Killing two birds with one stone: Sound investment with social impact

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Abstract[5]

The paper uses a novel dataset on project implemented by the European Bank for Reconstruction and Development in 2010-18 to examine project selection and project design at a multilateral development bank which pursues a combination of financial and social impact objectives. The analysis exploits the fact that details of the projects, including assessments of their expected social impact, are recorded at least twice: when a concept is first reviewed by the investment committee and when the final particulars of a project are approved, with less than half of project concepts translating into signed deals. The analysis shows that projects are simultaneously selected on the quality of credit and social impact, with client's probability of default having a smaller impact on project survival in case of projects with stronger expected social impact. At the median, a weakening of risk profile of a project by 0.4 of a standard deviation is offset by strengthening of the expected social impact by one standard deviation, with unchanged probability of a project being implemented. In addition, social impact of some projects is strengthened between the concept and final stages of approval. In particular, requests are made to work on strengthening client's corporate governance in connection with more than a fifth of project concepts and such corporate governance work targets projects with otherwise weaker expected social impact and financials. Insights from the project selection and design at the EBRD may be useful for the growing universe of investors declaring social impact objectives.

Keywords: social impact, development finance, project selection, project design

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1. Introduction

Institutional investors, banks and various foundations increasingly declare focus on social impact objectives alongside traditional goal of profit maximisation when making investment decisions. In part, this is driven by increasing realisation that maximizing shareholder welfare is not necessarily equivalent to achieving highest return on equity (Hart and Zingales, 2017).

Social impact strategies vary. For instance, in January 2020, Goldman Sachs, a major investment bank, announced that it will only support initial public offerings of clients with at least one diverse board member, rising to two such members from 2021. Some sovereign wealth funds opt out of fossil-fuel related investments, in particular in the coal sector. Other investors earmark a certain fraction of portfolio to green bonds (bonds with certified use of proceeds for green-economy purposes) and / or commit to reporting on the carbon footprint of their portfolios.

As such "social-impact filters" and enhanced reporting on social and environmental outcomes become increasingly common, the question arises if investors can take a step further and kill two birds with one stone. In other words, how can investors optimise both the financial performance and social impact without explicitly subordinating one goal to the other?

In this respect, experience of development banks, and, in particular, multilateral development banks may be insightful as these institutions have been investing under multiple-objectives mandate for decades. Some of them, for instance, the International Finance Corporation (IFC) and the European Bank for Reconstruction and Development (EBRD) have explicit focus on private-sector investments, similar to many banks and investment funds. The mandate of EBRD, which started operations in the early 1990s, specifically stresses that projects need to both satisfy sound banking (achieve financial return) and deliver social impact by facilitating transition of economies where the bank invests to sustainable market economies (as EBRD was set up to facilitate transition from central planning in post-communist economies).

The way in which a development bank has been selecting and designing investment projects under its dual-objective mandate may thus hold valuable lessons for investors declaring social impact goals. This paper distils stylised facts about project selection and project design at the EBRD taking advantage of the unique data collected at two distinct stages in the investment cycle.

EBRD is unique in that it records ex ante assessments of expected social impact of projects and their expected financial performance several times: first, at the time of the initial review of the project concept by the investment committee, subsequently at the stage of the final review by the investment committee, and then regularly during the lifetime of the project culminating in an assessment upon completion.

This dataset enables us to track characteristics of projects that were advanced from the concept stage to implementation and compare them to the attributes of projects that were considered by did not materialise. In addition, records of the initial project review include

features of project design needed to improve or substantiate a project's social impact. It is thus possible to zoom in on projects where work has been requested on the projects design between concept and final stages to strengthen the social impact of bank's financing.

The data have a number of other attractive features. For instance, we are able to use information on the economist reviewing each project and exploit differences between suggestions regarding social impact work with respect to projects reviewed by the same individual (and thus reflecting the same skill set of reviewer).

Many project features that contribute to social impact – such as work on client's corporate governance -- are not recorded in management information systems. These need to be assessed based on review notes prepared for the investment committee using a combination of analyst assessment (for a subsample of projects) and automated text analysis based on machine learning (with human-coded subsample used to train the algorithm).

The paper applies BERT machine-learning algorithm (Devlin et al., 2018) and focuses on one specific feature of projects – enhancements to the standards of corporate governance and corporate disclosure of EBRD clients. These may take form, for instance, of a corporate governance action plan, implementation of international (IFRS) accounting standards, introduction of independent board directors on a company board or creation of an audit committee of the board.

A number of studies looked at the determinants of success of projects supported by multilateral development banks (MDBs), including country, client and project characteristics (see, for instance, Dollar and Levin (2005); Bulman et al. (2015); Denizer et al. (2013); Desai et al., 2017).

