Memory in Contracts:

The Experience of the EBRD (1991-2003)

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Abstract

The objective of this paper is to identify the role of memory as a screening device in repeated contracts with asymmetric information in financial intermediation. We use an original dataset from the European Bank for Reconstruction and Development. We propose a simple empirical method to capture the role of memory using the client's reputation. Our results unambiguously isolate the dominant effect of memory on the bank's lending decisions over market factors in the case of established clients.

Keywords: Financial Contract; Empirical contract theory; Reputation; Asymmetric information

JEL Classification: D21, D82, G21, L14, P21.

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1 Introduction

The optimal long-term contract in repeated moral hazard generally exhibits memory (Lambert 1983, Rogerson 1985 and Chiappori et al. 1994). With repeated contracts the principal is able to learn from the agent's past history and, hence, propose a long-term contract that internalizes this information over time. The benefit is that risk sharing is improved. A natural application of long-term contracting is in financial intermediation where asymmetric information is a key problem (Stiglitz and Weiss 1981, 1983). Banks tend to maintain durable relationships with clients of established reputation. It has been proved that, thank to memory, a long-term credit contract benefits the borrower in the shape of lower interest rates and fewer collateral demands (Boot and Thakor 1994). Other models, however, predict that the duration of the bank-borrower relationship in fact increases the borrowing cost because its benefits also create for the borrower switching costs to start a new relationship with a competitor (Greenbaum et al. 1989 and Sharpe 1990). The advantages of the reduction in asymmetric information, in this specific bilateral relationship through memory, would thus be offset by the market power gained by the bank. These conflicting predictions are reproduced by the empirical literature. Berger and Udell (1995) and Bodenhorn (2003) find a negative relationship between duration of the bank-borrower relationship and borrowing cost or collateral demands. Degryse and Van Cayseele (2000) find in contrast that the loan rate increases with the duration of the bank-borrower relationship. Neither result is confirmed by other studies in which no statistically significant correlation is obtained (Blackwell and Winters 1997, Petersen and Rajan 1994, Cole 1998 and Elsas and Krahnen 1998). This inconclusive empirical evidence illustrates that the borrowing cost may not only be a function of duration but also of other factors. It tends to increase with the amount of credit, the riskiness of the project and market power but tends to decrease with competition. In addition, banks use the borrowing cost to sort out borrowers and eliminate the ones with the highest probability of default. It is therefore an instrument that can deal with both adverse selection and moral hazard (Stiglitz and Weiss 1981). The reputation effect is then

difficult to capture.

We argue that the method used so far by the empirical literature is flawed as it pools all firms whatever the duration (or frequency or intensity) of the relationship with their bank, and estimates the effect of duration on the borrowing cost. The problem is that the borrowing cost can vary across firms not only because of the duration of the relationship but also as a result of the banks' screening policy. In other words, this method is unable to disentangle the competition and asymmetric information effects, which in turn prevents us from identifying the effect of memory.

The present paper proposes a different empirical strategy to overcome this problem. First of all, in common with the rest of the literature, we focus on one single bank to control for unobserved heterogeneity in lending policy. We build an original database from data made public by the London-based European Bank for Reconstruction and Development (EBRD) on all its investments in private and public firms during the first years of its life (1991-2003).[1] Second, our dataset allows us to split it into two subsamples: firms which have signed one single contract and firms which have signed more than one contract. In so doing, we somewhat control for the screening effect. In both subsamples, the amount of lending and the type of contract set for each firm's first contract reflect the screening policy of the bank. In the subpopulation of the several-contract firms information on the firms'past actions obviously exists. The question is: will the bank use it? We run regressions for each of the two subsamples. If the same results are obtained, this means that the bank does not use the past history of its clients in designing contracts. Our results clearly show that it is not the case. The total project value of the first signed contract (and not of the following ones) is neatly identified as the dominant individual fixed effect in the design of contracts for firms which signed more than one.

This result could, however, be driven by the effect of competition. The bank could indeed offer better lending conditions to its long-term clients in order to prevent them from going to competitors. The specificity of the EBRD enables us to rule out this possibility. The EBRD was created in 1991 just after

[1] Any local or foreign firm is eligible for EBRD financing.

the Soviet Bloc had collapsed to assist the countries of that region in transforming their centrally-planned economic systems into market economies. When it started its lending operations in 1991, the business environment of all these countries was characterized by large output fall, complete disorganization of production, macroeconomic and political instability and inadequate banking sector. This exceptional situation makes the EBRD experience an interesting natural experiment for two reasons. First, the management of risk had to be carried out in a very uncertain environment. The country risk was high owing to the macroeconomic turmoil and all potential borrowers had no market experience and no history of creditworthiness. Second, its decisions were not affected by competition because local banks were insolvent and foreign banks did not enter these risky markets in the early transition period. Moreover, the public shareholders of the EBRD appointed to the bank the mission to lead the financial flows to these countries and not to crowd out private investments. The EBRD was therefore in a situation of monopoly.

The monopolistic behavior of the EBRD offer ideal conditions to test memory in long-term credit contracting. Our estimations yield unambiguous results validating the predictions that reputation is the dominant device in screening clients.

The remainder of the paper is organized as follows. Section 2 focuses on the main theoretical contributions studying the bank-client relationship. Section 3 characterizes the model of the EBRD-client relationship. The data and descriptive statistics are presented in Section 4. Section 5 presents the econometric method and results and section 6 concludes.

2 The contract choice

The choice of the optimal contract between a lender and a borrower has been widely studied. Asymmetric information is the major source of risk between the two counterparts that is very difficult to control for. The lender aims at defining a mechanism device that allows her (i) to distinguish the good

(solvent) borrower from the bad one and (ii) to choose the right incentives to force the borrower to put as much effort as possible into the completion of the investment project for which credit is demanded. Therefore, the problem turns out to be the sum of various dimensions of uncertainty and imperfect information.

In a framework accounting for the repeated moral hazard problem between borrowers and lenders, Boot et al. (1991) conclude that, for borrowers with good reputation, there is a unique equilibrium, in which each borrower is offered an unsecured loan contract. In contrast, borrowers with bad reputation are offered a secured contract with collaterals that are lost only upon default. When private information on borrowers' type is added, the problem turns out to be of an adverse selection type: agents are required to self-report. Then, if borrower quality and effort are substitutes, low-quality borrowers post collaterals to commit to higher effort. This action reduces the likelihood of default of low-quality borrowers but remains higher than that of the high-borrower quality. As a consequence, there is a deadweight loss associated with collaterals. The private information problem accentuates the relationship between collateral requirements and borrower risks (already present in moral hazard problems). In the empirical test that Boot et al. (1991) propose, a key result deserves attention: the decrease in collateral costs or the increase in loan size yield a lower utilization of collaterals at equilibrium. Larger loans are more likely to have lower collaterals as well as loans with longer maturity. The size of the loan can be interpreted as a signal of borrower's quality. Other factors occurring in the client–bank relationship can also be interpreted as signals of the quality of the borrower such as, for instance, the structure of the contracts signed by the two counterparts. A bank can usually discriminate across clients by proposing different contracts to them. The contracts can be grouped by type according to their 'nature' but, nevertheless, each of them is often tailored to the client's needs.

Looking at the most widespread class of contracts, Inderst and Mueller (2006) investigate the optimality of debt versus equity contracts. Debt contracts are optimal when the lender is conservative and equity contracts when aggressive. Debt contracts are suitable for financing profitable projects that are

likely to break even on public information alone, while less profitable projects are financed with equity. In addition, debts are proven to mitigate moral hazard and other problems that arise from asymmetric information. For instance, investments by small firms in tangible assets such as equipment or properties are expected to be financed with debts. Furthermore, these authors analyze the sub-optimality of a lender's decision to propose a contract (to a potential borrower) by choosing it from a menu of contracts after having observed (ex-ante) a public signal. The menu choice always creates a problem because a lender would always choose a contract ex-post optimal for her. Nevertheless, given that the lender optimally restricts herself to a single contract to avoid ex-post self-dealing, it is optimal to offer a single contract that the client accepts or rejects on the basis of the contract's conditions. There is no adjustment of the loan terms after the screening, which guarantees the optimality of the decision. The authors provide empirical evidence supporting this result. Loans are often granted at standardized terms and borrowers, in particular small firms, are often charged with the same rate of interest (because of an implicit same risk premium).

The screening process is a key condition to discriminate among clients but it is a real burden for the bank (Manove et al., 2001). It is costly especially in a perfect competitive setting. Therefore, a bank always has a strong interest in proposing a contract with a high level of collaterals and avoiding the screening stage. In this way, it is sure to discard low types. Manove et al. (2001) focus on the screening cost in the case where a bank is a monopolist in the credit market. The result shows that there is a big difference with respect to the standard competitive structure. In the case of a monopolistic bank, the optimal bank's strategy is to offer one unique contract and then screen all projects. The motivation is straightforward: the structure of the credit market makes the demand quite inelastic and high interest rates do not lower the borrowing volume. The important factor is the market power of the bank, which is efficient under the conditions of asymmetric information. Throughout the screening process information is generated at a cost for the bank. Therefore, the bank screens the clients, funds the better projects and covers its costs with higher interest rates. As an additional result, the high

concentration of the credit market allows the bank to establish a closer long-term relationship with firms. As for the borrowers, good ones have an incentive in distinguishing themselves from the others by posting sufficient collaterals. As described in the next section, the framework developed by Manove et al. (2001) perfectly fits the behaviour adopted by the EBRD. In this theoretical framework, the reputation effect is crucial to building memory on clients, which, in the long run, turns out to be a discrimination device.

To our knowledge, these theoretical results have not yet been tested empirically. The obvious reason is that it is very difficult to identify a bank behaving as a monopolist in the credit market. The case of the EBRD seems to be unique and can be used as a kind of natural experiment to capture the memory effect in the contracts' terms.

3 The EBRD-client relationship

3.1 The EBRD

With a capital of 20 billion euros and owned by sixty-one countries and two intergovernmental institutions (the European Union and the European Investment Bank), the EBRD is a peculiar investment bank. Its main characteristics are the following:

- Unlike private investment banks, the EBRD has sovereign shareholders that do not receive dividends.
- Its investments are geographically restricted to the region of the former Soviet Bloc.
- Unlike the World Bank, the EBRD invests mainly in private enterprises. According to our calculations, the share of public clients between 1991 and 2003 does not exceed 12.5% of the total share of cumulated investment of 23%.
- Its investments have to respect environmental standards.

