to a better understanding of the gender gap in access to finance.

Second, we contribute to the literature on the effects of corruption. These effects have been widely studied, and the evidence demonstrates that corruption affects growth,

productivity, and foreign direct investment (Mauro, 1995; Méon and Weill, 2010; Wei and Shleifer, 2000) at the macroeconomic level and bank lending decisions (Fungáčová et al., 2015) at the microeconomic level. Our work presents a new perspective of the impact of corruption by showing its detrimental effects on gender equality in economic life.

The paper is structured as follows: Section 3.2 presents the literature review, Section 3.3 develops the hypotheses, Section 3.4 describes the data and econometric methodology, Section 3.5 reports the results, and Section 3.6 concludes the paper.

3.2 Literature review

3.2.1 Discouraged borrowers

Credit rationing and discouragement are supply and demand dysfunctions that affect credit markets; although the former has been studied in detail for more than 40 years, the latter has been more recently studied because of Kon and Storey (2003), the first to propose the discouraged borrowers' theory. They define discouraged borrowers as good borrowers who do not apply for loans because they think they will be rejected. Their model is based on three characteristics: the cost of the loan application, the imperfect screening of applicants by banks, and the difference between the lending rates of banks and other money lenders. They show that the level of discouragement increases with the first two characteristics and decreases with the last characteristic. Additionally, they predict that although discouragement decreases with information asymmetry, this relationship may not be linear.

Subsequently, several empirical studies have uncovered the determinants of discouraged borrowers. First, evidence has been provided that entrepreneur characteristics such as gender, experience, and level of education affect the probability of discouragement (Chakravarty and Xiang, 2013; Fraser, 2014; Gama et al., 2017). Second, support has been provided for the influence of firm characteristics on discouragement, with the role of firm age, firm size, creditworthiness, and ownership structure (Brown et al., 2011; Chakravarty and Xiang, 2013; Cole, 2016; Ferrando and Mulier, 2015; Freel et al., 2012; Han et al., 2009; Mac an Bhaird et al., 2016; Xiang et al., 2015). Third, elements that alleviate asymmetric information such as a lending relationship (Chakravarty and Xiang, 2013; Chakravarty and Yilmazer, 2009; Freel et al., 2012) or distance between lenders and borrowers (Gama et al., 2017) have been demonstrated to play a role in reducing the probability of discouraged borrowers.

3.2.2 Gender, corruption, and access to finance

3.2.2.1 Gender and access to finance

The literature has confirmed differences between female-owned and male-owned firms in access to credit. These differences are explained by three main factors: structural dissimilarities, supply-side discrimination, and demand-side risk aversion (Carter and Shaw, 2006).

Specifically, a strand of research has demonstrated that gender is not a factor in female entrepreneurs' difficulties in access to finance but that the structural differences between female-owned and male-owned firms are. Compared with male-owned firms, female-owned firms are usually younger and smaller (Coleman, 2000), have a narrower range of collateral (Fabowale et al., 1995) and fewer and shorter lending relationships (Cole and Mehran, 2018), and operate in industries which require less capital such as retail sales, trade, or services (Cole and Mehran, 2018; Robb and Wolken, 2002; Stefani and Vacca, 2013). These characteristics are reasons why female-owned firms are less likely to apply for credit or are considered riskier by lenders than men are.

On the supply side, evidence has revealed that women entrepreneurs are discriminated against in the credit market. Women are less likely to obtain a bank loan and more likely to pay higher interest rates than men (Alesina et al., 2013; Aristei and Gallo, 2016). In a similar fashion, Cavalluzzo et al. (2002) reveal that firms owned by women receive a higher rate of rejection as the lender market concentration increased. Bellucci et al. (2010) also find that female entrepreneurs are more likely to be required to show collateral and experience stricter credit limits than male entrepreneurs.

On the demand side, the difference in the use of external finance between female and male-led firms can be explained by female entrepreneurs' perceptions. Female entrepreneurs are less confident than male entrepreneurs and anticipate that they will be more likely to be turned down than men would be, resulting in women's lower rate of application. Treichel and Scott (2006) find that loan applications from women-owned firms are less likely to be rejected than those of men-owned firms and that the terms of approved loans are not significantly between women and men. However, women's belief that they might be discriminated against in the lending process constrains them from applying for loans. Likewise, Ongena and Popov (2016) and Moro et al. (2017) propose the same conclusion. Using a different approach, Naegels et al. (2018) explore how individual entrepreneurs' perceptions of normative and

cognitive institutions drive financing behaviors. They find that female entrepreneurs in Tanzania apply for credit less than their male counterparts and mainly rely on alternative sources to finance their firms' operations because of the fear of loan rejection. Carter and Shaw (2006) also reveal that because female entrepreneurs perceive that their chance to obtain the full loan amount is less than that of men, female entrepreneurs are also inclined to request a smaller loan than is necessary.

3.2.2.2 Gender and corruption

The first strand of studies tended to show that women have a tendency to be more honest (Capraro, 2018; Grosch and Rau, 2017; Muehlheusser et al., 2015) and more risk averse (Byrnes et al., 1999; Croson and Gneezy, 2009) than men and lack experience in managing corrupt practices (Rheinby and Chene, 2016; Swamy et al., 2001). In line with this view, many studies have confirmed that women condone less corrupt behaviors than men. Dollar et al. (2001) state that the presence of women in government reduces the level of corruption because women may be more ethical and more concerned with the common good than men. Swamy et al. (2001) find that women tolerate less corruption and are less involved in corruption than men. Torgler and Valev (2010) also confirm that women condemn corrupt behaviors more than men. In addition to the studies based on survey data, Rivas (2013) applies an experimental method and finds that women are less corrupt than men.

A second strand of works however moderates the view that women are less inclined to engage in corruption than men, by stressing the influence of the cultural and institutional contexts. The evidence has tended to show no significant difference between women and men when corruption is considered normal behavior in society, and that women are less inclined to be corrupt than men because women are more pragmatic regarding the realities of detection and punishment. Alatas et al. (2009) find different attitudes toward corruption in four investigated countries. Although women in Australia are less condoning of corruption than men, attitudes toward corruption are not significantly different between women and men in India, Indonesia, and Singapore. Hence, they conclude that these attitudes are culture specific. Using an experimental method, Schulze and Frank (2003) reveal that the effect of gender on corruption is influenced by the institutional context. In the absence of the risk of detection and punishment, no difference is found in the corrupt behaviors between women and men. Nevertheless, women are significantly less willing to accept bribes when there is the risk of detection and punishment. These findings have been confirmed in several subsequent works. The significant effect of women's participation in government to reduce corruption disappears

when institutional features such as rule of law, freedom of the press, and democratic elections are controlled (Sung, 2003). This result supports the view that the relationship between gender and corruption is mainly based on its context, and a "fairer system" plays a more important role in reducing corruption than gender does. Breen et al. (2017) also find that women in the business field are less likely to pay bribes than men but only in democracies because the risk of detection and punishment is greater.

