The reputation effect:
A case study of credit contracts in transition countries

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Abstract

This paper proposes an empirical analysis and focuses on the financing strategy adopted by the European Bank for Reconstruction and Development in the period 1991–2003. Our added value is an original exploration concerning the role of institutional memory. By exploiting information on the number and type of contracts by client, we test different indicators to approximate the client's reputation. Our results unambiguously show that the value of the first-investment project financed by the EBRD (as a proxy for reputation) was the most effective screening device for established clients.

JEL codes: F34, G21, P33.
Keywords: International lending, screening devices, fixed-effect technique.

1. Introduction

The European Bank for Reconstruction and Development (EBRD) was established in 1990 to assist the political and economic transformation of the group of post-socialist countries in Central and Eastern Europe.

In a few chapters of the EBRD Creation Agreement, the promoters of this new institution identified the bank's main mode of action to be the financing of individual projects mainly intended to develop private sector entreprises. This mission translated into a concern: financing investments that would not otherwise be funded yet with a catalytic power in the host economies. If there were a non-EBRD solution for getting credits, potential clients would certainly avoid involvement with the EBRD whose loan rates were not subsidized and whose projects were required to have an impact on the economic transition process (Besley at al., 2010). In this respect, the mission of the EBRD was not to crowd out private banking financing, but the bank operated in countries and financed projects that no commercial bank would consider. Therefore, *de jure et de facto,* as soon as the EBRD was established, it had a dominant position in financing investment projects to be run in transition countries.[1]

[1]Despite EBRD's dealings with government-owned commercial banks (as in Dinç, 2005), the bank's institutional origins as well as the composition of its board of directors (namely, the representatives of sixty-one countries and two intergovernmental institutions) made it almost impossible for politicians to make decisions about credit lending to further their political goals.

However, like any other credit institution, the EBRD faced the problem of screening clients and choosing projects with the highest expected returns.

This exceptional situation makes the EBRD experience an interesting case study 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. Furthermore, all potential borrowers lacked market experience and had no history of creditworthiness. Second, the decisions made by the EBRD were not affected by competition because local banks were insolvent and foreign banks did not enter these risky markets in the early transition period (Lanine and Vander Vennet, 2007).

Given the original features of the evidence we are working with, we are not proposing a study to compare the EBRD's behavior in the credit market with that of other commercial banks. Rather, our interest is to propose an empirical exercise to identify the signal(s) the bank may have exploited to embed the idea of reputation and, as a consequence, to establish a screening device to fix the amount of the granted credits.

Banks usually tend to maintain durable relationships with clients of established reputation. With repeated contracts, the principal (here the *bank)* is able to learn from the agent's past performance and, hence, to propose a contract that internalizes this information over time. The benefit is that risk sharing is improved (Stiglitz and Weiss 1981, 1983).

The present paper investigates this last issue by proposing an empirical analysis of the specific case study of the EBRD. We aim to identify an empirical approach to emphasize the role of the learning process (namely, memory as a proxy for reputation) as a screening device for granting credits. The monopolistic behavior of the EBRD in the 1990s offers ideal conditions to test this issue. We built an original database with data from the credit contracts granted for investments to private and public firms during the first years of EBRD's activity (1991–2003), based on its own releases. Our dataset allows us to split contracts into two subsamples: firms that signed a single contract and firms that signed more than one contract. This enabled us to develop an identification strategy to control for the screening effect. In both subsamples, the amount of the loan and the type of contract set for each firm's first contract reflect the screening policy of the bank at the time. In the subpopulation of several-contract firms, information on the firms' previous actions existed. The question is: did the bank use it? We ran regressions

for each of the two subsamples. If the same results were obtained, this would mean that the bank did not draw on its history with these clients in designing contracts. Instead, our results clearly show that this was not the case. The total project value of the first signed contract is neatly identified as the dominant borrower fixed effect that has an important role in explaining the size of the further (second and more) contracts(s) the bank granted to the same client

The EBRD's experience was unique because of its mission and the economic environment it operated in. Nevertheless, in this analysis, we propose a few ideas to implement an empirical strategy that brings novel insights and opens potential paths for application to more sophisticated economic settings, such as commercial firms in developed economies.