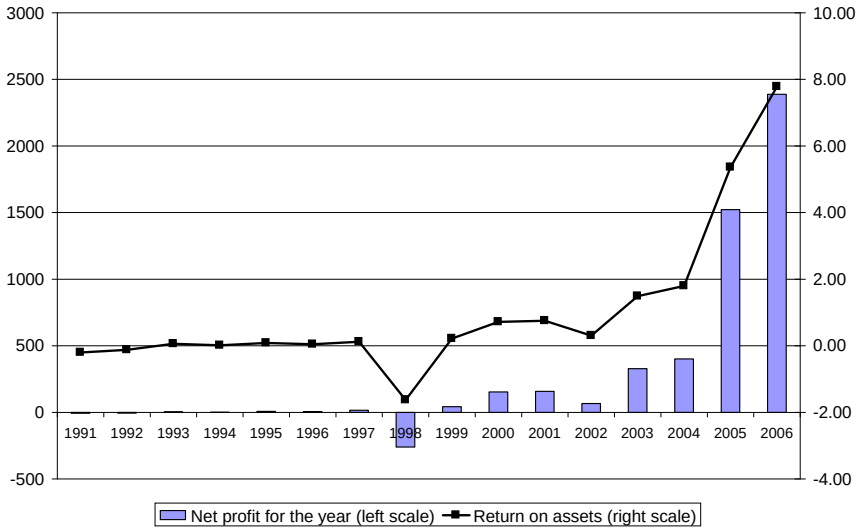

Figure 1: EBRD performance (€ million) (Source: EBRD, Calculus: authors)

- Its mandate stipulates that it must only work in countries that are committed to democratic principles. Nevertheless, some investments have been realized in certain countries that are far from being fully-fledged democracies.

From a theoretical point of view, we consider the objective function of the EBRD as identical to that of any investment bank. Its objective is to maximize profits from investment projects and to do so by using all the instruments available on the financial markets to raise funds and protect its portfolio against risks.[2] Figure 1 describes the EBRD performance (described as net profits) over time.

Its constraints, however, are different. It must invest in a restricted geographic area and this precludes diversification of its portfolio with investments in safer places in the rest of the world. Therefore, in this respect, the EBRD faces a harder constraint than any other investment bank. On the other hand, its sovereign shareholders virtually guarantee protection against bankruptcy, which is far from the case

[2]In fact, the objectives of the EBRD are not totally identical to those of other investment banks. The EBRD aims at being a catalyst for financial institutions and wants to avoid crowding them out. In other words, the EBRD does not see other financial institutions as competitors. However, in the bank-client relationship, which is our concern in this paper, its objective is to maximize profits from its clients' projects, i.e., in accordance with the EBRD's statement, to apply "sound banking principles" (EBRD, 1999).

for any other private investment bank. This feature together with its stable sovereign ownership allows the EBRD to raise funds in the best conditions and, simultaneously, face the high risks inherent in investing in the region.

3.2 The types of contracts granted by the EBRD

When considering a potential client for a lending contract, the bank follows a very standard procedure. First, we consider a contract running for one period. The bank and its client agree to sign the contract; then, the bank finances the firm which realizes the investment and pays back the loan (plus interest) to the bank.[3] Second, we consider a more established bank-client relationship. The bank grants to a firm a first contract. Then, according to the behaviour held by the client, the bank can decide to finance or not a second project whenever the client applies for a second (or more) contract. The problem faced by the bank therefore becomes dynamic. In a repeated contract, two scenarios are possible depending on whether the two stages are independent or not. If the stages are independent, the final result is the sum of the results of two one-stage games. Such a contract is nevertheless an incomplete one. Chiappori et al. (1994) prove that the long-term relationship can outperform a succession of day-by-day agreements if the role of memory is taken into account. To obtain this result, the principal's objective function must be time-separable and the current behavior must affect the probability of the current outcome. Under these assumptions the bank can write a long-term renegotiation-proof contract by adapting the terms of the contract in the second period with respect to the return of the firm's investment in the first period. The bank, therefore, remembers the return of the firm's first-period investment. The structure of such a contract is optimal: neither the principal (bank) nor the agent (the firm) has an incentive to deviate. Our empirical exercise aims at identifying whether and to what extent reputation has an impact on the credit amount granted by the bank to finance its clients' investment projects.

[3] In this section, for the sake of simplicity, we intend 'loan' to mean any kind of credit contract the bank may propose.

4 Data and descriptive statistics

We have built an original database from data made public by the EBRD over time. Our database includes 1788 financial contracts signed by the bank with private and public clients from 1991 to 2003. It contains information on the identity of the clients, the amount of the contract in ECU/Euros, the value of the investment project, the sector of investment, the nationality of the client, the year the contract was signed, the type of contract (loan, share, equity and guarantee), and other characteristics (old clients, private/public, macro-programmes...). In this section we present a brief overview of the content of our database and we discuss the most relevant descriptive statistics.

4.1 The contracts

The number of contracts and the amount of the annual investments were very low at the beginning of the transition process (see Figures 2 and 3). The EBRD was underusing its capital, a source of criticism among the shareholders and commentators. This underuse was principally because of the severe macroeconomic downturn that affected the entire region. After these initial difficulties,the bank's target was to strongly to increase the volume of the portfolio. The recovery of most of the countries in the region helped the EBRD to sign more contracts and make sizeable profits from 1999 onwards.

The average EBRD investment has been remarkably stable with a slight downward trend in the most recent years (see Figure 4). According to the information available on the EBRD website, the bank designed different kinds of contracts. They all represent the financial instruments by which the bank participates in the realization of the investment project proposed by the borrower. These contracts not only differ in the maturity of the credits but also in other characteristics that we will discuss below. First, in Table 1, we provide a general overview of the different kinds of contracts signed by the bank and their frequency:

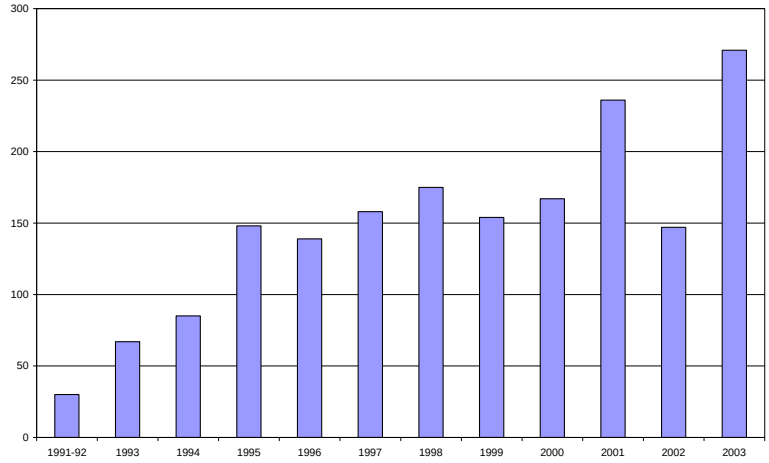

Figure 2: Number of contracts signed by the EBRD between 1991 and 2003.

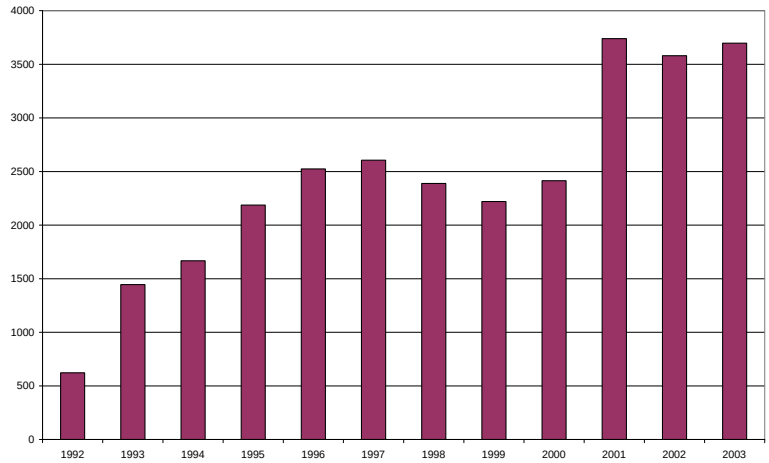

Figure 3: EBRD Investments by year (ECU/€ million)

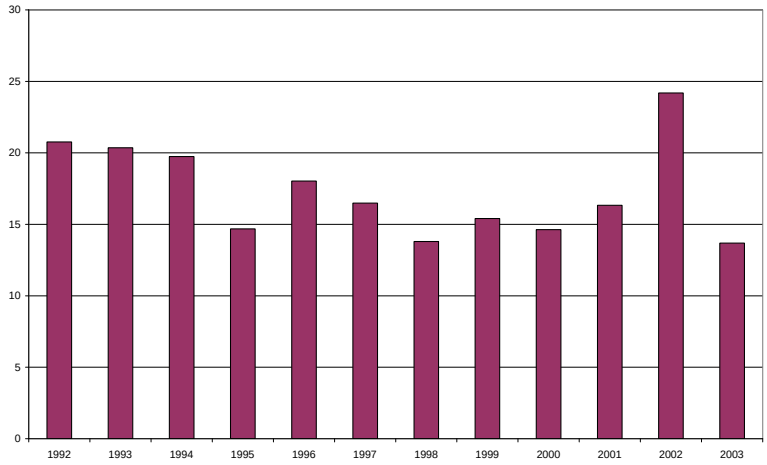

Figure 4: Average EBRD investment by year (ECU/€ million)

[Table 1 about here]

Three main categories of credit instruments can be distinguished: loan, guarantee, and share and equity contracts. Loans have been the financial contract most frequently used by the EBRD between 1991 and 2003 (Figure 5). A loan is generally considered as a short-term contract, lasting five years on average, and tailored to meet the particular requirements of the project. The credit risk is usually taken by the bank or partially syndicated to the market. A loan may be securitized by a borrower's asset and/or converted into shares or be equity-linked. The second important category of contracts includes share and equity. Share-type contracts were mainly signed at the beginning of the EBRD's activity while equity contracts represent a broader category of financial contracts including share contracts. An equity investment can be undertaken in various forms, including subscription to ordinary shares. When the EBRD takes an equity stake it expects an appropriate return on its investment. The bank usually sells its equity investment on a non-recourse base, has a clear exit strategy and only takes a minority position.[4] The third category of credit instruments refers to guarantee contracts. They have been used mainly at the end of our dataset period. By this type of contract, the bank helps borrowers in gaining

[4]Equity is considered to be a non-contingent contract.

access to financial sources through the provision of guarantees (EBRD, 1999).

