Non-Traditional Credit Contracts: the Role of Culture, Social Norms and Law

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ABSTRACT This thesis is mainly divided into three chapters. Although they may have different purposes, all these works concern credit contracts that are different from "traditional" bank loans. With traditional we mean a credit contract where a formal lending institution (a bank) provides a sum to an individual agent or a firm, at a pre-specified interest rate, often requiring some collateral as a guarantee against defaults, and resorts to a third part (typically a court) in order to protect its property rights in case the amount due at maturity is not repaid. However, credit contracts may differ with respect to each one of these fundamental components: the presence of collateral, the way interest rates are computed, and the efficiency of justice in reducing the social loss in case of default. In the second chapter we deal with a setup of traditional lending failures generated by the absence of collateral but high social punishment in case of default; in the third chapter we consider the effects of the religious component that rejects a pre-specified interest rate on the efficiency of Islamic banks; while in the fourth chapter we are concerned about the efficiency of the courts in protecting lenders' rights in case the amount due at maturity is not repaid.

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1
Introduction

This thesis investigates the mechanisms and the impact underlying credit contracts that are different from "traditional", or "Western-type", bank loans.

By "traditional" loan, we intend a credit contract where a formal lending institution (a bank) provides a sum to an individual agent or a firm, at a pre-specified interest rate, often requiring some collateral as a guarantee, and resorts to a third part (typically a court) in case the amount due at maturity is not repaid.

However, in some specific setup, characterized by extreme poverty and often by the absence of collateral, we observe several failures of traditional banking contracts due to the excessive risk they involve. Since from the beginning of the Eighties, the economic literature has focused on banking failures (Stiglitz and Weiss 1981; Gosh et al. 2000) and tried to find reasons

to explain why other forms of lending, such as microcredit, work better than individual banking contracts, with special attention to the repayment mechanism and to the impact on households' welfare (Pitt and Khandker 1998; Morduch 1998; Pitt 1999).

Thus, in Chapter 2 we compare two forms of lending which seem to be more effective than individual banking contracts in developing countries. We analyze the impact of monitoring pressure on investment in microcredit and informal credit contracts. In particular, we compare the effects of peer monitoring (which is a special feature on which group lending bases its repayment mechanism) with individual monitoring (which instead is typical of informal lending) on borrowers' incentive to invest in productive activities. The model presented in Chapter 2 predicts that, under some conditions, a higher investment should be observed when an agent chooses to resort to group lending rather than on informal contracts. We test these predictions using data from a World Bank survey carried out in Bangladesh during the period 1991-1992. Estimates provide evidence of a positive influence of both types of credit on investment. However, despite controlling for collateral and other features of contracts which are different from monitoring, the impact of group lending on input expenditure is higher than the impact of informal credit contracts, supporting the idea that peer monitoring acts as a stronger incentive to save and invest with respect to individual monitoring.

On the other hand, several features of the Western model of banking are not accepted in some countries. A reason for this to occur may be due to the presence religious principles. In particular, according to the Shariah,

Islamic banks are not allowed to require a pre-specified interest rate on their loans. Consequently, Islamic credit contracts are based on a profit and loss sharing mechanism, such that, if the borrower is an entrepreneur, a share of the profits coming from his/her economic activity goes to the lender and the same occurs in case of losses. Thus, as opposite to the Western-type of credit, Islamic contracts involve some risk of the lender and this peculiarity can have important consequences on banking governance and several effects on the efficiency of formal lending institutions.

As a consequence, Chapter 3 analyzes the implications of religious beliefs on the efficient behavior of banks. In particular, we show that the profit and loss sharing principle, that is peculiar to Islamic banks, reformulates the allocation of risk between shareholders and depositors. We focus on monitoring as a determinant of bank efficiency, under the assumption that equity is a better device than deposits for reducing excessive risk undertaking. Since in Islamic banks depositors are closer to stockholders in terms of residual claiming on profits, the positive relationship between capitalization and efficiency, highlighted by Basel II Agreements, should in principle be weaker in than in their Western counterparts. In Chapter 3, we check this prediction by means of an efficiency cost frontier analysis. Results, obtained on samples of European-15 and Islamic banks during the period 1996-2002, show that the ratio of equity to deposits negatively affects inefficiency in both types of banks, but this effect is considerably undersized in Islamic banks as compared to European ones, thus providing a justification to the reluctance that has accompanied the proposal of capital coefficient revision for Islamic banks in accordance to Basel II Agreements.

Finally, a credit contract may divert from traditional banking with respect to the approach used by the lender to collect the sum due. In a traditional credit contract, once the borrower does not repay an overdue loan, the lender is allowed to resort to a court which guarantees his/her right to recover the amount due. However, in both industrialized and developing countries, illegal lenders (where illegal refers to the fact that lenders do not resort to the legal system but use means like violence to recover their loans) find convenient to act as substitutes of legal ones. It has been argued (Fazio, 1997) that one of the main determinants of the proliferation of illegal contracts may be the high level of inefficiency of the judiciary system.

Therefore, in Chapter 4 we provide an explanation for the reasons why improvements in the efficiency of the legal system can deter the demand for illegal credit contracts and usury, which can eventually expropriate entrepreneurs from their businesses and foster money laundering activity. In the model presented in Chapter 4 we show that people are more likely to borrow from legal markets when justice is efficient, while they prefer to resort to illegal lenders when justice is inefficient. In the empirical part of this chapter we estimate the impact of the inefficiency of courts (measured by the length of trials) on usury crimes for the provinces of Italy from 1999 to 2002. Econometric estimates support the idea that a higher efficiency of justice can actually reduce the cases of usury.

2

The Effects of Peer Monitoring on Investment

A Comparison Between Group Lending and Informal Credit

2.1 Introduction

In the last two decades, microcredit institutions had spread over a great number of poor countries. The way these institutions operate is mainly through group loans. A considerable number of development economists assert that the strength of this system, supported by the very high repayment rates (over 90 per cent), is mainly due to a particular feature of group loans, which is peer monitoring. The importance of peer pressure as a good substitute for collateral is crucial to make this system work and allows the very poor, who by definition has no collateral to be used to ensure his/her solvability, to escape from the vicious circle of indigence.

In recent years, as a consequence of microcredit rapid diffusion, a significant branch of the literature has focused on the impact that it has on poverty reduction. Many studies analyze the effects of the major lending programs on some households' and firms' behavior, such as per-capita expenditure, labor supply, children school enrollment (Pitt and Khandker 1998; Morduch 1998; Pitt 1999), or business profits and revenues (Madajewicz, 1999). Most part of these works provide evidence that microcredit programs can reduce poverty through productive capital provision (credit services) and through some additional benefits directly linked to program participation (non-credit services), such as education, the observation of basic health rules, skill training and consciousness development.

On the other hand, despite the large number of lending programs introduced by governmental and non-governmental organizations, informal credit is still an important source of funds for rural households in low income countries[1]. In fact, since by definition poor people are considered too risky and often lack any adequate collateral, they are frequently rationed out of the formal banking sector (Stiglitz and Weiss, 1981; Gosh et al., 2000)[2], thus the available sources of credit for them become either participating to a program offered by one or more institutions or resorting to the informal sector.

[1] See Dalla Pellegrina and Masciandaro (2004) for a discussion on the choice between group lending and informal lending.

[2] In many countries credit rationing may also be the outcome of the introduction of interest rate ceilings, as a consequence of usury laws (Blitz and Long, 1965; Shay, 1970; Greer 1973; Dunkelberg and DeMagistris, 1979).

Typically, governmental and non-governmental organizations provide group loans, while informal credit contracts are individually accorded. Thus, the main question addressed in this chapter is the following: is there any particular feature concerning group lending that pushes investment to a larger extent than individual credit is able to do?

The answer we provide is based on peer monitoring and peer pressure. Using a two-period model where individuals have no initial endowments and need to borrow for both consumption and investment purposes, we show that, under certain conditions, investment of input constrained agents grows with monitoring pressure.

Results rely on the strength of social punishment that may follow an adverse behavior of the borrower (i.e., too much credit used for present consumption and a paucity of resources invested), which ends up with the spread of negative information concerning his/her reliability, and in turns affects him/her through the denial of economic benefits from the community. Social sanctions can be implemented by individuals that have been negatively affected by this adverse behavior and are also close enough to the agent, so as to have an incentive to gather information regarding his/her actions.

The hypothesis, in line with the literature, that peer pressure is stronger than the monitoring system set up by an individual lender, leads to the presumption that the amount of resources invested when funds come from a group loan is larger than in an individual (informal) loan.

Using data from a survey carried out by the World Bank during years 1991 and 1992 in Bangladesh, we test this hypothesis focusing on the im-

pact of microcredit programs (that traditionally provide group lending) versus informal loans on agricultural investment. It has to be pointed out that, although agricultural activities seem not the main target of some institution, like the Grameen Bank, they are a primary source of income for rural households in poor countries[3].

Furthermore, they are more relevant for other lenders, like the Bangladesh Rural Advancement Committee (BRAC), or the Bangladesh Rural Development Board (BRDB). The econometric analysis allows to test the hypothesis that peer monitoring and the threat of social sanctions that are imposed in case of misbehavior in a group lending contract induce a higher investment in productive activities than in the case of informal loans.

In the broad class of microcredit we consider three major programs available in Bangladesh: the Grameen Bank, the Bangladesh Rural Advancement Committee (BRAC) and the Bangladesh Rural Development Board's RD-12 Program (BRDB). We also add to this category all other secondary non-government sources of credit (i.e., cooperatives). On the opposite side, we include in the informal class all the loans coming from relatives, friends, neighbors, and those obtained by landlords, input suppliers, shopkeepers and employers.

Under the assumption that farmers are profit maximizing and input constrained, credit of whatever source should have a direct impact on invest-

[3]Although the Grameen Bank targets more new small self-employment activities, the importance of agriculture is stressed in the "sixteen decisions" promoted by the Bank. Some examples are the following: "We shall grow vegetables all the year round"; "We shall eat plenty of them and sell the surplus"; or even "During the plantation seasons, we shall plant as many seedlings as possible".

ment. Following Pitt and Khandker (1998) and Madajewicz (1999) we use three different estimation techniques in order to identify the impact of institutional programs versus informal credit on investment, starting from the very straightforward Two-Stage Least Squares, then adding two other approaches more suited to address both the problem of the censoring nature of credit and the selection bias that originates from endogenous credit market participation[4].

We find that credit services achieve the goal of relaxing farmers' lack of resources and this can raise investment in variable inputs. However, institutional credit is more likely than informal loans to positively affect variable input expenditure and this is consistent with the initial hypothesis concerning peer pressure.

Two important things have to be reminded. First, whereas institutional credit is almost exclusively granted for productive purposes[5], the path of informal credit transactions is not so clear and has to be investigated: a side-aim of this chapter is indeed to focus on the mechanism underlying credit market selection process, identifying which categories more heavily rely on one or the other form of lending. Second, there are other factors that might affect the path of investment, such as the price of credit and the presence of collateral: we do not concentrate on these features in the theoretical part,

[4]Much weight has been given to the problem of endogeneity. As Pitt and Khandker (1998) point out, it is possible to summarize the sources of endogeneity in three broad classes, and within these classes it is important to distinguish pure endogeneity from self selection into a particular program. Since the endogeneity argument represents one of the most important features of the econometric exercise, we will discuss this topic in detail further on.

[5]Although it is possible that some institutions provide consumption loans, these represent a very low percentage over the total amount of available credit. The Grameen Bank, for example, offers a few number of housing loans.

but rather we control for these determinants in the econometric analysis, in order to clean up the estimated coefficients from their presence.

The rest of the chapter is organized as follows. Section 2.2 gives an overview of the differences between institutional microcredit and informal moneylenders. Section 2.3 briefly describes the model. Section 2.4 illustrates the dataset. Section 2.5 turns to the estimation techniques adopted. Section 2.6 focuses on the results. Finally, section 2.7 concludes.

2.2 Microcredit institutions and informal moneylenders

This section gives a brief overview of the role of microcredit institutions located in Bangladesh and compares these institutions with the informal credit market.

As we described in the previous section, the major organizations providing credit to low income households in Bangladesh are: the Grameen Bank, the Bangladesh Rural Advancement Committee (BRAC) and the Bangladesh Rural Development Board's RD-12 Program (BRDB), together with some other minor non-governmental institutions.

The Grameen Bank, established in 1976 by Professor Muhammad Yunus with the aim of creating a credit system able to serve the poorest of the poor, has now more than 2.4 million borrowers, 95 percent of whom are women. With 1,170 branches, the GB provides services in 40,000 villages, covering more than half of the total villages in Bangladesh. The positive impact of the Grameen Bank presence on poor and formerly poor borrowers has been documented in many independent studies carried out by external

agencies including the World Bank, the International Food Research Policy Institute (IFPRI) and the Bangladesh Institute of Development Studies (BIDS).

The Bangladesh Rural Advancement Committee was established as a relief and rehabilitation organization in 1972 after the Bangladesh Liberation War by Mr. Fazle Hasan Abed. Over the years, BRAC has gradually evolved into a large and multifaceted development organization, serving more than 60,000 villages over 86,000 in Bangladesh, corresponding to 4.07 million of borrowers and covering almost all the country area. Furthermore, the Agriculture Extension Programme of BRAC aims to increase the nutritional and income status of the rural households by increasing agricultural production through technology transfer and quality input supply. The Agriculture Programme is also running a number of collaborative projects with Bangladesh Rice Research Institutes (BRRI) and the International Rice Research Institute (IRRI).

The Bangladesh Rural Development Board (BRDB), transformed in 1982 into a nation-wide institution after the success of the Integrated Rural Development Program (IRDP) launched in 1972, is the prime government agency engaged in rural development and poverty alleviation. BRDB basically operates by organizing the small and marginal farmers into cooperative societies for increasing agricultural production through improved means and by forming formal and informal groups of landless men and distressed women to promote income generating activities in the rural areas. With 63,000 primary agricultural cooperatives promoted and 28% of the

beneficiaries that have crossed the poverty line, statistics assess that BRDB is now one of the pioneers in poverty alleviation.

Credit programs offered by the Grameen Bank, the Bangladesh Rural Advancement Committee and the Bangladesh Rural Development Board, mainly operate through group lending. This system relies on solidarity groups: these are small informal groups of four to six persons consisting of co-opted members coming from the same background and trusting each other.

According to the perspectives of this paper, it has to be pointed out that at the beginning, credit provided by these institutions is restricted to income-generating production operations, freely selected by the borrower. Moreover, group members are jointly liable[6] for the total amount borrowed by the group: if one individual fails to repay his/her share of the loan, all other members of the group have to undertake the burden of the share remained unpaid, otherwise the all group is excluded from any other program of the same institution. Each group member is thus monitored by his/her peers, allowing this system to remove the need for physical collateral.

The microcredit system also encourages people to participate to extra-credit activities organized by the bank. These activities take place during weekly meetings and are based on training, discipline and creativity. For example, members of Grameen programs are invited to memorize and repeat the "sixteen decisions". These are rules aimed at raising people's con-

[6]See Ghatak and N'Guinanne for details on joint liability.

sciousness and dignity, thus improving household's standard of living and capability of managing scarce resources.

However, the opportunity cost of participating to weekly meetings and other activities organized by the bank, may be very high for individuals forced to live under the poverty line. These are reasons that can push borrowers towards informal credit contracts compensating the positive effects of non-credit services[7], although they are not the only ones. In fact, it is possible that individuals look for an informal loan for different causes, such as the non-eligibility status for institutional programs, or simply because they have easier access to other forms of funds raising, like intra-family transfers.

The class of informal contracts may be divided in two sub-categories: the first one is formed by suppliers and merchants, while the second is made of landlords, relatives and friends. The difference between these two classes is mainly ascribable to the type of collateral required.

Loans from suppliers and other merchants are extended to farmers mainly against the standing crops of the current season. Such loans are almost exclusively short-term based, and are recovered through the purchase of the output at a price agreed in advance, which is always below the market rate. It is worth to mention that these people are often engaged in activities like buying or selling agricultural inputs and outputs, thus they clearly have some advantage in lending to farmers, because this raises the incentives for the latter to trade agricultural inputs and outputs with them.

[7]This is mainly the reason why we do not give much weight about excluding non-credit services from the remaining part of the analysis.

Most of the credit provided by these agents is carried out during the flowering or ripening season of the crop, when contractors need advances for producers, labor and packing material. Borrowing from informal moneylenders at this stage is optimal because they give immediate approval and flexible amounts of money. The use of physical collateral is not required in contracts of this kind, but rather some other tying arrangement is used as a substitute for it[8].

Landlords, relatives and friends are also part of the category of moneylenders. They are typically wealthy persons linked to the borrower by a close relationship. These individuals are usually influent members of the community to which they belong, and for this reason the monitoring system between borrowers and lenders is sometimes stronger than in the case of suppliers and merchants. However, these lenders set much higher interest rates than institutional programs[9].

Summary statistics supporting this pattern of credit, interest rate and collateral on the sample used for the econometric exercise are illustrated in Appendix A. These statistics emphasize many advantages of program credit versus informal credit (no collateral, lower interest rates, etc.). At this point, one may think that, given eligibility, it would be completely irrational to ask for an informal loan.

The idea is that people are sometimes forced to opt for informal moneylenders. As we illustrated in the previous section, informal credit markets

[8]Usually, as we pointed out above, the standing crop is used as collateral.

[9]Interest rates of 150 per cent and more are not difficult to observe. These interest rates are to be compared with 15 to 20 per cent set by institutional programs.

might be a catalyst for those people that are not eligible for a program, but the pattern of this choice is somewhat ambiguous and difficult to investigate given simple surveys. For this reason we try to find if there is evidence of some categories of individuals that are more suited to borrow from informal lenders, or if there is any evidence of some common behavior within households that choose this form of financing. This evidence is discussed further on.

2.3 The model

We consider a two-period model where agents (farmers) produce and consume a unique good. Agents have no initial wealth to be used for consumption or production purposes and need to finance their consumption in period 0 (X_0) with credit. However, they must devote some resources to a productive activity, which gives a random output Y in period 1. Moreover, agents have some input (L) which is fixed in the short run, and it is typically land (see Pitt ,1999, for a discussion on the rigidity of land market in Bangladesh), but no variable inputs like seeds, fertilizers, etc.[10].

Suppose that the amount borrowed is C and that the share of the loan consumed in period 0 is aC, so that

$$cE = (1 - a)C \tag{2.1}$$

where cE represents variable input expenditure (c is the marginal cost of variable inputs and E is the quantity) and $0 < a < 1$. This is the equation

[10]This situation well represents the problem of farmers in the sample described in the next section, since in Bangladesh land market is almost immobile but other inputs are scarce because of poverty.

to be estimated empirically. More precisely, we want to explain how does the optimal choice of a change with different levels of pressure involved by social sanctions. However, this pressure will also affect the optimal demand of credit, which turns to affect a. Thus, the model is actually concerned about how does an optimal choice of a change with different levels of "social pressure", given the optimal demand of funds.

In order to model these features, we assume that output has the following functional form

$$Y = (1+\delta)\left(\frac{(1-a)C}{c}\right)^{\gamma} L^{1-\gamma} \tag{2.2}$$

where $\left(\frac{(1-a)C}{c}\right)^{\gamma} L^{1-\gamma}$ is a standard Cobb-Douglas production function with weights γ, for variable inputs, and $1-\gamma$, for fixed inputs, where $0 < \gamma < 1$. The term $1+\delta$ represents total factor productivity. We assume that δ is a random shock distributed on $[-1, 1]$, with zero mean and constant variance σ^2. Output is used to pay back the loan and also for consumption in the next period (X_1). The production process has thus constant returns to scale, implying that returns are decreasing in inputs that can be bought through credit.

The agent will pay back his/her loan plus interests if he/she has money to do so, and this will occur with probability $p = \Pr\{Y \geq (1+r)C\}$, where

r is an exogenous interest rate[11], while sanctions are imposed if the output is not sufficient to recover the loan.

Economic sanctions, s_e, depend on the level of enforcement in the economy and are typically a share of the output , $s_e = \psi Y$. We assume that enforcement power is the same for all individuals in the economy, so that an equal share of output is subtracted either by an informal lender in case of default of the borrower, or by the NGO in case of default of the group (see Besley and Coate, 1995). Unlike Besley and Coate, we assume that also peers that rescue some defaulting member of their group have enforcement power and can recover part of the cost incurred by rescuing[12].

On the other hand, social sanctions[13] depend on the degree of information that damaged individuals involved in the contract have on the quantity of funds "eaten" by the defaulting agent in the first period. These are a function of a, $s_s = s_s(a)$, where $\frac{\partial s_s}{\partial a} > 0$ and $\frac{\partial^2 s_s}{\partial a^2} > 0$. Social sanctions are inflicted by informed subjects that are "close enough" to the defaulting agent, so that this closeness justifies the sufficiently low cost of monitoring the level of a. Social sanctions are weighted by a parameter θ, which represents the "threat", or "pressure" exerted by informed agents (creditors and peers) that could potentially spread around negative information

[11]Typically this is the interest rate required by the moneylender if the agent borrows on the informal market, as well as the interest rate charged by the NGO, if the agent participates to a group lending program. Since we can control for interest rates in the regressions, we do not explicitly model the spread between them across different types of contracts. The same argument holds for collateral.