In summary, two strands of literature have investigated the effect of gender on corruption. The first strand confirms that women are less inclined to engage in corruption than men, and the second finds no difference between women and men in attitudes toward corruption if corruption is not stigmatized. Several reasons can be found to explain this link: women are more honest in condoning corrupt behaviors and more risk averse than men. Hence, because risks may be a part of participating in corrupt activities, women are more likely to avoid them than men. Additionally, women are less experienced in corrupt transactions than men, limiting their access to these behaviors. Furthermore, the link between gender and corruption varies by cultural and institutional contexts.

3.2.2.3 Gender, corruption, and access to finance

According to our review of the literature, two studies have investigated whether corruption has a different impact on men and women in access to finance.

Galli et al. (2018) use data for 11 European countries from the European Central Bank-Survey on the Access to Finance of Enterprises during the period 2009–2014. They expected that women-owned firms would refrain less from applying for credit when corruption was low than when it was high. Measuring the corruption perception by country-level indices, and controlling for firm characteristics and country features, they find that women-led firms are more reluctant to apply for bank credit than men-led firms. However, this result is not affected by a country's level of corruption. Therefore, their expectation is not proved.

Wellalage et al. (2019) question whether corruption worsens gender equality in access to credit. They work on Enterprise Surveys data collected by the World Bank in 2014 for five countries in South Asia that limit women's rights. They measure corruption by the percentage of sales paid to "get things done" at the firm level, allowing them to capture the experience of corruption. They find evidence that gender differences exist in credit access. Surprisingly, women benefit more from corruption than men. When women-owned firms pay bribes, they experience less credit constraints than men-owned firms. An explanation for the result is that

women-owned firms experience more difficulties in credit access than men-owned firms. Therefore, women engage in corruption to avoid the discrimination against them.

3.3 Hypotheses development

Our literature review has shown that women-led firms are less likely to have access to credit than men-led firms because of the structural differences between these two types of firms and the discrimination of lenders against women-led firms; additionally, women-led firms are discouraged from entering the credit market because they perceive a higher probability of rejection than men-led firms. Therefore, women-led firms are more likely to become discouraged borrowers than men-led firms.

Additionally, despite dramatic changes, women continue to have the main role in childcare and homemaking (Bianchi et al., 2006). This role influences women's self-concepts, affecting their behaviors: they prefer to act honestly than dishonestly when teaching their children values (Eagly and Wood, 2016). Hence, women may be less involved in corruption than men. In addition, the behavior of women is influenced by social constructs (Eagly and Wood, 2016). For example, women will be more condemned and punished than men if they engage in corrupt activities (Esarey and Chirillo, 2013), because these behaviors are perceived as inconsistent with women's roles. It prevents women from engaging in corrupt practices as well. More importantly, corruption is a hidden agreement not protected by legislation. Hence, participating in these agreements, women experience risks of being detected, punished, or not receiving the expected results. However, studies on gender differences in risk taking have also shown that women are more risk averse than men (Byrnes et al., 1999; Croson and Gneezy, 2009). Based on these arguments, we expect that corruption enhances the discouragement of women entrepreneurs in access to credit, and we propose hypothesis 1 (H1):

H1: Perceiving high corruption discourages women entrepreneurs from applying for credit.

If the first hypothesis is confirmed, we can then question which channels explain the discouragement of female entrepreneurs when perceiving high corruption. To answer this question, we test hypotheses 2 to 4 (H2–H4).

First, "ability to pay" is a key element affecting the probability of making a bribe payment. Women-managed firms are significantly smaller sized and have profits less than men-managed firms; hence, the former have fewer financial resources to pay bribes than the latter. The paradox is that women are considered as "soft targets" and required to pay more bribes

than men-managed firms because women have less education and time and fewer business skills than men (Ellis et al., 2005). Therefore, we assume that women entrepreneurs are affected more by corruption than their men counterparts are. Hence, if women entrepreneurs must use more firm resources to pay bribes than their male counterparts, this situation restrains them from applying for credit. Thus, we propose H2.

H2: Women-managed firms pay a higher bribe than their men counterparts, discouraging the former from applying for credit.

Second, corruption is a hidden agreement based on trust and reciprocity. Because women have generally joined business and politics later than men, women have less experience, making it more difficult for women to access the "bribe-sharing old boy networks" (Rheinby and Chene, 2016; Swamy et al., 2001). Barnes and Beaulieu (2019) and Goetz (2007) have also revealed that women are marginalized from access to important networks; therefore, they have less experience in managing corruption than men.[29] When women accumulate an amount of knowledge and experience equal to that of men, there may be no difference between women and men in corrupt behaviors. On the basis of these arguments, we infer that experience is an explanation for gender differences in applying for credit when perceiving high corruption, and we expect that the more years of experience female entrepreneurs have, the more confidence they have to overcome constraints due to corruption to access credit. Our expectation is presented in H3.

H3: Women entrepreneurs' experience mitigates the probability of them being discouraged from credit application when they perceive high corruption.

Third, the social role theory of Eagly and Wood (2016) predicts that when the roles of women change such that women have more opportunities to access the fields now dominated by men, gender differences should decrease. In line with that theory, we expect that higher gender equality reduces the difference between women and men in terms their reaction to corruption, namely, in terms of discouragement. Moreover, in a society with high gender equality, women may experience less pressure from corruption than those in a society with low gender equality; thus, the former may experience less fear when applying for credit than the latter. Based on these inferences, we propose H4.

[29] Rivas (2013, p.2) predicts that "it may be just a matter of time until women get involved in corrupt activities."

H4: Gender equality reduces the probability that women entrepreneurs are discouraged from credit application when they perceive high corruption.

3.4 Data and methodology

3.4.1 Data

We use the Enterprise Surveys (ES) data from the World Bank. The survey has been conducted since the 1990s to offer an expansive array of economic data including access to finance, and corruption. More than 90% of the questions objectively determine the characteristics of a country's business environment, and the remaining questions show the respondents' opinions on obstacles to their firms' operation. This dataset contains rich information at the firm level, allowing us to deeply investigate our concerns. We collect data from middle-income and high-income countries surveyed from 2011 to 2018. In low-income countries, low-end financial institutions and specialized lenders but not banks seem particularly suited to ease firms' access to finance (Beck et al., 2013). Because our study focuses on bank lending, we exclude low-income countries to avoid biases. In addition, because of missing values and avoiding problems of extremely unequal cluster sizes (Spamann, 2019), we exclude countries with fewer than 4 discouraged borrowers. Finally, our dataset includes 68 countries. Each country participates in the survey once during the period 2011–2018, and the survey can last from 1 to 3 years in one country. Appendix 3.2 displays the list of countries.

3.4.2 Methodology

Our key hypothesis (H1) predicts that firms managed by women are more discouraged when they perceive high corruption.

The dependent variable is *discouraged,* which is a dummy variable equal to one if the firm did not apply for credit not because they had sufficient capital but because they consider that application procedures are complex, interest rates are unfavorable, collateral requirements are excessive, loan size and maturity are insufficient, or the application would be rejected. It is equal to zero if the firm applied for a loan. This measure of discouragement has been applied in many studies (Chakravarty and Xiang, 2013; Gama et al., 2017; Statnik and Vu, 2020).