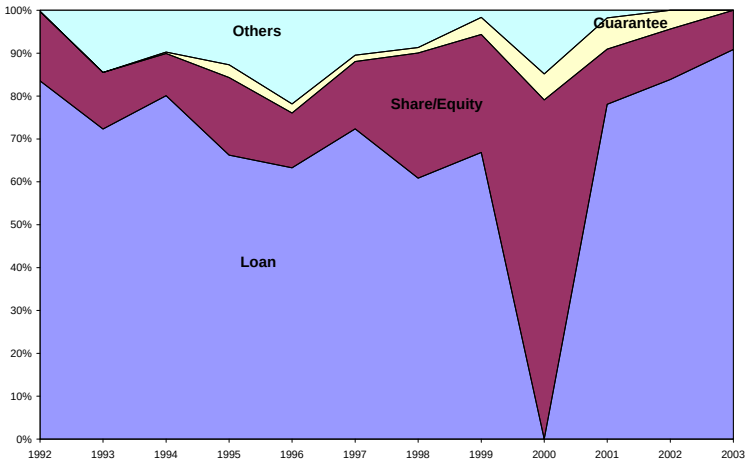

Figure 5: Financial contracts by type in percentage by year

Table 2 and 3 show descriptive statistics on the total values of projects that have been selected by the EBRD and the share that it effectively financed. In most accepted projects, the EBRD is not the only lending source.[5] The statistical information is given for the total population and two parts of it, one at the outset of transition (1993-1995) and the other at the end of the period (2000-2003). The total project value of loans is always higher than that of shares, but both have decreased over time. The median bank lending in loan contracts has remained unchanged over time while it has declined in share contracts. Figure 6 compares the fraction of the total project value financed by the EBRD for share and loan contracts. This fraction increases proportionally with the total project value but the increase is more pronounced for shares than for loans. As a shareholder the bank can control the management of the firm which implies the reduction of uncertainty associated with the imperfect information about the firm's behavior. The bank tends to augment its participation with the size of the project value in share contracts in order to protect itself against the risk. As for loans, the collateral allows for a control

[5] The contracts issued by the EBRD always require a co-financed part. It can be a cash financing from the firm or, in other cases, from a consortium of commercial banks. However, the involvent of commercial banks in the credit process is strictly suject to the EBRD participation. Hence, even in this case, the EBRD plays as a dominant agent.

of risk.

[Table 2 about here]

[Table 3 about here]

We also split the population into two subgroups of firms:[6] a first group with firms which have obtained one credit over the sample period (around 1270 firms) and a second group of those which have signed more than one contract (around 100 firms). Tables 4 and 5 show data for single-contract and several-contract firms respectively. The median bank lending fraction for several-contract firms is always more important than for single-contract firms. These differences may be associated with reputation premia.

[Table 4 about here]

[Table 5 about here]

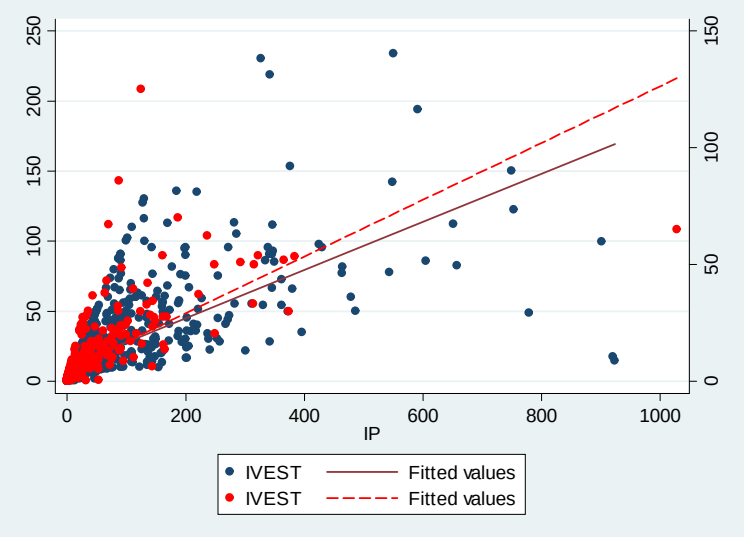

Figure 6: Fraction of EBRD financing in share and loan contracts (red points and dashed line for shares, and blue points and solid line stand for loans)

[6] This split of the population will be essential to test the role of memory on bank behavior in the econometric exercise.

To learn more about the attitude of the EBRD toward risk we consider the likelihood of a contract type granted by the bank that is chosen against other possible ones conditional on the total investment size and the credit amount supplied by the bank. In this way we expect some information on the bank's risk behaviour when it finances large projects. To do so, we run a multilogit estimation by regressing the 13 contract types against all available information: the investment size, the credit size, the libor and democracy indexes as well as the country of origin's GDP per capita level. Then, we compute the probabilities for the two most frequently signed contracts (loans and equity/share) in both subsamples (single-contract subsample and more-than-one-contract subsample). The results are graphically represented in figures 7 and 8. The probability of signing one contract type (either loan or equity/share) conditional on the investment size is graphed on the left of each figure, and the probability of signing one contract type conditional on the credit size is represented on the right. Let us define $\underline{\mathbf{w}}_i$ the vector of the characteristics associated with the client (i) that can influence the EBRD's decision to grant her a type of contract $(Y = j)$ rather than another contract. The model of the EBRD's contract choice can be defined by:

$$\Pr ob(Y_i = j \mid \underline{\mathbf{w}}_i) = \frac{\exp(\underline{\mathbf{w}}_i' \alpha_j)}{\sum_{j=1}^{13} \exp(\underline{\mathbf{w}}_i' \alpha_j)}, \quad j = 1...13.$$

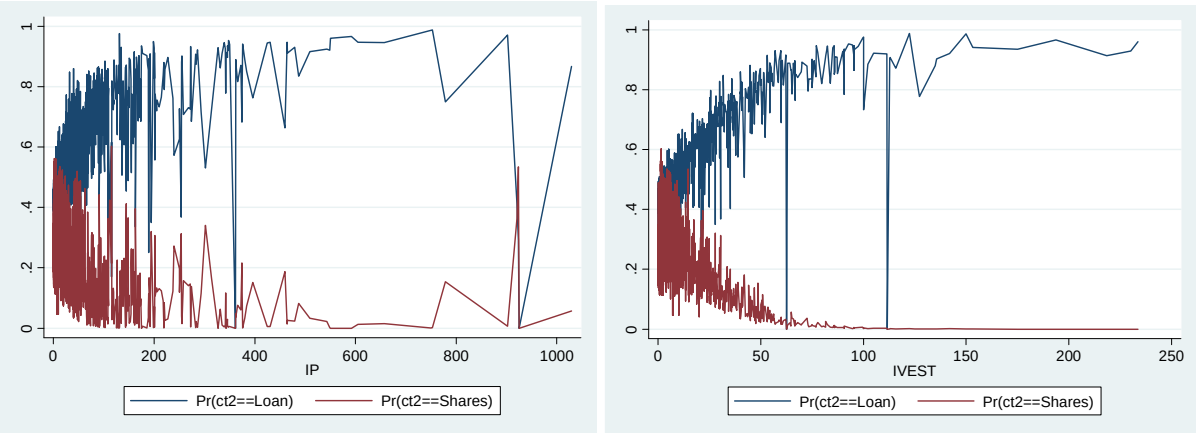

Figure 7: Multilogit probabilities for the subsample of unique contracts

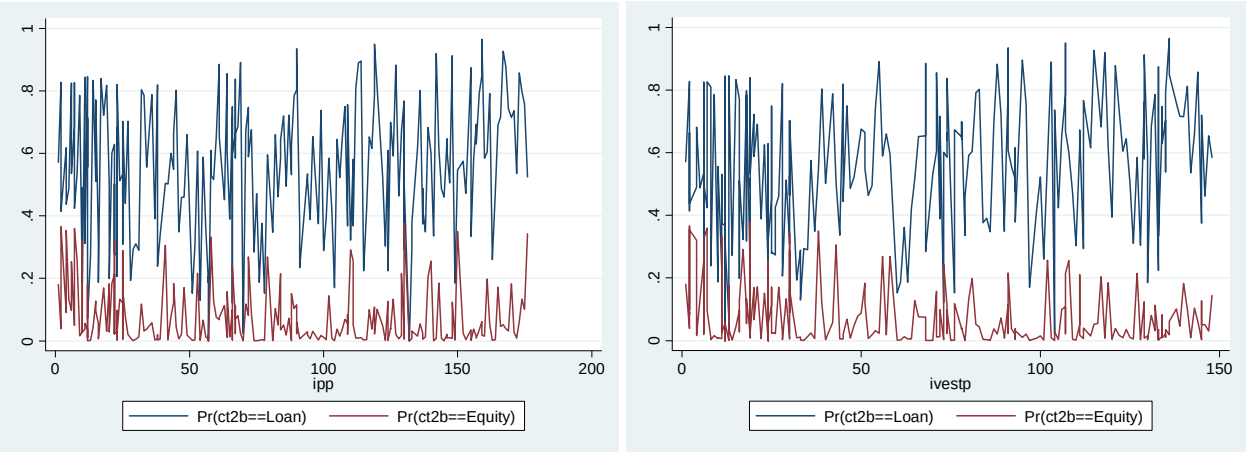

Figure 8: Multilogit probabilities for the subsample of more than one contract

The multilogit predictions draw that there is a higher probability for the bank to grant a loan rather than a share or equity contract with respect of any investment or credit size. However, there is a clear difference in the distribution between both subsamples. In the single-contract subsample, the probability of granting a loan increases with the investment or credit size while in the more-than-one-contract subsample, the probabilities rather follow a random walk. This difference in the distribution of probabilities may signal that the EBRD does not behave in the same way for a first contract than for a second (or more) contract. The bank has certainly less client information for a first contract than for a second and, hence, the first contract carries more risk. The bank seems to adjust its lending policy in face of this higher risk. These results suggest the hypothesis that the EBRD's lending policy does not consist in offering a formatted menu but rather in granting credits tailored on the basis of clients' information and possibly on the basis whether it is a first contract or the signature of a further contract.

4.2 Countries and sectors

There are two criteria that can account for the geographical distribution of contracts between 1991 and 2003: market size (population size or income per-capita), and political regime. Figure 9 and Figure 10 show the geographical distribution of the EBRD investments in cumulated terms by country

and per-capita by country. Russia has received more credits than any other country in the region over the period followed by the Eastern European countries, and then by the Central Asian countries. The latter countries not only have a poor business climate but also non-democratic institutions. In terms of the cumulated amount of investments per capita, the ranking among the host countries is substantially reversed in the upper half of the distribution. The Central European countries, which are the most developed countries of the population and lead the transition process, have received the largest per capita financing (around 300000 euros for Slovenia, Croatia and Estonia) while the Central Asian countries still lag very much behind. According to this second criterion, Russia moves down to the lower half of the distribution.