The remainder of the paper is organized as follows. Section 2 focuses on the main theoretical contributions derived from studying the bank-client relationship. Section 3 presents evidence from our case study. Section 4 presents the econometric strategy and results and Section 5 is the conclusion.

2. The choice of contracts

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 counterparties, and it is very difficult to control for. The lender aims at defining a 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.

A bank can usually discriminate between clients by offering different contracts to them. The contracts can be grouped by type according to their "nature" but, nevertheless, a contract is often tailored to the individual client's needs.

Examining the most widespread class of contracts, Inderst and Mueller (2006) investigated the optimality of debt versus equity contracts. Debt contracts were found to be optimal when the lender was conservative and equity contracts were optimal 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 analyzed 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 always chooses the 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 can accept or reject on the basis of the contract's conditions. There is no provision for adjustment of the loan terms after the screening, and this guarantees the optimality of the decision. The authors provided empirical evidence supporting this result. Loans are often granted at standardized terms and borrowers, in particular small firms, are often charged the same rate of interest because of an implicit same-risk premium.

However, the previous arguments were developed by looking at the evidence from a competitive market. What could be the differences in a bank's attitudes about the screening process when it is a monopolist?

The screening process is a key tool for discriminating between clients but it is a real burden for banks (Manove et al., 2001).[2] The process is costly. Manove et al. (2001) focus on the screening cost in the case in which a bank is a monopolist in the credit market. The results show that there is a big difference with respect to the standard competitive structure. In the case of a monopolistic bank, the bank's optimal strategy is to offer one unique contract and then to 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 conditions of asymmetric information. Throughout the screening process, information is generated at a cost to the bank. Therefore, the bank screens the clients, funds the better projects and covers its costs with higher interest rates. As for the borrowers, the good ones have an incentive to distinguish themselves.

As described in the next section, the framework developed by Manove et al. (2001) perfectly fits the behavior adopted by the EBRD. In this theoretical framework,

the reputation effect is crucial to building a memory of 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 for this is that it is very difficult to identify a bank behaving as a monopolist in the credit market. Therefore, the case of the EBRD appears as an interesting case study that can be used as a kind of natural experiment to investigate the previous issue.

3. The EBRD-client relationship

When considering a potential client for a loan contract, the EBRD followed a very standard procedure (Vuylsteke, 1995).

First, we consider the case of financing only an investment project. The bank and its client agree to sign the contract; then, the bank finances the firm, which makes 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 its first contract to a firm. Then, depending on the behavior displayed by the client, the bank can decide whether to finance a second project when the client applies for a second (or subsequent) contract.

Under these assumptions, the bank can write a contract by adapting the terms of the contract in the second period while taking into account the return of the firm's investment in the first period (Chiappori et al., 1994). The bank, therefore, recalls the return on the firm's first-period investment. The structure of such a contract is optimal: neither the principal (the 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 amount of credit granted by the EBRD to finance its clients' investment projects in the case of repeated contracts.

For the purposes of this study, we built an original database from data made public by the EBRD over time. Our database includes all 1,780 financial contracts signed by the bank with private and public clients from 1991 to 2003. It contains information in each case on the identity and nationality of the clients, the amount of the contract in ECU/Euros, the value of the investment project, the sector of investment, the year the contract was signed, the type of contract (loan, share, equity or guarantee), and

[3]In this section, for the sake of simplicity, we intend “loan” to mean any kind of credit contract the bank proposes.

other characteristics (for example, previous clients, private/public sector, and macro-programs). In *[Authors]* (2013), there is an extensive description of the contents of the database. Three main categories of credit instrument can be distinguished: loans, guarantees, and share and equity contracts. Loans were the financial contract most frequently employed by the EBRD between 1991 and 2003 (Table 1). A loan is generally considered a short-term contract, lasting five years on average, and tailored to meet the particular requirements of the project. The credit risk is usually assumed by the bank or partially syndicated to the market.

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**

The second important category of contract includes shares 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 a 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 basis; it has a clear exit strategy and only takes a minority position.[4] The third category of credit instruments refers to guarantee contracts. They were used mainly at the end of our dataset period. Through this type of contract, the bank helps borrowers with gaining access to financial sources through the provision of guarantees (EBRD, 1999). Finally,

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

this difference in the distribution of probabilities of the single or several (granted) contracts may signal that the EBRD does not behave in the same way with a first contract as it does with a second (or further) contract. The bank certainly has less client information for a first contract than for a second and, hence, the first contract carries more risk. The bank is likely to adjust its lending policy in the face of this higher risk. If so, we may formulate the hypothesis that the EBRD's lending policy does not consist of offering a formatted menu but rather of granting credits tailored on the basis of client information and possibly on the basis of whether the contract is a first or a subsequent contract.