The first key explanatory variable is *Gender,* which is a dummy variable equal to one if top managers are female and to zero otherwise. It allows us to investigate the effect of gender on firms' financing decisions.

The second key explanatory variable is *Corruption*, which is measured through the perception of corruption at the firm level. It is a dummy variable equal to one if firms perceive corruption as a major or very severe obstacle and to zero if firms perceive no obstacle or a minor or moderate obstacle. The advantage of this measurement is that we could observe the perception of corruption for each firm and its effect on firm managers, resulting in their credit access decisions.

Our aim is to investigate H1 (i.e., women-led firms are more discouraged than man-led firms when the former perceives high corruption). To achieve this objective, we include an interaction between *Gender* and *Corruption*, which is the third key explanatory variable. If H1 is confirmed, we should observe a significantly positive coefficient for this interaction term. This finding would mean that higher corruption discourages more women-led firms than men-led firms from applying for credit.

In line with the literature on borrower discouragement, we also include a set of control variables: experience of top managers (*experience)*; firm characteristics such as financial services used by firms *(AI1, AI2)*, their locations *(city1m, maincity)*, firm age *(age)*, firm size *(size)*, ownership *(ffirm)*, export activities *(diexport)*, trade credit *(tradecr)*, research and development *(innovation)*, information transparency *(certificate, exteraudit*), credit worthiness *(creditline)*, and access to finance *(access)*. All these variables are defined in Appendix 3.1.

To explore the hypothesis H1 that women-led firms are more discouraged when they perceive high corruption, we estimate the following model:

$$discouraged_i = \alpha + \beta_1\, gender_i + \beta_2\, corruption_i + \beta_3\, gender_i \times corruption_i + \sigma B_i + Year\ dummies + Sector\ dummies + Country\ dummies + \varepsilon_i \quad (1)$$

Where *i* is the firm, *k* the country, and *B* is the set of firm-level control variables. We also control for the country, sector, and year as fixed effects to eliminate time-invariant factors. These fixed effects also control for country-specific, sector-specific, and year-specific effects, which may bias the estimates. We alternately perform regressions with the OLS model and the logit model to check the robustness of our findings. The model clusters standard errors by country.

Furthermore, to examine whether the gendered impact of corruption on discouragement is stronger in highly corrupt environment, we split the sample into two groups of countries at the median value of the "control for corruption" indicator issued by the World Bank. This

indicator "*captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as 'capture' of the state by elites and private interests*." Its values range from -2.5 to 2.5, and a higher value means a lower level of corruption. As a result, we have two groups: high- and low-corruption countries. Next, we test H1 by applying equation (1) to two groups.

Table 3.1 shows the summary statistics for the whole sample and also the means for all variables for female- and male-managed firms. Both types of firms have significant differences in many aspects, and female-managed firms perceive less corruption than male-managed firms: 28% and 36% of female-managed firms and male-managed firms, respectively consider corruption as a major or very severe obstacle. Additionally, female entrepreneurs have less experience than their male counterparts. Firms led by women are also significantly smaller, younger, less frequently use financial services, invest less in R&D activities, and are owned more by domestic owners. Finally, male-managed firms report more obstacles in access to finance than female-managed firms: 26% and 24% of male- and female-managed firms mention access to finance as a major or very severe obstacle.

3.5 Results

3.5.1 Main estimations

We test the hypothesis that the perception of high corruption discourages more women than men to apply for credit. Table 3.2 reports the estimations: OLS is in column 1 and the logit model is in column 2. We observe that the interaction *corruption*×*gender* is significantly positive in both estimations; thus, female entrepreneurs are more discouraged than male entrepreneurs when they perceive high corruption.

The effect is economically significant. The marginal effect of the interaction term with the logit model and the coefficient of the interaction term with the OLS model in column 1 of Table 3.2 show that the probability of discouraged borrowers increases 4% if female entrepreneurs perceive that corruption is a major or severe obstacle to their firm's operation.

We furthermore investigate whether the effect varies with the level of corruption of the country. To achieve this objective, we split the sample into two groups and redo the OLS estimation for each group in column 3 for high-corruption countries and in column 4 for low-corruption countries. The interaction *corruption*×*gender* is significantly positive in high corruption countries but not significant in low-corruption countries. The probability of

discouraged borrowers in higher corruption countries increases by 8% if female entrepreneurs perceive high corruption.

Thus, our findings support H1: perceiving high corruption discourages women entrepreneurs from applying for credit. In addition, this effect is stronger in a highly corrupt environment.

The greater involvement of women than men in domestic activities explains this behavior: they can be influenced to act with honesty to teach their children the appropriate values (Eagly and Wood, 2016). Hence, in a more corrupt environment that can affect financing operations, women can be less willing than men to apply for a loan. The greater risk aversion of women than men (Croson and Gneezy, 2009) can also lead women to reduce their loan applications in the presence of corruption. Both factors then increase the number of discouraged female borrowers because they perceive high corruption.

3.5.2 Addressing the endogeneity bias

Although we control for characteristics of entrepreneurs and firms, and for time-invariant unobservable country, sector, and year characteristics to mitigate the probability of endogeneity, our main finding can be misleading because of omitted variables, errors in measuring variables, or simultaneous causality.

There may be reverse causality between the discouragement and gender of top managers. Firms managed by women are more discouraged from applying for credit than those managed by men because female entrepreneurs have been observed to be less self-confident and more risk averse than male entrepreneurs and want to maintain control of their business (Coleman, 2000; Treichel and Scott, 2006). By contrast, the discouragement from credit markets influences a firm's prospects, leading to the choice of a top manager which can be more disadvantageous for women. Therefore, the gender variable may not completely be an exogenous variable. To mitigate the probability of biased results because of endogeneity, we find an instrumental variable (IV) for the gender variable.

The literature has confirmed that female-owned firms usually operate in industries that require the least capital such as retail sales, trade, or services (Cole and Mehran, 2018; Robb and Wolken, 2002; Stefani and Vacca, 2013). Therefore, in some specific sectors, the probability of a woman being a top manager can be higher than that in other sectors dominated by men, for example, construction and wholesale trade. Liu et al. (2014) also use the percent of women directors in an industry (excluding the firm) as an IV for gender. Furthermore, Huang

and Kisgen (2013) conjecture that firms located in areas with greater gender equality might have a higher probability of women becoming executives. Hence, based on firm location, they use the state's gender status equality as an IV for gender. Combining these ideas, we apply the locality–sector average of gender as an IV for gender. For each firm, IV is the mean of the gender variable of all firms in the same locality and sector but excludes the firm. The average percentage of female top managers of other firms in the same location and sector is difficult to correlate with the decision to apply for credit of the firm. Therefore, this variable can be a satisfactory IV for the gender variable.