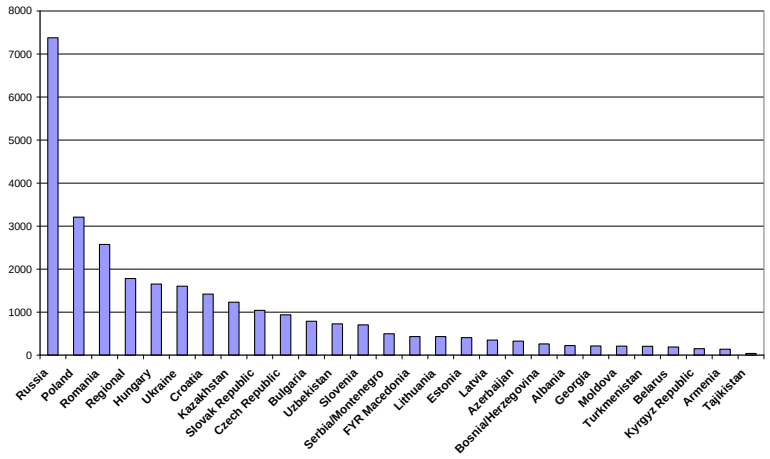

Figure 9: Cumulated EBRD investment by country (€ million)

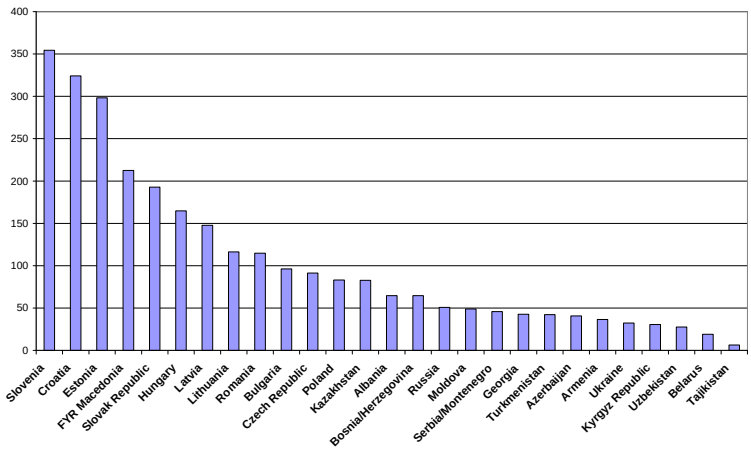

Figure 10: Cumulated EBRD investments per capita by country (€ thousands)

[Table 6 about here]

We split the distribution into three sub-periods (1991-1995, 1996-1999 and 2000-2003). Table 6 shows that at the beginning of the transition process almost half of the investments went to the early starters, Central Europe and the Baltic states. Then their share reduced to roughly one-third of the total. Along with the transition process, Russia received an increasing part of the the EBRD investments and its share has remained stable. South-Eastern Europe has seen a progressive increase in its share of the EBRD investments over the period. The relative share of Eastern Europe and the Caucasus has decreased. Finally, the Central Asian countries reached a noticeable share between 1996 and 1999 which fell by half in the last period.

[Table 7 about here]

As for the distribution by sector (Table 7) [7], at the beginning of the transition, most of the investments of the EBRD went to Finance, Telecom, Oil/Gas/Natural Resources and Other sectors. The objective was to finance infrastructure and the restructuring of the banking and the manufacturing

[7] A complete list of all sectors is included in Appendix A.

sectors. Thereafter, the focus of the bank switched to the financing of the creation of small and medium entreprises (SMEs).

5 Empirical strategy

The EBRD selects one of the thirteen different available contracts (Table 1) when deciding to finance the investment project of a firm. The one selected should be the contract that reduces as much as possible the asymmetric information between the principal and the agent. The objective of the econometric analysis is to identify the screening device that enables the bank to discriminate among the firms and select the contract that will incite them to behave well. In particular, we want to verify whether the bank modifies its behavior when it signs several contracts with the same firm over time. If it does, as proved by Lambert (1983), Rogerson (1985) and Chiappori et al. (1994), this means that the bank uses the historical information (memory) about the firm to adjust the financing conditions in order to maximize its profits. To do so, after having considered the full sample, we first proceed by splitting the whole population into two subpopulations: one-contract firms and several-contract firms. The latter subpopulation includes historical information on the firms and we want to check whether the bank uses it. In this way, we can both control for imperfect information and identify the role of memory (reputation). We apply the same econometric specification to both subpopulations but allow for different specifications of the same fixed effects.

According to the level of significance of the fixed effects, we are able to check (i) the degree of heterogeneity they account for and (ii) the importance of the reputation effect captured by an ad-hoc fixed effect in the case of established clients.

5.1 Econometric specification

In order to run our econometric exercise, we match data referring to a few characteristics of the contracts signed by the bank with other data referring to the environment in which the investment project has been run. In such a way, we can capture the degree of the investment risk (country and credit risks). According to the general theoretical framework discussed in Section 2, the amount of the credit contract is supposed to be the result of a combination of the market conditions and the expected return of the investment.

The variables referring to the environment are: the measure of income level in the host market (GDP per capita), an indicator for political institutions (degree of democracy, DEM), time dummies and, finally, a dummy for public clients. In fact, a public client is more likely to be considered as a solvent client. Concerning the contract, beside the value of the credit (IV) granted by the EBRD to the firm, we consider the type of contract, the year it has been signed and the return of the investment of that firm that can be approximated, for a solvent firm, by the value of its productive investment (IP, available in the database). This investment value is the minimun level of return of any successful productive investment by the firm, which corresponds to its repayment capacity .

The maturity of a credit is different for each category of contract and the type of contract is an approximate indicator of the credit maturity as mentionned in the Subsection 4.1. Finally, we know that the interest rate charged by the EBRD is equal to the LIBOR (London Interbank Offered Rate) plus a risk premium. The value of the LIBOR allows to capture the current conditions of the financial markets. On the firm hand, the LIBOR is an approximated measure of the effort required to establish her reputation as solvent firm.On the bank hand, any changes in the LIBOR will affect the credit supply to the firm. In addition, for the specific case of loan contracts, the LIBOR can approximate the rate of return of the bank's investment.

As for the risk premium, the data from the EBRD are not available, which does not represent

an obstacle for the issue we are studying. As argued in Section 2, the borrowing cost cannot be an unambiguous indicator of the borrowers' type. In our exercise, we overcome this problem by introducing individual fixed effects which control for the omitted variable bias. The description of the variables is given in Box 1.

[Box 1 about here]

We formulate the empirical model as follows. Let us define the dependent variable (value of the credit) as Y (IV) and $\underline{X}$ $=(IP, Public, DEM, Libor, GDP)$ the vector of the independent variables. Each entry of the dependent variable, the size of the credit for financing an investment project (IP) is defined as $y_{itjs,}$ with $i = firm$, $t = year$, $j = host\ country$, $s =$*sector.* We also include an interaction term $(Dem_{jt} * year_t)$ between the democracy index and the time dummies. This term is meant to track the possible changes of the variable democracy across time in each country. Then, the equation we consider can be defined as:

$$\begin{aligned} IV_{itjs} &= \alpha_0 + \beta_1 IP_{itjs} + \beta_2 Public_i + \beta_3 Dem_{jt} + \beta_4 Libor_t + \beta_5 GDP_{jt} + \\ &\quad \beta_6 (Dem_{jt} * year_t) + \varepsilon_{itjs}. \end{aligned} \tag{1}$$

Our database is not a true panel but rather a pooling of independent cross sections across time. Hence, we need to control for heterogeneity problems As argued in Wooldridge (2006), this pooled structure implies that the dependent variable may have different distributions in different time periods and, to control for it, we need to introduce some time-fixed effects (μ_t). The same reasoning applies to the sector dimension for which we include some sector-fixed effects (μ_s). In addition, as shown for instance in Baltagi (2008), we also need to include the unobservable time-invariant individual-specific effect (μ_i) to control for the heterogeneity problem as much as possible. Controlling for all these effects

allows to decompose the error term (ε_{itjs}) in the following way:

$$\varepsilon_{itjs} = \mu_i + \mu_t + \mu_s + \nu_{itjs}, \tag{2}$$

where μ_i is the unobservable time-invariant individual-specific effect and ν_{itjs} denotes the remaining disturbances, which are now expected to be $IID(0, \sigma_\nu^2)$. By plugging the error decomposition in the previous equation, we obtain the following equation

$$\begin{aligned} IV_{itjs} \quad = \quad & \alpha_0 + \beta_1 IP_{itjs} + \beta_2 Public_i + \beta_3 Dem_{jt} + \beta_4 Libor_t + \beta_5 GDP_{jt} + \\ & \beta_6 (Dem_{jt} * year_t) + \gamma_1 \mu_i + \gamma_2 \mu_t + \gamma_3 \mu_s + \nu_{itjs}. \end{aligned} \tag{3}$$

The choice of the variable μ_i turns out to be crucial for obtaining the independence between the residuals and the dependent variable. In a standard panel effect the variable μ_i would be simply identified with firm-fixed effects. Due to the structure of the panel this option is not here possible. It is then necessary to look for other potential candidates that do not introduce endogeneity distortions. We start with considering the sectors of activities of the investing firms ($Sector$).The theoretical framework points out the contract type as one of the possible way to identify the individual-firm effects. The contract type is in fact time invariant according to EBRD's statements. In our exercises the firm-fixed effects (FE) will be alternatively identified by the following exogenous variables: the contract type granted at time t ($C13$), and, for established clients obtaining more than one contract, the contract type signed by a firm at $t = 1 (C13FIRST)$ or the value of the investment of the same firm financed at $t = 1$ ($IPFIRST$). Therefore, the specification used for the estimation can be written as:

$$IV_{itjs} = \alpha_0 + \beta_1 IP_{itjs} + \beta_2 DI_j + \beta_3 Dem_{jt} + \beta_4 (Libor_t) + \beta_5 GDP_{jt} \quad (4)$$
$$+\beta_6 (Dem_{jt} * year_t) + \gamma_1 FE_i + \gamma_2 Year_t + \gamma_3 Sector_s + \nu_{itjs}$$

[Table 8 about here]

Table 8 gives descriptive statistics for some of these variables for the overall period and for two years: 1993 and 2003. The dependent variable is the financing amount (IV) granted by the EBRD. This is one of the variables in the bank's profit function, which depends negatively on the riskiness of the project.[8] It reflects both the screening process and the incentive mechanism that take place across clients. The measure of political institutions is taken from Polity IV project (2007). It is an index varying between zero (for an absolute autocracy) and ten (for a fully-fledged democracy).[9] In our population this index declines over time because the EBRD financed democracies of Central and Eastern Europe at the beginning of the transition and later started to finance autocratic countries from Central Asia. The variation of the Libor corresponds to the historical values of the credit market over the period.