4. Empirical strategy

The EBRD selects one of the thirteen different available contracts (Table 1) when deciding to finance a firm's investment project. 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 credit granting among firms and to select the contract that will incite the borrower to behave well.

In particular, we want to verify whether the EBRD exploits information about client's previous contract(s) to fix the credit size when it signs more than one contract with the same borrower If it does, as proved by Lambert (1983), Rogerson (1985) and Chiappori et al. (1994), this means that the bank uses historical information (memory) to maximize its profits. In order to focus on this issue, we proceed first by splitting the population into two subpopulations: one-contract firms and several-contract firms. Historical information is available on the firms in the subpopulation of several-contract firms, and we want to check whether the bank uses this information. We apply the same independent variables to both subpopulations but allow for different specifications of the fixed-effect estimation techniques.

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

4.1 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 carried out. In this way, we take into account both the country-investment risk and the project risk. 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),[5] time dummies and, finally, a dummy for public clients because a public client is more likely to be considered a solvent client. Concerning the contract, in addition to the value of the credit (IV) granted by the EBRD to the firm, we consider the type of contract, the year it was signed, and the value of the investment (the credit refers to) (IP). This investment value (IP) approximates the minimum level of return for any successful productive investment by the firm, which corresponds to its capacity for repayment. When adopting this hypothesis, we are following the results achieved by Holmström (1999) who showed that the distinguishing characteristics of this investment represent a way to disclose the unknown characteristics of an agent when working under the dynamics perspective of a reputation effect.

The maturity of a credit is different for each category of contract and the type of contract is an indicator approximating the credit maturity, as mentioned in Section 3. 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 us to capture the current conditions of the financial markets. From the bank's point of view, any changes in the LIBOR will affect the credit supply to the firm.

As for the risk premium, the data from the EBRD are not available and in our econometric strategy we control for this factor by considering it as one of the features included in the different types of firm or contract fixed effects. [6]

[5] In a companion paper, the *Authors (2013)* perform a few estimations including further indicators to represent the economic and political conditions in the host markets. Results confirm that the only indicator to be statistically significant is DEM.

[6]This strategy is suitable for our analysis because we are not centering our study on the problem of the returns of credit contracts to the EBRD or comparing them to those of commercial banks. Any extension in this direction would require complete information about credit contracts.

BOX 1: **LIST OF VARIABLES**

C13	Type of contract signed by the EBRD (13 possible contracts)
LDEM	Logarithm of the index of democratic level 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
LGDP	Logarithm of gross domestic product per-capita of the host country (IMF statistics, 2007)
LIP	Logarithm of the total value of the investment project (EBRD website)
LIV	Logarithm of the value of the investment financed by the EBRD
LLIBOR	Logarithm of the 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
IPFIRST	Interaction term between IP and FIRST

We formulate the empirical model as follows. Our database was built by considering each contract as a single entry: for each entry we record all the available information that refer to it. Let us define the dependent variable (value of the granted credit) as Y=(IV) and $\underline{X}$=(*IP, Public , DEM, Libor, GDP*) as the vector of the independent variables. Each dependent variable (IV) is defined as $IV_{itjs,}$ with $i = firm, t = year$, $j = host\ country$, $s = sector.$ Instead, our regressors are variables referring either to the firm (i.e., IP_{itjs} and $Public_i$) and to the host market (i.e., DEM_{jt} and GDP_{jt}) as well as to the general credit conditions of financial markets (i.e., $LIBOR_t$). 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 over time in each country with strong implications, for instance, on the protection of property rights.[7]

Therefore, the equation (as a logarithm) can be defined as:

$$LIV_{itjs} = \alpha_0 + \beta_1 LIP_{itjs} + \beta_2 Public_i + \beta_3 LDEM_{jt} + \beta_4 LLIBOR_t + \beta_5 LGDP_{jt} + \beta_6 (LDEM_{jt} * year_t) + \varepsilon_{itjs}. \quad (1)$$

Our database is not a true panel, but rather a pooling of independent cross sections over time. Hence, we need to control for heterogeneity problems As argued in

[7]We prefer to rely on this qualitative variable rather than other pure quantitative variables (such as GDP $_{jt}$ * year $_{jt}$) because more informative of the state-of-right in host countries. Other statistics usually selected to capture the development of a financial system (as those released by the World Bank) are not available for the sample of countries we are studying in the period under consideration.