Additionally, corruption is a complex notion, and it is difficult to measure. The first measurements for corruption emerged in the 1990s (Heinrich and Hodess, 2011), and researchers continue to search for accurate methods to capture corruption. Therefore, measuring corruption with errors can be a source of endogeneity. Moreover, inaccurate estimations may occur because of omitted variables. For example, burdens of loan policies may affect corruption and discouraged borrowers, but these policies have not been controlled in the model. To mitigate these biases, we use the locality–sector average of corruption by referring to Fisman and Svensson (2007) and Qi and Ongena (2019). For each firm, this IV measures the mean of the "corruption variable" of all firms in the same locality and sector, excluding the firm. As Fisman and Svensson (2007) explain, the locality–sector average of corruption is determined by inherent characteristics of the locality–sector, for example, underlying technologies, rent-extraction talent, and inclinations of bureaucrats, which are exogenous to the firm. Hence, IV can alleviate biases due to endogeneity.

We apply the two-stage least squares method (2SLS) and use the two instrumental variables for gender and corruption. The correlations between corruption, gender, and the two instrumental variables are 0.46 and 0.32, respectively. More important, F-statistics in the first stages are much higher than 10, and all instrumental variables are highly significant at 1% level to explain for the variables for which they are a substitute. Hence, we reject the hypothesis that instrumental variables are weak and use them as a substitute for the endogenous variables.

Table 3.3 reports the results with the instrumental variables. We confirm our finding that female entrepreneurs are more discouraged from applying for loans than male entrepreneurs are when the former perceive high corruption. This result proves that the gendered impact of corruption on discouraged borrowers is a causal effect rather than a simple correlation.

3.5.3 Testing the explanations

An explanation for our key finding may be that women are more honest and risk averse than men are; however, both reasons are difficult to measure and then check, and they are not unique explanations. The available data allow us to test three other explanations. We expect that the gendered impact of corruption on discouraged borrowers can be explained by three channels: women entrepreneurs are reluctant to apply for credit because they suffer more from corruption than their men counterparts do. Moreover, women have less experience in managing corruption than men, which hampers women from accessing credit when corruption is high. Finally, we expect gender inequality to increase the gender gap in credit demand in the presence of corruption.

The first explanation explains that women can suffer more from corruption than men. If this is the case, a greater perception of corruption can reduce the willingness of women to apply for credit, because they are more hampered by corruption than men. To test the relevance of this explanation, we use the information on the percentage of sales to bribe public officials regarding customs, taxes, licenses, regulations (*corruption1*). We check whether these informal payments are higher for female-led firms than for male-led firms. To achieve this objective, we perform a univariate test. We conduct a two-sample t test of a difference in the means of *corruption1* between female and male entrepreneurs with equal variances (Table 3.4) and observe that women pay 1.08% of sales for informal payments and men pay 0.78%. This difference is statistically significant. This finding supports H2, according to which women-managed firms pay more bribes than men-managed firms, and explains why women are more discouraged than men to apply for a loan when perceiving more corruption.

The second explanation is related to experience: the greater discouragement of women to apply for credit in the presence of greater corruption is due to women having less experience than men. We have shown that female managers have less experience than male managers do. To investigate the hypothesis H3, we redo the estimations by considering the experience of the managers, with the variable *experience* defined as the number of years of experience in the sector for top managers (Table 3.5). First, we add *experience*, *experience*×*gender*, *experience*×*corruption*, and *experience*×*corruption*×*gender* in column (1). The interaction term *experience*×*corruption*×*gender* provides information on how experience affects the financing behavior of female entrepreneurs in the presence of corruption. We observe a significant and positive coefficient for *corruption*×*gender* and a significantly negative coefficient for *experience*×*corruption*×*gender*. In other words, the greater experience of

women entrepreneurs mitigates the probability that they are discouraged from credit application when perceiving high corruption.

Second, we split the sample at the median value of female entrepreneurs' years of experience and perform regressions on each subsample. This alternative approach allows us to investigate the influence of experience by mitigating multicollinearity resulting from a triple interaction term. Rather than examining the triple interaction term *experience*×*corruption*×*gender*, we compare the results for *corruption*×*gender* between both subsamples. The estimations are presented in column 2 for short-experience entrepreneurs and in column 3 for long-experience entrepreneurs. *corruption*×*gender* is significantly positive for short-experience entrepreneurs but not significant for long-experience entrepreneurs. This result corroborates the finding obtained with the triple interaction term that greater experience mitigates the discouragement of female borrowers in the presence of corruption.

Thus, these findings support H3 and provide evidence that the explanation for this key finding is that the greater discouragement of women to apply for credit in the presence of greater corruption is due to their having less experience than men.

The third explanation explains the influence of culture: gender equality can play a role in the gendered effect of corruption on the discouragement of borrowers. We examine the relevance of this explanation by considering the variable *gendergap* in the estimations. This variable is the Global Gender Gap Index from the World Economic Forum. This index examines the gap between men and women in access to resources and opportunities in a country by composing 14 different indicators. Its value ranges from 0 to 1, where 1 indicates equality and 0 is inequality. Table 3.6 displays the estimations.

We start by including *gendergap*, *gendergap*×*gender*, *gendergap*×*corruption*, and *gendergap*×*corruption*×*gender* in column (1). The interaction term *gendergap*×*corruption*×*gender* provides information on the influence of culture on the behavior of female entrepreneurs when perceiving corruption. In addition to the significant and positive coefficient for *corruption*×*gender*, we observe a significantly negative coefficient for *gendergap*×*corruption*×*gender*. This finding means that greater gender equality mitigates the discouraging impact of corruption on women when applying for a loan.

Next, we split the sample into two groups based on the median of the *gendergap* variable (i.e. low gender equality, high gender equality) and perform regressions on each subsample in columns (2) and (3) to check whether we obtain the same finding. We observe that

corruption×*gender* is significantly positive for the subsample of countries with low gender equality but not significant for the subsample of countries with high gender equality. These results confirm the mitigating role of gender equality on the discouragement of female borrowers in the presence of corruption.

Hence, we have demonstrated support for H4, namely, gender equality reduces the probability that female entrepreneurs relative to male entrepreneurs are discouraged from applying for credit when they perceive more corruption.

We explain this result by following the social role theory of Eagly and Wood (2016). In countries that practice gender equality, women and men have equal opportunities to access resources, and one of these opportunities is access to credit sources. Women are less likely to be rejected than men because of their gender. Therefore, there is no significant difference between women and men in their loan applications. Moreover, gender equality seems to play an important role in mitigating corruption. Hence, in a society with higher gender equality, women may experience less pressure from corruption and thereby be less discouraged from applying for credit.

3.5.4 Robustness checks

We perform additional tests to check the robustness of our results by applying other measurements for the dependent variable and corruption.

3.5.4.1 Applying other measures for the dependent variable

We check the relevance of the results obtained through two stricter measures for discouraged borrowers. In the main model, discouraged borrowers are defined as non-applicants who did not apply for credit because of complex application procedures, unfavorable interest rates, excessive collateral requirements, insufficient loan size and maturity, or fear of being rejected. Following Statnik and Vu (2020), we now apply a stricter approach and consider that only the last reason, fear of being rejected, indicates discouragement. We then use the variable *fear*, with a value of one if firms did not apply for a loan because of fear they would be rejected and zero if they did not apply for other reasons. When using this variable in the model, our results could be affected by sample selection bias due to excluding all applicants. To overcome this issue, we use a Heckman selection model. The selection equation includes

the same explaining variables as the main model in equation (1) and uses the variable *noapp*, defined as a dummy variable equal to one for non-applicants and zero for applicants.[30]

The regression equation is observed only if *noapp* is equal to one. It includes the same explaining variables as the main model from equation (1) and adds Heckman's lambda. The explained variable is *fear*: a dummy variable equal to one for non-applicants who fear rejection and to zero for other non-applicants.