According to the theoretical results discussed in Section 2, we expect that all independent variables in equation (4) except the LIBOR will have a positive sign. An increase in the LIBOR implies a decrease in the amount of credit. In order to test the level of individual heterogeneity we apply the technique of pooled OLS versus fixed effects.[10] In all the contracts signed by the EBRD the type of contracts is an individual time invariant characteristic. We will treat it as an individual fixed effect. We will identify it by applying the three different measures: $C13$, $C13FIRST$, $IPFIRST$. By running regression with $C13$ as individual fixed effects, we do not include any historical information for the firms. When we introduce

[8] See Stiglitz and Weiss (1981) on credit rationing.
[9] See the Polity IV website for details on how the scores are computed.
[10] The econometric estimations have been computed with the Stata 9.0 package.

historical information on individual firms (by $FIRST$ variable), it is possible to observe whether the past performance of firms affects the conditions of the contract proposed by the bank. If it does, we can conclude that the bank memorizes the past information and uses it to adjust the conditions of the next contracts for each individual firm.

5.2 Results

Our database contains all contracts signed by the bank over the period 1991-2003. First, we concentrate on the full sample and, then, we split it into two groups: one-contract firms and several-contract firms. In order to test the reputation effect, we run regressions separately for each group of firms. We proceed first by assessing whether the fixed effect model should be preferred to the pooled OLS (with the F-test) and to random effect model (with the Hausman test). In all the regressions we control for heteroskedasticity by applying either the White and cluster correction. Then, we test the different measures of individual fixed effects.

5.2.1 The full sample

We first consider all contracts as they are totally independent. Then, we identify the main factors that can influence the size of the credits granted by the EBRD.

In Table 9a, we show the output of the OLS estimations for the pool of observations when considering dummies by year, by sector and an interaction term (dem*years) that takes into account the transition of the political regime in the host countries towards democracy. In order to control for heteroskedasticity problems, we correct the residuals with either the White or cluster method. The cluster method is appropriate since it allows us to take into consideration the fact that one firm can apply for more than one contract.

The results we obtain are robust overall. The proxy of the repayment capacity (IP) and the GDP per capita of the host country have a positive impact on the credit size. Being a public borrower

has also a positive impact on the credit size, which can be interpreted as a guarantee for being a solvent client. In contrast, the LIBOR and the democracy index display negative signs. As for the Libor, the result simply confirms that the size of the credit is inversely related to the interest rate level. The negative sign associated with the democracy index indicates that EBRD invests increasingly over time in the less democratic countries (see Subsection 4.2). This can be explained by the fact that at the beginning of the transition the EBRD granted few credits but mostly in more democracies then increased its supply of credits to all types of regimes and, finally, kept investing a lot in less democratic countries because the more democratic ones started to be financed by the private investment banks. Finally, the statistical tests run for the time and sector dummies state that those variables are not always statistically significant. Thus, time, sectors or transition dynamics are not discriminating factors influencing the credit size granted by the bank.

We repeat the same exercise by including a type of fixed effect at firm level: the type of contract. As we widely discuss in the first part of the study, most of the contracts offered by the bank are standardized. Therefore, it is likely that the type of the contract signed by the client is somewhat the result of the screening process of the bank, and it is automatically defined by the contractual condition a firm is required to fulfill. The estimations run by using these fixed effects (Table 10a) confirm the previous results. The regressors (when statistically significant) improve their degree of significance. According to the F-test, the fixed effect estimation has to be preferred to the pooled OLS when including the interaction term. Again, the size of the investment, the identity of the client and the level of the GDP per capita in the host market have a positive impact on the credit size. Finally, we establish that the fixed effects cover almost three-quarters of the variance. This result suggests that there really is a device to discriminate across clients and helps to explain the differences in the amount of credits granted by the bank.

In addition, we perform a robustness check. Another characteristic that may be very important for the bank's lending decisions is a fraction of the borrower's capital owned by an international firm.

By international firm it is meant a firm from the United States, Canada, Western Europe, Japan and other Asian developed countries or city-states, Australia and New Zealand. As a shareholder, the international firm is assumed to have some control on the local firm's management, bring management experience, international contacts, access to capital markets and international clients, and high returns' expectations. These international firms are usually considered as well established clients and may contribute to reducing the investment project's risk evaluation by the EBRD when they own a fraction of the local borrower's capital. We want to check whether this international factor affects the bank's behavior. To do so, we built an ad-hoc dummy (dummy MNE) distinguishing the 617 projects having at least one international partner from those having none. We add this variable to the regressors and we run again the previous estimations whose results are in Tables 9b and 10b. The specification performs well but the new dummy is never statistically significant.[11] The presence of an international partner does not seem to play any role in the bank's lending behaviour towards the borrowers that obtained a credit.[12]

Having considered the full sample, we now want to go further by splitting the sample into two subsamples in order to verify the results' robustness. The first subsample includes all firms having signed only one contract while the second one is composed of the firms having signed more than one contract. The specific split of the sample is the method we propose to identify the role of memory in the bank's lending decisions.

[Table 9a and 9b about here]

[Table 10a and 10b about here]

[11] We ran other regressions to check for robustness using the one-contract subsample. Results are available upon request.

[12] The presence of an international partner could possibly affect the bank's decision to grant or not a credit to an applicant but the EBRD does not provide information on rejected projects to be able to test it.

5.2.2 One-contract firms

This subpopulation includes 1269 contracts. Since, each contract corresponds to a particular firm, we do not have historical information on the firms. Therefore we can only test one measure of individual fixed effects ($C13$). This is a qualitative variable that identifies each type of the thirteen contracts.

[Table 11 about here]

[Table 12 about here]

The results of the F-test and the Hausman test show that the fixed effect model should be preferred to the pooled and random effects models (Tables 11 and 12). In addition, the fraction of the variance due to fixed effects (ρ) is particularly high (0.70). The estimates of ρ suggests that almost three-quarters of the variation in the financing amount is related to the different types of contracts (Baltagi, 2008 and Baum, 2006). In the fixed effect estimations, the coefficients of all the explanatory variables (when they are statistically significant) display the expected sign. The repayment capacity of the firm is always highly significant. All dummy variables are always statistically significant. The public identity of a client turns out to be important because a public client may be considered by the bank as less risky than a private one. The significance of the interaction term between democracy (DEM) and the time dummy means the more democratic a country is over time the larger is the size of the financing offered by the bank. This result either tends to confirm the official claim that the EBRD promotes democratic institutions in transition countries or means that a country moving to democracy (over time) offers more profitable investment opportunities.

For an additional robustness check of the obtained results, we also ran regressions using the same specification for a particular sector, banking and finance, in which the EBRD has been very active in all transition countries over the sample period. The results obtained are very similar to those of the full sample (Table 13).

[Table 13 about here]

To sum up, for the one-contract firms the individual fixed effects by type of contract turn out to be a good measure to identify individual heterogeneity. Each contract signed by the bank is granted according to the individual characteristic of the client. This captures the optimal behavior of the bank in face of both adverse selection and moral hazard when it signs a first contract with a firm that it has selected.

5.2.3 Several-contract firms

This subpopulation includes 346 contracts. Now, to any firm more than one contract applies. Therefore, we have historical information on each individual firm and we can control for it. Given this characteristic, we would like to check whether the individual heterogeneity we identified in the previous subpopulation holds in the present one. If it does, this means that the bank deals with firms of both subsamples in the same way, hence neglecting historical information in the subpopulation of several-contract firms. Thus, we repeat the previous exercise in its entirety for this subsample. In order to control for heteroskedasticity, we alternatively apply the White and the cluster corrections. The cluster correction is important for controlling the autocorrelation in the residuals because each firm appears more than once in the subsample.

[Table 14 about here]

[Table 15 about here]

The previous exercise for this subsample yields a first important result: fixed effects by type of contract do not capture the individual heterogeneity, as happened previously (Tables 14 and 15). First, the F-test is weakly significant or insignificant while the Hausman test strongly rejects the random effect model. As a result, we conclude that the model with contract-type ($C13$) fixed effects is not a quite robust estimation technique for this subpopulation, even if these estimations should be preferred to the pooled and random effects estimations. This conclusion is reinforced by the low level of $\rho(0.07–0.12)$ of

these estimations.

We, therefore, need to look for other measures of fixed effects for controlling individual heterogeneity. One reasonable factor that can have an important impact on discrimination across clients is the client reputation. As discussed by Boot and Thakor (1994), an established client can enjoy better conditions when signing various contracts with the same bank. We are able to identify the potential reputation of a client by isolating the first type of contract and the value of the first investment (namely, the repayment capacity) for the firm that appears more than once in our database. Then, we match these values to the other (later) contracts signed by the same firm. In order to avoid endogeneity problems, we extract from this sub-sample of several-contract firms the entries that correspond to the first contract for all firms as well as the firms with more than one contract signed the same year (as first entry), for which we are not able to determine the chronological order of these contracts.

In this way, we are able to exploit the historical information included in this subsample by testing two measures of individual fixed effects defined previously: C13FIRST and IPFIRST. Each of these measures contains this historical information because it takes into account the information associated with the first contract signed by each firm (FIRST). The variable IPFIRST represents the project value of the first contract; the variable C13FIRST is the type of the first signed contract. The present exercise yields the second important result of the paper: the fixed effects associated with the project value of the first contract are a good measure to account for individual heterogeneity in this subsample.

[Table 16 about here]

[Table 17 about here]

[Table 18 about here]

Whenever the project *value* of the first contract (*IPFIRST*) is included in the individual fixed effects, the value of ρ increases strongly [Tables 17 and 18]. When we only consider the *type* of contract (*C13*), the level of ρ is low (first column in Table 14). Then, when we consider a measure of reputation for

established clients (second and third column in Table 14), the value of ρ is high, above all when we consider the size of the first investment ($IPFIRST$). This result is evidence of the presence of memory. The project value of the first contract is historical information for the bank since it reflects what the firm paid back, while the type of the first contract contains no history. In addition, the project value (IP) is always statistically significant and has the expected sign. Concerning the other variables, they lose part of their statistical significance when compared with the previous exercise but keep the expected sign. The only difference is for the identity ($PUBLIC$) of the client. Being a public partner no longer has strategic importance. It even displays a negative sign in one estimation out of four. In the previous sample, the absence of historical information obliged the bank to rely on the other available variables, for instance, public ownership. Once the bank deals with established clients the previous public-status effect is replaced by a more specific client-reputation effect. Another way to interpret this result (and, especially, the negative sign of the coefficient) is simply to argue that the bank changed the strategy to operate in the market. It may be more oriented in financing projects not involving public partners.