[12]This assumption is like saying that, in case of default, a peer must partially contribute with his/her own (although insufficient) resources to his/her share of the loan.

[13]See again Besley and Coate (1995) on the role of social sanctions.

concerning the low reliability of the subject. Thus θ can be thought as the "incentive" of gathering information on the actions of the borrower.

Assuming that the opportunity cost of money is $\overline{r}$, borrowers maximize their utility with respect to the quantities consumed in each period, the amount of credit borrowed, and the share of funds to be consumed/invested, under the intertemporal budget constraint (2.3):

$$C + \frac{\widetilde{Y}}{1+\overline{r}} = X_0 + cE + \frac{pC(1+r) + (1-p)(\theta s_s + s_e) + X_1}{1+\overline{r}} \qquad (2.3)$$

The intertemporal utility function of the agents is additively separable with instantaneous utility functions that depend on consumption in each period and β is the intertemporal discount factor. Under the assumption of constant price index over time ($P_Y = P_{X_0} = P_{X_1} = 1$), the problem to be solved by the borrower is:

$$\begin{aligned} &\underset{\substack{X_0, X_1, C, a \\ s.t.}}{Max} U(X_0) + \beta E\{U(X_1)\} \qquad (2.4) \\ &X_1 = Y - pC(1+r) - (1-p)(\theta s_s + s_e) \\ &X_0 = aC \\ &cE = (1-a)C \end{aligned}$$

Substituting the constraints into the utility function, the maximization problem (2.4) becomes that of choosing the total quantity of funds borrowed and the share of the loan used for present consumption:

$$\underset{C,a}{Max} U(aC) + \beta E\{U[Y - pC(1+r) - (1-p)(\theta s_s + s_e)]\} \qquad (2.5)$$

The first order conditions for the problem are:

$$U'a+\beta E\left\{U'\left[\begin{array}{c}\frac{\partial Y}{\partial C}-p(1+r)+\frac{\partial(1-p)}{\partial C}\cdot\\ \cdot((1+r)C-s_c-\theta s_s)-(1-p)\frac{\partial s_c}{\partial C}\end{array}\right]\right\}=0 \qquad (2.6)$$

$$U'C+\beta E\left\{U'\left[\begin{array}{c}\frac{\partial Y}{\partial a}-\frac{\partial p}{\partial a}\left((1+r)C-s_c-\theta s_s\right)+\\ -(1-p)\left(\frac{\partial s_c}{\partial a}\theta+\frac{\partial s_s}{\partial a}\right)\end{array}\right]\right\}=0 \qquad (2.7)$$

Hence, the optimal credit demand, as well as the share of funds consumed/invested, will be a function of the marginal cost of inputs, technological parameters, fixed inputs, interest rate and peer pressure.

$$C^*=f(c,\gamma,L,r,\theta) \qquad (2.8)$$

$$a^*=g(c,\gamma,L,r,\theta) \qquad (2.9)$$

There is no close form solution for C^* and a*. However, since this model is aimed at showing how the share of funds consumed/invested varies with different levels of social pressure, we are actually concerned about finding a sign for $\frac{\partial a}{\partial \theta}$.

In Appendix A, using linear utility functions[14], and implicitly deriving the combination of (2.6) and (2.7), we show that it is possible to find sufficient conditions for $\frac{\partial a}{\partial \theta}<0$. By this procedure, we obtain the following (see Appendix A):

[14]This hypothesis could be relaxed either taking account of corner solutions or by assuming different functional forms for utility. However, this would only complicate computations nd give approximately the same insights of the linear utility representation.

Proposition 1 *Under the hypothesis of linear utility functions, the share of funds consumed in the first period decreases the higher the threat of social sanctions if:*

$$(1+r) \geq \psi \frac{\partial \overline{Y}}{\partial C} \quad \text{and} \quad \frac{\theta}{\psi} > \frac{\left|\frac{\partial Y}{\partial a}\right|}{\frac{\partial s_a}{\partial a}} \tag{2.10}$$

Proposition 1 contains important implications concerning the role of social and economic sanctions. Both sufficient conditions, in fact, imply that social pressure has a positive impact on investment if economic sanctions (or law enforcement) are scarce. In particular, the second inequality relates social pressure with economic sanctions, showing evidence of a substitution effect between these two types of punishment. Thus, not only we conclude that social sanctions are important to promote investment where law enforcement is weak and there is convenience to gather information on borrowers, but also the opposite, that is, social sanctions might have an adverse effect on investment if law enforcement is effective.

The econometric work set up in the following sections is aimed at testing the theoretical results concerning the effects of social sanctions on investment, and particularly the consequences on the level of investment induced by types of credit that are different in terms of social pressure. It is worth reminding that the theoretical literature often stresses the importance of peer pressure on group lending repayments: in case of default, since informed individuals involved in a group loan are more concerned about the actions taken by their peers –while informal lenders are often compensated by collateral–, they will have an higher incentive to gather information on

their actions, and thus the parameter θ is supposed to be higher in group lending.

Thus, if conditions (2.10) hold, we should observe a higher impact of group lending on investment with respect to informal lending. According to the model, this should occur whenever social pressure is important relative to law enforcement, that might actually be the case of poor developing countries like Bangladesh.

2.4 The data

The dataset consists of a sample of 516 households. These are rice farmers selected from a survey carried out on 1798 households in rural Bangladeshi villages by the Bangladesh Institute of Development Studies at the World Bank in 1991/92. The reason why we choose this class of farmers is that rice is widely cultivated in Bangladesh.

Moreover, traditional rice, at the time of the survey, was the main crop, while treatment of high yield rice or other crops would typically originate a selection problem in the type of crop. Since a selection issue is already treated in the credit market (see next section for details) we preferred not to further complicate the analysis. We present statistics comparing the full sample of borrowers from NGOs and from informal lenders in the survey and the sample of rice farmers in Tables 2.1 and 2.2.

The survey has been conducted three times during the period 1991 and 1992, but we concentrated on the Aman season (November-February), which is also called the "peak season" for rice crops, since much informa-

tion is missing during the "lean seasons". The original sample consisted of three randomly selected villages from each of the 29 thanas (sub-districts) surveyed. In 24 of these thanas, a microcredit program (Grameen, BRAC or BRDB RD-12) had been in operation for at least three years. A total of 20 households in each village were surveyed.

Statistics from the selected sample of rice farmers surveyed show that bank credit is 13 per cent of total loans made, institutional (NGO) credit represents a share of 65 per cent, while informal credit covers 22 per cent of total loans. Moreover, 35 per cent of the loans are for agricultural purposes, 63 per cent for non-agricultural activities, and 28 per cent for personal uses. From these statistics we can observe the distribution of loans with respect to the credit source: as stated above, informal lenders are more likely to grant loans for personal use (62 per cent of the total), while NGOs finance only 22 per cent of personal use loans; 33 per cent of informal market credit constitutes agricultural loans, as well as for microcredit institutions. NGOs credit is instead massively devoted to non-agricultural activities (72 per cent, as compared with 15 per cent of group loans).

Average NGO loans are 6,622 taka, as compared with a lower average principal for informal loans (3,743 taka). Program interest rate is 16.13 per cent on average, as compared with a mean of 57.30 per cent in the informal credit market. However, NGO interest rates are almost fixed, while informal credit rates considerably differ across the sample with a standard deviation of 65.04.

In the dataset there are no observations concerning the value of collateral: based on information about whether collateral has been actually required,

a dummy was built and used as a control variable together with other measures of transaction costs, such as the distance to the lender.

The sample includes both eligible and not eligible households for microcredit programs. So far, the eligibility rule has been a widely debated issue (Morduch 1998; Pitt 1999). It is common to all microcredit programs that the ownership of less than half an acre of cultivable land constitutes the principal eligibility rule. The main problem is that land quality is unobservable: sometimes households own uncultivable lands, or it may occur that lands cultivated during one season are poorly suited to agriculture during another season. Furthermore, many of these households have small gardens around their houses, even if they do not own any cultivable land. Pitt (1999) points out that the difference between total land ownership and cultivable land is primarily homestead land. Hence, we use total land owned minus homestead land to determine whether an household should be considered a target for NGOs. Since this criterion still does not perfectly match actual program credit participation in the sample, we also use a continuous measure of land to identify the effects of credit on the variables of interest.

Another measure of land has been used to control for decreasing returns to scale: this measure consists of the total area cultivated by household members and includes all rice-cultivated acres by the household, augmented by the share received for sharecrop or fixed-rent outstanding contracts.

Credit of whatever nature is the total amount of borrowed funds from each of the two examined sources, institutional (NGO) and informal. Some authors treat credit as a binary variable: we rather use a continuous mea-

sure of principal because a higher investment should not depend on the simple choice between borrowing or not borrowing, but on the amount of money that actually can raise investment, that is total borrowing.

Inputs are divided in working capital and semi-fixed assets. Working capital is per-acre variable costs. These costs include expenditure for seeds and fertilizers, tillage water costs, etc.. Semi-fixed assets consist of the value of bullocks, ploughs and other agricultural equipment[15]. Land is not included among these determinants because, as we discussed above, land is a properly fixed asset in this economy and credit is rarely used to buy land.

Crop is traditional rice. At the time of the survey only a few farmers were cultivating high-yield crops. Only after the devastating floods of 1998, some NGOs introduced high-yield hybrids.

Furthermore, we include personal variables, such as age and education of households members, their religion and the gender of the household head, as well as technological variables, such as land tenure and other controls like the use of loans. Moreover, the database includes records on the number of relatives who are alive and those who own land. Since a large literature provides evidence of endogeneity of transfers in similar contexts, these represent good controls since they are an exogenous measure of the potential transfers that a household can achieve. Finally, dummy variables are con-

[15]The difference with variable expenditure is that if a farmer cannot seed his/her plot, for example because of a flood, he/she does not have to buy variable inputs but has to bear the cost for semi-fixed assets anyway.

Table 2.1 – NGO Credit

Variables	Full Sample	Rice Farmers
Average Principal (in taka)	7546	6622
Distance to the Lender (miles)	5.0	6.1
Households who Hold less than 0.5 Acres of land	76%	53%
Age of Household Head	40	41
Age of Household Spouse	29	32
Education of Household Head (years)	2.8	3.2
Education of Household Spouse (years)	1.3	1.6

Table 2.2 – Informal Credit

Variables	Full Sample	Rice Farmers
Average Principal (in taka)	4800	3743
Average Interest Rate	49.26	50.30
Loans on which Collateral Has Been Required	12%	13%
Distance to the Lender (miles)	4.0	4.3
Households who Hold Less than 0.5 Acres of Land	68%	53%
Age of Household Head	42	44
Age of Household Spouse	31	34
Education of Household Head (years)	4.1	4.7
Education of Household Spouse (years)	2.1	2.3

sidered in order to correct for village fixed effects, including prices of inputs and rice, which are common to each community.

For more detailed information on the regressors used in the estimation, we summarize all variables in Appendix A.

2.5 Estimation techniques

The empirical work attempts to check two hypothesis: the first is the higher aptitude of institutional credit versus informal loans in raising working capital. The theory, as illustrated in previous sections, predicts that a larger share of investment is associated with program credit because peer monitor-

ing and the threat of social sanctions reduce the quantity of funds used for unproductive purposes. Furthermore, since programs provide short-term loans by definition, whereas informal credit can have a variable structure, we test the same hypothesis on semi-fixed capital: the reason is to determine whether informal funds may be used to finance higher value projects like purchasing agricultural equipment.

The second point we pursue is to investigate the mechanism underlying the process of selection into one or the other credit market. This is a crucial issue because the endogenous nature of credit and the paucity of instruments available could lead to serious biases. So far, the selection mechanism for institutional credit has been investigated by some authors (Pitt and Khandker, 1998), and one of its main exogenous determinants has been recognized in the eligibility rule for programs, that is the ownership of less than 0.5 acres of cultivable land. Thus, the informal sector might be a residual market for all individuals that are rationed out of institutional programs.

However, as pointed out in the previous sections, it may also be the case that some agents choose to self-select into the informal market for different reasons, like a particular relationship with the lender, or even because, given the personal and unproductive destination of funds, they fear high pressure from other group members. Nonetheless, factors that push borrowers towards the informal market are not uniquely determined and have to be investigated through the empirical analysis.

In this section we present the equations estimated in the econometric exercise, then we briefly discuss some sources of endogeneity that frequently

arise when dealing with selection issues. Finally, we illustrate in detail the estimation procedure used.

2.5.1 The equations

Following the approach suggested by Pitt and Khandker (1998) and relying on the theory illustrated in previous sections, we estimate conditional variable input investment (equation (2.13))[16], conditioned on the total amount of credit borrowed (equations (2.11) and (2.12)) and on a set of control variables representing household preferences and technology.

The complete set of reduced form equations estimated is the following:

$$C_{ij}^{N} = X_{ij}\alpha_N + Z_{ij}^{C}\beta_N + \mu_{jN} + \epsilon_{ijN} \tag{2.11}$$

$$C_{ij}^{I} = X_{ij}\alpha_I + Z_{ij}^{C}\beta_I + \mu_{jI} + \epsilon_{ijI} \tag{2.12}$$

$$E_{ij}^{W} = X_{ij}\alpha_W + Z_{ij}^{E}\beta_W + C_{ij}^{N}\gamma_W + C_{ij}^{I}\delta_W + \mu_{jW} + \epsilon_{ijW} \tag{2.13}$$

$$E_{ij}^{F} = X_{ij}\alpha_F + Z_{ij}^{E}\beta_F + C_{ij}^{N}\gamma_F + C_{ij}^{I}\delta_F + \mu_{jF} + \epsilon_{ijF} \tag{2.14}$$

Where i stands for household, which is the unit of observation, and j refers to the village.

[16] We add to the system an equation for conditional semi-fixed input expenditure (2.14), which includes ploughs and other machinery, excluding land, in order to check the possibility that credit also affects investment in the long-run.

C_{ij}^N is the cumulative quantity of institutional credit borrowed by the household from Grameen Bank, BRAC, BRDB and other NGOs, while C_{ij}^I is the cumulative quantity of informal loans; E_{ij}^W is per-acre variable input expenditure and E_{ij}^F are per-acre semi-fixed assets. We refer to variable input expenditure and semi-fixed assets as household estimated behaviors.

X_{ij} are general characteristics of the household common to all equations (such as religion, age of the household head and education) as well as technological features (land tenure, total area cultivated, etc.) and control variables (interest rate, collateral and distance to the lender).

Z_{ij}^C are characteristics of the household that affect credit transactions but not other household's estimated behaviors (such as eligibility status, total land owned[17] and other exogenous measures of potential collateral); while Z_{ij}^E are controls for other characteristics of credit contracts that differ from social pressure (actual interest rate, collateral required).

μ_{jN}, μ_{jI}, μ_{jW} and μ_{jF} are village specific-effects, while ϵ_{ijP}, ϵ_{ijI}, ϵ_{ijW} and ϵ_{ijF} are idiosyncratic errors, such as $E(\epsilon_{ij.}|X_{ij}, Z_{ij}, \mu_{j.}) = 0$ in equations (2.11)-(2.12), and $E(\epsilon_{ij.}|X_{ij}, C_{ij}, \mu_{j.}) = 0$ in equations (2.13)-(2.14). The covariance matrix is assumed to be diagonal. The hypothesis of no correlation among the errors of the equations in the system could not be rejected at 1 per cent significance level for all equations with the Tobit and Selection specifications. However, the test on OLS brings ambiguous results: since it does not reject the null hypothesis of no correlation between NGO credit and expenditure, while it does for informal credit, we decided

[17] For a discussion on the exogeneity of land see Pitt and Khandker (1998) and Pitt (1999).

to estimate separately each equation in the system for coherence with the other specifications.

In the next subsection we discuss some endogeneity issues, then we illustrate the estimation procedure.

2.5.2 Sources of bias

As illustrated in Pitt and Khandker (1998), the sources of bias that may arise when treating programs effects can be summarized into three major classes.

The first class originates from nonrandom placement of credit programs: this problem mainly concerns institutional credit and may be due to the fact that programs are most frequently allocated in poorer villages or more flood-prone areas, rather than in wealthier ones. Treating program placement as random can lead to a downward bias of program effects, as discussed in Pitt, Rosenzweig and Gibbons (1993) and Heckman (1990). The same argument holds for informal lenders that may not be uniformly distributed across the villages included in the sample.

The second class of bias is related to unmeasured village attributes that affect both credit transactions and household behavior. Climate conditions and a high propensity to natural disasters, among the others, are important characteristics affecting both these variables, especially when dealing with agricultural aspects. Also prices and infrastructures are important elements that must be taken into consideration. We correct for these two forms of bias using village fixed effects in both credit and expenditure equations.

Finally, the last source of bias concerns unmeasured household features that affect both credit transactions and household behavior (selection mechanism). These are intrinsic characteristics or personal qualities, like ability and individual aptitudes: it may occur, for example, that more skilled farmers are also more able in obtaining one type of credit, and this would wrongly attribute to that type of credit the higher investment that might instead be due to a higher ability. Such unobservable characteristics may originate a self-selection problem that consists in both the decision of borrowing and the choice of a specific credit market, which in this case can be the institutional or the informal one. Problems of this kind are traditionally solved using instrumental variables when these are available.

A Durbin-Wu-Hausman procedure has been used to test for endogeneity in the sample used. The null hypothesis of no correlation between credit and the error term in equation (2.13) has been rejected in both cases of institutional and informal credit respectively at 5 and 10 per cent significance level[18].

However, credit market selection mechanism can be splitted in two components, an observable and an unobservable one, and some additional information can be exploited using the observable component. A number of individual determinants of the market choice mechanism, like ability, are unmeasurable by definition, but some of them are indeed measurable. The selection system originated by programs exogenous eligibility rules, or by

[18]Credit seems not to be endogenous in explaining semi-fixed assets, although for coherence, and since results do not substantially vary, we report estimates computed with instrumental variables in both equations rather than Two-Stages LS for variable input expenditure and OLS for semi-fixed assets.

existing relationships between the borrower and the lender, are an example of this measurable variables that can be exploited to correct for the market selection mechanism.

In order to solve the problem of endogeneity of different nature, two approaches have been utilized in this work, in addition to the use of fixed effects: the first is related to a particular recursive structure of the system, while the second involves a selection procedure.

As we illustrated above, the system (2.11-2.14) assumes a recursive nature, due to the presence of the Z^C matrix. This is particularly useful in order to have instruments to identify parameters associated to endogenous regressors, such as credit. In both equations (2.13) and (2.14), the variable credit can be instrumented with all the regressors included in Z_{ij}^C but not in X_{ij}. Instruments adopted are program eligibility status (less than 0.5 acres of land owned interacted with a dummy variable that takes value of 1 if there is an NGO in the village) and two continuous and exogenous measures of land owned and inherited assets (house). But exploiting the recursive structure of the system may not be enough, since instruments are still inadequate. However, since there is evidence of self-selection in each credit market, a specific selection model can be estimated in order to generate further instruments, namely the Mills' ratio found in the first stage of the selection procedure.

Finally, another source of bias not related to endogeneity is the censoring nature of credit. In the sample of traditional rice farmers, investment is a continuous variable, but only a portion of these households is borrowing money. Credit is thus censored in equations (2.11) and (2.12). We will

illustrate the methodology used to correct for this bias in the following section.

2.5.3 Estimators

Pitt and Khandker use a quasi-experimental survey design to provide statistical identification of program effects in a LIML context. They identify the effect of participation of a credit program on some households outcomes exploiting the information coming from not eligible households in program villages and the exogenous rule of half an acre of land as a proxy for eligibility. Lacking any information of this kind relatively to informal credit, which is available in every village and does not imply any eligibility rule, we do not use the same approach. Moreover, the presence of a lager number of equations makes that method cumbersome in this case.

The estimation procedure illustrated below goes through the following scheme: first, we adopt an estimator that treats the problem of endogeneity of credit by exploiting the reduced form recursivity of the system (2.11-2.14). We further consider the issue of the censoring nature of credit and the possibility of detecting some credit market selection mechanism from household measurable characteristics.

The first technique is an instrumental variable method (Two-Stage Least Squares-FE). This simple estimation technique treats endogeneity using fixed effects to correct for nonrandom allocation of credit and unmeasured village characteristics that affect both credit transactions and household behavior, instrumenting endogenous regressors to further correct for unmea-

sured household features that affect both credit transactions and household behavior[19].

However, as described above, IV techniques do not consider the censoring nature of credit. We thus treat these issues with a second estimation technique: the Tobit-IV-FE estimator treats all sources of bias cited above together with the censoring nature of credit.

A third estimator (Selection-IV-FE)[20] also makes the market selection device explicit in the credit transaction equations correcting for the fraction of selection bias that is ascribable to its observable determinants[21].

The way Tobit-IV-FE and Selection-IV-FE are built follows the procedure of instrumental variables, that is replacing endogenous regressors with their expected value in order to eliminate unmeasurable error components, but there are clearly several differences in the way the predicted values of the endogenous variables are computed.