Wooldridge (2006), this pooled structure implies that the dependent variable may have different distributions in different time periods and, to control for this, 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 us to decompose the error term (ε_{itjs}) in the following way:

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

where μ_i is the unobservable time-invariant individual-specific effect and ν_{itjs} denotes the remaining disturbances, which are now expected to be $IID(0, \sigma_v^2)$.

The choice of the variable μ_i turns out to be crucial for obtaining 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. However, because of the structure of the database, the adoption of firm-fixed effects is limited and we can perform several estimations, alternating different types of fixed effects. Next, we will refine these results by checking the efficiency in the estimation results by adopting the various categories of fixed effects. If any difference is revealed, estimation results obtained by including different type of fixed effects should disclose complementary insights. It is therefore necessary to look for potential fixed-effect candidates, which do not introduce endogeneity distortions.

The theoretical framework indicates the contract type (once it has been signed) as one of the possible ways to identify the fixed effects beyond the canonical firm-fixed effects. The contract type is in fact time-invariant according to the EBRD statements. In our exercises, the fixed effects (FE) will be alternatively identified by the following exogenous variables: the contract type granted at time t ($C13$) for all clients, and, for established clients, obtaining more than one contract. Furthermore, we consider the contract type signed by a firm at time $t=1$ ($C13FIRST$) or the value of the investment in the same firm financed at $t=1$ ($IPFIRST$). Therefore, the specification (as a logarithm) used for the estimation can be written as:

$$LIV_{itjs} = \alpha_0 + \beta_1 LIP_{itjs} + \beta_2 DI_j + \beta_3 LDEM_{jt} + \beta_4 (LLIBOR_t) + \beta_5 LGDP_{jt} + \beta_6 (LDEM_{jt} * year_t) + \gamma_1 FE_i + \gamma_2 Year_t + \gamma_3 Sector_s + \nu_{itjs} \quad (2)$$

Table 2 gives descriptive statistics for some of these variables for the overall period and for two specific years: 1993 and 2003. The dependent variable is the financing amount (IV_{itjs}) 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 occurs between clients. The measure of political institutions is taken from the Polity IV project. This is an index varying between zero (for an absolute autocracy) and ten (for a fully-fledged democracy).[9]

Table 2: 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

In our population, this index declines over time because the EBRD financed democracies in Central and Eastern Europe at the beginning of the transition and later provided finance in autocratic countries of Central Asia. The variation of the LIBOR corresponds to the historical values of the credit market during the period.

[8] See Stiglitz and Weiss (1981) on credit rationing.

[9] According to the Polity IV website (www.systemicpeace.org/polity/polity4.htm), there is no minimum condition to define a political regime as democratic. Democracy (DEM) is considered as a variable. The DEM indicator is an additive eleven-point scale. It is derived by the sum of the coding of:

- Competitiveness of political participation,
- Openness and competitiveness of executive recruitment,
- Constraint on the chief executive.

Relying on the results discussed in Section 2, we expect that all independent variables in equation (2) will have a positive sign. An improvement in the market conditions in host countries is expected to reduce the risk of the investment and, therefore, the EBRD will be more prone to finance a bigger portion of the investment projects. This tendency is also expected to be reinforced by an increase in the LIBOR, thereby making each financing contract more profitable for the bank.

In order to test the level of individual heterogeneity, we apply the technique of pooled OLS versus fixed effects.[10] Our empirical strategy to identify a way to isolate the reputation effect in this sample of observations consists of detecting the most performing type of fixed effect. Referring to the current issue in the literature, the types of contracts granted by the bank somewhat signal the screening process the EBRD put in place. In this perspective, we are referring to three types of time-invariant fixed effects ($C13$, $C13FIRST$ and $IPFIRST$) plus the canonical firm fixed effect that is considered as a potential benchmark. By running a regression with $C13$ as fixed effects (also labeled as contract fixed effects), we do not include any information about firms' historical track record. When we introduce historical information on individual firms (using the $C13FIRST$ or $IPFIRST$ variables), 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 recalls the past information and uses it to adjust the conditions of the future contracts with each individual firm.