The sign and the significance of *corruption*×*gender* in columns 1 to 3 of Table 3.7 are the same as those of the main findings. These results again confirm that female entrepreneurs are less likely to apply for credit when they perceive high corruption than their male counterparts are, and this effect is stronger in a high-corruption environment than in a low-corruption environment.

Another definition of "discouraged borrowers" can be obtained by considering firms that have a line of credit from a financial institution and did not apply for loans not because they have sufficient capital but because application procedures are complex, interest rates are unfavorable, collateral requirements are excessive, loan size and maturity are insufficient, or they do not think the application would be approved. When a firm has a line of credit from a financial institution, this element can prove its creditworthiness in the eyes of that institution. Therefore, we classify firms with lines of credit as good borrowers and use the measurement of discouraged borrowers as outlined. The dependent variable is given a value of one if the firm is considered to be a discouraged borrower and a value of zero if it applies for loans. The results in columns 4 to 6 in Table 3.7 are consistent with the main results and confirm our expectations.

By applying other measurements for the dependent variable, we are confident that our findings are not driven by how we capture discouraged borrowers.

3.5.4.2 Applying other measures for corruption

We use two alternative measures of corruption. In the main model, we consider *corruption* to be defined as a dummy variable equal to one if firms perceive corruption as a major or very severe obstacle and zero for a perception of no obstacle or a minor or moderate obstacle. We first use *corruption2*, which is a dummy variable equal to one if firms perceive corruption as a moderate, major, or very severe obstacle and zero for a perception of no obstacle

[30] As explained by Kai and Prabhala (2007, p. 45), "Strictly speaking, exclusion restrictions are not necessary in the Heckman selection model because the model is identified by non-linearity". Hence, we use the same set of variables in our selection equation and regression equation.

or a minor obstacle. We then consider *corruption3*, which captures corruption at five different levels from one to five, where one is no obstacle and five is a very severe obstacle.

We perform regressions with both these measures of corruption in Table 3.8. Our results confirm that corruption constrains more female than male managers from applying for loans and that this effect is stronger in a highly corrupt environment. Hence, the definition of the corruption variables does not affect our results.

3.6 Conclusion

This paper examines whether corruption discourages more female borrowers than male borrowers and thus contributes to increasing the gender gap in access to finance. To achieve this objective, we perform a cross-country investigation on a large dataset of firms.

Our key finding is that female borrowers are more discouraged by corruption to ask for credit than male borrowers. It supports the view that corruption increases the gender gap in access to finance and thus enhances gender inequality in participation in economic activity.

We furthermore find evidence for the three explanations for the gendered impact of corruption on borrower discouragement. First, women-managed firms pay more bribes than men-managed firms do. Thus, women entrepreneurs suffer more from corruption than their male counterparts, which can divert the former from asking for a loan. Second, women have less experience in management than men do and thus less such experience in managing corruption. This can enhance women's aversion to managing corrupt practices. Third, the degree of gender equality influences the gendered impact of corruption with greater discouragement for women associated with less gender equality.

Our work therefore provides new evidence that advances the understanding of what shapes the gender gap in access to finance. The institutional framework through the degree of corruption affects this gender gap, influencing the equal participation of women and men in economic activity. Our conclusion thus supports implementing policies against corruption that reduce the gender gap in access to finance.

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Table 3.1 – Descriptive statistics of variables

This table summaries statistics of variables used in the models. The last column shows the significance of a two-sample t-test of a difference in means of variables between female and male entrepreneurs with equal variances. Definition of variables are provided in the Appendix 3.1. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

Variable	Obs	Mean	Std. Dev.	Min	Max	Female		Male		T-test
						Mean	Std.dev.	Mean	Std.dev.	
discouraged	19366	0.52	0.50	0	1	0.53	0.49	0.51	0.50	
corruption	19366	0.34	0.47	0	1	0.28	0.45	0.36	0.48	***
corruption1	16616	0.83	4.64	0	100	1.08	5.83	0.78	4.38	***
corruption2	19366	0.52	0.50	0	1	0.43	0.50	0.53	0.50	***
corruption3	19366	1.70	1.47	0	4	1.45	1.44	1.75	1.47	***
gender	19366	0.16	0.36	0	1					
experience	19366	17.94	10.79	1	70	16.85	10.03	18.15	10.92	***
AI1	19366	0.90	0.30	0	1	0.88	0.33	0.90	0.30	***
AI2	19366	0.46	0.50	0	1	0.43	0.50	0.47	0.50	***
city1m	19366	0.40	0.49	0	1	0.39	0.49	0.41	0.49	*
maincity	19366	0.48	0.50	0	1	0.47	0.50	0.49	0.50	
age	19366	18.40	14.70	0	190	17.35	13.18	18.60	14.95	***
size	19366	1.78	0.77	1	3	1.69	0.76	1.80	0.77	***
ffirm	19366	0.04	0.19	0	1	0.03	0.17	0.04	0.19	***
diexport	19366	7.29	21.34	0	100	8.22	22.87	7.12	21.04	***
tradecr	19366	45.11	35.49	0	100	45.53	37.04	45.03	35.20	
innovation	19366	0.22	0.41	0	1	0.20	0.40	0.22	0.41	***
certificate	19366	0.27	0.44	0	1	0.23	0.42	0.28	0.45	***
exteraudit	19366	0.55	0.50	0	1	0.45	0.50	0.57	0.49	***
creditline	19366	0.50	0.50	0	1	0.48	0.50	0.50	0.50	**
access	19366	0.25	0.44	0	1	0.24	0.43	0.26	0.44	*
gendergap	14118	0.67	0.04	0.51	0.79					