The Tobit-IV-FE uses a Tobit model to estimate predicted institutional and informal credit transactions, augmented with all exogenous instruments for credit mentioned above. The predicted expected values of credit

[19] Instruments used are the eligibility rule of half an acre of land owned interacted with the presence of an office of an NGO supplying group loans to pepole living in the village, a continuous measure of land owned and the value of inherited assets (house).

[20] This estimator is based on Heckman (1976).

[21] Instruments are the eligibility rule of half an acre of land owned interacted with the presence of an office of an NGO supplying group loans to pepole living in the village in the first stage, while a continuous measure of land owned and the value of inherited assets (house), together with the Mills' ratio, are used to instrument cumulative credit.

are then plugged into the behavioral equations (2.13) and (2.14)[22] and finally these are estimated with standard maximum likelihood techniques.

Predicted values are computed in the following way:

$$\widehat{C} = E(C|X_{ij}, Z_{ij}^{C}, \widehat{\beta_C}, \widehat{\sigma_\varepsilon^C}) = \int_0^\infty C^* f(C^*|X_{ij}, Z_{ij}^{C}, \widehat{\beta_C}, \widehat{\sigma_\varepsilon^C})\, dC^* \quad (2.15)$$

where $C = C^N, C^I$.

The Selection-IV-FE estimator follows the same procedure as the one described above for the Tobit-IV-FE, but this method includes a credit market selection correction term which is used as an additional instrument for credit. In general, sample selection bias refers to problems where the dependent variable is only observed for a restricted, non-random sample. In this particular case, one only observes household cumulative program borrowing if the household has joined a program. Conversely, household cumulative informal borrowing is observable if the household has agreed to an informal contract.

Moreover, the assumption that underlies a sample selection model is that participation does not have only an intercept effect, but also a slope effect (i.e., the betas differ according to participation status as well). We thus estimated a first stage Probit model to predict the probability of program participation and informal market participation and in the second-stage, we estimated with OLS the expected value of cumulative borrowing including

[22] We also estimated a different version of the Tobit-IV-FE and Selection-IV-FE models, using the corrected fitted values of endogenous variables as instruments for the actual ones, together with all other exogenous instruments. However, results did not change with respect to the Two-stage method illustrated above.

in the subsets of program members and informal borrowers their respective inverse Mills' ratios as regressors. According to this type of model, the participation effect does not show up as an eligibility dummy variable (an exogenous proxy for participation), but rather in the fact that the constant terms and betas may differ from the sample of program borrowers to that of informal borrowers. Predicted values of credit are computed according to (2.15) times the probability that credit is observed. The following section compares the results from the estimation techniques described above.

2.6 Results

In this section we present the estimates of the model described by equations (2.11-2.14). The results are reported in Tables 2.3-2.7. Tables 2.4 and 2.5 refer to institutional and informal cumulative credit transactions, while Table 2.3 reports the first stage of the selection technique. Finally, Tables 2.6 and 2.7 illustrate the estimated parameters values of working and semi-fixed capital.

Moreover, instead of reporting the Tobit actual estimated parameters in column 3 of Tables 2.4 and 2.5, we scaled them by the probability of falling in the uncensored region, in order to allow comparisons with the least squares marginal effects in column 2 of each table. Thus, institutional credit parameters were scaled by $\widehat{\Phi} = \Phi(\widehat{\beta}'\overline{X}/\widehat{\sigma})$ =0.43, while informal credit parameters were scaled by $\widehat{\Phi} = \Phi(\widehat{\beta}'\overline{X}/\widehat{\sigma})$ =0.13.

2.6.1 Credit

Since the dependent variable in credit equation (cumulative loans) may capture both the probability of joining a particular credit market as well as the actual quantity of cumulative funds borrowed, it would be interesting to separate these two determinants.

As an example, suppose that the sharecropper status is a positive determinant of informal borrowing. By estimating an equation where the dependent variable is total amount of loans with a Two-Stage LS or Tobit, one may infer that sharecroppers borrow a higher quantity of money. However, this might not be the right conclusion, since it does not distinguish among the higher propensity for these category of farmers of borrowing in this market and the quantity of funds they are able to raise.

Indeed, sharecroppers have easier access to informal markets because of their close relationship with landlords, but these loans show on average smaller amounts because sharecroppers are in general poorer than other class of farmers, (i.e., they have inadequate collateral). Even Tobit estimates fail to capture this effect, while the comparison between results of the first-stage selection model with other estimators can help disentangling this problem. Bearing in mind this aspect, a detailed description of the main determinants of credit transactions follows.

Land status is measured by two variables. The first is a dummy variable (Target*NGO) which assumes a value of 1 if the household owns less than 0.5 acres of land, interacted with a dummy for the presence of an NGO in the village, thus identifying program eligibility. As previously discussed,

there are various explanations for the non-significance of that variable in the cumulative credit equations. However, this variable becomes significant in the determination of program participation in (Table 2.3, column 2). Conversely, the possession of less of half an acre of land deters informal borrowing (Table 2.3, column 3).

A continuous measure of land captures the program target of landless borrowers once we do not control for program participation (Table 2.4, column 3). On the other hand, the cumulative amount of informal borrowing grows with land owned: this feature very well captures the important role of land as a collateral for informal credit contracts in agriculture. Moreover, land seems to be the only collateral required, since the dummy that identifies whether a house has been inherited is not significant.

Male education is another important determinant of the amount of loans granted, especially for informal lending: this reflects the fact that moneylenders tend to lend larger amounts of money to highly reliable individuals in the village. Religion is also a determinant of cumulative borrowing: Islamic, rather than Jewish households are granted larger loans, and this might be a wealth effect, since in Bangladesh the latter are on average poorer than the former.

Other determinants of program credit transactions are potential sources of transfers: a higher number of parents, children and siblings who own land, which is an exogenous proxy of intrahousehold transfers and wealth, generally tends to decrease cumulative borrowing in both cases of informal credit and group lending.

On the other hand, the number of relatives who are alive, slightly tends to increase the propensity of participating to group lending and deters participation in the informal market: this might be the effect of the spreading information among relatives regarding some benefits of microcredit (e.g. lower interest rates, no collateral and non-credit services). However, this variable, especially the number of children and siblings alive, seems to increase cumulative informal borrowing, and this might be the effect of the use of human collateral.

In conclusion, it seems that informal credit is chosen by agents who have a close relationship with the lender, as in the case of sharecroppers, trusted (i.e., more educated) persons in the village, that own land (which is the only collateral accepted by moneylenders). On the other hand, household that participate to program lending are landless (as required by NGOs targeting), potentially poor (with landless relatives) but might be more informed concerning life in the village, thanks to the larger net of relatives they possess.

2.6.2 Investment

Tables 2.6 and 2.7 report estimates of the impact of credit on working and semi-fixed capital.

The hypothesis that NGO credit has a higher impact than informal credit on investment in variable inputs seems to hold. This impact seems not to be due to any difference between group loans and informal contracts which are not specified by the model: neither to the cost of credit, since we controlled

for both interest rates actually faced and other transaction costs[23], nor to the presence of collateral on informal loans[24]. On the other hand, credit of whatever nature has no impact on semi-fixed assets, which are very poor in the sample used, and this is consistent with our short-run model.

Furthermore, the issue of endogeneity seems relevant, since parameters associated to informal credit variable are not significant unless we correct for the bias arising due to the market selection component. Institutional credit parameter is positive and significant at 5 per cent level in 2SLS and at 10 per cent level in the Tobit, while it is significant at 1 per cent level in the Selection model. On the other hand, informal credit parameters are lower than NGO credit parameters as the model predicts, even though they need a correction for selectivity in order to become significant. Institutional credit, for example, has the effect of increasing per-acre variable input expenditure by 5.5 per cent, as predicted by the Selection model, against 1.2 of informal credit.

Variable input expenditure is higher the better educated are the household head and his wife, although education seems to strongly determine the acquisition of semi-fixed capital. Moreover, the traditional inefficiency of sharecropping contracts shows up in a lower investment in variable inputs with respect to the rest of the sample (fixed-rent croppers and self-cultivating ones).

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[23] Although they are not significant, the signs of the parameters associated to the cost of credit have a negative sign as predicted by the model, at least for what concerns short-run expenditure.

[24] If we consider, as in the spirit of the model, that collateral can increase the incentive to invest due to the threat represented by its loss in case of default, its parameter should have a positive sign in the expenditure equation, as it actually does.

Total area cultivated seems not to determine variable input expenditure, but rather it strongly influences semi-fixed input accumulation. As expected, indeed, semi-fixed input expenditure shows an inexistent link with rural credit, since the amount borrowed is often too low to finance investments greater than seeds and fertilizers. Semi-fixed input expenditure rather massively and negatively depends on the extension of the area cultivated. In fact, the pattern of decreasing returns is clearly more evident here than it is for variable expenditure, where the parameters show the same signs but are not significant.

Finally, Hausman tests performed comparing credit coefficients estimated in equation (2.13) with OLS, versus IV, Tobit, or Selection specifications, rejects the null hypothesis of no regressor-error correlation only with Tobit or Selection specifications, suggesting that IV are probably not the correct technique to be used in this case.

2.7 Conclusions

As a consequence of the rapid growth of microcredit institutions, a considerable literature concerning the impact of these programs on poverty reduction has developed. Many studies analyze the effects of the major lending institutions on some household behavior and most part of these works provide evidence that microcredit programs can reduce poverty through productive capital provision (credit services) and through some additional benefits directly linked to program participation (non-credit services), such as education, the observation of basic health rules, skill training and con-

sciousness development. However, there are no models focusing on investment, which is actually the main purpose of NGOs.

Moreover, despite the large number of lending programs introduced by governmental and non-governmental organizations, informal credit is still an important source of funds for rural households in low income countries. The reason is mainly due to the credit rationing mechanism that occurs on the formal banking sector, which is an outcome of the high risk associated to lending to the poor, but also to the rationing mechanism based on land owned that occurs in group lending provided by some NGOs, which penalizes many farmers.

This chapter, using data from a World Bank survey carried out in Bangladesh during the period 1991-1992, gives close insights concerning credit market selection mechanism and clearly shows evidence of this feature.

The model presented here tries to compare the effects on investment of these two types of credit, focusing on the impact exerted by social sanctions on the propensity to invest in productive activities. Its implications are that, under certain conditions, agents that rely on group lending programs are induced to invest a higher portion of their loans in productive activities, and this is due to the heavier threat of social sanctions that might be inflicted in case of misbehavior of the borrower. The econometric analysis presented here makes this feature evident for what concerns variable input expenditure, validating the hypothesis of the model in the short-run.

Table 2.3 – First Step Heckman Procedure

Dependent Variable: *credit=1*	NO Credit	Informal Credit
Religion	-0.473	0.269
	(1.48)	(0.68)
Age HH Head	0.002	-0.011
	(0.22)	(0.77)
Age HH Spouse	-0.001	0.001
	(0.14)	(0.11)
Education HH Head	0.033	0.055
	(1.04)	(1.42)
Education HH Spouse	-0.028	-0.013
	(0.65)	(0.24)
Household is Male	0.702	-0.321
	(0.93)	(0.31)
Number of Persons in the HH	0.071	0.079
	(1.48)	(1.40)
Fixed Rent	0.310	-0.258
	(1.55)	(1.00)
Sharecropping	0.057	0.556**
	(0.30)	(2.15)
Total Area Cultivated	-0.235**	-0.113
	(2.09)	(0.95)
Parents Own land	-0.089	0.024
	(0.81)	(0.15)
Siblings Own land	-0.048	0.090*
	(1.25)	(1.67)
Children Own land	-0.086***	0.034
	(2.62)	(0.80)
Other Relatives Own land	-0.000	-0.006
	(0.01)	(0.13)
Parents Alive	0.063	-0.189
	(0.57)	(1.25)
Siblings Alive	0.073**	-0.075*
	(2.17)	(1.80)
Children Alive	0.063**	-0.016
	(2.09)	(0.48)
Other Relatives Alive	-0.019	0.047
	(0.61)	(1.23)
land	-0.105	0.009
	(1.22)	(0.26)
House	1.958***	-0.399
	(7.20)	(1.24)
Target*NO	0.457**	-1.459*
	(2.12)	(1.88)
Constant	-7.683***	-6.285
	(4.44)	(0.89)

Absolute value of t-statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 2.4 – NGO credit

Dependent Variable: *NGO credit*	2SLS (I stage)	Tobit	Heckman
Religion	-2,468.564***	-1,755.74***	-637.932
	(3.13)	(2.82)	(0.57)
Age HH Head	31.087	30.32	46.495
	(1.21)	(1.35)	(1.04)
Age HH Spouse	3.298	6.64	4.370
	(0.15)	(0.35)	(0.12)
Education HH Head	80.678	25.44	52.259
	(1.19)	(0.43)	(0.50)
Education HH Spouse	11.611	71.52	144.978
	(0.12)	(0.89)	(1.04)
Household is Male	196.021	965.42	1,216.738
	(0.11)	(0.61)	(0.43)
Number of Persons in the HH	83.236	124.98	-21.665
	(0.81)	(1.37)	(0.12)
Fixed Rent	353.748	340.43	-447.173
	(0.78)	(0.87)	(0.63)
Sharecropping	-19.188	-201.86	-202.340
	(0.05)	(0.53)	(0.29)
Total Area Cultivated	-635.046***	-587.82***	-193.215
	(2.89)	(2.74)	(0.48)
Parents Own Land	-142.861	-252.15	27.255
	(0.56)	(1.14)	(0.07)
Siblings Own Land	-80.181	-30.53	-19.268
	(0.93)	(0.43)	(0.16)
Children Own Land	-184.038**	-179.28***	-74.026
	(2.46)	(2.62)	(0.54)
Other Relatives Own Land	18.322	69.06	145.475
	(0.22)	(0.96)	(1.15)
Parents Alive	-25.690	-67.61	-136.162
	(0.10)	(0.32)	(0.36)
Siblings Alive	102.303	91.14	132.860
	(1.45)	(1.50)	(1.11)
Children Alive	93.824	67.98	-136.161
	(1.48)	(1.23)	(1.28)
Other Relatives Alive	35.270	-5.67	-17.368
	(0.52)	(0.09)	(0.16)
Land	-1.943	-236.56*	143.236
	(0.02)	(1.83)	(0.40)
House	3,104.209***	3,028***	-2,991.724**
	(6.08)	(7.57)	(2.10)
Target*NGO	377.538	73.22	
	(0.29)	(0.17)	
Mills lambda			-3,694.536**
			(2.13)
Constant	1,221.912	7,027.13***	20,632.896***
	(0.26)	(3.29)	(3.50)

Absolute value of t-statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 2.5 · Informal credit

Dependent Variable: *Informal credit*	2SLS (I stage)	Tobit	Heckman
Religion	-316.308	-47.501	-2,271.765**
	(1.04)	(0.49)	(2.06)
Age HH Head	-3.958	-7.874	-3.114
	(0.40)	(0.91)	(0.07)
Age HH Spouse	4.706	8.357	-1.536
	(0.56)	(1.13)	(0.04)
Education HH Head	50.444*	45.383**	228.913*
	(1.93)	(2.22)	(1.88)
Education HH Spouse	-27.016	-24.509	190.501
	(0.75)	(0.88)	(1.16)
Household is Male	46.806	68.396	44.237
	(0.07)	(0.98)	(1.38)
Number of Persons in the HH	1.230	6.952	-225.666
	(0.03)	(0.22)	(1.00)
Fixed Rent	-39.311	84.130	1,217.728
	(0.23)	(0.59)	(1.28)
Sharecropping	147.186*	177.845*	-2,501.825**
	(1.68)	(1.79)	(2.48)
Total Area Cultivated	-2.241	-39.194	-0.656
	(0.03)	(0.61)	(0.00)
Parents Own Land	-83.216	-127.478	-1,436.272**
	(0.85)	(1.48)	(2.50)
Siblings Own Land	18.609	18.665	-246.344
	(0.56)	(0.70)	(1.38)
Children Own Land	-43.876	-12.342	-224.102**
	(1.52)	(0.51)	(2.03)
Other Relatives Own Land	6.329	24.771	218.910
	(0.20)	(1.02)	(1.33)
Parents Alive	-26.129	-26.996	750.403
	(0.27)	(0.33)	(1.50)
Siblings Alive	18.384	11.139	265.651*
	(0.68)	(0.53)	(1.90)
Children Alive	15.301	3.660	224.163*
	(0.62)	(0.19)	(1.80)
Other Relatives Alive	6.921	8.365	102.334
	(0.26)	(0.40)	(0.64)
Land	60.085*	26.543*	396.222**
	(1.91)	(1.72)	(2.57)
House	-289.823	-677.510	-1,079.643
	(1.47)	(1.01)	(0.80)
Target*NGO	-389.647	-561.976**	
	(0.79)	(2.00)	
Mills lambda			-1,885.354*
			(1.88)
Constant	71.777	-1,793.357**	-1,702.319
	(0.04)	(2.25)	(0.47)
R-squared	0.39		

Absolute value of t-statistics in parentheses
significant at 10%; ** significant at 5%; *** significant at 1%

Table 2.6 – Variable Input Expenditure

Dependent Variable: *Variable Input Expenditure*	2SLS (II stage)	ML(Tobit)	ML(Heckman)
NGO Credit	0.126**	0.032*	0.054***
	(2.15)	(1.66)	(3.08)
Informal Credit	0.109	0.016	0.012*
	(0.45)	(0.45)	(1.67)
Religion	312.128	94.427	136.278
	(1.25)	(0.67)	(1.00)
Age HH Head	-5.241	-1.592	-1.199
	(0.87)	(0.36)	(0.28)
Age HH Spouse	-2.733	-3.673	-4.506
	(0.57)	(1.00)	(1.24)
Education HH Head	13.518	24.962**	20.763*
	(0.70)	(2.18)	(1.80)
Education HH Spouse	27.906	23.268	26.337*
	(1.36)	(1.50)	(1.70)
Household is Male	427.335	276.091	295.849
	(1.04)	(0.89)	(0.96)
Number of Persons in the HH	-14.661	-7.345	-14.365
	(0.63)	(0.42)	(0.83)
Fixed Rent	113.503	85.469	82.926
	(1.10)	(1.12)	(1.09)
Sharecropping	-163.166*	-167.713**	-164.814**
	(1.80)	(2.43)	(2.40)
Total Area Cultivated	-30.941	-54.564	-36.863
	(0.32)	(0.75)	(0.51)
Total Area Cultivated Squared	11.929	9.228	8.452
	(0.78)	(0.80)	(0.74)
Use: Dowry	-17.322	-74.263	-26.200
	(0.04)	(0.29)	(0.11)
Use: Non farming activities	131.268	54.339	48.523
	(0.95)	(0.67)	(0.65)
Distance to the Lender	-6.087	-2.013	1.532
	(0.90)	(0.51)	(0.45)
Interest Rate	-1.846	-1.653	-0.801
	(0.97)	(1.33)	(0.76)
Collateral	351.124	344.705	356.824
	(0.38)	(1.23)	(1.50)
Constant	-1127.456	662.934	702.883
	(0.73)	(0.74)	(0.89)
R-squared	0.34		

Absolute value of t-statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
Other controls: Parents Own Land; Siblings Own Land; Children Own Land; Other Relatives Own Land; Parents Alive; Siblings Alive; Children Alive; Other Relatives Alive.

Table 2.7 – Fixed Input Expenditure

Dependent Variable: *Fixed Input Expenditure*	2SLS (II stage)	ML(Tobit)	ML(Heckman)
NGO Credit	0.016	-0.174	-0.094
	(0.04)	(1.09)	(0.65)
Informal Credit	0.167	-0.357	-0.070
	(0.09)	(1.26)	(1.12)
Religion	44.263	-483.096	-294.633
	(0.02)	(0.42)	(0.26)
Age HH Head	-51.224	-44.885	-51.206
	(1.22)	(1.25)	(1.43)
Age HH Spouse	17.569	18.663	20.576
	(0.52)	(0.62)	(0.68)
Education HH Head	174.492	200.265**	190.403**
	(1.18)	(2.12)	(1.99)
Education HH Spouse	5.770	5.070	5.148
	(0.04)	(0.04)	(0.04)
Household is Male	356.292	345.043	353.768
	(0.12)	(0.14)	(0.14)
Number of Persons in the HH	130.447	155.139	166.033
	(0.79)	(1.09)	(1.15)
Fixed Rent	335.353	310.052	298.736
	(0.48)	(0.49)	(0.47)
Sharecropping	-694.233	-642.032	-722.953
	(1.08)	(1.13)	(1.27)
Total Area Cultivated	-2,293.545***	-2,357.154***	-2,330.437***
	(3.42)	(3.96)	(3.89)
Total Area Cultivated Squared	239.161**	236.529**	241.271**
	(2.25)	(2.49)	(2.53)
Use: Dowry	-2,645.794	-1,806.261	-2,330.659
	(0.64)	(0.86)	(1.13)
Use: Non farming activities	-1,025.094	-766.716	-856.640
	(1.10)	(1.15)	(1.39)
Distance to the Lender	24.845	48.405	26.638
	(0.48)	(1.49)	(0.94)
Interest Rate	6.654	16.015	6.339
	(0.42)	(1.56)	(0.72)
Collateral	-466.591	1,002.150	207.532
	(0.07)	(0.44)	(0.11)
Constant	1,557.132	40,181.473***	40,202.28***
	(0.22)	(6.16)	(6.16)
R-squared	0.26		

Absolute value of t-statistics in parentheses
significant at 10%; ** significant at 5%; *** significant at 1%
Other controls: Parents Own Land; Siblings Own Land; Children Own Land; Other Relatives Own Land; Parents Alive; Siblings Alive; Children Alive; Other Relatives Alive.