Once more, for robustness check, in the regressions carried out for the banking and finance sector alone, the results for the more-than-one-contract subsample are similar to those of all sectors included. The memory effect applies especially for native banks, i.e. local borrowing banks that do not have an international partner (Tables 19 and 20).

[Table 19 about here]

[Table 20 about here]

To conclude, the memory of the first contract overrides all the other potential effects. It turns out that the coefficient is always statistically significant. Memory thus allows the bank to discriminate across firms according to their individual historical characteristics and offer tailored contracts to control risk better. As an indicator, it can be observed that the number of groups inside this subsample increases from eight to between ninety and ninety-four thanks to the memory effect.

6 Conclusions

Contract theory has proved that the optimal contract generally exhibits memory in repeated contracts with moral hazard. It has turned out to be difficult to identify it clearly in the empirical literature on long-term contracting in financial intermediation. Considering that the method used so far in this literature is flawed, we proposed in this paper an alternative empirical method based on the separation of observations between firms having signed one contract and firms having signed more than one contract. We argue that this procedure is required to control for the effect of asymmetric information in the bank's lending policy. Nevertheless this is not sufficient. The effect of memory on moral hazard can be affected by the competition effect in the banking industry making it hard to isolate. The dataset we built from the European Bank for Reconstruction and Development allows us to achieve it. The EBRD has been in a situation of monopoly in many transition countries especially at the outset of the transition process. Moreover, its shareholders are sovereign and assigned to the bank its mission to foster and not to crowd out financial flows towards the private sector in these countries. Our results yield two conclusions. First, they unambiguously identify the role of memory in the bank's lending decisions when the firms have signed more than one contract. Second, they confirm the relevance of the empirical method we propose to control for the adverse selection effect, which, in our opinion, explain the inconclusive results that is generally observed in the empirical literature. The common background of our empirical tests has been the identification of the mechanisms adopted by the bank to discriminate clients and propose them profitable contracts suitable for their type. According to our results, the EBRD's lending policy has been a combination of its specific objectives in this geographical area and the constraints associated with the information on clients. The need to cope with high credit risk unambiguously forced the bank to adopt measures of protection by using a client-screening scheme. As discussed by the economic literature, there does not exist a unique scheme to be implemented. In our sample, a screening device as general as the type of contract turns out to be an efficient tool, especially when considering sectoral subsamples

of data. The importance of the cluster correction in absence of memory effects may indicate that the EBRD has likely designed various types of contracts, each of them tailored to the market conditions of a specific sector. Then, the bank attributed them to clients who wanted to invest in a particular sector and country. Therefore, the sectoral characteristics become the device rendering the contract itself the most suitable screening tool. Our econometric specification led to robust results but we think that they will be hard to replicate with data on private banks, whose lending policies are affected by competition.

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LIST OF TABLES

Table 1: EBRD contracts and their frequency (1991-2003)
(Source: EBRD, Calculus: authors)

Contract	**Freq.**	**%**
Debt	1	0.06
Equity	141	7.92
Guarantee	100	5.62
Line of Credit	7	0.39
Loan	949	53.31
Loan/Line of credit	1	0.06
Loan/Shares	96	5.39
Loan/guarantee	1	0.06
Senior debt	72	4.04
Shares	404	22.70
Shares/Loan	2	0.11
Shares/Loan/Share	1	0.06
Share/Loan/Guarantee	1	0.06
Subordinated debt	4	0.22
TOTAL	**1780**	**100**

Table 2: Descriptive statistics on loans (value € mill.)
(Source: EBRD, Calculus: authors)

	Variable	**Obs**	**Mean**	**Std. Dev**	**Median**	**Min**	**Max**
Total sample[1]							
	Bank financing	945	21.25	27.76	12.7	0.1	233.76
	Tot. project value	936	60.81	109.94	29.25	0.1	923.9
Up to 1995							
	Bank financing	219	19.98	23.53	10.90	0.2	142
	Tot. project value	220	68.24	115.81	31.85	0.5	923.9
From 2000 on							
	Bank financing	438	21.19	31.36	10.00	0.1	233.76
	Tot. project value	427	50.60	94.94	15.00	0.1	750

[1] The difference between the number of observation in bank financing and total project value is due to lack of data for one of the two variables.

Table 3: Descriptive statistics on shares (value € mill.)
(Source: EBRD, Calculus: authors)

	Variable	Obs	Mean	Std. Dev	Median	Min	Max
Total sample							
	Bank financing	402	9.05	13.93	3.2	0.1	125
	Tot. project value	402	34.57	76.98	8.2	0.1	1028.9
Up to 1995							
	Bank financing	84	10.14	11.82	5.9	0.1	53.4
	Tot. project value	84	35.92	59.96	18.6	0.7	384.1
From 2000 on							
	Bank financing	100	7.45	11.95	3.1	0.3	53.7
	Tot. project value	99	26.87	63.57	4.8	0.5	365.8

Table 4: Descriptive statistics on single contracts (value mill. €)
(Source: EBRD, Calculus: authors)

	Variable	Obs	Mean	Std. Dev	Median	Min	Max
Total sample							
	Bank financing	1369	17.73	25.53	8.8	0.1	233.8
	Value project	1353	55.02	106.34	17.1	0.1	1028.9
Up to 1995							
	Bank financing	279	17.86	22.18	9.1	0.1	142
	Value project	279	68.95	122.65	27.5	0.5	924.8
From 2000 on							
	Bank financing	596	18.08	29.05	7.9	0.1	233.8
	Value project	596	44.8	87.60	10.09	0.1	750

Table 5: Descriptive statistics on several-contract firms (value € mill.)
(Source: EBRD, Calculus: authors)

	Variable	Obs	Mean	Std. Dev	Median	Min	Max
Total sample							
	Bank financing	405	11.97	17.75	6.6	0.5	130
	Tot. project value	395	28.7	56.3	8.7	0.5	651.3
Up to 1995							
	Bank financing	59	16.47	20.83	8.8	0.5	109.8
	Tot. project value	59	36.25	53.61	20.8	1.3	329.6
From 2000 on							
	Bank financing	219	11.78	18.87	5.6	0.1	130
	Tot. project value	202	28.63	65.32	7.9	0.1	651.3

Table 6: Descriptive statistics: cumulated investment by region (%)
(Source: EBRD, Calculus: authors)

Regions	1991-1995	1996-1999	2000-2003
Russia	19.9	29.1	28.8
Central Europe and Baltic States	45.9	32.9	36.0
Eastern Europe and the Caucasus	11.8	11.9	7.5
South-Eastern Europe	16.8	13.5	20.5
Central Asia	5.6	12.6	7.2

Table 7: Descriptive statistics: cumulated investment by sector (%)
(Source: EBRD, Calculus: authors)

Sector	**1991-1995**	**1996-1999**	**2000-2003**
Finance	19.6	27.0	30.2
Environment	..	4.1	..
Food	2.6	8.1	9.0
Telecom	14.5	6.8	4.9
Energy	9.5	9.7	8.9
Oil/Gas/Nat.Res.	10.8	10.3	8.4
Transport	8.8	3.4	16.1
Others	34.3	30.6	22.4

BOX 1: **LIST OF VARIABLES**

C13	Type of contract signed by the EBRD (13 possible contracts)
DEM	Index of democraticlevel in the country hosting the investment (Polity IV, 2007)
PUBLIC	Dummy variable for presence of a public client or other interests of the bank in the project
DSY	Dummy for investments financed by the EBRD for the same firm in the same year
GDP	Gross domestic product per-capita of the host country (IMF statistics, 2007)
IP	Total value of the investment project
IPDSY	Value of projects for firms obtaining more than one credit the same year
IV	Value of the investment financed by the EBRD
Libor	Average annual value of Libor interest rate at 12 months.
FIRST	Dummy for the first contract signed by the EBRD with firms obtaining more than one credit
Sector	Dummy by sector
Year	Time dummy
C13FIRST	Interaction term between C13 and FIRST
C13IPFIRST	Interaction term among C13, IP and FIRST
IPFIRST	Interaction term between IP and FIRST
Dummy MNE	Dummy for contract involving a multinational firm as a partner.

Table 8: Descriptive statistics

	Variable	Obs	Mean	Std. Dev	Min	Max
Sample						
	Libor	1788	4.23	1.45	2.17	9.91
	GDP per-capita ($)	1706	2706.5	2143.6	151.48	13937.4
	Polity IV index (DEM)	1662	6.5	2.85	0	10
	EBRD Credit Value (€ mill.)	1766	16.5	24.2	0	233.7
	Total project value (€ mill.)	1750	49.23	97.87	0	1028.9
	Financing share	1728	0.6	0.33	0.009	1
1993						
	Libor	71	7.24	0	7.24	7.24
	GDP per-capita ($)	68	2167	1519.7	225.8	6801.8
	Polity IV index (DEM)	68	7.32	2.45	0	10
	EBRD Credit Value (€ mill.)	71	20.36	23.9	0.1	100.12
	Total project value (€ mill.)	71	69.98	96.95	1.3	464.7
	Financing share	71	0.43	0.28	0.04	1
2003						
	Libor	272	2.17	0	2.17	2.17
	GDP per-capita ($)	260	3292.8	2539.6	248.2	13937.4
	Polity IV index (DEM)	254	6.61	3.04	0	10
	EBRD Credit Value (€ mill.)	270	13.69	23.7	0.1	230.2
	Total project value(€ mill.)	271	33.26	77.4	0.1	750
	Financing share	270	0.69	0.34	0.01	1

Table 9a: Econometric results: full sample

Method of estimation: Pooled OLS, Value in brackets: Std Error,

Dependent variable: IV

	OLS	**OLS**	**OLS**	**OLS**
C	13.17 (5.77)**	7.68(5.89)	13.61(5.11)**	8.08(2.26)**
IP	0.16 (0.019)***	0.16(0.02)***	0.16 (0.008)***	0.16(0.008)***
PUBLIC	7.55(2.34)***	7.40(2.37)***	7.55(2.04)***	7.48(1.90)***
Dem	-0.25(0.14)*	-1.65(0.79)**	-0.25(0.02)***	-0.14(0.18)
Libor	-1.72 (0.69)**	0.26(0.82)	-1.72 (0.16)***	-1.67(0.25)***
GDP	0.0006(0.0002)**	0.0005(0.0003)**	0.0006(0.0002)***	0.0005(0.0002)**
Dummy years	yes	yes	yes	yes
Dummy sectors	yes	yes	yes	yes
DEM*years	no	yes	no	yes
Tests:				
D. Years=0	2.93***	0.50	26647***	234.71***
D. Sectors=0	4.97***	4.14***	1.4 10^5***	1.4 10^5***
DEM*year=0		1.22*		1747.38***
DEM*year=D. Years		1.14		1499.96***
Robustness errors	Heterosk.	Heterosk	Clusters	Clusters
Adj. R-Square	0.51	0.51	0.51	0.52
OBS	1620	1620	1614	1614