4.2 Results

Our database contains all contracts signed by the bank during the period 1991–2003.[11] In order to test the reputation effect, we run regressions separately for each group of firms (namely one-contract firms and several-contract firms). We proceed first by assessing whether the fixed-effect model should be preferred to the pooled OLS (with the F-test) and to the random effect model (with the Hausman test). In all the regressions we control for heteroskedasticity by applying either the White or the cluster correction (by contract or by firm). Then we test the different measures of time-invariant fixed effects.

[10] The econometric estimations were computed with the Stata 11 package.
[11] Therefore, we are considering the population of all granted credits.

4.2.1 One-contract firm

This subpopulation includes 1,168 contracts (referring to 1,168 different firms). As each contract corresponds to a particular firm, but we do not dispose of historical information about the bank-client relationship. Therefore, we can only test one measure of fixed effects: the contract-fixed effects ($C13$). This is a qualitative variable that identifies each type of the thirteen contracts.

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 (Table 3). Still preferring the cluster-error correction version of the estimations, the contract-fixed-effect results disclose interesting insights. The fraction of the variance due to fixed effects (ρ) is relatively high (0.70).

Table 3
Econometric results: One-contract firms
Method of estimation: OLS and Fixed effects, Clustering by contract (C13), Value in brackets: Std Error, Dependent variable: LIV

	OLS	**OLS**	**Fixed effects**	**Fixed effects**
C	-1.73 (0.63)***	-1.72 (0.20)***	-2.24 (0.8)***	-2.24 (0.3)***
LIP	0.81 (0.01)***	0.81 (0.02)***	0.77(0.01)***	0.77 (0.01)***
PUBLIC	0.30 (0.07)***	0.30 (0.09)***	0.23 (0.07)***	0.23 (0.05)***
LDEM	0.16 (0.24)	0.16 (0.06)**	0.18 (0.34)	0.18 (0.03)***
LLIBOR	1.05 (0.70)	1.05 (0.15)***	1.25 (0.81)	1.25 (0.19)***
LGDP	0.01 (0.03)	0.01 (0.02)	0.04 (0.03)	0.04 (0.02)
Dummy years	yes	yes	yes	yes
Dummy sectors	yes	yes	yes	yes
DEM*years	yes	yes	yes	yes
Fixed effects			C13	C13
Tests:				
Hausman Test (χ^2)			228.9***	
F-test: fixed vs pooled			9.69***	
D. Years=0	1.55	751***	0.99	2189.87***
D. Sectors=0	3.65***	12071***	3.21***	6743***
DEM*year=0	2.05**	52203 ***	1.92**	3177.95***
DEM*year=D. Years	2.26***	1.4 e+10***	1.97**	369.73***
σ_u			0.51	0.51
ρ			0.43	0.43
Robustness errors	White	Cluster	White	Cluster
R-Square (within)	0.84	0.84	0.82	0.82
OBS	1168	1164	1164	1164

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

The estimate of ρ suggests that almost half of the variation in the amount of financing is related to the different types of contract (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 firm's repayment capacity (IP_{itjs}) 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 less risky by the bank than a private one, when granting just one credit (and this result differentiates this group of contracts from the full sample). The significance of the interaction term between democracy (DEM_{jt}) and the time dummy means that the more democratic a country is over time, the larger the size of the financing offered by the bank. This result either confirms the official claim that the EBRD promotes democratic institutions in transition countries or indicates that a country moving to democracy (over time) offers more profitable investment opportunities.

To sum up, for the one-contract firms the contract-fixed effects turn out to be a good measure for identifying individual heterogeneity. Each contract signed by the bank is granted according to the individual characteristics of the client, and the contract itself is a suitable device to control for incomplete information when signing a first contract with a firm.

4.2.2. Several-contract firms

This subpopulation includes 306 contracts and considers all firms that obtained more than one contract. 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 bank takes into consideration the historical track record of a firm when signing more that a contract. If it does not, this means that the bank deals with firms of both subsamples in the same way, thereby ignoring 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 sample.