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3

Capitalization, Efficiency and Governance in Islamic Banks

3.1 Introduction

Some Western Financial Institutions, after the controversial debate on bank capital adequacy, started discussing about the proposal of extending Basel II principles to other credit providers as well, including Islamic banks.

On the other hand, a strong opposition has been encountered. Some Islamic academics[1] claim that the request of capital coefficient adequacy is excessive and discriminating from the Islamic finance perspective, since the peculiar nature of Islamic contracts is indeed, by itself, an efficient and suitable instrument of risk absorption.

Thus, the crucial point raised in this chapter is the following: in order to ensure equal competitive conditions, capital ratios have to be imposed on every type of bank, regardless of its operational setup (Western or Islamic),

[1] Among others, see Obaidullah (2004).

or the opposite is true? In other words, does the financial structure matter in this context?

As far as the Western model of banking is concerned, theory states that the weight of equity, relative to other forms of funds provision –especially deposits– could, under certain conditions, push managers towards an efficient behavior in terms of shareholders' and other agents' interests. However, this does not necessarily mean that this result has to be automatically extended to the model of Islamic banking, where both deposit demand and credit supply contracts follow the principle of risk-sharing. This crucial difference in terms of the nature of contracts may imply some important effects in terms of capitalization requirements.

In the Western type of banking, the contractual relationship that links shareholders to managers is clearly different from the relationship that links depositors to managers: in the first case, risk sharing principles are somehow contemplated, while in the second case, a deposit contract tends to insure both initial capital and nominal returns against the risk of bad management[2]. On the other hand, in the Islamic banking framework, the status of a depositor is closer to the status of a shareholder, since both are *residual claimants* on bank profits and also share losses, thus the latter is not necessarily supposed to insure the former.

But what is the main difference between depositors and shareholders in the Western banking framework? One discriminating element is definitely

[2]Here we depart from the extreme case of bankruptcy and bank runs (for details on this topic, see Diamond and Rajan, 2000).

represented by the different role of monitoring exerted by one or the other category of stakeholders.

Whenever an agent invests some funds that are not insured against the risk of bad management he/she will be more willing to invest time and resources in order to monitor the behavior of the institution which is managing his/her funds. Nevertheless, if capital is insured and remuneration does not reflect the efficient use of resources, there is no incentive for close monitoring (apart from forecasting the risk of bankruptcy).

If this claim is correct, we should observe more efficiency in Western banks when leverage (i.e., the ratio of deposits to equity) is lower, but this effect should be weaker whenever the figure of the depositor does not substantially depart from the one of the shareholder, i.e. in Islamic banks.

At a first glance, one might think that there should be no difference between the role of depositors and shareholders within the Islamic system. However, as described in the next section, this seems not to be a correct claim, since a crucial distinction between shareholders and depositors is still, even in Islamic banks, the right of voting. In fact, voting means bearing a higher level of responsibility and its reward is represented by a higher participation to profits.

In this chapter, the relationship between equity and deposits is analyzed using efficiency frontier techniques on a sample of European and Islamic banks. Results show that the reduction of inefficiency implied by a higher equity to deposits ratio is significant for both types of banks in the sample, but it is almost twice as weak for Islamic banks, thus supporting the claim

that capital ratios are somehow effective in terms of efficiency, but they need to be targeted on each specific model of banking.

The chapter is organized as follows: Section 3.2 illustrates the economic features of Islamic contracts, analyzing the state of literature on efficiency and banking governance, in Section 3.3 we describe the data, Section 3.4 introduces the econometric techniques used for estimation of the efficiency frontier. Results are presented in Section 3.5. Section 3.6 concludes.

3.2 Islamic banking, efficiency and governance

In this section we briefly introduce the basic structure of Islamic contracts, then we switch to the theoretical literature on banking governance in order to illustrate the main points of interest that characterize the differences between the Islamic and the Western financial systems.

3.2.1 Islamic contracts

What is the design of Islamic banking contracts? There are various features of Islamic contracts; however, within the banking framework, we can distinguish two main types: Mudaraba and Musharaka[3].

The former consists of an agreement between two parts, whereby one of them, the financier, entrusts funds to another part, the bank (who does not provide capital but only managerial experience and effort), to undertake an economic activity. In Mudaraba, the financier is not allowed a role in the management of an enterprise. Consequently, Mudaraba represents a profit

[3]On the types of contacts see Lewis and Algaud (2001).

and loss sharing contract where the return to lenders is a specified share in the profit/loss that turns out from the project in which they have a stake. That is, once the outcome of the project financed is realized, profits are splitted between the financier and the entrepreneur in line with the specified shares, while in the opposite case the financier is not liable for losses that go beyond the capital he/she has contributed. Thus the entrepreneur does not share in the losses except for the opportunity cost of his/her time and effort.

On the other hand, in Musharaka, the entrepreneur adds some of his/her own capital to that supplied by the financial investors, so exposing himself/herself to the risk of capital losses. Thus, loosely speaking, Musharaka can be compared to a joint venture. Since the investor contributes with his/her capital, in general he/she can therefore claim a greater percentage of profits. In most other respects, this contract bears the same characteristics of Mudaraba.

Mudaraba and Musharka constitute the twin pillars of Islamic banking (Ariff, 1982). The Musharaka principle is invoked in the equity structure of banks and is similar to the modern concepts of partnership and joint stock ownership. On the other hand, as far as depositors are concerned, the bank manages their funds to generate profits subject to the rules of Mudaraba.

Islamic deposits can be of four types: current accounts, saving deposits, investment deposits and some special investment accounts. As in the most part of Western countries, current accounts do not receive any remuneration and are exempted from losses. In all other cases, deposits are pooled by the bank under a Mudaraba agreement in addition to other lawful (but

often less preferable) modes, including mark-up, deferred sales or leasing, to provide funds to its customers. The unique limitation is that the bank cannot use funds to finance activities that are forbidden by the Shariah (such as the production and trade of tobacco and alcohol).

Sometimes contracts take the form of the so-called "two-tier" or "triple" Mudaraba principle. In this arrangement, the Mudaraba contract has been extended to include three parties: the depositors as financiers, the bank as an intermediary, and an entrepreneur who requires funds. Thus, the bank acts an entrepreneur when it receives funds from depositors and as a financier when it provides the funds to entrepreneurs.

This brief description shows up some differences and similarities between the Islamic and the Western financial systems, as well as between the role played by equity and deposits in each type of banking. Clearly, these two sources of funds are not considered identical in any situation, since in general, as previously pointed out, Musharaka entails to a larger share of profits (and bears a larger share of losses as well) than Mudaraba. Therefore, even in Islamic banks, we would still expect some different impact of equity, as compared to deposits, on bank efficiency.

Before turning to the estimation of this effect, what remains to be analyzed is what the theoretical literature has so far explained about the relationship between equity and debt[4] and its impact on firms' performance.

[4]Since there is a plenty of literature on this topic, we concentrate only on works that are helpful to understand the specific relationship between equity and a particular figure of debt holder, that is the depositor.

3.2.2 Theoretical background

Since financial economics has often taken as a starting point of development the efficiency of the banking system, this study is aimed ad identifying which are the main determinants of inefficiency within Islamic banks, taking into account the fact that they might face different unitary costs or make a different use of inputs than Western banks. Therefore inputs have a singular impact on efficiency depending on the structure of the banking system.

Moreover, as discussed in the previous section, the replacement of returns on a fixed basis (interest rate) with a profit and loss share principle, implies some peculiar features with respect to the Western financial system.

In this work, we focus our attention on the effects of monitoring on the managerial activity. In fact, apart from the case of current accounts, if savings entrusted to an Islamic bank increase or decrease following the profit or losses of the bank, the owner of these savings will be more concerned about the behavior of managers ruling the institution and has more incentive to monitor their choices. The same is not true for Western banks, where depositors have their capital (and also returns, as long as these are predetermined) insured. This practice could end up in a different impact of equity over deposits in Islamic banks as compared to Western financial institutions.

The literature on corporate finance (see below) has long produced works in order to give an explanation for the monitoring incentives of shareholders on managerial activity. But where do the monitoring incentives of depositors originate?

In the Western banking system there would be no specific reason for depositors to monitor managerial activity apart from the risk of bank-runs, while in the Islamic framework profit and loss sharing contracts are, by themselves, a sufficient reason for monitoring. However, at this point, one may ask which are the monitoring devices used by depositors.

Formally, as discussed above, within a Mudaraba contract the principal (the depositor) should not be entitled to interfere with the management of the agent (bank managers). In practice, Khan and Mirakhor (1992) discuss about the possibility of having both direct and indirect control in these situations. The first realizes through some explicit restrictions on the contract (restricted Mudaraba), while the second operates through implicit agreements, such as the threat of withdrawing sums or the loss of reputation, that are even more effective in a highly trust-based environment, such as that of Islamic financial institutions, than in more anonymous contexts, as those of Western banks.

Moreover, although this is not the main point of this work, it has to be mentioned that, even on the asset side of the balance sheet of a bank, managers of Islamic institutions should have a stronger incentive than Western bank managers to monitor their clients, for the same reasons illustrated in the case of depositors.

However, since on the funds provision perspective Islamic bank contracts are more defined, while the supply of funds is realized through various types of contracts (that sometimes are not properly of profit and loss sharing), in the econometric estimation we concentrate solely on the former aspect, that is the existence of possible similarities between shareholders and depositors.

In other words, we focus on depositors as residual claimants on profits, by trying to measure the impact of their monitoring activity on the level of efficiency. For this reason it is worth to remind some basic theories on corporate governance concerning the relationship between different types of stakeholders in determining corporate efficiency.

Since the pioneering work of Modigliani and Miller (1958) on indifference between debt and equity, academics have long tried to find explanations for the non-neutrality of this postulate. In the perspective of our work, the key problem raised by this literature is the moral hazard behavior of managers, which ends up in the theory of agency costs. Actually, since managers have interests that depart from those of shareholders (and, in the case of the banking industry, from those of depositors as well), they might have an incentive to waste firm resources rather than increasing firm value.

Jensen and Meckling (1976) and Myers (1977), among others, analyze the inverse relationship between the strong use of leverage and firm performance. The authors claim that a higher leverage also means higher agency costs due to the presence of conflicting interests between shareholders and debt holders: this moral hazard problem suggests that leverage may be negatively correlated with firms performance.

On the other hand, Jensen (1986) points out how the conflict between shareholders and debt holders could expand the banking activity beyond its maximum level of efficiency. This situation might actually occur, for example, when managers' rewards are dependent upon the dimension of banking assets, with the result of an increasing overall level of risk in the banking system.

In this case, debt financing might raise the pressure on managers to perform, because it reduces the moral hazard behavior by reducing the "free cash-flow" at the disposal of managers. Consequently, firms with a higher leverage should be the most inclined to improve their performance.

Nevertheless, a survey of the empirical literature[5] on this debate shows a lack of consensus on the link between leverage and bank performance. However, two key elements may explain this divergence. On one hand, this literature uses various measures of performance: either basic accounting ratios or more sophisticated measures, such as total factor productivity indicators. Consequently, it can be argued that different conclusions can result from the differences in the measures of performance.

On the other hand, this phenomenon may also be the result of the fact that many studies use unsatisfactory measures, as the disadvantages of using raw accounting measures to evaluate corporate performance are well known. It is worth noting, however, that all studies were only performed on one country. Therefore, different conclusions may result from the influence of the institutional framework on the relationship (Weill, 2002).

Finally, a crucial point is that, in the banking framework, the traditional conflict between managers and shareholders has to be reconsidered in order to take account of another class of stakeholders –depositors– whose interests, in the Islamic financial system, are rather more similar to those of equity holders than to those of debt holders.

[5]For a survey of empirical studies on the impact of ownership structure on corporate performance, see Short (1994).

In the following sections we empirically estimate the different impact of leverage (deposits over equity) on bank performance in both Islamic and Western banks using a Stochastic Cost Efficiency Frontier approach.

This method interprets inefficiency as the diversion between actual expenditure observed for a bank and the minimum expenditure achievable, where this minimum expenditure is estimated through the construction of an efficiency frontier.

3.3 The data

Our sample of Islamic banks (excluding mixed banks with Islamic services) has been extracted from the database Bankscope for the period 1996-2002.

The original sample included 49 banks but, due to mortality and mergers, we had to drop 14 banks. Hence, the analysis has been carried out on 35 banks during the period 1996-2002 for a total of 245 observations.

As a representative sample of the Western banking system, data on European-15 banks have been extracted for the same period of interest[6]. In this case, the original sample included 8,017 banks but, again due to mortality and mergers, they have been reduced to 6,800.

More accurate details concerning the procedure followed in the empirical analysis to perform comparisons between the two blocks of financial institutions will be described in the next section.

[6]The reason why we choose European-15 banks is that they are part of a block of countries that are similar in terms of financial regulation and particularly, that are willing to accept Basel II principles of capital adequacy.

Descriptive statistics reported in Table 3.1 show some differences and similarities between European and Islamic financial institutions. First, from the liability side, the average percentage of deposits in the period 1996-2002 represents, for European and Islamic banks respectively, 60 and 69 per cent of total liabilities, including equity and reserves (i.e., total assets).

Risk capital, on its turn, is 9 per cent of liabilities in the sample of Islamic banks and 7 per cent in the sample of European banks. The remaining part of liabilities is composed by certificates of deposit, bonds, and other sources of debt.

Second, from the revenue side, Islamic banks seem more willing to exert a traditional activity with respect to their European counterparts: in fact, net ordinary loans represent 50 per cent of the asset composition, against 28 per cent of other earning assets.

The situation is somehow different in the case of European banks, where net loans constitute only a weakly dominant fraction of the asset supply (46 per cent against 44 per cent represented by services). The same trend is confirmed if we observe the off-balance sheet items, that are lower in Islamic banks (18 per cent of total assets) with respect to what takes place in Europe (25 per cent of total assets).

Third, Islamic banks seem to be less profitable than Western banks, since net averaged profits are 7 per cent of equity, while European banks show a ROE of about 10 per cent. This aspect concerning profit ratios is strengthened by the fact that earning assets are 78 per cent of total assets, as compared to 90 per cent of European banks. Moreover, fixed assets as

well are higher in Islamic banks (3 per cent of total assets) than in Europe (1 per cent).

Fourth, at a first glance, the excess of liquidity seems to represent a problem for Islamic banks, probably reflecting a substantial rigidity of the interbank market and the consequent storage of a large amount of liquid resources for precautionary purposes. The ratio of liquid funds over total deposits and borrowing is indeed 35 per cent, as compared to 23 per cent in Europe.

Input costs are summarized in Table 3.2. Interest expenses (or deposit remuneration), despite being not very different in both groups of banks, is slightly larger in Europe, and this perhaps can give an explanation for the higher use of deposits with respect to other funding in Islamic banks (see again Table 3.1).

Moreover, some important differences emerge from the analysis of two other inputs adopted in the estimation of the cost frontier: fixed assets and employees.

The cost of fixed assets, that is depreciation, is higher in the group of Islamic banks (4.8 per cent), than in the European sample (2.8 per cent), although, as illustrated in Table 3.1, the use of fixed assets seems quite larger in the former group of banks than in the latter. Even the annual unitary staff cost is clearly higher for Islamic institutions (82 th. EUR) than for their European counterparts (66 th. EUR), which perhaps justifies a larger use of human resources in Europe (0.11 against 0.08 over total assets in mil. EUR, Table 3.1).

These features suggest the presence of some sort of inefficiency in Islamic banks due to the incorrect use of inputs. In particular, despite the cost of fixed assets (depreciation) being higher than in Europe, Islamic banks make a massive use of this resource. On the other hand, staff seem to represent a considerable cost in the income statement of Islamic banks, even if our data do not permit to identify whether managers or employees are the source of this discrepancy as compared to European banks.

Bad loans and reserves are other important potential sources of inefficiency. Apparently, Islamic banks seem to give evidence of a larger presence of reserves against bad loans (406 per cent versus 53 per cent). However, it has to be reminded that the use of reserves in Islamic banks is quite different with respect to Western banks, since the mechanism of loss sharing, together with the higher volatility of investments, implies that a massive presence of reserves can be absolutely normal.

In the next section we describe the inefficiency measures used to perform the empirical analysis and the procedure followed, then we compare empirical results with the descriptive statistics presented above.

3.4 Inefficiency measurement

There are many ways to measure inefficiency. The most frequently used criteria are the data envelopment models (DEA), the free disposable hull analysis, the stochastic frontier analysis (SFA), the thick frontier approach and the distribution free approach (DFA). The first two approaches mentioned are non-parametric techniques, while the remaining three are para-

Table 3.1 – Average Value of the Variables (1996-2002)

Variables	Islamic Banks	European Banks
Total Assets	109.000 (mil.. EUR)	46.041.130(mil. EUR)
Deposits/Total Assets	69%	60%
Equity/Total Assets	7%	9%
Net loans/Total Assets	50%	46%
Other Earning Assets/Total Assets	28%	44%
Total Earning Assets/Total Assets	78%	90%
Off-balance Sheet Items/Total Asse ts	18%	25%
Net Profits/Equity (ROE)	7%	10%
Fixed Assets/Total Assets	3%	1%
Liquid AssetsDeposits	35%	23%
ReservesBad loans	406%	53%
Number of Employees/Total Assets (mil. EUR)	0.08	0.11

Table 3.2 – Average Value of the Variables (1996-2002)

Variables	Islamic Banks	European Banks
Interest ExpensesDeposits	4.3%	5.7%
DepreciationFixed Assets	4.8%	2.8%
Staff ExpensesNumber of Employees	82 (th. EUR)	66 (th. EUR)

metric methods[7]. Clearly, the preference of a technique over another depends on the type of study that is carried out.

An important issue concerns what type of inefficiency should be determined. Depending again upon the type of research, but also on data availability, one may want to estimate technical efficiency, cost efficiency or profit efficiency as well. For example, technical efficiency measurement requires data on input use and output provision, whereas the estimation of cost inefficiency requires information on input prices, output quantities,

[7]Berger and Humphrey (1997) report a nearly equal split between the use of parametric and non parametric techniques in the literature.

and total expenditure on these inputs. Thus, in general, it is not possible to say in advance which technique is more onerous in terms of information.

In the credit industry, for example, many studies note that banks devote a plenty of their revenues to rent and employees expenses, while others claim that a higher level of efficiency implies higher staff costs –due to an incentive argument– thus, given data availability on prices, in this study it seems reasonable to opt for the estimation of cost inefficiency. Moreover, cost efficiency is particularly suited in the case of cross-countries comparisons, which closely resembles the aim of this work, since prices can strongly differ from one country/block of countries to another.

Among the class of non-parametric methods, DEA models are the most widely used to estimate inefficiency. However, since the DEA approach is deterministic, it embodies a strong assumption, meaning that all deviations from the minimum cost or from maximum output are due to inefficiency. For this reason, many studies, like the present, have been conducted using a parametric approach which allows for random shocks, meaning the SFA analysis (Aigner et al., 1977).

The main problem when dealing with the SFA approach is to separate the actual inefficiency component from other purely random factors affecting producers behavior. SFA might suffer from strong assumptions as well, especially when the econometric has to deal with the hypothesis required on the distribution of the inefficiency component and its independence from other factors determining producer behavior.

However, as in our case, the availability of panel data substantially solves this problem without needing to make any distributional assumption on

the inefficiency components, while obtaining consistent estimates. Schmidt and Sickles (1984), among others, note that cross sectional models require that the inefficiency error component be independent from the regressors, although it is easy to imagine that inefficiency might be correlated with input or output vectors producers select. Another important drawback of cross sectional models is that the estimates they provide, although unbiased, can be inefficient. Again this problem can be solved through the use of panel data.

Moreover, the pioneering work of Jondrow et al. (1982) has helped disentangling the issue of separating inefficiency from pure random components in maximum likelihood estimation of cross sectional data. We will make use of their contribution as well in our panel data context.

The standard against which cost efficiency is estimated is represented by the cost frontier; thus an *input-oriented* approach is utilized, as opposite to the *output-oriented* approach which is used in the case of technical efficiency measurement. Besides data requirements, the two techniques differ in the number of outputs they allow to insert in the frontier. A great advantage of the *input-oriented* approach is that it admits situations in which firms produce multiple outputs, whereas the *output-oriented* approach requires that firms produce a single output.

Suppose that the deterministic component of the cost frontier of the bank i in year t, is described as follows:

$$c(\mathbf{y}_{it}, \mathbf{w}_{it}, \theta) \leq E_{it} \tag{3.1}$$

where E_{it} represents the total expenditure incurred by the bank i in year t, $\mathbf{y}_{it}$ is a vector of outputs, $\mathbf{w}_{it}$ is a vector of input prices faced by the bank, and θ is a vector of parameters to be estimated. Cost efficiency is defined by the ratio of minimum feasible cost to observed expenditure and it is clearly lower or equal than 1.