*** 1% significance level; ** 5%; * 10%

Table 9b: Econometric results: full sample

Method of estimation: Pooled OLS, Value in brackets: Std Error,

Dependent variable: IV

	OLS	**OLS**	**OLS**	**OLS**
C	10.83 (2.81)***	5.04(3.16)	10.90(2.74)***	5.13(1.28)***
IP	0.16 (0.019)***	0.16(0.02)***	0.16 (0.008)***	0.16(0.008)***
PUBLIC	7.22(2.36)***	6.90(2.40)***	7.24(2.36)***	6.91(2.32)**
Dem	-0.24(0.14)*	-1.71(0.77)**	-0.23(0.03)***	-1.71(0.29)***
Libor	-1.76 (0.67)**	0.36(0.82)	-1.72 (0.14)***	0.35(0.67)
GDP	0.0006(0.0002)**	0.0005(0.0003)**	0.0006(0.0002)***	0.0005(0.0002)**
Dummy MNE	-0.83 (0.90)	-1.2 (0.91)	-0.79 (0.88)	-1.16 (1.16)
Dummy years	yes	yes	yes	yes
Dummy sectors	yes	yes	yes	yes
DEM*years	no	yes	no	yes
Tests:				
D. Years=0	3.01***	0.49	1.5 10^5***	260.86***
D. Sectors=0	5.02***	4.23***	40210***	3.4 10^5***
DEM*year=0		1.39		1747.38***
DEM*year=D. Years		1.26		1.1 10^5***
Robustness errors	Heterosk.	Heterosk	Clusters	Clusters
Adj. R-Square	0.51	0.51	0.51	0.52
OBS	1620	1620	1614	1614

*** 1% significance level; ** 5%; * 10%

Table 10a
Econometric results: full sample
Method of estimation: Fixed effects, Value in brackets: Std Error,

Dependent variable: IV

	Fixed effects	**Fixed effects**	**Fixed effects**	**Fixed effects**
C	12.7 (6.10)**	5.15 (6.37)	12.72 (3.82)***	5.15 (2.19)**
IP	0.16 (0.005)***	0.16(0.005)***	0.16 (0.007)***	0.16(0.007)***
PUBLIC	6.88 (1.76)***	6.81 (1.77)***	6.88 (1.49)***	6.81 (1.38)***
Dem	-0.18 (0.17)	-0.79 (1.02)	-0.18 (0.06)***	-0.79 (0.48)
Libor	-1.92(0.70)	0.77 (1.13)	-1.92(0.21)***	0.77 (0.46)
GDP	0.0006(0.0002)	0.0005 (0.0002)**	0.0006(0.0002***)	0.0005 (0.0002)**
Dummy years	yes	yes	yes	yes
Dummy sectors	yes	yes	yes	yes
DEM*years	no	yes	no	yes
Fixed effects	C13	C13	C13	C13
Tests:				
Hausman Test (χ^2)	39.64	17.18***		
F-test: fixed vs pooled	4.52***	4.65***		
D. Years=0	3.84***	3.84***	1.8 10^6***	1.4 10^5***
D. Sectors=0	2.87***	2.87***	2.1 10^5***	1582***
DEM*year=0		0.28		1.4 10^5***
$\boldsymbol{\sigma}_u$	27.55	28.05	27.55	28.05
$\boldsymbol{\rho}$	0.72	0.73	0.72	0.73
Robustness errors	Heterosk.	Heterosk	Clusters	Clusters
R-Square (within)	0.50	0.49	0.49	0.50
OBS	1614	1265	1614	1614
Groups	13	13	13	13

*** 1% significance level; ** 5%; * 10%

Table 10b
Econometric results: full sample
Method of estimation: Fixed effects, Value in brackets: Std Error,

Dependent variable: IV

	Fixed effects	**Fixed effects**	**Fixed effects**	**Fixed effects**
C	10.49 (4.59)**	2.94 (4.84)	10.49 (1.62)***	2.94 (1.83)
IP	0.16 (0.005)***	0.16(0.005)***	0.16 (0.007)***	0.16(0.007)***
PUBLIC	6.72 (1.81)***	6.46 (1.82)***	6.72 (1.87)***	6.46 (1.88)***
Dem	-0.17 (0.17)	-0.82 (1.02)	-0.18 (0.04)***	-0.82 (0.51)
Libor	-1.94(1.57)	0.83 (1.13)	-1.94(0.17)***	0.83 (0.54)
GDP	0.0006(0.0002)	0.0006 (0.0002)**	0.0006(0.0002***)	0.0006 (0.0002)**
Dummy MNE	-0.41(1.02)	-0.81 (1.03)	-0.41(1.03)	-0.81 (1.32)
Dummy years	yes	yes	yes	yes
Dummy sectors	yes	yes	yes	yes
DEM*years	no	yes	no	yes
Fixed effects	C13	C13	C13	C13
Tests:				
Hausman Test (χ^2)	20.88	83.29***		
F-test: fixed vs pooled	4.50***	4.62***		
D. Years=0	3.87***	0.28	1.7 10^5***	1.7 10^5***
D. Sectors=0	3.18***	3.11***	1.8 10^5***	2.6 10^5***
DEM*year=0		1.14		268***
$\boldsymbol{\sigma_u}$	27.50	28.03	27.50	28.03
$\boldsymbol{\rho}$	0.72	0.73	0.72	0.73
Robustness errors	Heterosk.	Heterosk	Clusters	Clusters
R-Square (within)	0.49	0.50	0.49	0.50
OBS	1614	1614	1614	1614
Groups	13	13	13	13

*** 1% significance level; ** 5%; * 10%

Table 11
Econometric results: One-contract firms
Method of estimation: Pooled OLS, Value in brackets: Std Error, Dependent varibale : IV

	OLS	**OLS**
C	14.75 (6.9)**	8.38(7.56)
IP	0.15 (0.02)***	0.15(0.02)***
PUBLIC	8.12(2.71)***	8.00(2.75)***
Dem	-0.21(0.19)	dropped
Libor	-1.78 (0.73)**	0.32(0.92)
GDP	0.0004(0.0003)	0.0004(0.0003)
Dummy years	yes	yes
Dummy sectors	yes	yes
DEM*years	no	yes
Tests:		
D. Years=0	2.61***	0.89
D. Sectors=0	4.47***	3.20***
DEM*year=0		1.55*
DEM*year=D. Years		
Robustness errors	Heterosk.	Heterosk
Adj. R-Square	0.51	0.51
OBS	1269	1269

*** 1% significance level; ** 5%; * 10%

Table 12
Econometric results: One-contract firms
Method of estimation: Fixed effects, Value in brackets: Std Error, Dependent varibale : IV

	Fixed effects	**Fixed effects**
C	14.7 (6.77)**	-8.78 (-0.57)
IP	0.16 (0.02)***	0.15(0.006)***
PUBLIC	7.19 (2.72)***	7.12 (2.04)***
Dem	-0.14 (0.19)	dropped
Libor	-2.03(0.70)***	3.94 (2.82)
GDP	0.0005(0.0003)	0.0004 (0.0003)
Dummy years	yes	yes
Dummy sectors	yes	yes
DEM*years	no	yes
Fixed effects	C13	C13
Tests:		
Hausman Test (χ^2)	11.20**	17.18***
F-test: fixed vs pooled	4.33***	4.57***
D. Years=0	3.03***	0.98
D. Sectors=0	2.02***	1.73**
DEM*year=0		1.82**
$\boldsymbol{\sigma_u}$	27.75	28.63
$\boldsymbol{\rho}$	0.70	0.71
Robustness errors	Heterosk.	Heterosk
R-Square (within)	0.48	0.49
OBS	1265	1265
Groups	13	13

*** 1% significance level; ** 5%; * 10%

Table 13
Econometric results: one-contract firms
Sector: Banking and Finance
Method of estimation: Fixed effects, Value in brackets: Std Error,

Dependent variable: IV

	Pooled	**Pooled**	**Fixed effects**	**Fixed effects**
C	5.97 (1.66)***	5.98 (0.48)***	3.83(5.08)	3.83 (1.60)**
IP	0.36 (0.06)***	0.35(0.04)***	0.35 (0.01)***	0.35 (0.04)***
PUBLIC	1.16 (3.08)	1.53 (2.00)	1.65 (4.91)	1.65 (2.38)
Dem	dropped	dropped	dropped	dropped
Libor	-1.95 (0.45)***	-1.93 (0.23)***	-1.51 (1.53)	-1.51 (0.42)***
GDP	0.001 (0.0004)**	0.001(0.0003)**	0.001 (0.0002)***	0.001 (0.0003)**
Dummy years	yes	yes	yes	yes
DEM*years	yes	yes	yes	yes
Fixed effects			C13	C13
Tests:				
F-test: fixed vs pooled			3.10**	
D. Years=0	3.71***	36971.4***	0.89	23106.5***
DEM*year=0	1.35	1144.3***	1.30	4928.97***
$\boldsymbol{\sigma_u}$			5.74	5.74
$\boldsymbol{\rho}$			0.22	0.22
Robustness errors	Heterosk.	Cluster	Heterosk	Cluster
R-Square (within)	0.57	0.57	0.58	0.58
OBS	582	582	578	578
Groups			8	8

*** 1% significance level; ** 5%; * 10%

Table 14

Econometric results: several-contract firms

Method of estimation: Pooled OLS (with error correction), Value in brackets: Std Error, Dependent varibale : IV

	OLS	**OLS**	**OLS**
C	14.57 (10.14)	0.44(3.65)	14.57 (7.34)**
IP	0.21 (0.03)***	0.21(0.03)***	0.22 (0.032)***
PUBLIC	1.96 (4.11)	1.97 (4.06)	1.96 (0.62)
Dem	dropped	-0.19(0.19)	dropped
Libor	-5.58 (4.42)	0.67 (1.18)	-5.58 (3.04)*
GDP	0.0007 (0.0004)*	0.0007 (0.0004)**	0.0007 (0.0004)*
IPDSY	0.34 (0.12)***	0.32 (0.11)***	0.34 (0.12)***
Dummy years	yes	yes	yes
Dummy sectors	yes	yes	yes
DEM*years	yes	no	yes
Tests:			
D. Years= 0	1.81*	0.69	2.07**
D. Sectors=0	3.30***	4.20***	2.99***
DEM*year=0	1.62*		2.16**
DEM*year=D. Years	1.85*		3.06***
Robustness errors	Heterosk	Heterosk	Cluster
Adj. R-Square	0.65	0.64	0.65
OBS	346	346	346