Table 4
Econometric results: Several-contract firms
Method of estimation: OLS, Clustering by contracts (C13), Value in brackets: Std Error,
Dependent varibale: LIV

	OLS	**OLS**
C	0.77 (1.69)	-4.90 (057)***
LIP	0.87 (0.33)***	0.87 (0.04)***
PUBLIC	0.02 (0.20)	0.02 (0.27)
LDEM	0.94 (0.45)**	0.95 (0.21)***
LLIBOR	Dropped	Dropped
LGDP	0.01(0.07)	0.002(0.07)
Dummy years	Yes	yes
Dummy sectors	Yes	yes
DEM*years	Yes	yes
D. Years = 0	4.82***	4.3 e+08 ***
D. Sectors=0	5.19***	403.6***
DEM*year=0	4.90***	4.6 e+09***
DEM*year=D. Years	4.73***	2.3 e+09***
Robustness errors	White	Cluster
Adj. R-Square	0.82	0.82
OBS	306	304

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

When including the canonical firm-fixed effects, such fixed effects are performing quite well (referring to the values of ρ) , still having the cluster corrected model as the preferred ones. In case of being statistical significant, the regressors turns out to display the expected coefficient with the exception of the $PUBLIC_i$ variable that lost its statistical significance.[12] It might be that, for repeated contracts, the public client does not enjoy a very good reputation. Rather, it is identified negatively because, for instance, it is not able to efficiently run its investment projects, which could reduce its repayment capacity. However, in quantitative terms, the introduction of fixed effects does not strongly improve the goodness-of-fit of the estimations. Furthermore, fixed effects by type of contract do not capture the individual heterogeneity as well as they do with firm-fixed effects (Tables 5). The value of ρ sets around 0.26 in the case of contract fixed effects (definitely lower than in Table 4), while the one of firm-fixed effects (that we consider as a benchmark because it embeds the individual heterogeneity

[12]The variable LLIBOR was dropped because of a collinearity effect.

firm by firm) achieves 0.75. This finding emphasizes that there exists important common features (shared by firms) that affect the contents of the credit contracts addressed to the different clients. As a result, we conclude that the model with contract-type $(C13)$ fixed effects is not a performing quite as well for this subpopulation, even though these estimations should be preferred to the pooled and random-effect estimations.

Table 5
Econometric results: Several-contract firms
Method of estimation: Fixed effects,Value in brackets: Std Error,
Dependent variable: LIV

	Fixed effects	**Fixed effects**	**Fixed effects**	**Fixed effects**
C	-5.27 (5.33)	-5.27 (0.50)***	-6.63 (3.00)**	-6.63 (3.28)**
LIP	0.84 (0.033)***	0.84 (0.05)***	0.76 (0.05)***	0.76 (0.04)***
PUBLIC	-0.73 (0.23)	-0.07 (0.28)	-0.21(0.35)	-0.21 (0.31)
LDEM	0.99 (0.43)**	0.99 (0.15)***	6.54 (2.14)***	6.54 (2.32)***
LLIBOR	Dropped	Dropped	Dropped	Dropped
LGDP	0.07 (0.07)	0.07 (0.07)	0.14 (0.22)	0.14 (0.18)
Dummy years	yes	yes	yes	yes
Dummy sectors	yes	yes	yes	yes
DEM*years	yes	yes	Yes	yes
Fixed effects	C13	C13	Firm	Firm
Tests:				
F-test: fixed vs pooled	5.69***		1.73***	
D. Years = 0	3.09***	403.78***	2.00 **	25.27***
D. Sectors=0	2.40***	35.38***	0.25	7.75***
DEM*year=0	2.99***	28.71***	1.95**	22.63***
DEM*year=D. Years	3.08***	1080***	1.90**	39.28***
σ_u	0.39	0.39	1.03	1.03
ρ	0.26	0.26	0.75	0.75
Robustness errors	White	Cluster (by contract)	White	Cluster (by firm)
R-Square (within)	0.83	0.83	0.70	0.70
OBS	304	304	306	306

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

We therefore need to look for other measures of fixed effects for controlling the reputation effect for clients to whom the EBRD granted more than one credit.

In our database, 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 a 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 in the same year (as first entry), because we are not able to determine their chronological order.