In this model, $\mathbf{w}_{it}$ includes three inputs and their relative cost: the unitary cost of capital to the bank (the profit or interest paid on deposits, excluded demand deposits), the unitary cost of fixed assets (depreciation) and the unitary cost of labor (staff expenses over the number of employees).

The vector $\mathbf{y}_{it}$ contains three outputs: properly Islamic products (such as Musharaka and Mudaraba for Islamic banks, or net loans in the case of Western banks), investment in other earning assets (such as leasing), and off-balance sheet transactions. Off-balance sheet transactions have been included among outputs since, as pointed out by Berger and Mester (1997), the Basel II risk ratios imply that these assets have approximately the same perceived credit risk, and are thus good substitutes, of directly issued loans.

Moreover, some studies assess the importance of controlling for financial capital (Clark, 1996, among others). Traditional measures of efficiency, in fact, fail to capture the risk of insolvency. This is clearly a serious shortcoming when dealing with financial institutions, since they should not only be efficient, but also prudent and solvent. Thus, given the importance of financial capital in this study, and according to the approach followed by some authors (Huges and Mester 1993; Maudos et al. 2002), we included equity in the functional form of the frontier as a net output in order to control for these features.

If we assume that the deterministic component of the frontier has a translog functional form[8], then the stochastic cost frontier corresponding to the deterministic model given in equation (3.1) can be written as:

$$\begin{aligned}\ln E_{it} &= \beta_{0t} + \sum_m \alpha_m \ln y_{mit} + \sum_n \beta_n \ln w_{nit} + \\ &+ \frac{1}{2}\sum_m \sum_j \alpha_{mj} \ln y_{mit} \ln y_{mit} + \frac{1}{2}\sum_n \sum_k \beta_{nk} \ln w_{nit} \ln w_{kit} + \\ &+ \sum_n \sum_m \gamma_{nm} \ln w_{nit} \ln y_{mit} + \varepsilon_{it}\end{aligned} \tag{3.2}$$

where β_{0t} is the production frontier intercept common to all banks in period t and ε_{it} is the sum of a positive inefficiency component, u_{it}[9], and an idiosyncratic term, v_{it}. All the remaining terms represent the deterministic component of the translog frontier, $c(\mathrm{y}_{it}, \mathrm{w}_{it}, \theta)$. Equation (3.2) can be rewritten as follows:

$$\begin{aligned}\ln E_{it} &= \beta_{it} + \sum_m \alpha_m \ln y_{mit} + \sum_n \beta_n \ln w_{nit} + \\ &+ \frac{1}{2}\sum_m \sum_j \alpha_{mj} \ln y_{mit} \ln y_{mit} + \frac{1}{2}\sum_n \sum_k \beta_{nk} \ln w_{nit} \ln w_{kit} + \\ &+ \sum_n \sum_m \gamma_{nm} \ln w_{nit} \ln y_{mit} + v_{it}\end{aligned} \tag{3.3}$$

where $\beta_{it} = \beta_{0t} + u_{it}$.

The SFA assumes that v_{it} is a two-sided normal random noise component with zero mean and a standard deviation σ_v, while the u_{it} is a non-negative

[8]The use of the Cobb-Douglas has been criticized by some authors (Hasenkamp, 1976) due to its inadequacy, especially in presence of multiple outputs. As a consequence, many econometrics adopt the translog functional form in the estimation of the cost frontier.

[9]Note that inefficiency is time-variant in this specification, as it will be explained further on.

cost inefficiency component typical of each bank in each year. As we will see further on, some estimation techniques require additional assumptions on the specific functional form to be attributed to the cost inefficiency component, while others do not necessarily involve such hypothesis.

After having imposed the linear restrictions of degree one price homogeneity and other usual restrictions typical of the translog cost function[10], we estimated the coefficients u_{it} by means of three different techniques. The first and the second techniques are respectively a fixed effects model and a random effects model. As in the traditional panel data literature, random effects assume that in the specification (3.2) and (3.3) u_{it} is randomly distributed and thus independent from the regressors, while fixed effects allows u_{it} to be correlated with other regressors. Also other considerations concerning the literature on panel data hold true, including the usual trade-off between unbiasedness and efficiency, although both models are consistent for observations on individuals and time that approach infinity.

The third technique is a maximum likelihood approach developed by Aigner et al. (1976) and later by Jondrow et al. (1982). Pitt and Lee (1981) also used this technique to estimate technical inefficiency in the context of panel data. However, the strong distributional and independence assumptions required even in a panel data context (see below), have induced us to compare inefficiency coefficients estimated by this maximum likelihood

[10]See Kumbhakar and Lovell (2000) for further details.

procedure with the two alternatives mentioned above, namely LSDV and random effects.

Moreover, in order to allow for time-varying cost inefficiency, we follow Lee and Schmidt (1993) by assuming that the u_{it} in equation (3.2) are specified as:

$$u_{it} = \beta(t) \cdot u_i \tag{3.4}$$

where the function $\beta(t)$ is represented by a set of time dummy variables[11].

The LSDV and the random effects models are estimated by means of a two-way error component regression[12]. In the first case (LSDV), time and bank dummy variables are simply included in the regression and the u_{it} are estimated as follows:

$$\widehat{u}_{it} = \left(\widehat{\beta}_t \widehat{u}_i\right) - \min_i \left\{\widehat{\beta}_t \widehat{u}_i\right\} \tag{3.5}$$

where $\min_i \left\{\widehat{\beta}_t \widehat{u}_i\right\}$ represents the β_{0t}, that is the production frontier intercept common to all banks in period t.

If instead we assume that the inefficiency component has constant mean and variance, and is uncorrelated with the regressors and with the random noise v_{it}, a random effect model is specified. In this case the estimation procedure is carried out by means of GLS.

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[11] Although other specifications have been proposed (Cornwell, Schmidt and Sickles, 1990; Kumbhakar, 1990), the one of Lee and Schmidt is more suitable for panels which do not have a very large number of observations, since it requires the estimation of $T-1$ additional parameters, where T is the total number of years in the sample.

[12] See Baltagi (1995) for further details.

The problem with this model is that the variances of the inefficiency terms and of the random shock are not known, but have to be estimated in order to replace the true values in the covariance matrix of the random component, so that the estimated covariance matrix allows to perform feasible GLS. Many estimators of these variances have been suggested by the literature: here, we use the method of Judge et al. (1988). Once the constant term and the parameters of equation (3.3) have been estimated, the $\widehat{u}_{it}$ can be retrieved from the residuals[13].

The maximum likelihood technique requires two basic assumptions: the first is that the random component and the inefficiency term must be distributed independently of each other and of the regressors. Moreover, besides the assumptions on independence, this approach requires additional hypothesis on the distribution of the term u_i. Thus, we assume that the u_i has an half-normal distribution, i.e. $u_i \sim \left|N(0, \sigma_u^2)\right|$[14].

In order to separate the random noise from inefficiency, the model of Jondrow et al. (1982) suggests a solution by considering the expected value of u conditional on ε. The authors proved that the conditional distribution of u given ε is that of a normal, $N(\mu_*, \sigma_*^2)$, truncated at zero, where μ_*/σ_* contains both variances of u and v. Then, the expected value or the mode of this distribution can be used as point estimates of u_{it}.

The procedure followed to separate the two variances uses the information included in the expected value of u conditional on ε, and goes through

[13] See Kumbhakar and Lovell (2000) for further details.

[14] Other hypothesis have been used on the distribution of the inefficiency component: truncated normal, exponential and Gamma and there are seval studies on the sensitivity of estimates to the distribution assigned (see for example Greene, 1990).

three steps. In the first step OLS are to be performed in order to get the starting values for all the parameters. In the second and third steps the standard errors of u and v can be estimated with a maximum likelihood procedure, and the expected value of the distribution of u conditional on ε is used to obtain estimates of the u_i. Once the u_i has been estimated, u_{it} can be retrieved by means of (3.5).

The correlation between the inefficiency terms computed through the three methods on the sample of Islamic banks is illustrated in Appendix B[15]. Coefficients reported in Table B1 show a strong correlation between the three methods, in accordance with the results obtained by the empirical literature[16].

In the second stage of our procedure, estimates of the u_{it}, which are nothing but the logarithm of technical inefficiency, are used to examine the sources of inefficiency. Following Hussein (2004), we do this by means of another standard panel data model where the inefficiency components are now regressed against logarithms of inputs and equity.

Here, the specific-effect is related to the country and not to the bank for a simple reason: despite the advantage of producing consistent estimates, a potential drawback of panel data models is indeed that they might also capture the effects of all phenomena in the system (such as the regulatory environment) and country effects are thus used to clean estimates from possible institutional components.

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[15]We do not report any correlation for European banks since the comparison occurs through a simulation over a high number of sub-samples as it will be clear further on.

[16]Gong and Sickles (1989), for example, obtained similar results on a series of Monte-carlo experiments.

The estimated equation (Tables 3.3-3.4) is the following:

$$u_{it} = \alpha_0 + \alpha_1 \mathbf{x}_{it} + \mu_i + \delta_t \tag{3.6}$$

where u_{it} are the previously estimated inefficiency components, μ_i are country-specific effects, δ_t are time-specific effects[17]. $\mathbf{x}_{it}$ is a vector of quantities of input/net output used to estimate the stochastic frontier, which obviously includes a measure of the impact of equity as compared to deposits, namely their ratio. Moreover, in order to eliminate the effect of scale economies or diseconomies, we use fixed assets and staff variables over total assets. A measure of excess liquidity (liquid assets over total deposits and borrowing) is also included to take account of the interbank market effects.

Furthermore, in order to make the results computed from the set of 35 Islamic banks comparable with the output of a quite larger set of 6,800 European banks, we performed a simulation over 3,000 sub-samples of the latter. The experiment has been conducted following the same procedure described above for Islamic banks, where each sub-sample was represented by 35 European banks, randomly picked from the initial larger sample.

Finally, for each technique used (LSDV, random effects and maximum likelihood) to estimate regression (3.6), the distributions of the difference between the coefficient equity/deposits estimated through the simulation and the correspondent coefficient computed for Islamic banks are reported in Figures 3.1-3.3. Finally, Table 3.4 reports average coefficients of the simulation over the sample of European banks.

[17]Note that the first period dummy in the sample together with one country dummy have been dropped from the regressors in order to avoid the dummy varable trap.

Table 3.3 – Determinants of Inefficiency – Islamic Banks

Variables in logs Dependent Variable: u_{it}	Fixed Effects	Random Effects	Maximum likelihood
Fixed AssetsTotal Assets	0.077	0.065	0.085*
	(1.58)	(1.45)	(1.92)
Number of EmployeesTotal Assets	0.436***	0.165***	0.397***
	(11.03)	(4.54)	(11.05)
EquityDeposits	-0.113***	-0.105***	-0.104***
	(5.50)	(5.54)	(5.54)
IquidityShort Term Funding	-0.214***	0.030	-0.188***
	(2.77)	(0.42)	(2.68)
1997	0.092	0.109	-0.314**
	(0.59)	(0.75)	(2.21)
1998	0.296*	0.339**	0.191
	(1.87)	(2.33)	(1.33)
1999	0.451***	0.412***	0.056
	(2.88)	(2.86)	(0.39)
2000	0.550***	0.468***	0.071
	(3.51)	(3.24)	(0.50)
2001	0.302*	0.310**	0.006
	(1.93)	(2.15)	(0.05)
2002	0.392**	0.303**	0.078
	(2.50)	(2.10)	(0.55)
Constant	1.810***	-0.217	1.809***
	(4.12)	(0.54)	(4.52)
Observations	245	245	245
R-squared	0.80	0.81	0.79

Absolute value of t-statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

3.5 Empirical results

From the estimates of equation (3.6) reported in Tables 3.3 and 3.4, it is possible to draw some interesting conclusions about a better use of inputs in Islamic banks.

First, estimates provide evidence of a significant (at 1 per cent level of confidence) negative impact of equity over deposits on cost inefficiency in both sets of banks, so as to assess the ability of reducing cost inefficiency through equity. Moreover, the impact of equity in European banks quite offsets that of their Islamic counterparts (0.178 , on average, against 0.107 in Islamic countries). This is evident also from Figures 3.1-3.3, where all

Table 3.4 – Determinants of Inefficiency – European Banks

Variables in logs Dependent Variable: u_n	Fixed Effects	Random Effects	Maximum likelihood
Fixed AssetsTotal Assets	-0.0295	-0.022	-0.005
Number of EmployeesTotal Assets	0.104	0.068	0.086
EquityDeposits	-0.189	-0.166	-0.181
IquidityShort T erm Funding	-0.036	-0.012	-0.030
1997	-0.012	-0.012	-0.098
1998	-0.011	-0.005	-0.055
1999	-0.029	-0.026	-0.044
2000	-0.011	-0.016	-0.027
2001	0.000	-0.012	-0.042
2002	0.000	0.007	0.002
Constant	3.045	1.891	2.407

Values of t-statistics do not appear in parentheses since estimated parameters are from simulations

the distributions of the difference in equity/deposits coefficients between European and Islamic banks are skewed to the left for all estimation procedures. Thus, the hypothesis that a higher use of equity has a weaker impact on Islamic banks inefficiency with respect to European banks seems to hold true. As discussed in previous sections, this result could be due to the possibility that a higher share of risk capital strengthens the monitoring effect on managerial operational activity. As a consequence, the profit and loss sharing features that assimilate depositors to shareholders imply a weaker discrepancy, in terms of monitoring incentives, between the figure of a shareholder and that of a depositor in Islamic banks.

Second, Islamic banks inefficiency positively depends on the use of fixed assets (the parameter is significant at 10 per cent level only with the ML es-

timation procedure), while results are the opposite as far as the European banks are concerned. The adverse effect of fixed assets in Islamic banks might be due to the different form of activity they carry out. As illustrated in Section 3.3, Islamic financial institutions are more keen to grant a traditional type of credit (borrowing-lending), which requires a high level of human capital, especially at the time of customers evaluation when the system is highly trust-based. On the opposite side, in the Western banking system, the weight of non-traditional financial operations (services), which involve a considerable use of technology, is continuously growing in the last decades.

Third: if, in the Islamic system, trust carries such an important role, the use of human resources should be crucial to understand inefficiency. However, despite the activity of Islamic banks being strongly focused on reputation and interpersonal relationships, the use human resources clearly appears to be quite far from efficiency requirements. The parameter associated with staff is indeed positive and significant at 1 per cent level of confidence.

This is in line with some Islamic academics' suggestion that staff members are not sufficiently qualified in the Islamic banking industry. The estimated parameter is also positive (although largely undersized) in the simulation performed on the European sample of banks. The reasons of the inefficiencies of the staff component in Europe are probably quite different from the ones described for Islamic institutions and linked to a restructuring process that is involving the entire Western financial system, which is likely to take several periods of time to complete.

Finally, the measure of liquidity carries some surprising results, since it is negatively related to inefficiency, meaning that Islamic banks that accumulate a significant amount of liquid resources also operate under better efficiency conditions.

This might depend upon the rigidities that characterize the Islamic financial world: an excess liquidity can improve efficiency within the system because it reduces the high cost of resorting to short-term lending. However, this problem should probably be offset with the presence of a dynamic interbank market. In fact, results could be reverted with the introduction of an efficient interbank market in the Islamic banking system, which is certainly an interesting issue for future research. It is worth observing that this phenomenon (liquidity that is negatively related to inefficiency) also occurs in European institutions, although the effect is weaker and perhaps arising from reasons that are completely different from those characterizing Islamic banks[18].

3.6 Conclusions

In this work we concentrated on a widely debated issue within the literature on Islamic banking, such as the requirement of capital coefficient adequacy, in line with the recommendations introduced with Basel II Agreements.

A large number of studies on the topic of Islamic finance have long suggested that capital adequacy prerequisites could never be at the basis of an

[18]On the opposite side, this adverse result could be the effect of an excessive reliability upon the interbank market and might reflect the extra-cost of continuously monitoring liquidity.

Fig. 3.1-Equity/Deposits Estimated Coefficients (LSDV)

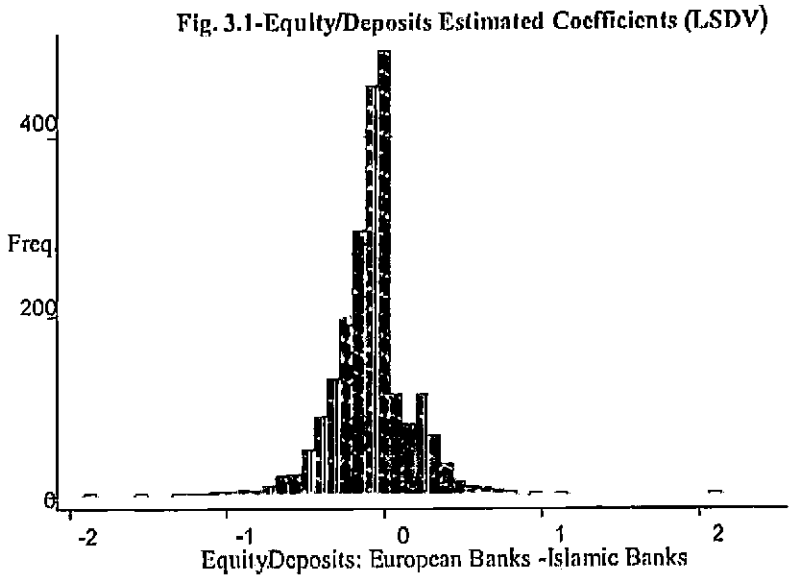


Fig. 3.2-Equity/Deposits Estimated Coefficients (Rand. Eff.)

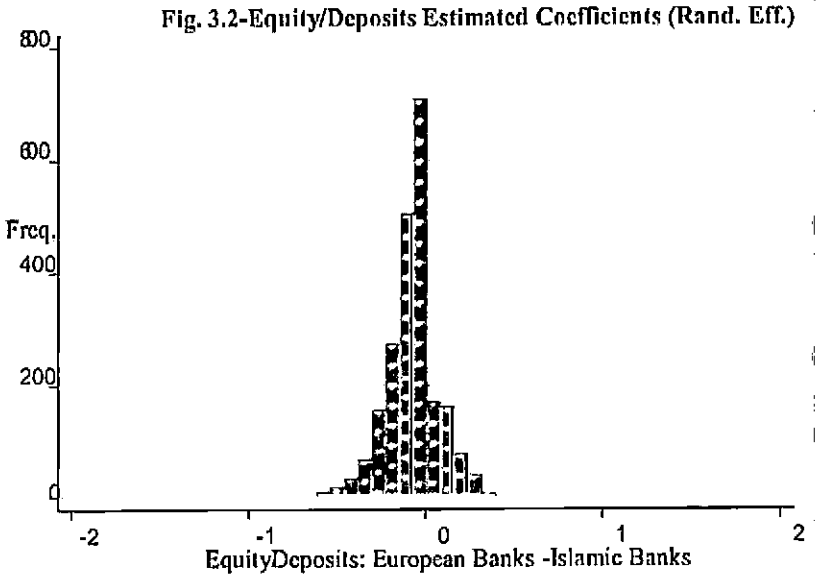
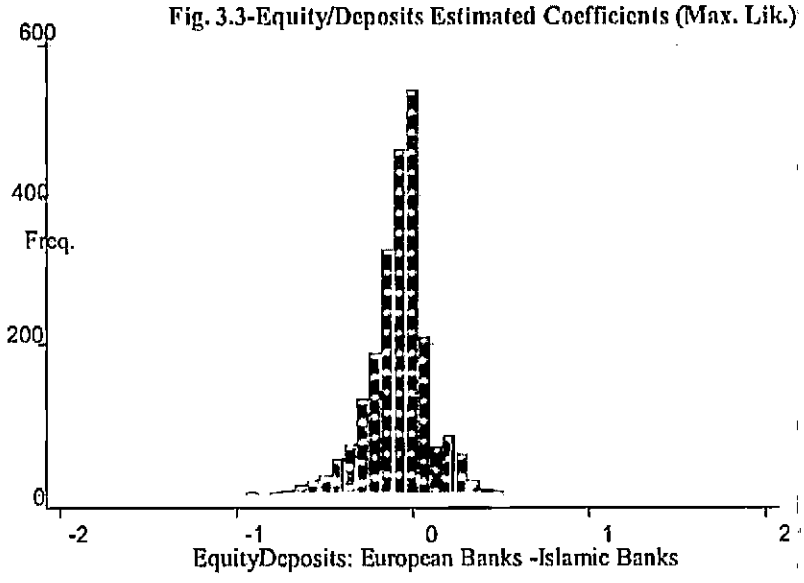


Fig. 3.3-Equity/Deposits Estimated Coefficients (Max. Lik.)



improvement, in terms of better risk management, from the perspective of an Islamic financial institution. The reason goes along with the argument concerning the different contract structure of Islamic banks, which is based on profit and loss sharing.

This principle, by reformulating the allocation of risk between shareholders and depositors, can basically act as an incentive for sharing the monitoring activity on managerial decisions as well. This does not occur in Western banks, where depositors' capital (also returns, as long as they are determined in advance) does not suffer, with few exceptions (risk of bankruptcy), from excessive risk undertaking.