*** 1% significance level; ** 5%; * 10%

Table 15
Econometric results: several-contract firms
Method of estimation: Fixed effects (with error correction), Value in brackets: Std Error, Dependent varibale : IV

	Fixed effects	**Fixed effects**	**Fixed effects**
C	1.43 (10.39)	-2.84 (4.95)	13.43 (7.60)*
IP	0.21 (0.03)***	0.21 (0.03)***	0.21 (0.03)***
PUBLIC	1.14 (4.57)	1.37 (4.50)	1.14(4.36)
Dem	dropped	-0.11(0.21)	dropped
Libor	-5.34(4.43)	0.85 (1.22)	-5.34 (3.04)*
GDP	0.0009(0.0004)**	0.001 (0.0004)**	0.0009(0.0004*)
IPDSY	0.34 (0.12)***	0.32 (0.11)***	0.34 (0.11)***
Dummy years	yes	yes	yes
Dummy sectors	yes	yes	yes
DEM*years	yes	no	yes
Fixed effects	ct13	ct13	ct13
Tests:			
Hausman Test (χ^2)	18.32***		
F-test: fixed vs pooled	1.85*	1.65	
D. Years$= 0$	1.7*	0.51	2.05**
D. Sectors=0	3.15***	4.42***	3.22***
DEM*year=0	1.68*		2.42***
DEM*year=D. Years	1.49		2.81***
$\boldsymbol{\sigma_u}$	4.21	3.20	4.21
$\boldsymbol{\rho}$	0.12	0.07	0.12
Robustness errors	Heterosk.	Heterosk	Cluster
R-Square (within)	0.48	0.64	0.65
OBS	344	344	344
Groups	8	8	8

*** 1% significance level; ** 5%; * 10%

Table 16

Econometric results: several-contract firms

Method of estimation: Fixed effects (with error correction), Value in brackets: Std Error, Dependent varibale : IV

	Fixed effects	**Fixed effects**
C	22.51 (9.04)**	22.51 (7.00)**
IP	0.21 (0.03)***	0.21 (0.03)***
PUBLIC	1.11(4.03)	1.11(3.87)
Dem	dropped	dropped
Libor	-6.40 (3.68)*	-6.40 (2.65)**
GDP	0.0008(0.0004)*	0.0008(0.0004)*
IPDSY	0.38 (0.12)***	0.38 (0.12)***
Dummy years	yes	yes
Dummy sectors	yes	yes
DEM*years	yes	yes
Fixed effects	C13FIRST	C13FIRST
Tests:		
Hausman Test (χ^2)	na[2]	
F-test: fixed vs pooled	2.73*	
D. Years= 0	2.27**	2.73***
D. Sectors=0	3.09***	2.80***
DEM*year=0	1.93**	3.02***
DEM*year=D. Years	2.11**	4.30***
$\boldsymbol{\sigma_u}$	5.51	5.51
$\boldsymbol{\rho}$	0.19	0.19
Robustness errors	Heterosk	Cluster
Adj. R-Square	0.66	0.66
OBS	346	346
Groups	8	8

*** 1% significance level; ** 5%; * 10%

[2] We experience problems in running this test with this fixed effect either in the current and the reduced form. The variable (CT2PPRR) contain a big mass of zero values and, hence, the model fitted fails to meet the asympothic assumption of the Hausman test.

Table 17
Econometric results: Second and further contracts
Method of estimation: Pooled OLS, Value in brackets: Std Error,

Dependent variable: IV

	OLS	**OLS**	**OLS**	**OLS**
C	-3.14 (4.40)	-5.06(2.47)*	-1.85(7.96)	3.36 (7.57)
IP	0.20(0.03)***	0.19 (0.28)***	0.194 (0.03)***	0.19 (0.03)***
PUBLIC	-1.92(5.85)	-2.00 (8.85)	-3.45 (6.48)	-3.25 (9.05)
Dem	-0.59 (0.25)**	-0.60 (0.42)	dropped	dropped
Libor	2.26 (0.59)***	2.26 (0.56)**	1.93 (2.48)	1.93 (0.79)***
GDP	0.001 (0.0006)**	0.001(0.0002)***	0.001 (0.0007)*	0.001 (0.0001)***
Dummy years	yes	yes	yes	yes
Dummy sectors	yes	yes	yes	yes
DEM*years	no	no	yes	yes
Tests:				
D. Years=0	6.21***	6.70**	2.98***	18.71***
D. Sectors=0	4.78***	2.74	2.20***	14.09***
DEM*year=0			2.82***	12.49***
DEM*year=D. Years			5.45***	22.06***
Robustness errors	Heterosk.	Cluster	Heterosk.	Cluster
Adj. R-Square	0.58	0.58	0.59	0.59
OBS	191	191	191	191

*** 1% significance level; ** 5%; * 10%

Table 18
Econometric results: Second and further contracts
Method of estimation: Fixed effects, Value in brackets: Std Error,

Dependent variable: IV

	Fixed effects	**Fixed effects**	**Fixed effects**
C	-3.65 (17.63)	2.99 (11.94)	98.91(26.82)***
IP	0.19 (0.017)***	0.19(0.02)***	0.63(0.20)***
PUBLIC	-5.99 (6.98)	-4.07 (6.56)	-20.50 (6.84)***
Dem	dropped	dropped	dropped
Libor	1.90 (2.42)	1.42 (2.33)	-2.45 (1.41)*
GDP	0.002 (0.0006)**	0.001 (0.0006)**	-0.003 (0.002)
Dummy years	yes	yes	yes
Dummy sectors	yes	yes	yes
DEM*years	yes	yes	yes
Fixed effects	C13	C13FIRST	IPFIRST
Tests:			
F-test: fixed vs pooled	0.94	3.27***	4.42***
D. Years=0	0.84	2.23**	2.56**
D. Sectors=0	0.64	1.79**	7.35***
DEM*year=0	0.86	2.11**	11.11***
DEM*year=D. Years	0.72	2.86**	9.80***
σ_u	3.32	15.49	76.23
ρ	0.07	0.64	0.99
Robustness errors	Heterosk.	Heterosk	Heterosk
R-Square (within)	0.59	0.60	0.81
OBS	190	190	179
Groups	6	7	91

*** 1% significance level; ** 5%; * 10%

Table 19
Econometric results: Second and further contracts in Banking and Finance sector
Method of estimation: Fixed effects, Value in brackets: Std Error,

Dependent variable: IV

	Fixed effects	**Fixed effects**	**Fixed effects**
C	-2.58(6.87)	-0.52(6.40)	5.25(8.04)
IP	0.33 (0.034)***	0.32(0.03)***	0.73(0.06)***
PUBLIC	dropped	dropped	dropped
Dem	dropped	dropped	dropped
Libor	1.67 (2.31)	1.03 (2.18)	-1.71 (2.55)
GDP	0.001 (0.0006)*	0.001 (0.0006)*	-0.002 (0.001)*
Dummy years	yes	yes	yes
DEM*years	yes	yes	yes
Fixed effects	C13	C13FIRST	IPFIRST
Tests:			
F-test: fixed vs pooled	0.81	3.76***	5.41***
D. Years=0	0.55	0.76	1.62
DEM*year=0	0.55	0.61	2.44**
σ_u	5.27	13.72	26.71
ρ	0.17	0.61	0.94
Robustness errors	Heterosk.	Heterosk	Heterosk
R-Square (within)	0.55	0.60	0.81
OBS	141	138	129
Groups	6	7	58

*** 1% significance level; ** 5%; * 10%

Table 20
Econometric results: Second and further contracts in Banking and Finance sector
Subsample: Native firms
Method of estimation: Fixed effects, Value in brackets: Std Error,

Dependent variable: IV

	Fixed effects	**Fixed effects**	**Fixed effects**	**Fixed effects**	**Fixed effects**	**Fixed effects**
C	-2.58(6.87)	-1.68(4.54)	13.62 (9.30)	0.52 (2.70)	-1.68 (1.97)	13.62 (10.04)
IP	0.80 (0.046)***	0.77(0.05)***	0.58(0.06)***	0.80 (0.15)***	0.77 (0.17)***	0.58 (0.23)**
PUBLIC	dropped	dropped	dropped	dropped	dropped	dropped
Dem	dropped	dropped	dropped	dropped	dropped	dropped
Libor	0.32 (1.60)	0.08 (1.59)	-2.67 (2.61)	0.32 (0.74)	0.08 (1.09)	-2.67 (1.30)**
GDP	0.005 (0.0006)	0.007 (0.0006)	-0.003 (0.001)**	0.005 (0.006)	0.0007 (0.0004)	-0.003 (0.001)**
Dummy years	yes	yes	yes	yes	yes	yes
DEM*years	yes	yes	yes	yes	yes	yes
Fixed effects	C13	C13FIRST	IPFIRST	C13	C13FIRST	IPFIRST
Tests:						
F-test: fixed vs pooled	0.12	1.06	1.93**			
D. Years=0	3.92***	17.51***	1.32	7.08 E07***	380.37***	14.99***
DEM*year=0	16.36***	12.43***	1.86*	1.4 E07***	18.63***	301.80***
$\boldsymbol{\sigma}_u$	74.9	7.17	19.87	74.99	7.17	19.87
$\boldsymbol{\rho}$	0.99	0.48	0.91	0.98	0.48	0.91
Robustness errors	Heterosk.	Heterosk	Heterosk	Cluster	Cluster	Cluster
R-Square (within)	0.83	0.82	0.75	0.83	0.82	0.75
OBS	115	112	111	115	112	111
Groups	6	7	53	6	7	53

*** 1% significance level; ** 5%; * 10%

A Appendix: List of sectors

The following table gather all the sectors firms asking for a financement belong to:

Bank, Finance and holding	Local servicies (water, waste...)
Chemical (includ. Pharmacy)	Media
Education and other public services	Manufacturing
Electrictronical and Hi-Tech	Metal
Energy	Natural resources
Environment	Oil and gas
Food and beverage (incl. agriculture)	Real estates
Health and personal care	Telecommunication
Hotels and tourism	Trade and retails
Infrastructure (transport)	Vehicles