In this way, we are able to use the historical information included in this subsample by testing two measures of reputation by exploiting two indicators of contract fixed effects defined as: *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 an important result: the fixed effects associated with the project value of the first contract are a good measure to account for individual heterogeneity in this subsample.

In Table 6, we present the results obtained by introducing the standard contract fixed effects (C13), whereas in Table 7 we consider the two novel measures of reputation: *IPFIRST* and *C13FIRST*-fixed effects. Estimation results (in Table 6) remain almost unchanged if compared to those of the contract-fixed effects (in Table 5). The big novelty in these last estimations is the negative coefficient (even if weakly statistical significant) associated with the identity of the client (namely, public client). This result reinforces the argument we presented above: in the case of repeated contracts, it seems that a public client is not the type of client targeted by the bank. Perhaps such a client has access to other sources of financing or perhaps it cannot be relied up to fulfill agreed upon commitments. Moreover, in the sample solely composed of second and further contracts (Table 6), contract (*C13*) fixed-effect estimations are not any more informative about the reputation effect of the clients than they are for one-contract firms. In Table 7, the adoption of fixed effects as the first type of contract granted to a firm (*C13FIRST*) do not deliver an important improvement in the goodness-of-fit of the model and the statistical significance of the regressors is basically unchanged with respect to the case of adopting contract-fixed effects.[13]

Instead, whenever the project *value* of the first contract (*IPFIRST*) is included as a fixed effect, the value of ρ increases strongly (Table 7) as well as the statistical

[13] It is notable that the ρ of the regression with $C13FIRST$ -fixed effects is also lower than the for the $C13$ -fixed effect estimations.

Table 6
Econometric results: Second and further contracts
Method of estimation: OLS and Fixed effects, Value in brackets: Std Error,
Dependent variable: LIV

	OLS	**OLS**	**Fixed effects**	**Fixed effects**
C	-4.66 (4.21)	-2.38 (2.37)	-0.98 (3.55)	98.91(26.82)***
LIP	0.84 (0.04)***	0.86 (0.07)***	0.85 (0.04)***	0.84(0.08)***
PUBLIC	-0.50 (0.27)*	- 0.51 (0.46)	-0.68 (0.37)*	-0.68 (0.4)***
LDEM	1.33 (0.66)**	1.31 (0.17)***	1.05 (0.53)*	1.05 (0.36)**
LLIBOR	Dropped	Dropped	Dropped	Dropped
LGDP	0.09 (0.10)	0.08 (0.09)	0.11 (0.09)	0.11 (0.09)
Dummy years	yes	Yes	yes	yes
Dummy sectors	yes	Yes	yes	yes
DEM*years	yes	Yes	yes	yes
Fixed effects			C13	C13
Tests:				
F-test: fixed vs pooled			6.71***	
D. Years=0	8.60***	316.71***	4.40***	2744.15***
D. Sectors=0	1.65*	77.43***	1.41	41.32***
DEM*year=0	7.98***	37.60***	3.94**	376.26***
DEM*year=D. Years	7.54***	156.53***	4.06**	463.20***
σ_u			0.61	0.61
ρ			0.49	0.49
Robustness errors	White	Clusters (by sectors)	White	Clusters (by sectors)
R-Square (within)	0.85	0.85	0.88	0.80
OBS	169	168	168	168

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

significance of the regressors included in the estimation. This last fixed-effect is a measure of the reputation of established clients and it is evidence of the presence of memory. The project value of the first contract is historical information for the bank. It provides informative evidence about the ability of the managers to run investment projects and, knowing ex-post the rate of return of that operation, the bank is able to get an approximation of the effective credit-repayment capacity of the firm (namely reputation effect) for the credit the same firm is currently applying for. On the other hand, the first type of contract (*C13FIRST*) is not as informative about the historical track record of a client. In the estimation that includes *IPFIRST,* the project value (IP $_{itjs}$) is always statistically significant and the coefficient has the expected sign. Concerning the other variables, they gain part of their statistical significance (if compared with the previous exercise) and keep the expected sign. Again, being a public

Table 7
Econometric results: Second and further contracts

Method of estimation: Fixed effects, Value in brackets: Std Error,
Dependent variable: LIV