Table 3.2 – Main estimations

This table presents the results of regressions examining the gendered impact of corruption on discouraged borrowers. Columns (1) and (2) test the effects for the whole data using OLS and logit models; columns (3) and (4) split the sample into 2 groups (high vs low corruption countries). Definitions of variables are provided in the Appendix 3.1. Robust standard errors in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variable = discouraged			
	Whole data-OLS	Whole data-Logit	High-corruption	Low-corruption
	(1)	(2)	(3)	(4)
corruption	-0.010	-0.074	-0.031**	0.047***
	(0.016)	(0.114)	(0.014)	(0.014)
gender	-0.004	-0.036	-0.008	0.006
	(0.011)	(0.071)	(0.014)	(0.013)
corruption x gender	0.043*	0.315**	0.078***	-0.050
	(0.023)	(0.150)	(0.022)	(0.031)
experience	-0.001***	-0.008***	-0.001***	-0.001
	(0.000)	(0.003)	(0.000)	(0.000)
AI1	-0.003	-0.085	0.000	-0.016
	(0.020)	(0.131)	(0.025)	(0.015)
AI2	-0.069***	-0.434***	-0.063***	-0.078***
	(0.011)	(0.068)	(0.011)	(0.025)
age	-0.000	-0.000	0.000	-0.000
	(0.000)	(0.002)	(0.000)	(0.000)
size	-0.036***	-0.244***	-0.037***	-0.040***
	(0.009)	(0.053)	(0.013)	(0.009)
ffirm	0.009	0.059	0.015	0.001
	(0.016)	(0.109)	(0.019)	(0.028)
diexport	-0.000	-0.002*	-0.000	-0.000
	(0.000)	(0.001)	(0.000)	(0.000)
tradecr	-0.001**	-0.005***	-0.001	-0.001***
	(0.000)	(0.002)	(0.000)	(0.000)
innovation	-0.033**	-0.248***	-0.029*	-0.038*
	(0.012)	(0.089)	(0.015)	(0.020)
certificate	-0.022***	-0.176***	-0.014**	-0.030**
	(0.006)	(0.046)	(0.007)	(0.011)
exteraudit	-0.059***	-0.422***	-0.068***	-0.042**
	(0.015)	(0.110)	(0.021)	(0.015)
creditline	-0.414***	-2.199***	-0.391***	-0.472***

	(0.066)	(0.272)	(0.085)	(0.034)
access	0.019*	0.117	0.007	0.046***
	(0.011)	(0.074)	(0.013)	(0.012)
city1m	-0.014	-0.064	-0.015	-0.010
	(0.011)	(0.069)	(0.012)	(0.027)
maincity	0.002	0.004	-0.011	0.027*
	(0.013)	(0.096)	(0.015)	(0.016)
constant	1.027***	3.433***	1.036***	0.809***
	(0.058)	(0.336)	(0.060)	(0.060)
Sector FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
R^2	0.440		0.414	0.468
N	19,366	19,366	13,916	5,450

Table 3.3 – Instrumental variable results

This table presents the instrumental variable results. Columns (1), (2) and (3) report the results from the second-stage and first-stage estimates for the whole data. Columns (4), (5) and (6) report the results for the group of high corruption countries, and columns (7), (8) and (9) report the results for the group of low corruption countries. Controls: *experience*, *AI1*, *AI2*, *city1m*, *maincity*, *age*, *size*, *ffirm*, *diexport*, *tradecr*, *innovation*, *certificate*, *exteraudit*, *creditline*, *access*. Definitions of variables are provided in the Appendix 3.1. Robust standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variables								
	discouraged	*corruption*	*gender*	*discouraged*	*corruption*	*gender*	*discouraged*	*corruption*	*gender*
				High corruption			Low corruption		
	Second stage	First stage		Second stage	First stage		Second stage	First stage	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
corruption	-0.142			-0.221***			0.204		
	(0.101)			(0.077)			(0.149)		
gender	-0.184			-0.294**			0.151		
	(0.134)			(0.132)			(0.280)		
corruption × gender	1.223***			1.578***			0.658		
	(0.366)			(0.383)			(2.080)		
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IV corruption		0.584***	0.018		0.635***	0.020		0.360***	0.013
		(0.020)	(0.013)		(0.022)	(0.015)		(0.046)	(0.032)
IV gender		0.059***	0.329***		0.069***	0.349***		0.001	0.221***
		(0.023)	(0.029)		(0.027)	(0.034)		(0.044)	(0.055)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster country	Yes			Yes			Yes		
Weak instrument *F*-stat		94.42	24.63		93.49	17.69		35.63	19.65
R^2	0.279	0.255	0.146	0.165	0.266	0.113	0.299	0.236	0.217
N	18,924	18,924	18,924	13,634	13,634	13,634	5,290	5,290	5,290

Table 3.4 – T-test of a difference in means

This table presents a two-sample t-test of a difference in means of informal payments paid to "get things done" between female and male entrepreneurs with equal variances.

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
Male	13991	0.779	0.037	4.380	0.706	0.851
Female	2625	1.081	0.114	5.827	0.858	1.304
Combined	16616	0.826	0.036	4.640	0.756	0.897
Difference		-0.302	0.099		-0.495	-0.108

Difference = mean(male) - mean(female)

Ho: difference = 0

Ha: difference != 0

Pr(|T| > |t|) = 0.0022

Table 3.5 – Interaction of gender, corruption, and experience of the top managers

This table presents the results of regressions examining the impact of the interaction of *Gender*, *Corruption* and *Experience* on discouraged borrowers. Column (1) tests this interaction for the whole data; columns (2) and (3) split the sample into 2 groups at the median value of *Experience*. Controls: *AI1, AI2, city1m, maincity, age, size, ffirm, diexport, tradecr, innovation, certificate, exteraudit, creditline, access*. Definitions of variables are provided in the Appendix 3.1. Robust standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variable = *discouraged*		
		Short experience	Long experience
	(1)	(2)	(3)
corruption	-0.025	-0.014	-0.008
	(0.029)	(0.020)	(0.016)
gender	-0.029	0.003	-0.013
	(0.025)	(0.017)	(0.016)
experience	-0.001**	0.002	-0.001
	(0.001)	(0.002)	(0.001)
corruption × gender	0.144***	0.082***	0.012
	(0.036)	(0.025)	(0.028)
experience × gender	0.002		
	(0.001)		
experience × corruption	0.001		
	(0.001)		
experience × corruption × gender	-0.006***		
	(0.002)		
Controls	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
R^2	0.440	0.404	0.452
N	19,366	9,801	9,565

Table 3.6 – Interaction of gender, corruption, and gender equality

This table presents the results of regressions examining the impact of the interaction of *Gender*, *Corruption* and *Gendergap* on discouraged borrowers. Column (1) tests this interaction for the whole data; columns (2) and (3) split the sample into 2 groups at the median value of *Gendergap*. Controls: *AI1, AI2, city1m, maincity, age, size, ffirm, diexport, tradecr, innovation, certificate, exteraudit, creditline, access.* Definitions of variables are provided in the Appendix 3.1. Robust standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variable = *discouraged*		
		Inequality	Equality
	(1)	(2)	(3)
corruption	-0.166	-0.034*	0.008
	(0.298)	(0.018)	(0.011)
gender	-0.196	-0.009	-0.002
	(0.245)	(0.012)	(0.013)
gendergap	-0.983		
	(0.792)		
corruption × gender	0.746**	0.079**	0.019
	(0.333)	(0.028)	(0.026)
gendergap × gender	0.293		
	(0.372)		
gendergap × corruption	0.261		
	(0.427)		
gendergap × corruption × gender	-1.070**		
	(0.494)		
Controls	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Country FE		Yes	Yes
R^2	0.380	0.352	0.468
N	14,118	7,119	12,247