While these studies yield useful insights about patterns of MDB investments they leave open the question about the mechanics of decision making underpinning these outcomes. Are projects implemented by development banks representative of the universe of available investment projects? Do MDBs select projects based on their financial and social-impact characteristics? Do development banks work on project design to enhance social impact of their investments? If so, how do they do it? What are the trade-offs involved in project selection and design?

Earlier studies generally lacked information on project selection and the elements of project design that are needed to answer these questions. For instance, Kilby (2015) uses length of project preparation at the World Bank as a proxy for the depth of World Bank contribution to project design in an instrumental variables framework. The unique data collected at the two stages of project consideration at the EBRD provides for a more direct and detailed analysis of project selection and project design, including trade-offs between financial and non-financial objectives.

The analysis reveals that projects are simultaneously selected on the quality of credit and social impact. In addition, the social impact of some projects is strengthened at the concept

and final stages of approval. In particular, requests are made to work on strengthening client's corporate governance in connection with more than a fifth of project concepts and such corporate governance work targets projects with otherwise weaker expected social impact.

To the best of our knowledge, this is the first study to quantify the interplay of social and financial objectives of a large investor and the way these objectives jointly affect project selection and design. In particular, the system implemented at the EBRD relies on quantification of the social impact of a project at an early stage of consideration. Investment committee includes separate officers that are responsible for risk management and for social impact of the projects. As a result, decision making process internalises both objectives. The survival of projects that carry strong social impact is relatively little impacted by credit rating of the client. In contrast, projects where social impact is assessed to be relatively weak are much more likely to be implemented if the client is perceived to be financially strong.

The paper contributes to the growing literature on the private-sector impact investment looking for advancing environmental, social and governance objectives (see, for instance, Renneboog et al. (2008, 2011), Barber et al., 2017). The findings provide empirical evidence suggesting that one way to meaningfully incorporate social-impact objectives, and the associated trade-offs, into decision making of an investor is to quantify social impact in ways similar to quantification of financial risks, and to do so from early stages of project considerations. This echoes conclusions from a theoretical model developed by Opp and Oehmke (2020).

Social impact assessments can also strengthen incentives to design projects in a way that increases their impact, in addition to selecting projects with higher potential impact (in the spirit of theoretical argument by Gollier and Pouget, 2014). The paper also contributes to the literature on the impact of development bank projects by shedding light on how this impact materialises through project selection and project design work within the investing institutions.

The rest of the paper is structured as follows. Section 2 reviews earlier studies on social impact investing. Section 3 introduces a simple model illustrating decision making by socially responsible investors, including project selection and project design and derives testable implications. Section 4 presents the key features of the data and outlines the estimation strategy. Section 5 discusses the empirical results. Concluding remarks follow.

2. Investing to achieve social impact

2.1. Social impact of investment projects

Recent studies looked at various properties of impact investing – private-sector investments with stated social and environmental objectives in addition to the profit maximisation goal (see, for instance, Barber et al. (2017) for a discussion and overview of 161 funds since 161 that state dual objectives in their motivations). Early evidence suggests that impact investing funds generally find it somewhat easier to raise capital than conventional funds and investors

may be willing to accept lower financial performance in these funds although evidence on the existence and extent of return-impact trade-off is not conclusive (see, for instance, Renneboog et al., 2008, 2011; Zerbib, 2019; Pedersen et al., 2019).

A model by Opp and Oehmke (2020) suggests that to achieve meaningful impact working side-by-side with commercial investors, social impact investors need to base their decision on a measure of social impact ("social responsibility index"). This index needs to reflect social counterfactual outcomes thus potentially allowing for investment in dirty (or sin) industries (industries otherwise shunned by a range of investors, see Hong and Kacperczyk, 2009). The index also needs to place value on social impact irrespective of whether a given investor is involved in a project. The measure of social impact used in this paper is broadly in line with both these conditions.

2.2. Impact of projects conducted by development banks

While the rapid rise in private impact is a relatively recent phenomenon, multilateral development banks have been around for decades (the World Bank was set up at the end of the Second World War). Yet relatively little is known about ways in which development banks select and design their projects.

Evidence from evaluations of social impact of projects conducted by the World Bank and other development institutions has been mixed as well as incomplete. In general, country characteristics matter for project development outcomes. Examples include the quality of democratic institutions and the extent of civil liberties (Isham et al., 1997) and macroeconomic and political instability (see Guillaumont and Laajaj, 2006). Project characteristics also matter. For instance, Khwaja (2009) demonstrates the value of community participation in road projects in Pakistan.

The importance of both project and country effects were documented, for instance, by Dollar and Levin (2005) for World Bank projects for the period 1990-99; by Bulman et al. (2015) for more than 3,800 World Bank projects since 1995 and more than 1,300 Asian Development Bank (ADB) projects since 1973 (see also Kryg (2018) for evidence from the EBRD projects and Geli et al., 2014, for World Bank projects). Broccolini et al. (2019) provide evidence on the ability of multilateral development banks to mobilise private finance.