Given this debate, here we focused on cost efficiency and monitoring. If the assumption that equity is a better device for risk reduction holds, this should in principle drive down inefficiency. However, since Islamic de-

positors' interests are closer to shareholders' interests in terms of residual claiming on profits, this relationship should be in principle weaker in Islamic banks rather than in their Western counterparts. For this reason, capital adequacy requirements would result excessive and discriminating.

Results, obtained by means of a stochastic cost frontier approach aimed at analyzing inefficiency of both a sample of European-15 banks and a sample of Islamic banks during the period 1996-2002, show that the expected inverse relation between relative capitalization and efficiency is confirmed for both groups of banks, since the indicator of inverse leverage (equity/deposits) negatively affects inefficiency.

Moreover, in line with the argument concerning the higher incentive for depositors of Islamic financial institutions to share with equity holders the monitoring activity on managers, we observed that the effect described above is considerably undersized in Islamic banks as compared to European ones.

Thus, empirical evidence provide a justification to the reluctance, from the point of view of Islamic banks and academics, that has accompanied the proposal of capital coefficient revision in accordance to Basel II Agreements.

Finally, interesting conclusions can be drawn about a better use of inputs in Islamic banks: first, from the empirical evidence, a clear signal of inefficiency emerges from an insufficient role of staff members in Islamic financial institutions. This implies that Islamic banks should work in the direction of better selecting and training managers and employees. Second, the excessive importance of liquidity in reducing inefficiency leaves room

for future research issues in terms of an accurate analysis of the Islamic interbank market of funds.

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4

Illegal Financial Markets and the Inefficiency of Justice

4.1 Introduction

Illegal financial practices are a serious problem for both industrialized and developing countries. In particular, the Italian financial system suffers from the presence of economic agents and structures in collusion with organized crime (Mafia, Camorra, N'drangeta), which profoundly modifiy the mechanisms of the market with respect to rules and objectives and distort competition (Antonio Fazio, Governor of the Bank of Italy, 1997). Thus, it is necessary to ensure that illicit resources cannot divert the ordinary course of financial intermediation, with potential harmful effects on the behavior of borrowers' and lenders' choices.

The Governor of the Bank of Italy also stresses the point that the gap among the level of economic development in the various regions of Italy is due to a considerable extent to inadequate economic and social infrastruc-

tures; to shortcomings in the public administration and especially to the slowness and inefficiency of the judicial system.

In light of this statement, it is worth to observe that development is not merely defined by standard measures of wealth, like per capita income, but rather involves broader concepts of welfare. Crime exemption, for example, is necessarily at the basis of welfare, since crimes, and especially financial crimes, seriously undermine the well behaving of the entire economy by distorting the use of resources.

Consequently, this chapter focuses on the impact that an inefficient judicial system may have on the prosperity of illegal financial markets, with special attention to usury crimes.

In order to cope with the problem of illegal financing, it is necessary to understand the basic features that characterize the aims of illegal funds provisioners. In particular, it is worth to point out that, during the last decades, illegal lenders's objectives have radically changed. As John Lea (2002) observes, in recent years we have come to understand something of the normality of crime, not simply as an everyday event, but even as part of the political and economic structure of society, part of the way the system works rather than simply something which disrupts normality.

On one hand, globalization has taken place in every sector of the economic life, and these changes undermine the traditional symbols of social prestige and status by which criminals took their power. As an example, the old virtues of the "Mafia man of honor" –in particular respect flowing from the willingness to use violence– have been replaced by those of the accumulation of wealth as a symbol of social status. In fact, as Arlacchi

(1988) states, yet during the Sixties, the Mafioso's role was becoming more and more nearly that of a mere common criminal, a modern urban gangster who had neither popular roots nor popular backing.

On the other hand, criminals have taken advantage from new perspectives, by integrating themselves into new forms of power, and changing the elites with whom they enter into relations of cooperation, thus remaining not far behind the globalization process. The main area in which criminal organizations renewed themselves has been the involvement in the drugs trade. For example, in the South of Italy, during the 1970s, this became a major source of finance and activity. In fact, much of the money that was invested in building construction by the Mafia companies came from the expanding global drugs trade.

Soon, other highly profitable activities (illegal migration, sexual trafficking of people and arms smuggling) replaced traditional and less profitable ones. However, some of the latter, like usury, have not disappeared from the spectrum of illegal practices, but simply changed their function: from funds provision devices, they evolved into money laundering devices, or even these two activities most of the times coexist (Fazio, 2001; Masciandaro, 2000).

Consequently, illegal credit provision, has become an important way by which organized crime groups take the control of small business for money laundering purposes[1]. Indeed, under conditions of economic instability, such

[1] In Italy, the most recent facts concerning illegal financial practices of this type, implied the hypothesis of usury crime linked to money laundering activity within an inquiry denominated «cafittera» (Reggio Calabria, January, 2005).

as the present time, banks think twice about lending money to unsteady small businesses –this sector is very large in Italy.

Therefore, criminal organizations find convenient to act as substitutes of legal lenders suppliers, but use violence to collect overdue loans, since their primary objective is to seek a share in the control of the enterprise. This is an elaborate form of what is defined as "loan-sharking". By mid 1993 it was estimated in a report by Confcommercio –the Italian small business association– that the Mafia controlled 50 percent of public works projects and building sites in southern Italy, 20-22 percent of building firms and 20 percent of restaurants (Ruggiero, 1993).

As far as credit and crimes are concerned, it is worth to briefly expose the state of the literature on this topic. On one hand, economists have long focused on the impact of the quality of justice on financial markets (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997 and 1998). More specifically, Cristini, Moya and Powell (1999); Bianco, Pagano and Jappelli (2000); Fabbri (2001); Masciandaro (2001b), and Fabbri and Padula (2003), investigate the relationship between law enforcement and legal credit allocation in various regions and countries. However, these contributions have never been concerned about the influence that law might have on the prosperity of the "black" side of the financial system, that is the illegal component.

On the other hand, the outstanding literature on illegal financial markets and usury has not yet included law efficiency as a determinant of illegal markets behavior. Many contributions have been written on usury ceilings (Blitz and Long, 1965, among others), arguing about the effects of some "legal rule" (represented by the imposition of an upper bound on interest

rates) on crimes reduction. Much work has also been done on the microfoundations of usury markets (Masciandaro, 2001a; Masciandaro, 2002; Cifarelli et al., 2002) but, so far, these fields did not bring law in the front line.

The aim of this work is indeed to merge these two fields in order to explain if and how the inefficiency of justice can have some impact on illegal financial markets performance. We build this work on the idea that improvements in the efficiency of the legal system can deter the demand for illegal credit contracts, and possibly usury (through which illegal lenders eventually expropriate entrepreneurs from their businesses and foster money laundering activity, as in Barone, 2004).

The basic idea underlying these facts is very simple. Legal lenders (banks) will transfer all the extra-costs (explicit and implicit) of an inefficient judicial system to the borrower. Thus, borrowers will be less willing to accept a legal contract if courts are highly inefficient, due to the considerable cost they have to bear. On the other hand, if criminals can be punished according to the efficiency of justice, they will be more willing to propose a credit contract if there is a low probability of being punished (Becker, 1968). To our knowledge, there are no works encompassing together these two features.

This approach is supported by the empirical results presented in the second part of this work, where we investigate the presence of a positive relationship between the efficiency of the Italian courts and usury crimes.

The chapter is organized as follows: in Section 4.2 we describe a simple model of legal/illegal financing and justice, while in Section 4.3 we empir-

ically check if the prediction that a low level of judicial efficiency increases illegal credit holds true. Section 4.4 concludes.

4.2 The model

The analysis lasts one period. There is an infinite number of identical legal lenders (banks)[2] competing on the legal financial market, one monopolistic[3] illegal lender and one borrower.

There are two main differences between a legal lender and an illegal one: due to competition with other identical lenders, the first must fulfil a zero profit condition, while the second maximizes his/her profits. Second, legal lenders need to apply to the courts in order to recover an overdue loan, so they are subject to the recovering technology of justice (which might be more or less efficient).

On the other hand, illegal lenders (and here the definition "illegal" is exploited) have a more efficient recovering technology on their loans. In fact, they do not apply to the courts when they do not get repaid: if the income of the borrower is not enough to fully repay the entire sum due[4], the illegal lender uses psychological pressure and perhaps violence in order to expropriate some available asset of the borrower (the collateral). In contrast, if

[2]In the model we focus our attention only on one of these legal lenders.

[3]This is due to the fact that criminal organizations have a strong monopoly power in their area. For example, in Italy, the Mafia mainly operates in Sicilia and Camorra in Campania. Furthermore, the chief members (families and clans) of these organizations tend to split the territory such that, as far as credit is concerned, people living in a certain area are forced to borrow from the clan controlling that place and cannot resort to another illegal borrower.

[4]Obviously, if the borrower succeeds in repaying the full amount due, his/her relationship with the illegal lender is extinguished.

the borrower has not sufficient money to pay this sum, the bank goes to the courts and receives the amount due net of the inefficiency of justice. Note that, even when a borrower extinguishes his/her relationship with the bank, he/she only finds convenient to repay this amount (a legal lender's outside option). Thus, whatever occurs to the output of the borrower, the bank gets capital plus interest net of the inefficiency of justice.

The variable representing the efficiency of courts is j, where $0 \leq j \leq 1$. This means that if courts succeed in recovering 1 unit of money from the borrower, they are able to transfer only a share j of this sum to the legal lender[5]. The remaining share $(1-j)$ could, for example, represent the length of trials. The level of efficiency of justice is public information.

Furthermore, following Becker 1968, illegal activities are risky, and risk arises from the fact that illegal agents can be punished. In our case, we assume that the lender can be punished by the legal system according to the efficiency of justice, j[6]. In order to simplify things, we assume that the probability of punishment is directly represented by the parameter j. Thus,

[5]This seems well describing the definition of inefficiency, since a share $(1-j)$ of resources are lost by courts along the way. If, on the opposite side, courts succeeded in recovering only a share j of resources and this is entirely transferred to the lender, we should say that justice is ineffective, but fully efficent.

[6]Actually, in Becker (1968) the punishment applied to the illegal lender is multiplied by the probability of punishment, which is positively related to justice. One might correctly think that also the probability of detection matters. However, two arguments help explaining why this can actually be less important that one may think. First, in the economic analysis of crime, the difference between detection and punishment becomes more evident only in the evolution from static to dynamic models, as in Davis (1988). On this point see also Marselli and Vannini (1999). Second, one may think about the exterme case represented by the prescription of crimes. This rule states that a crime is considered like never been committed if a judgement has not yet been pronounced within a certain period of time. However, pronounciation of judgements depends entirely on the efficiency of courts, thus if courts are very slow in doing their job, criminals are less likely to be punished, even if detection occurs with probability equal to one.

if p is the level of punishment, then the illegal agent will suffer only pj and will find more convenient to supply credit the more inefficient are courts.

Suppose that the borrower needs one unit of capital to start a new economic activity. The output generated by this activity is random: in the good state (which occurs with probability $\frac{1}{2}$)[7] one unit of capital produces $\overline{y}$ units of income, while in the bad state $y = 0$.

The borrower has no liquid assets to be directly used for production purposes, but he/she owns some collateral (C), which is an illiquid and non divisible asset (it can be thought as being the net value of the firm) that cannot be immediately sold in order to pay lenders. Moreover, he/she is unlimitedly liable for his/her obligations. In order to simplify things, suppose also that the opportunity cost of money is zero for both lenders.

First, the borrower must choose a lender. He/she has perfect information and can distinguish between legal and illegal ones. Second, once the sum has been lent and output realized, the borrower must pay back the capital plus interests to the lender he/she has chosen. If he/she has not enough money to repay the sum due, the lender takes his/her collateral.

If r_{LL} is the interest rate required by the legal lender, his/her expected profit is:

$$E(\Pi_{LL}) = \frac{1}{2}Cj + \frac{1}{2}(1 + r_{LL})j - 1 \tag{4.1}$$

Since legal lenders are competing, we can compute the optimal gross interest rate required simply imposing the zero profit condition:

[7] The equal split between the probability of each state to occur is not relevant for the basic results of the model, but helps symplifying the analysis.

$$1 + r^*_{LL} = \frac{2}{j} - C \tag{4.2}$$

Hence, the first implication is that efficient courts and a high value of collateral drive required legal interest rates down.

The borrower will accept the legal lender's contract if his/her expected profit is positive:

$$E(\Pi_B) = \frac{\overline{y}}{2} - \frac{1}{2}C - \frac{1}{2}(1 + r^*_{LL})\,j \geq 0 \tag{4.3}$$

that is if:

$$j \geq 1 - \frac{\overline{y} - 2}{C} \tag{4.4}$$

A necessary and sufficient condition for the bank to stay on the market is that the threshold (4.4) is smaller than one (remind that the parameter representing the efficiency of justice lays between 0 and 1). This occurs whenever $\overline{y} \geq 2$, that is when the expected value of y is greater than the sum borrowed.

Thus, for values of j included in the interval $(1 - \frac{\overline{y}-2}{C}, 1]$, legal lenders will be willing lend to the borrower and the latter gets all the expected rent coming from production, while for $j \subseteq [0, 1 - \frac{\overline{y}-2}{C})$ the illegal lender may find convenient to require the maximum interest rate achievable by expropriating all the expected profit of the borrower:

$$E(\Pi'_B) = \frac{\overline{y}}{2} - \frac{1}{2}C - \frac{1}{2}(1 + r_{IL}) = 0 \tag{4.5}$$

Hence,

$$1 + r_{IL}^{*} = \overline{y} - C \tag{4.6}$$

which is independent from the inefficiency of justice.

In this case, the illegal lender will offer the contract only if he/she obtains positive profits, that is if:

$$E\left(\Pi_{IL}|r_{IL}^{*}\right) = \frac{1}{2}C + \frac{1}{2}\left(\overline{y} - C\right) - 1 - pj \geq 0 \tag{4.7}$$

Which holds for sufficiently low values of the parameter j:

$$j \leq \frac{1}{p}\left(\frac{\overline{y}}{2} - 1\right) \tag{4.8}$$

At this point, we can draw some preliminary conclusions concerning the impact of the inefficiency of justice on legal and illegal financing. First, for given values assumed by $\overline{y} \geq 2$, C, and p, if:

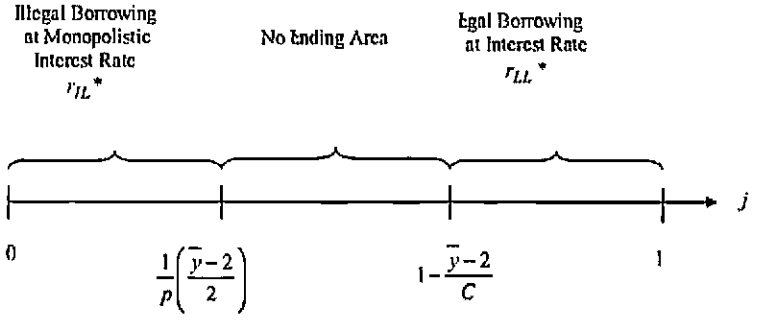
$$\frac{1}{p}\left(\frac{\overline{y}}{2} - 1\right) \leq 1 - \frac{\overline{y} - 2}{C} \tag{4.9}$$

$$p \geq \frac{1}{2\left(\frac{1}{\overline{y}-2} - \frac{1}{C}\right)}$$

the agent will choose to borrow from the legal lender if justice is sufficiently efficient $\left(j \geq 1 - \frac{\overline{y}-2}{C}\right)$ and gets all the expected rent, while if justice is inefficient $\left(j < \frac{1}{p}\left(\frac{\overline{y}}{2} - 1\right)\right)$ he/she will prefer to borrow from the illegal lender at the monopolistic interest rate and loose all his/her expected rent[8]. Moreover, expropriation of collateral will take place in case of bad

[8]Note that a necessary condition for the illegal lender not to steal all the market to the legal one, is that $\frac{1}{p}\left(\frac{\overline{y}}{2} - 1\right) < 1$, thus $E(y)$ should never exceed $1 + p$.

Figure 4.1



state (and consequently illegal practices like usury might occur if justice is relatively inefficient and the borrower is unlucky), whereas in the good state the borrower will be able to repay the sum due at maturity to each lender.

Thus, as it is possible to observe in Figure 4.1, if the borrower has a high value of collateral he/she will be less likely to borrow from the bank since his/her guarantee has a higher value for him/her (who might loose C) than for the bank (who is secured only for jC). Conversely, if the penalty for the illegal lender (p) increases, it will be more likely that the illegal contract will be chosen by the borrower, since the illegal lender offers his/her contract for higher degree of courts efficiency. Furthermore, borrowers with high expected productivity (high $\overline{y}$) are more likely to be financed by both the legal lender and the illegal lender than low productive ones, since a higher value of $\overline{y}$ pushes the legal threshold (4.4) to the left and the illegal threshold (4.8) to the right.

However, if (4.9) holds with inequality, there will be some region of intermediate values assumed by the parameter j such that, if j falls in this interval, potential borrowers are not financed, since neither banks nor illegal monopolistic lenders will find convenient to lend.

One may ask if there might be convenience for the monopolistic illegal lender to reduce interest rates in order to capture some of share of demand remained unsatisfied. The answer is no, since the rent produced for given $\overline{y}$, C, p and j is unchanged (the difference is that now the borrower appropriates a share of of this rent). In fact, even if there was some way to reduce monopolistic interest rates (e.g., through usury ceilings), borrowers will still find not convenient to accept any contract if j falls between $\frac{1}{p}\left(\frac{\overline{y}}{2}-1\right)$ and $1-\frac{\overline{y}-2}{C}$. In order to show why this situation occurs, suppose, for example, that the illegal lender proposes the minimum interest rate compatible with his/her zero profit condition, $r_{IL}^{\min}$, so as to transfer all the rent to the borrower:

$$E\left(\Pi_{IL}\right)=\frac{1}{2}C+\frac{1}{2}\left(1+r_{IL}^{\min}\right)-1-pj=0 \tag{4.10}$$
$$1+r_{IL}^{\min}=2\left(1+pj\right)-C$$

In this case, the borrower will accept this contract if his/her profits are positive:

$$E\left(\Pi_{B}|r_{IL}^{\min}\right)=\frac{\overline{y}}{2}-\frac{1}{2}C-\frac{1}{2}\left[2\left(1+pj\right)-C\right]\geq 0 \tag{4.11}$$

Hence, if:

$$j \leq \frac{1}{p}\left(\frac{\overline{y}}{2} - 1\right) \tag{4.12}$$

which is the same threshold found in (4.8). Thus, neither lending nor borrowing occur for $\frac{1}{p}\left(\frac{\overline{y}}{2} - 1\right) < j < 1 - \frac{\overline{y}-2}{C}$.

On the other hand, for given values assumed by $\overline{y} \geq 2$, C, and p, if (4.9) holds with the opposite sign:

$$\frac{1}{p}\left(\frac{\overline{y}}{2} - 1\right) > 1 - \frac{\overline{y} - 2}{C} \tag{4.13}$$
$$p < \frac{1}{2\left(\frac{1}{\overline{y}-2} - \frac{1}{C}\right)}$$

there will be some "shaded" interval for the parameter j such that, if j lies in this interval, the illegal lender, by reducing his/her interest rate below r_{IL}^{*} (since the borrower must now keep some rent), can steal the market to the bank. In this case, the illegal lender can offer an interest rate $\widetilde{r}_{IL} > r_{IL}^{\min}$ (since he/she must also keep some rent), such that his/her profits are maximized under the constraint that the profits of the borrower are equal to those he/she obtains by going to the legal lender:

$$\begin{aligned} &\underset{\widetilde{r}_{IL}}{Max} \quad E(\Pi_{IL}) = \frac{1}{2}C + \frac{1}{2}(1 + \widetilde{r}_{IL}) - 1 - pj \\ &\text{s.t.} \\ &E(\Pi_B|\widetilde{r}_{IL}) = E(\Pi_{IL}|r_{LL}^{*}) \Leftrightarrow 1 + \widetilde{r}_{IL} = \left(\frac{2}{j} - C\right) j \end{aligned} \tag{4.14}$$

Hence, (4.14) states that, when the constraint is satisfied with equality, then $\widetilde{r}_{IL} = \left(\frac{2}{j} - C\right) j - 1$, which is lower than r_{IL}^{*} for every $j \geq 1 - \frac{\overline{y}-2}{C}$.

However, when the illegal lender charges the interest rate $\tilde{r}_{IL}$, his/her profits are positive whenever $j < \frac{1}{1+\frac{2p}{C}}$ (this satisfies (4.14) and also implies that $\tilde{r}_{IL} > r_{IL}^{\min}$).

Thus, $\frac{1}{1+\frac{2p}{C}}$ must be in the interval $\left[1-\frac{\overline{y}-2}{C}, \frac{1}{p}\left(\frac{\overline{y}}{2}-1\right)\right]$[9]. Within this interval, the illegal lender will succeed in stealing part of the market to the illegal one if $j \subseteq [1-\frac{\overline{y}-2}{C}, \frac{1}{1+\frac{2p}{C}})$. However, the borrower will choose the bank if $j \subseteq (\frac{1}{1+\frac{2p}{C}}, \frac{1}{p}\left(\frac{\overline{y}}{2}-1\right)]$, while he/she will be indifferent between the two lenders if $j = \frac{1}{1+\frac{2p}{C}}$.