Table 3.7 – Other measurements for discouraged borrowers

This table presents the results of regressions examining the gendered impact of corruption on discouraged borrowers by using other measurements for discouraged borrowers. Column (1) applies Heckman selection model to test the effect for the whole data. Columns (2) and (3) apply the same method and test on two separate groups (high vs low corruption countries). Columns (4), (5) and (6) apply OLS and measure discouraged borrowers by a stricter way. Column (4) tests the effect for the whole data; columns (5) and (6) split the sample into 2 groups (high vs low corruption countries). Controls: *experience, AI1, AI2, city1m, maincity, age, size, ffirm, diexport, tradecr, innovation, certificate, exteraudit, creditline, access* for the regressions in columns (1) to (3); and without *creditline* for the regressions in columns (4) to (6). Definitions of variables are provided in the Appendix 3.1. Robust standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variable = *fear*			Dependent variable = *discouraged1*		
		High corruption	Low corruption		High corruption	Low corruption
	(1)	(2)	(3)	(4)	(5)	(6)
corruption	-0.007***	-0.012***	0.011**	-0.011	-0.026	0.022
	(0.002)	(0.003)	(0.005)	(0.024)	(0.030)	(0.013)
gender	-0.006*	-0.005	-0.006	-0.028**	-0.019	-0.038**
	(0.003)	(0.004)	(0.006)	(0.013)	(0.015)	(0.017)
corruption × gender	0.014**	0.019***	-0.004	0.053**	0.065**	0.015
	(0.006)	(0.007)	(0.012)	(0.026)	(0.031)	(0.033)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Lambda	0.029**	0.042***	0.001			
	(0.013)	(0.016)	(0.026)			
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
R^2				0.308	0.356	0.126
N Censored	9,355	5,989	3,366			
N Uncensored	29,737	22,817	6,920			
N	39,092	28,806	10,286	11,618	7,816	3,802

Table 3.8 – Other measurements for corruption

This table presents the results of regressions examining the gendered impact of corruption on discouraged borrowers by using other measurements for corruption. Columns (1) and (4) test the effect for the whole data; columns (2), (3), (5) and (6) split the sample into 2 groups (high vs low corruption countries). Controls: *experience, AI1, AI2, city1m, maincity, age, size, ffirm, diexport, tradecr, innovation, certificate, exteraudit, creditline, access.* Definitions of variables are provided in the Appendix 3.1. Robust standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

	Dependent variable = *discouraged*					
		High-corruption	Low-corruption		High-corruption	Low-corruption
	(1)	(2)	(3)	(4)	(5)	(6)
corruption2	-0.005	-0.014	0.012			
	(0.010)	(0.012)	(0.015)			
gender	-0.006	-0.009	-0.005	-0.013	-0.021	0.000
	(0.014)	(0.018)	(0.016)	(0.014)	(0.017)	(0.017)
corruption2 × gender	0.034**	0.053***	-0.007			
	(0.016)	(0.019)	(0.025)			
corruption3				-0.002	-0.009**	0.011**
				(0.004)	(0.004)	(0.005)
corruption3 × gender				0.015**	0.023***	-0.006
				(0.007)	(0.007)	(0.010)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.440	0.414	0.466	0.440	0.414	0.467
N	19,366	13,916	5,450	19,366	13,916	5,450

Appendix 3.1 – Definitions of variables

Name	Definition	Source
DEPENDENT VARIABLES		
discouraged	Dummy =1 for discouraged borrowers and 0 for applicants	ES
discouraged1	Dummy=1 for discouraged borrowers who have credit lines and 0 for applicants	ES
fear	Dummy=1 for non-applicants who did not think their application be approved and 0 for other non-applicants	ES
INDEPENDENT VARIABLES		
Corruption		
corruption	Dummy =1 if corruption is major obstacle or very severe obstacle and 0 otherwise	ES
corruption1	Percentage of sales paid as informal payment	ES
corruption2	Dummy =1 if corruption is moderate, major obstacle or very severe obstacle and 0 for otherwise	ES
corruption3	Degree of corruption affecting to a firm's operation	ES
Entrepreneur characteristics		
gender	Dummy=1 if top managers are female and 0 otherwise	ES
experience	Number of years of experience in the sector for top managers	ES
Firm characteristics		
AI1	Dummy =1 if firms have a checking or savings account and 0 for otherwise	ES
AI2	Dummy =1 if firms have an overdraft facility and 0 for otherwise	ES
city1m	Dummy = 1 if firm located in city with population over 1 million	ES
maincity	Dummy = 1 if firm located in main business city	ES
age	Firm age measured by number of year establishment operates	ES
size	Firm size measured by number of employees: small (5-19), medium (20-99) and large (>100)	ES
ffirm	Dummy =1 if percentage of firm owned by foreigners is greater than 50% and 0 for otherwise	ES
diexport	Direct export as a percentage of sale	ES
tradecr	Proportion of total annual purchases of material inputs purchased on credit	ES
innovation	Dummy =1 if firms spent on formal research and development activities and 0 for otherwise	ES
certificate	Dummy =1 if firm got internationally recognized quality certification	ES
exteraudit	Dummy =1 if firms' annual financial statements are checked and certified by an external auditor	ES
creditline	Dummy = 1 if firms have a line of credit or loan from a financial institution	ES
Firms perception about the operating environment		
access	Dummy =1 if access to finance is major obstacle and very severe obstacle and 0 for otherwise	ES
Country level variables		
gendergap	Gender gap Index	WEF

Appendix 3.2 – List of countries in the sample

Countries in the sample	
Albania	Lesotho
Argentina	Macedonia, FYR
Armenia	Malaysia
Azerbaijan	Mauritania
Belarus	Moldova
Bolivia	Mongolia
Bosnia and Herzegovina	Montenegro
Bulgaria	Morocco
Cambodia	Myanma
Cameroon	Namibia
China	Nicaragua
Colombia	Nigeria
Côte d'ivoir	Pakistan
Croatia	Papua New Guinea
Czech republic	Paraguay
Djibout	Peru
Dominican Republic	Philippines
Ecuador	Romania
Egypt	Russia
El Salvador	Serbia
Georgia	Slovakia
Ghana	Solomon Islands
Greece	Sudan
Guatemala	Swaziland
Honduras	Thailand
Hungary	Timor-Leste
India	Tunisia
Indonesia	Turkey
Israel	Ukraine
Jordan	Uruguay
Kazakhstan	Uzbekistan
Kosovo	Vietnam
Laos	Yemen
Lebanon	Zambia

GENERAL CONCLUSION

This thesis deeply investigates the impact of the application costs and bank screening errors on discouragement through the effects of corruption, credit sharing information, and the gendered impact of corruption. We perform a cross-country investigation on a large dataset of firms based mainly on data from Enterprise Surveys of the World Bank. Other supplemental data is from Global Competitive Index, Corruption Perception Index, Doing Business, Djankov et al. (2007), Orbis Bank Focus, Global Gender Gap Index, and World Governance Indicators.