	Fixed effects	**Fixed effects**	**Fixed effects**	**Fixed effects**
C	-4.70 (4.21)	-4.70 (6.28)	-11.96 (11.56)	-53.27(15.63)***
LIP	0.80 (0.05)***	0.80 (0.06)***	0.70 (0.07)***	0.70(0.07)***
PUBLIC	-0.58 (0.38)	-0.58 (0.30)	-0.72 (0.66)	-0.72 (0.67)
LDEM	1.27 (0.57)**	1.27 (0.66)	14.98 (8.63)*	14.98 (4.88)***
LLIBOR	Dropped	Dropped	Dropped	Dropped
LGDP	0.07 (0.10)	0.07 (0.07)	1.08 (0.50)**	1.08 (0.49)**
Dummy years	Yes	Yes	yes	yes
Dummy sectors	Yes	Yes	yes	yes
DEM*years	Yes	Yes	yes	yes
Fixed effects	C13FIRST	C13FIRST	IPFIRST	IPFIRST
Tests:				
F-test: fixed vs pooled	1.83*		1.75**	
D. Years=0	4.29***	1179.15**	1.68	6.71***
D. Sectors=0	1.12	13.48***	1.37	2.93**
DEM*year=0	3.89***	7867.7***	1.70	198.96***
DEM*year=D. Years	3.80***	2100.92**	1.68	180.17***
σ_u	0.50	0.50	7.54	7.58
ρ	0.36	0.36	0.99	0.99
Robustness errors	White	Cluster (by C13FIRST)	White	Cluster (by IPFIRST)
R-Square (within)	0.85	0.85	0.85	0.85
OBS	166	166	157	157

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

partner no longer has strategic importance. Once more, the absence of historical information about clients obliged the bank to rely on other available variables, for instance, public ownership to control for incomplete information. Once the bank is dealing with established clients, the previous public-status effect is replaced by a more specific client-reputation effect.

To conclude, the reputation effect (namely the memory of the first contract) seems to override the incomplete information problem in the bank-client relationship. In the case of firms getting more than one credit from the EBRD, memory thus allows the bank to discriminate their credit size according to their individual historical characteristics and to offer tailored contracts.

5. Conclusions

The dataset we built from the records of the European Bank for Reconstruction and Development (EBRD) allows us to focus empirically on the reputation effect by referring to the strategy the bank adopted in granting credits and the main determinants of the strategy. The EBRD was effectively a monopoly in many transition countries, especially at the outset of the transition process. Moreover, the EBRD's shareholders were sovereign and assigned the bank a mission to foster private enterprises and not to crowd out financial flows towards the private sector. Our results identify the role of memory in the bank's lending decisions when firms signed more than one loan contract. The common background of our empirical tests was the identification of the mechanisms the bank adopted to discriminate between clients and to offer profitable contracts suitable for their type. According to our results, the EBRD's lending policy was a combination of its specific objectives in the former Soviet bloc countries and the constraints associated with a lack of information about its clients. The need to cope with high-credit risk unambiguously forced the bank to adopt protective measures by using a client-screening scheme. As discussed in the economic literature, there was no unique scheme available to be implemented. In our sample, a screening device as general as the type of contract turned out to be an efficient tool, especially when considering the one-contract subsample of data. The importance of the cluster correction in the absence of memory effects suggests that the EBRD probably designed various types of contract, each one tailored to the market conditions of a specific sector. Then, the bank offered these contracts to clients who wanted to invest in a particular sector and country.

Our exercise provides useful insights about EBRD strategies. We were able to perform an econometric analysis that confirmed a few relevant predictions discussed in contract theory. Unfortunately, the data at hand lacked sufficient information for us to evaluate the precise returns of the financed investments or to measure their economic impact in host countries. This missing material would yield further interesting conclusions. First, we could refine the structure of the exercise we proposed by bettering the measurement of a few variables. Second, controlling for the rate of success of the financed projects might bring more insights into the possible association between the optimality of the credit-screening process and the effective impact of financed investments on host-market economies.

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Appendix A: List of sectors

The following table shows all the sectors included in our sample:

Banking, Finance and holding	Local services (water, waste...)
Chemical (including Pharmaceutical)	Media
Education and other public services	Manufacturing
Electronic and Hi-Tech	Metal
Energy	Natural resources
Environment	Oil and gas
Food and beverage (incl. agriculture)	Real estate
Health and personal care	Telecommunication
Hotels and tourism	Trade and retail
Infrastructure (transport)	Vehicles