Note that a necessary condition for the illegal lender to be able to coexist with the legal one, is simply that the interval of values of j where the borrower accepts to borrow from the legal lender intersects the interval of values of j where the borrower also accepts to borrow from the illegal lender (i.e., that (4.13) holds instead of (4.9)).

Summarizing, for given values of $\overline{y}$, of the collateral, and the penalty imposed to the illegal lender, if $\frac{1}{p}\left(\frac{\overline{y}}{2}-1\right) \leq 1-\frac{\overline{y}-2}{C}$ the borrower will not borrow from illegal markets if justice is "sufficiently" efficient, and he/she chooses the illegal lender if justice is relatively inefficient, while for intermediate levels of courts inefficiency he/she will not borrow at all.

On the opposite side, if $\frac{1}{p}\left(\frac{\overline{y}}{2}-1\right) > 1-\frac{\overline{y}-2}{C}$, the situation is similar to the one described above, but legal and illegal lenders can contemporaneously stay on the market even for intermediate values of courts inefficiency.

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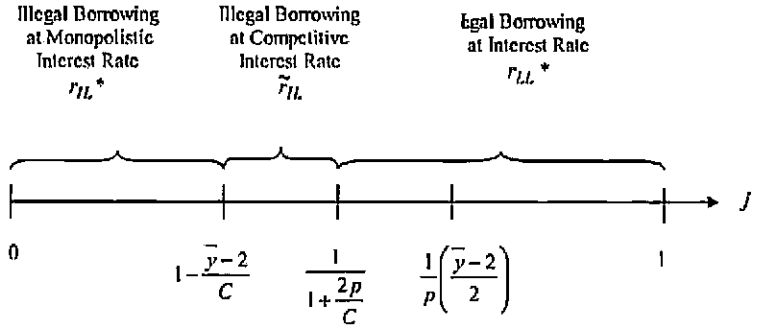
[9] For $\frac{1}{1+\frac{2p}{C}}$ to be in the interval the following conditions must hold: $1-\frac{\overline{y}-2}{C} < \frac{1}{1+\frac{2p}{C}}$ and $\frac{1}{1+\frac{2p}{C}} < \frac{1}{p}\left(\frac{\overline{y}}{2}-1\right)$. Both are satisfied when: $p < \frac{1}{2\left(\frac{1}{\overline{y}-2}-\frac{1}{C}\right)}$, that is, by definition, when (4.13) holds. Furthermore, a necessary condition for both lenders to stay on the market when j lays in the interval $\left[1-\frac{\overline{y}-2}{C}, \frac{1}{p}\left(\frac{\overline{y}}{2}-1\right)\right]$ is that $C > \overline{y}-2$, since otherwise p would be lower than zero, which is not possible.

Figure 4.2



Moreover, the illegal lender is able to steal part of the market to the legal one whenever the penalty imposed to the former is sufficiently low.

Finally, from the economic policy perspective, we found that implementing the efficiency of courts is a key determinant in order to reduce illegal financial markets practices like usury. However, in the short run, when this can be partially done, the best implementable solution in order to limit the action of illegal lenders is obviously the one of increasing the weight of penalties they incur when submitted to the decision of courts (p), so as to push them at the edge of the market (graphically, in Figures 4.1 and 4.2, this means shrinking to the left the interval of j where they find convenient to propose their credit contract).

4.3 Empirical issues

The theoretical framework illustrated in the previous section, predicts that a positive relationship between usury and the inefficiency of justice is pos-

sible. In this section, we basically investigate if this relationship holds by means of a panel estimation on Italian data.

Besides the inefficiency of justice, we also control for other factors that might determine the crime of usury. Confidence in (and perhaps the diffusion of) legal financial institution is among these determinants.

Furthermore, it is necessary to control for the dimension of the supply of illegal financial contracts (a proxy of this dimension is the presence of criminal organizations on the territory), and also for social and economic features that might push distressed firms and households towards the illegal market solution.

Finally, it remains to be observed that entrepreneurs are frequently less productive when they are new to a business, but they often become more productive when they get more experienced. In this case, banks would find convenient not to lend due to this low productivity argument, thus leaving newly settled firms with difficulties the only chance to resort to illegal lenders. From this perspective, we look for some measure of facilitated credit, since this instrument may increase firms' possibility to appropriate rents and further prevent the crime of usury[10].

4.3.1 The data

Data have been collected yearly for the period 1999-2002 on the universe of 103 Italian provinces[11] for a total of 412 observations. All descriptive statis-

[10]Moreover, since we control for the presence of the private banking sector (bank branches), it seems interesting, to our opinion, to control also for the public flow of capital.

[11]Italy is divided into 20 regions and 103 provinces. The definition of Italian provices is close to that of U.S. counties.

tics concerning the variables used in the empirical analysis are reported in Tables C1 (dependent variables) and C2-C5 (dependent variables for each single year) in Appendix C.

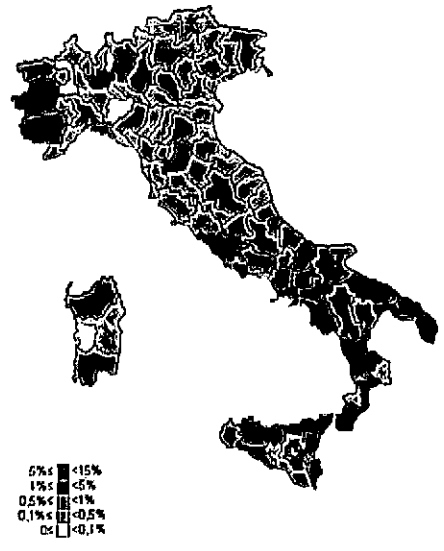
Data on the cases of usury (Table 4.1) denounced to the public authorities[12] have been released by the Italian Treasury. Cases range from 0, in many provinces of the North, to 139 in 2001 for the province of Rome, meaning that this variable seems quite volatile across provinces, as it emerges from Figure 4.3 (which reports the average share of crimes in the period 1999-2002 in each province). On the opposite side, usury crimes do not show evidence of any regular time path since they were 1,080 in 1999, 677 in year 2000, 840 in 2001, and 798 in 2002.

The efficiency of the judicial system is measured by the average length of trials for bankruptcy (Table 4.2). However, since the only available data coming from the National Institute of Statistics (ISTAT) provide means by Court of Appeals[13], while trials are carried out at a provincial level, we also included as a regressor the average length of trials in each court interacted with the number of trials in each province. Here the hypothesis is that the provincial length of trials (for bankruptcy) increases the higher the number of trials attributed to each provincial court. In fact, Nunziante

[12] Usury is a difficult variable to measure, since by definition it constitutes a black economy issue and is subject to under-estimation. On the other hand, it might also be subject to over-estimation problems due to the so called "usury slander" phenomenon (i.e., a person accuses another for having commited the crime in order to receive some benefit or reimbursement). However, as suggested by Fazio (2001), these features could compensate each other and the number of crimes is a good proxy to measure the actual incidence of the phenomenon. This variable has also been used in Dalla Pellegrina, Macis, Manera and Masciandaro (2004) for predictive analysis on the number of crimes in Italy.

[13] Each court of Appeals includes several provinces. In general, for small regions, the court of Appeals is unique, while larger regions have courts that include several provinces.

Figure 4.3 – Map of the Cases of Usury in Italy, 1999-2002
(Provincial Share of Crimes)



(2004) and Felli et al. (2004) point out that, in the Italian judicial system, in the years 1995-2003 the average length of trials and the number of trials went in the same direction. Moreover, we control for the number of trials taken as a separate independent variable.

As it emerges from Table 4.2, the (Court of Appeals) average length of trials ranges from 1,174 to 5,700 days (the highest length has been registered in Messina in 2001, as it emerges from Table C4), thus it is quite volatile across regions. Furthermore, the average length of trials grows from 1999 to 2001, then decreases in 2002. The same conclusions hold for the number of trials, which varies from 1 (for the province of Aosta in 1999) to 580 (for the province of Milano in 1999).

As far as legal financial markets are concerned, we also considered a measure of the degree of confidence in legal financial institutions, which is represented by the average use of ATM cards and credit cards in a household (as in Guiso, Sapienza, Zingales, 2004). This variable has been drawn from the Survey of Households Income and Wealth, carried out by the Bank of Italy on a representative sample of about 8,000 households. This survey is conducted every two years, thus we only considered data for the last available year (2002)[14].

Credit cards are widely used in the northern regions (the largest average number of credit cards per household, 1.72, is registered in Alto Adige), while households located in the southern regions do not make a large use of ATM and credit cards (the lowest average number of credit cards per household, 0.38, is registered in Campania).

From the same database we also considered the availability of informal credit, intended as credit from relatives or friends living outside the household[15]. The variable reports the average debt of the households surveyed in each region that answered positively to the question "At the end of the year did you have debts outstanding towards friends or relatives not living with you?". This variable does not change with the location of each household (northern or southern regions), in fact the most indebted households are in Veneto, while the less indebted households result to be those located in the closest region to Veneto, which is Friuli-Venezia Giulia.

[14]For this variables we only have access to regional aggregated data, which are means of the households surveyed in each region.

[15]In the view of this work, illegal credit is not that of relatives and friends.

The local presence of legal financial institutions is measured by the number of bank branches in each province (as in Pagano and Panunzi, 1997). These data have been provided by the Bank of Italy, for each year included in the sample, at a provincial level. Not surprisingly, bank branches are more concentrated in the most populated and high income provinces (Milano, Roma), while the opposite is true for scarcely populated provinces (Isernia, in the small region of Molise, is the one with the lowest number of branches).

Moreover, it is well known that illegal lenders take advantage of the state of illiquidity of an agent. In Italy, a specific measure for the state of illiquidity of a borrower is the protest. Basically, when a cheque or a draft comes overdue, the lender has two options: either trying to renegotiate the loan with the defaulting agent, or starting the appropriate legal procedure in order to recover the loan. In the European legislation, a protest must be raised in order to have the right to start any legal recovery procedure against the defaulting agent. Usually, it is not a bank who raises a protest, but typically some external creditor. The number of protests for each province has been drawn from the website of the Italian Institute of Statistics (ISTAT) for the years 1998-2001[16]. Protests range from 1,127 in 2001 for the province of Belluno to 386,814 for Naples in 1998. It has to be noted that, unlike usury, the number of protests shows a sharp decline (12 per cent on average) across the years included in the sample. The reasons of this declining path are not so clear, but this phenomenon might be due

[16]In line with the hypothesis of the model, we use the one priod lagged number of protests.

to a learning process concerning the inefficiency of the judicial system, such that people that are not confident about the ability of the courts to protect their interests (i.e., the costs of doing that are higher than benefits) do not apply to the legal system at all.

Furthermore, a measure of facilitated credit is included among the regressors. This variable consists of the amount of credit granted at a price which is lower than market interest rates due to governmental financial acts. Data (on a provincial basis) come from the Bank of Italy.

Since usury can easily take place when the social and economic conditions of the population are deteriorated, we also control for two variables representing these features: the rate of unemployment and per capita income of each province. Data have been respectively extracted at a provincial level from the website of the Italian Institute of Statistics and from the Istituto Tagliacarne, for the years 1999-2002. Data show a clear gap between the northern provinces (with lower unemployment and higher income) and the southern provinces (with higher unemployment and lower income).

Finally, the supply of illegal credit has been measured through the number of crimes committed by criminal organizations (art. 416 bis). Again, data have been provided by the Italian Institute of Statistics on a provincial level and show a substantial presence of criminal organizations in the southern regions.

4.3.2 Estimation techniques

We estimate the following equation:

Table 4.1 - Usury Crimes in Italy (1999-2002)

Year	Mean (by Prov.)	St. Dev.	Min	Max
1999	10.485	16.665	0	137
2000	6.572	13.252	0	117
2001	8.155	15.379	0	139
2002	7.747	13.867	0	119

Table 4.2 - Antiusury Trials in Italy (1999-2002)

Year	Mean (by Court)	St. Dev.	Min	Max
1999	2528	506.027	1174	2528
2000	2580	432.720	1546	3877
2001	2758	630.924	1676	5700
2002	2622	476.895	1771	4304

$$y_{it} = \alpha_i + x'_{it}\beta_{it} + \varepsilon_{it} \tag{4.15}$$

where y_{it} represents the cases of usury in every province; x_{it} is a vector of explanatory variables described in the previous section; α_i is the specific effect of each single province. The last component is an idiosyncratic shock, $\varepsilon_{it} \sim IID(0, \sigma_\varepsilon^2)$.

We try two linear panel data specifications, which are the fixed and the random effects. As it is standard in the panel data literature, the first technique considers the α_i as province-dummies[17], thus allowing fixed-effects to be correlated with other regressors, while the second technique assumes

[17]Note that, in order to keep all dummies in the regressions, the constant term has been dropped.

that the α_i are randomly distributed, thus independent from each other and from the regressors, i.e. $\alpha_i \sim IID(0, \sigma_\alpha^2)$.

However, since in our dataset the dependent variable assumes integer values included between 0 and infinite, count models seem more appropriated than linear models. Count models mainly assume two types of discrete statistical distributions for the dependent variable: the Poisson and the Negative Binomial (see Appendix C and Cameron and Trivedi, 1998, for further details).

4.3.3 Results

Estimation results are reported in Tables 4.3-4.5. The first table refers to the standard linear specification results, the second and the third tables report estimates of the marginal effects for the Poisson and the Negative Binomial models. Note also that, since some variables are aggregated at a regional level (and may capture other regional components correlated with those variables, but not the desired effects we would like to measure) estimation has been splitted in two parts. Hence, columns 2 (fixed effects) and 4 (random effects) of each table report estimates computed only with regressors that are disaggregated at a provincial level, while columns 3 (fixed effects) and 5 (random effects) report full estimates[18].

Predictions concerning the impact of the inefficiency of justice obtained in the theoretical part seem to hold. In fact, one of the two measures of inefficiency (Judicial Inefficiency 1, which is the length of trials interacted

[18] As it is shown at the bottom of each table, the Hausman test supports estimates with fixed effects in each model, while random-effects are availed only in the case of a full linear model.

with the number of trials for bankruptcy) is always highly significant in the explanation of the number of usury crimes in the Italian provincial framework.

However, the length of trials at a court/regional level (Judicial Inefficiency 2) is negative although nowhere significant. The possible explanation for the negative sign can be that, in provinces where the number of defaults for bankruptcy is lower, illegal financing is exploited as a mean to avoid defaults. Hence, in those provinces, usury can occur as a consequence of illegal financing, and firms do not shut down because they get expropriated by illegal lenders having money laundering purposes.

Confidence in legal financial institutions, represented by the number of credit cards owned by households in the province, has the expected sign, meaning that a higher reliability on the legal financial system can keep agents away from illegal financial markets. The parameter associated to this variable is significant in both the count estimation procedures used (Tables 4.4-4.5) but not with the standard linear panel specifications (Table 4.3). However, the inclusion of the number of credit cards owned as a regressor has potential drawbacks, due to its possible endogenous nature. As an example, credit cards are almost used for legal transactions only (otherwise, illegal transactions are made by cash). Thus, for this reason, together with the fact that this variable is aggregated at a regional level, it is included only in the extended specifications in column 3 and 5 of each table.

As far as the banking system is concerned, parameters signs are somehow coherent with our predictions. The amount of facilitated credit is highly significant but only in the fixed-effects specifications. In line with the ar-

guments previously discussed, the parameter associated to this variable suggests that a higher amount of facilitated credit helps reducing the cases of usury. On the other hand, the number of banks branches is nowhere significant.

Informal credit seems to be significant in reducing usury crimes. However, also this variable suffers from potential endogeneity, since it might be jointly determined with usury. The negative sign associated to the parameter offers an interesting explanation: it is possible that usury does not originate from the informal market (like the old type of usury, where the lender was a rich neighbor living in the community) but instead from illegal formal institutions hidden between many other legal ones[19]. Moreover, in line with our hypothesis, the number of protests, which is a proxy of the illiquidity status of a borrower, is strongly significant in determining usury crimes (the associated parameter is significant at 1 per cent level with all estimation techniques, except in column 2 of Table 4.5, where is significant at 5 per cent).

From the demand perspective, social and economic variables offer interesting insights, although they are sometimes not significant (however, random effects seem to offer almost always significant results). The unemployment rate, has a strong positive impact on usury crimes, signalling that usury spreads over poor settlements where the labor market does not grant the opportunity of a continuous income flow. In fact, a stable income is

[19]In fact, the descriptive analysis collected in Masciandaro and Porta (1997) highlights that the actual Italian usury markets are dominated by individuals, organizations and mechanisms that are completely different form the traditional informal credit networks.

often a prerequisite for the access to the legal credit market and whenever this requisite does not hold there is room for resorting to illegal lenders.

Furthermore, according to the model, the net per capita income[20] of each province shows, to our opinion, the other side of the story, that is an augmented presence of usury crimes where people can assure higher rents to illegal lenders. In order to capture non linearities in unemployment and per capita income, quadratic terms have been included in the regressions. Their signs give evidence of a marginal decreasing path for both the unemployment rate[21] and per capita income[22].

Finally, the proxy for the supply of illegal contracts (Mafia crimes) is highly significant and shows a positive impact on usury in all Tables 4.3-4.5. However, despite this result seeming robust, we need to be aware of the fact that this is just a proxy for the supply of illegal financial products and does necessarily represent all the possible supply.

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[20] We can think about this variable as a proxy for productivity, and thus for $\overline{y}$ in the model.

[21] In order to verify this statement, for each estimation technique we computed the unemployment rate that maximizes the funtion: $ax^2 + bx$, where x is the unemployment rate, a is the estimated marginal effect for unemployment, and b is the estimated marginal effect for unemployment squared. Each maximizing value has been compared with the average unemployment rate in the sample, wich is 9.83 per cent. We found that the average unemployment rate always falls at the left of each maximizing value computed.

[22] In order to verify this statement, for each estimation technique we computed the per capita income that maximizes the funtion: $ax^2 + bx$, where x is the per capita income, a is the estimated marginal effect for per capita income and b is the estimated marginal effect for per capita income squared. Each maximizing value has been compared with the average per capita income in the sample, wich is 18.41 (th. EUR). We found that the average per capita income always falls at the left of each maximizing value computed.

Table 4.3 – Determinants of Usury Crimes (Linear Panel Regression)

Dependent Varible: *number of usury crimes*	FE	FE (with regional aggregated varibles)	RE	RE (with regional aggregated varibles)
Mafia Crimes	0.217***	0.221***	0.194***	0.189***
	(5.52)	(5.66)	(5.77)	(5.54)
Protests[a]	0.008***	0.008***	0.006***	0.007***
	(4.65)	(4.97)	(3.50)	(3.75)
Inefficiency1[a]	0.005**	0.004***	0.002	0.001
	(2.42)	(3.42)	(0.71)	(0.46)
Inefficiency2[a]		-0.173		-0.153
		(0.53)		(0.59)
Bankruptcies	-0.063	-0.147**	-0.150***	-0.092
	(1.17)	(2.34)	(3.12)	(1.54)
Bank Branches	-0.001	-0.001	-0.002	-0.002
	(0.07)	(0.24)	(1.04)	(1.18)
Facilitated Cr.	-0.011**	-0.009*	-0.004	-0.004
	(2.06)	(1.70)	(1.48)	(1.41)
Unempl.	0.227	0.269	0.345	0.273
	(0.63)	(0.75)	(1.32)	(0.98)
Unempl. ^2	-0.002	-0.004	-0.011	-0.009
	(0.18)	(0.44)	(1.32)	(1.06)
PC Income	1.330	1.665*	1.215	1.119**
	(1.42)	(1.77)	(0.80)	(2.40)
PC Income ^2	-0.028**	-0.023**	-0.012	-0.021**
	(2.14)	(2.38)	(1.18)	(2.42)
Informal Credit		-0.078**		-0.016**
		(2.05)		(2.35)
ATM-Cr. Cards		-3.995		-4.032
		(1.17)		(1.57)
Observations	412	412	412	412
R-squared	0.95	0.96		
Number of Prov.	103	103	103	103

Hausman: chi2(9) = 161.95; full model: chi2(9) = 0.07
[a] Coefficients multiplied by 100
Absolute value of t-statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

4.4 Conclusions

We built this work on the idea that improvements in the efficiency of the legal system can deter the demand for illegal credit contracts, with particular attention to usury crimes. In the theoretical part of the chapter, we found that people are more likely to borrow from legal markets when justice is efficient, while they prefer to resort to illegal lenders when justice

Table 4.4 – Determinants of Usury Crimes (Poisson Panel Regression)

Dependent Variable: *number of usury crimes*	FE	FE (with regional aggregated variables)	RE	RE (with regional aggregated variables)
Mafia Crimes	0.033***	0.034***	0.028***	0.028***
	(4.22)	(4.28)	(3.10)	(3.05)
Protests[a]	0.006***	0.005***	0.003***	0.003***
	(3.74)	(3.80)	(3.93)	(3.87)
Inefficiency1[a]	0.003**	0.003***	0.002***	0.003***
	(2.49)	(3.10)	(3.28)	(4.21)
Inefficiency2[a]		-0.134		-0.117
		(0.92)		(0.02)
Bankruptcies	-0.018	-0.029**	-0.016	-0.033**
	(1.63)	(2.33)	(1.31)	(2.54)
Bank Branches	-0.000	-0.001	0.000	0.001
	(0.96)	(1.12)	(0.87)	(0.65)
Facilitated Cr.	-0.005***	-0.005***	-0.001	-0.001
	(3.51)	(3.23)	(0.74)	(0.34)
Unempl.	0.166	0.191	0.725***	0.702***
	(0.94)	(1.09)	(5.16)	(4.59)
Unempl. ^2	-0.003	-0.004	-0.014***	-0.016***
	(0.69)	(0.95)	(3.44)	(3.06)
PC Income	0.217	0.170	0.258*	0.755***
	(0.60)	(0.47)	(1.83)	(3.25)
PC Income ^2	-0.005	-0.004	-0.004	-0.013**
	(0.84)	(0.88)	(0.71)	(2.20)
Informal Credit		-0.064***		-0.004
		(4.71)		(1.28)
ATM-Cr. Cards		-2.428***		-2.261*
		(5.70)		(1.72)
Observations	412	412	412	412
Number of Prov.	103	103	103	103

Hausman: chi2(9) = 76.61; full model: chi2(9) = 46.36
[a] Coefficients multiplied by 100
Absolute value of z-statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

is inefficient. In fact, competitive legal lenders transfer all the extra-costs of an inefficient judicial system to the borrower. Thus, borrowers will be less willing to accept a legal contract if courts are highly inefficient due to the considerable costs they have to bear. On the other hand, if criminals are punished according to the efficiency of justice, they will be less willing to supply credit if there is a high probability of being punished.