The first essay examines the effect of corruption on discouraged borrowers. We find that in developing countries, firms are more likely to apply for bank loans when perceiving high corruption. Interestingly, this effect varies on the level of country development. The negative effect of corruption on discouragement is found in lower-middle income countries, while the positive effect is revealed in upper-middle income countries. The mechanism to explain these opposite effects is the burden of government regulations. In lower-middle income countries, law enforcement is less efficient, and corruption is more prevalent but hard to be detected. Firms, therefore, find corruption as a way to overcome red tapes. Inversely, in upper-middle income countries, the probability to be detected and punished when taking part in corruption behaviors is higher. Thus, firms fear applying for credit in the presence of corruption. By these findings, we are the first to reveal the "grease the wheel" effect of corruption on the demand for bank credit. However, besides good borrowers, the corrupt environment may also attract bad borrowers who take benefits of paying bribes to enhance their chances of acceptance. This increases lenders' screening costs to select good borrowers and increases the probability that lenders make wrong choices. Therefore, this grease the wheel of corruption should be interpreted with caution.

The second essay exploits the impact of the application costs and bank screening errors through the effect of credit information sharing on the probability of discouragement. The results show sharing more information through public credit registries significantly reduces the discouraged borrowers. Public credit registries are unique hubs of credit information operated by central banks. The requirement to supply credit information to them is mandatory to all supervised institutions. Therefore, information sharing through public credit registries is more reliable that supports banks effectively in their lending decisions by reducing application costs and mitigating screening errors, as such probability of discouragement decreases. Interestingly, the prediction of Kon and Storey's theory that increased information has a non-linear effect on

discouragement is confirmed by information sharing through private credit registries. We find that credit information sharing reduces the probability of discouragement only if information sharing reaches a sufficient level. Under this level, it increases borrower discouragement. An explanation for the non-linear effect is that in countries having a poor credit report system, the credit information is owned by several private credit bureaus and it is cut into pieces. Moreover, the accuracy of information is not guaranteed because of lacking a legal framework. Therefore, it is costly for lenders to access the full creditworthiness of borrowers and the screening errors are not improved, leading to the enhancement of discouraged borrowers. In contrast, in countries having an efficient credit report system, lenders benefit from the plenty and accuracy of information. They, therefore, make better lending decisions with lower costs, as such discouraged borrowers decrease. Our findings contribute to literature the first understandings about the effect of credit information sharing on discouragement. We highlight the role of improving both quality and coverage of credit report systems to mitigate asymmetric information, leading to reduce discouraged borrowers.

The third essay studies the gendered impact of corruption on discouraged borrowers. As expected, we find female entrepreneurs are less likely to apply for credit in presence of corruption than male entrepreneurs. Three channels are found to explain this result. First, women-managed firms are smaller and less profit, but they must pay higher bribes than men-managed firms. Thus, perceiving high corruption constraints them from applying for credit. Second, female entrepreneurs have less experience in management than males do and thus less experience in dealing with corruption. This increases female's aversion to demand bank credit in the presence of corruption. Third, the degree of gender equality influences the gendered impact of corruption on discouragement. Specifically, female entrepreneurs are more likely to be discouraged in a less gender equality society. Our findings in the third essay support the view that corruption increases gender inequality in credit access. Therefore, anti-corruption policies are needed to reduce the gender gap in access to finance.

Findings from our studies suggest policy implications to enhance the demand for bank credit: First, regarding the impact of corruption, solely anti-corruption in developing countries where burdensome regulations are popular may have a negative effect on the economy as it could increase discouragement. Therefore, anti-corruption should be taken together with improving the efficiency of law enforcement and reduce burdensome regulations. Achievements from anti-corruption will have positive effects not only on social and economic development, but also on reducing discouragement of women in access to finance. Second, our

results also support efforts to achieve gender equality to improve human rights in general and reduce the gender gap in credit access in particular. Third, regarding the impact of asymmetric information on discouraged borrowers, to improve the credit report system that effectively alleviates asymmetry information, developing countries need an efficient legal framework to establish, operate and collect credit information. As such, information is accurate and abundant to benefit the credit market that reduces borrower discouragement.

Corruption, asymétrie d'information et genre : impact sur la demande de crédit bancaire

Au travers de trois questions, cette thèse étudie les effets de la corruption, de l'asymétrie d'information et du genre sur le découragement. La corruption a-t-elle un impact sur la demande de crédit bancaire dans les pays en développement asiatiques ? Le partage de l'information sur le crédit réduit-il le nombre d'emprunteurs découragés ? La corruption décourage-t-elle davantage les femmes entrepreneurs à demander un crédit ? Nous répondons à ces trois questions en utilisant les enquêtes sur les entreprises menées par la Banque mondiale de 2011 à 2018. Tout d'abord, nous remarquons que si la corruption a globalement un effet négatif sur le découragement dans les pays en développement, cet effet dépend du niveau de leur développement : dans les pays les plus développés (resp. les moins), les entreprises sont plus (resp. moins) découragées à demander un crédit lorsqu'elles perçoivent un niveau de corruption plus élevé. Le poids des réglementations gouvernementales est un canal expliquant ces effets opposés. Concernant l'asymétrie d'information, nous observons que le partage d'informations via les registres de crédit publics atténue le découragement. Cet effet est plus complexe lorsque l'on prend en compte le partage d'informations via les registres de crédit privés : une couverture faible (resp. suffisante) de l'information diminue (resp. augmente) la demande de crédit bancaire. Enfin, nous montrons que lorsque les dirigeantes d'entreprise perçoivent un niveau élevé de corruption, elles sont plus découragées à demander du crédit que leur homologue homme. Nous expliquons ce résultat de trois manières : (1) les femmes souffrent davantage de la corruption que les hommes ; (2) les femmes ont moins d'expérience dans la gestion de la corruption ; (3) Le troisième facteur explicatif repose sur l'inégalité entre les sexes : cette inégalité accentue l'impact négatif de la corruption décourageant ainsi davantage les femmes dans leur demande de crédit.

Mots clés : découragement, corruption, partage d'informations, genre

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Corruption, asymmetric information and gender: impact on the demand for bank credit

This thesis investigates the effects of corruption, asymmetric information and gender on discouragement. Specifically, we answer three questions: Does corruption impact the demand for bank credit in Asian developing countries? Does credit information sharing reduce discouraged borrowers? Does corruption discourage more female entrepreneurs from applying for credit? Using Enterprise Survey conducted by the World Bank from 2011 to 2018, we find not only the significant effects but also the mechanisms to explain these effects. First, corruption has a negative effect on discouragement in developing countries. Moreover, this link varies on the level of country development. In more developed countries (resp. less), firms are more (resp. less) discouraged from applying for credit when perceiving higher corruption. The burden of government regulations is a channel to explain the above opposite effects. Second, information sharing through public credit registries mitigates discouragement. However, sharing information through private credit registries has a non-linear effect on discouragement. A low (resp. sufficient) coverage of the information diminishes (resp. enhances) the demand for bank credit. Third, perceiving high corruption, female entrepreneurs are more discouraged from applying for loans than male entrepreneurs. Three mechanisms are found to explain this result: (1) women suffer more from corruption than men do; (2) women have less experience in dealing with corruption; (3) the degree of gender equality influences the gendered impact of corruption with greater discouragement for women in a less gender equality society.

Key words: discouragement, corruption, information sharing, gender

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