Table 4.5 – Determinants of Usury Crimes (Negative Binomial Panel Regression)

Dependent Variable: *number of usury crimes*	FE	FE (with regional aggregated variables)	RE	RE (with regional aggregated variables)
Mafia Crimes	0.037***	0.038***	0.034**	0.029**
	(3.00)	(3.09)	(2.47)	(2.15)
Protests[a]	0.007**	0.005***	0.003***	0.002***
	(2.46)	(2.63)	(2.71)	(2.80)
Inefficiency1[a]	0.003*	0.003**	0.002***	0.003***
	(1.90)	(2.46)	(2.81)	(3.41)
Inefficiency[a]		-0.123		-0.107
		(0.96)		(0.08)
Bankruptcies	-0.018	-0.036*	-0.015	-0.030*
	(1.12)	(1.91)	(1.04)	(1.82)
Bank Branches	-0.001	-0.001	0.000	0.001
	(0.41)	(0.52)	(1.02)	(1.14)
Facilitated Cr.	-0.005***	-0.005**	-0.001	-0.001
	(2.75)	(2.49)	(0.77)	(0.57)
Unempl.	0.195	0.225	0.734***	0.559***
	(0.98)	(1.14)	(4.36)	(2.96)
Unempl. ^2	-0.003	-0.005	-0.014***	-0.009*
	(0.75)	(1.02)	(2.80)	(1.78)
PC Income	0.331	0.347	0.265	0.996***
	(0.30)	(0.11)	(1.44)	(3.48)
PC Income ^2	-0.007	-0.005	-0.003	-0.018**
	(0.84)	(0.93)	(0.49)	(2.33)
Informal Credit		-0.064***		-0.005
		(3.79)		(1.59)
ATM-Cr. Cards		-3.520***		-3.796**
		(4.50)		(2.55)
Observations	412	412	412	412
Number of Prov.	103	103	103	103

Hausman: chi2(9) = 30.41; full model: chi2(9) = 35.18
[a] Coefficients multiplied by 100
Absolute value of z-statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

We also found that, given the state of justice, if the borrower has a high value of collateral, he/she will be less willing to borrow from legal lenders, while if the penalty for the illegal lender increases, it will be less likely that the borrower chooses an illegal contract. Furthermore, from the model emerges that borrowers with high expected productivity are more likely to be financed by both the legal and the illegal lender than low productive ones. Thus, from the economic policy perspective, implementing

the efficiency of courts is determinant to reduce illegal financial markets practices. Furthermore, we found that another implementable measure that may help limiting the action of illegal lenders is to raise the burden of penalties that criminals incur when punished.

This approach is supported by our empirical results. In the empirical part of the chapter we estimated the impact of justice on usury crimes for the provinces of Italy from 1999 to 2002. Using two measures of courts inefficiency (the length of trials for bankruptcy and the length of trials for bankruptcy interacted with the cases of bankruptcy in each province), we showed that a higher efficiency of justice can actually reduce the cases of usury.

Moreover, estimates show that confidence in legal financial institutions, represented by the number of credit cards owned by households in the province and the amount of facilitated credit, are negatively correlated with usury crimes. Looking at the social and development variables, we found that the unemployment rate has a positive impact on usury crimes, thus signalling that usury spreads over settlements where the labor market offers weak opportunities. Furthermore, and this somehow supports the conclusions of the model, per capita income is positively related to usury crimes, offering the possible explanation that criminals target more productive firms and households, since in this case the rent they can appropriate is higher. Finally, the presence of criminal organizations in Italian provinces shows a strong positive impact on usury.

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Appendix A
(Chapter 2)

Proof of condition (2.10):

We assume that borrowers have linear utility functions. We also make the hypothesis that agents act under the certainty equivalence principle. Thus, by the combination of the first order conditions, the following optimal solution can be found:

$$\frac{\frac{\partial X_0}{\partial C}}{\frac{\partial X_0}{\partial a}} = \frac{\frac{\partial X_1}{\partial C}}{\frac{\partial X_1}{\partial a}} \tag{A.1}$$

which, given the definition of economic sanctions, $s_e = \psi Y$, implies:

$$\frac{a}{C} = \frac{\frac{\partial \overline{Y}}{\partial C}(1-\psi(1-p)) + \frac{\partial(1-p)}{\partial C}\left[(1+r)C - \psi\overline{Y} - \theta s_s\right] - p(1+r)}{\frac{\partial \overline{Y}}{\partial a} + \frac{\partial(1-p)}{\partial a}\left((1+r)C - \psi\overline{Y} - \theta s_s\right) - (1-p)\left(\theta\frac{\partial s_s}{\partial a} + \frac{\partial \overline{Y}}{\partial a}\right)} \tag{A.2}$$

where $\overline{Y}$ is the deterministic component of Y. Implicitly deriving this optimality condition, we get:

$$\frac{\partial a}{\partial \theta} = -\frac{a\left[\frac{\partial(1-p)}{\partial a}s_s + (1-p)\frac{\partial s_s}{\partial a}\right]}{\left(\frac{\partial^2 \overline{Y}}{\partial C \partial a}C - \frac{\partial^2 \overline{Y}}{\partial a^2}a - \frac{\partial \overline{Y}}{\partial a}\right)(1-\psi(1-p))+ \\ +\left(C\frac{\partial^2(1-p)}{\partial C \partial a} - a\frac{\partial^2(1-p)}{\partial a^2}\right)\left[(1+r)C - \theta s_s - \psi\overline{Y}\right]+ \\ +\theta(1-p)\left(\frac{\partial^2 s_s}{\partial a^2}a + \frac{\partial s_s}{\partial a}\right) + \frac{\partial(1-p)}{\partial C}\left[(1+r) - \psi\frac{\partial \overline{Y}}{\partial C}\right]C+ \\ +\frac{\partial(1-p)}{\partial a}\left(2\psi\frac{\partial \overline{Y}}{\partial a}a + 2\theta\frac{\partial s_s}{\partial a}a - \psi\frac{\partial \overline{Y}}{\partial C}C + \psi\overline{Y} + \theta s_s\right)} \quad \text{(A.3)}$$

At this point, we need to find sufficient conditions for the sign of (A.3) to be negative.

Proof. In order to make any further consideration, we need to find signs of $\frac{\partial(1-p)}{\partial a}$ and $\frac{\partial(1-p)}{\partial C}$ and their higher order terms. Since:

$$\begin{aligned} 1-p &= \Pr\{Y < (1+r)C\} = \quad \text{(A.4)} \\ &= \Pr\left\{(1+\delta)\left(\frac{(1-a)C}{c}\right)^{\gamma} L^{1-\gamma} < (1+r)C\right\} = \\ &= \Pr\left\{(1+\delta) < (1+r)C^{1-\gamma}(1-a)^{-\gamma}L^{\gamma-1}c^{\gamma}\right\} = \\ &= F\left((1+r)C^{1-\gamma}(1-a)^{-\gamma}L^{\gamma-1}c^{\gamma}\right) \end{aligned}$$

this implies:

$\frac{\partial(1-p)}{\partial C} > 0; \frac{\partial(1-p)}{\partial a} > 0; \frac{\partial^2(1-p)}{\partial a^2} > 0; \frac{\partial^2(1-p)}{\partial C \partial a} > 0$

We also need to know the values of $\frac{\partial \overline{Y}}{\partial a}$ and $\frac{\partial \overline{Y}}{\partial C}$ and their higher order terms, which can easily be found by differentiating the Y function:

$$\frac{\partial \overline{Y}}{\partial C} = \gamma \frac{1}{C} \overline{Y} \tag{A.5}$$

$$\frac{\partial \overline{Y}}{\partial a} = -\gamma \frac{1}{(1-a)} \overline{Y} \tag{A.6}$$

$$\frac{\partial^2 \overline{Y}}{\partial a^2} = -\gamma \left(\frac{1-\gamma}{(1-a)^2} \right) \overline{Y} \tag{A.7}$$

$$\frac{\partial^2 \overline{Y}}{\partial C \partial a} = -\gamma^2 \frac{1}{(1-a)\, C} \overline{Y} \tag{A.8}$$

Then, the last thing to be observed concerns the following component:

$$\left[(1+r)\, C - \theta s_s - \psi \overline{Y} \right] \tag{A.9}$$

This term cannot be positive, otherwise strategic default would occur with probability 1 and lenders would never be willing to lend, thus:

$$(1+r)\, C \leq \theta s_s + \psi Y \tag{A.10}$$

On the other hand, if default occurs on the loan because individuals have no money to pay, that is $Y \leq (1+r)\, C$, consumption in period 1 cannot even be negative, thus $X_1 = Y - \theta s_s - \psi Y \geq 0$. Then:

$$\theta s_s + \psi Y \leq Y \leq (1+r)\, C \tag{A.11}$$

which clearly contradicts (A.10). Therefore, (A.9) must be equal to zero.

Given these preliminary considerations, we can observe that the numerator of (A.3) is clearly positive.

The denominator can be decomposed in five parts. The first one is:

$$\left(\frac{\partial^2 \overline{Y}}{\partial C \partial a} C - \frac{\partial^2 \overline{Y}}{\partial a^2} a - \frac{\partial \overline{Y}}{\partial a} \right) (1 - \psi\,(1-p)) \tag{A.12}$$

which is positive, given the assumption on the deterministic components of production function.

The second part,

$$\left(C\frac{\partial^2(1-p)}{\partial C\partial a}-a\frac{\partial^2(1-p)}{\partial a^2}\right)\left[(1+r)C-\theta s_s-\psi\overline{Y}\right] \tag{A.13}$$

is zero, given the considerations made on (A.9).

The third part,

$$\theta(1-p)\left(\frac{\partial^2 s_s}{\partial a^2}a+\frac{\partial s_s}{\partial a}\right) \tag{A.14}$$

is clearly positive, given the assumptions on the social sanction function.

The fourth part,

$$\frac{\partial(1-p)}{\partial C}\left[(1+r)-\psi\frac{\partial\overline{Y}}{\partial C}\right]C \tag{A.15}$$

is not negative if $(1+r)\geq\psi\frac{\partial\overline{Y}}{\partial C}$. This occurs for high values of C, for low values of γ and for low values of ψ.

The last part of the denominator is:

$$\frac{\partial(1-p)}{\partial a}\left(2\psi\frac{\partial\overline{Y}}{\partial a}a+2\theta\frac{\partial s_s}{\partial a}a-\psi\frac{\partial\overline{Y}}{\partial C}C+\psi\overline{Y}+\theta s_s\right) \tag{A.16}$$

which is not negative if $\frac{\theta}{\psi}\geq\frac{-\frac{\partial Y}{\partial a}}{\frac{\partial s_s}{\partial a}}$.

Summarizing, we can state that:

the sign of (A.3) is positive if the following sufficient conditions hold:

$$(1+r)\geq\psi\frac{\partial\overline{Y}}{\partial C}\quad\text{and}\quad\frac{\theta}{\psi}>\frac{\left|\frac{\partial Y}{\partial a}\right|}{\frac{\partial s_s}{\partial a}} \tag{A.17}$$

Descriptive statistics:

Table A1 - Description of the Variables

Variables	Mean	Std. Dev.	Min	Max
Religion	.85	.34	0	1
Age of Household Head	42.04	12.99	18	85
Age of Household Spouse	32.17	14.00	0	67
Education of Household Head (years)	3.56	3.71	0	14
Education of Household Spouse (years)	1.75	2.69	0	12
Household Head Is Male	.98	.11	0	1
Number of Persons in the Household	5.80	2.46	1	17
Fixed Rent	.25	.43	0	1
Sharecrop	.52	.49	0	1
Total Area Cultivated (acres)	1.15	1.20	.025	8.2
Non Farming Activities	.38	.48	0	1
Parents Own Land (number)	.87	1.09	0	4
Siblings Own Land (number)	3.87	3.57	0	16
Children Own Land (number)	1.47	3.22	0	20
Relatives Own Land (number)	3.58	4.35	0	26
Parents Alive (number)	1.76	1.27	0	4
Siblings Alive (number)	8.14	3.85	0	25
Children Alive (number)	6.87	4.63	0	24
Relatives Alive (number)	6.32	5.51	0	32
Land Owned (acres)	1.21	2.92	0	52.5
House Ownership	.16	.37	0	1
Variable Expenditure (per-acre)	1082.31	923.15	0	11272.73
Semi-Fixed Capital (per-acre)	3006.88	6144.07	0	76250

Appendix B
(Chapter 3)

Correlation between estimation procedures:

The following table reports the correlation coefficients between fixed effects, random effects and maximum likelihood estimation procedures:

Table B1 – Correlation Between Estimation Procedures – Islamic Banks

FE-RE	0.8950
FE-ML	0.9816
RE-ML	0.8818

Appendix C
(Chapter 4)

Econometrics on count models:

For the Poisson distribution:

$$y_{it} \sim P\left[\mu_{it} = \alpha_i \lambda_{it}\right] \tag{C.1}$$

where μ_i is the mean (and also the variance)[1] of the dependent variable, α_i is the specific effect of each province, and $\lambda_{it} = \exp\left(x'_{it}\beta\right)$.

For the Negative Binomial distribution:

$$y_{it} \sim B\left[\mu_{it} = \alpha_i \lambda_{it}/\phi_i\right] \tag{C.2}$$

[1] In the Poisson case, the equality between the mean and and variance of the distribution is often defined as equaldispersion.

where μ_i is again the mean, while the variance is $(\alpha_i\lambda_{it}/\phi_i)(1+\alpha_i/\phi_i)$. In this case ϕ_i is a parameter of overdispersion[2].

If the α_i are assumed to be random, the theory on count models assumes that they have a Gamma distribution with parameters (δ,δ), so that $\mathrm{E}(\alpha_i)=1$ and $\mathrm{Var}(\alpha_i)=1/\delta$.

The fixed effects models are estimated as follows. When a Poisson distribution is assumed for the dependent variable, the joint distribution function is:

$$\Pr(y_{i1},...,y_{iT}|\alpha_i,\beta)=\prod_t\left(\frac{\exp(-\alpha_i\lambda_{it})(\alpha_i\lambda_{it})^{y_{it}}}{y_{it}!}\right) \qquad (C.3)$$

and the correspondent log-likelihood function is:

$$\ln\Pr(y_{i1},...,y_{iT}|\alpha_i,\beta)=-\alpha_i\sum_t\lambda_{it}+\ln\alpha_i\sum_t y_{it}+\sum_t y_{it}\ln\lambda_{it}-\ln\sum_t y_{it}! \qquad (C.4)$$

Differentiating (C.4)[3] it is possible to retrieve the estimates of α_i and λ_{it} (thus the β^s). When a Negative Binomial distribution is assumed for the dependent variable, the estimation procedure is the same as in the previous case, obviously taking account that the parameters of the distribution function are different.

When α_i is randomly distributed, the joint distribution function of the Poisson model is:

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[2]The advantage of this model with respect to the previous one is that a greater flexibility is allowed for the variance, since here the hypothesis of equaldispersion can be relaxed.

[3]See Cameron and Trivedi (1998) for further details.

$$\Pr\left(y_{i1},...,y_{iT}|\alpha_i,\beta\right) = \left(\prod_t \frac{(\lambda_{it})^{y_{it}}}{y_{it}!}\right)\left(\frac{\delta}{\sum_t \lambda_{it}+\delta}\right)^{\delta} \left(\sum_t \lambda_{it}+\delta\right)^{\sum_t y_{it}}\left(\frac{\Gamma\sum_t \lambda_{it}+\delta}{\Gamma(\delta)}\right) \tag{C.5}$$

then the procedure is the same as the one described for the fixed effects. In the Negative binomial case, the following additional hypothesis has to be made:

$$(1+\alpha_i/\phi_i)^{-1} \sim \text{Beta}(a,b) \tag{C.6}$$

Hausman, Hall e Griliches (1984) show that with this hypothesis the joint distribution function for the i individual is:

$$\Pr\left(y_{i1},...,y_{iT}|\alpha_i,\beta\right) = \left(\prod_t \frac{\Gamma(\lambda_{it}+y_{it})!}{\Gamma(\lambda_{it})!\Gamma(y_{it}+1)!}\right) \left(\frac{\Gamma(a+b)\,\Gamma\left(a+\sum_t \lambda_{it}\right)\Gamma\left(b+\sum_t y_{it}\right)}{\Gamma(a)\,\Gamma(b)\,\Gamma\left(a+b+\sum_t \lambda_{it}+\sum_t y_{it}\right)}\right) \tag{C.7}$$

Descriptive statistics:

Table C1 - Description of the Variables (1999-2002)

Variables	Mean	Std. Dev.	Min	Max
Mafia Crimes (number)	9.82	17.47	0	141
Protests (number)	22,687.67	37,495.84	1,127	386,814
Trials (number)	40.48	69.14	1	580
Bank Branches (number)	278.01	294.80	29	2293
Facilitated Credit (bil. EUR)	339.79	329.39	27.96	2,438.154
Informal Credit (per household, EUR)	79.77	101.86	0	319.17
ATM and Credit Cards (per household)	1.14	.41	.37	1.72
Unemployment (rate)	9.83	7.60	1.65	32.44
Per Capita Income (th. EUR)	18.41	4.63	9.42	32.06

Table C2 - Description of the Variables (1999)

Variables	Mean	Std. Dev.	Min	Max
Mafia Crimes	10.38	17.34	0	135
Protests	28,304.86	49,617.26	1,904	386,814
Number of Trials	46.51	80.66	1	580
Bank Branches	228.33	169.58	1.52	950
Facilitated Credit	376.30	363.96	32.60	2,438.15
Informal Credit	79.77	102.23	0	319.17
ATM and Credit Cards	1.14	.41	.379	1.72
Unemployment Rate	11.15	7.93	2.46	32.44
Per Capita Income	17.01	4.22	9.42	28.18

Table C3 - Description of the Variables (2000)

Variables	Mean	Std. Dev.	Min	Max
Mafia Crimes	7.68	14.73	0	121
Protests	23,276.17	35,548.53	1,366	223,421
Number of Trials	38.63	66.32	2	439
Bank Branches	236.99	177.17	1.61	986
Facilitated Credit	348.79	324.32	33.33	1,973
Informal Credit	79.77	102.23	0	319
ATM and Credit Cards	1.14	.41	.37	1.72
Unemployment Rate	10.17	7.87	1.71	30.53
Per Capita Income	7.88	4.48	10.15	29.61

Table C4 - Description of the Variables (2001)

Variables	Mean	Std. Dev.	Min	Max
Mafia Crimes	11.40	20.58	0	141
Protests	20,415.97	31,169.13	1,155	197,948
Number of Trials	36.30	60.21	1	394
Bank Branches	284.17	302.76	33	2,250
Facilitated Credit	331.92	323.25	33.36	2,015.32
Informal Credit	79.77	102.23	0	319.17
ATM and Credit Cards	1.14	.41	.37	1.72
Unemployment Rate	9.18	7.42	1.65	30.28
Per Capita Income	19.14	4.66	10.92	31.50

Table C5 - Description of the Variables (2002)

Variables	Mean	Std. Dev.	Min	Max
Mafia Crimes	9.82	16.78	.33	132.33
Protests	18,753.67	30,248.40	1127	202,035
Number of Trials	40.48	68.36	1.66	451.66
Bank Branches	241.15	173.30	1.03	783
Facilitated Credit	302.13	303.50	27.96	1,900.59
Informal Credit	79.77	102.23	0	319.17
ATM and Credit Cards	1.14	.41	.37	1.72
Unemployment Rate	8.84	7.02	1.85	29.05
Per Capita Income	19.14	4.66	10.92	31.50
Mafia Crimes	11.40	20.58	0	141