More variation in terms of project outcomes can be found within countries than between countries (Denizer et al. (2013), based on 6,000 World Bank projects during the period 1983-2011). Larger projects are typically associated with higher impact although findings vary from study to study. Private sector participation may improve the outcomes of infrastructure projects (Dobrescu et al., 2008, based on projects implemented by the EBRD). Early supervision of donor-funded projects may further boost outcomes (Kilby, 2000).

Evidence on trade-offs between financial and social-impact performance of development bank projects remains scarce and incomplete. Analysing projects implemented by the International Finance Corporation, IFC, Desai et al. (2017) find that financial returns of the

projects are typically unrelated to projects' ratings in terms of environments and social objectives. Furthermore, ex post assessments of the projects are often only weakly correlated with the economic rate of return expected ex ante (see Mubila et al. (2002), based on around 150 African Development Bank (AfDB) projects up to 1995).

In this context, an important advantage of the approach of this study is to look at any trade-offs between financial outcomes and social impact of projects in a framework of decision making by an investment committee. In doing so, the analysis zooms in on the information available to the committee at the pre-investment stage. In particular, these are measures of the probability of default of a client or guarantor (credit rating) and a numerical assessment of the expected social impact of projects.

2.3. Improvements in corporate governance and their impact

To illustrate how social impact of projects can be enhanced during the project selection stage, the analysis focuses on corporate governance of investee companies. In particular, many of the projects of the EBRD with private-sector and public-sector clients feature action plans aimed at improving the standards of corporate governance or standards of disclosure. This work is conducted in close cooperation with a specialised unit within the legal department of the EBRD, the Legal Transition Team, and it is often backed by donor-funded technical assistance.

Underpinning this work are regular assessments of corporate governance legal frameworks across the economies in which EBRD invests. The latest such assessment was made by the EBRD in 2016 and 2017 (see EBRD, 2019). These assessments cover the quality of the legal framework in place as well as the capacity of regulators and courts to enforce legislation. In addition, the analysis reviews corporate governance disclosures of the 10 largest companies in each economy.

A large number of studies document the positive impact of strong corporate governance and board diversity on financial performance of firms (see, for instance, Bernile et al., 2018, Brealey et al., 2014). Good corporate governance helps to mitigate the agency problem – issues arising from delegation of decision making by shareholders to boards and management, whereby managers may have superior information about firm's operations but their incentives and objectives may differ from those of shareholders (see, for instance, Shleifer and Vishny, 1997; Jensen and Meckling, 1976). Strengthening corporate governance may be a particularly important task at state-owned enterprises, where corporate governance is often weaker (OECD, 2018, see also Fan et al., 2014).

3. The model

3.1. Financial investors

Consider a universe of entrepreneurs who can implement projects. These projects have a unit cost and are entirely debt financed. Entrepreneurs differ in terms of their probability of default, $p \in [0; \hat{p})$. With probability $1 - p$, a project yields a revenue of $y \in (0; +\infty)$, where y is

uniformly distributed between 0 and $\hat{y}$. With probability p, a project yields nothing but still requires an effort on the part of entrepreneur.

The entrepreneur promises an income of x to a bank (which could be thought of as interest payment) and has a utility function of

$$U_e = (y - x)(1 - p) - w^*$$

where w^* is the reservation wage (the cost of entrepreneur's time). An entrepreneur agrees to go ahead with the project as long as

$$x \leq y - \frac{w^*}{1-p}$$

Consider a private sector investor without any capital or liquidity constraint. The expected return to the investor is $x(1 - p)$. Investor faces cost of funds r^* (such that $0 < r^* + w^* < \hat{y}(1 - \hat{p})$, so that at least some projects are worth the time of the investor and high-risk entrepreneur). The utility of a commercial investor is the expected return net of cost of funds:

$$U_i = x(1 - p) - r^*$$

The investor is willing to finance a project as long as the interest payment covers the cost of funds adjusted for the probability of default, expressed as $x \geq \frac{r^*}{1-p}$. Provided the realised value of the project net of the reservation wage and accounting for the eventuality of default is sufficient to pay such a return, or $y - \frac{w^*}{1-p} \geq \frac{r^*}{1-p}$, the investor and the entrepreneur can agree a rate of interest x in a way that a project gets financed. This yields:

$$y \geq \frac{w^* + r^*}{1-p} = y^*(p), y^*(p) \in (0; \hat{y})$$

Assume further that the realisation of project outcome y becomes known after due diligence is conducted. Thus ex ante a concept of a project has a certain likelihood of going ahead, which depend on the probability of default p. The higher the probability of default, the higher the reservation value of income y^* required for the project to go ahead, and thus the lower the ex ante likelihood of a project being signed.

3.2. Project selection by socially responsible investors

Now consider that the same project yields a social impact value $s \in [0; r^* + w^*)$, which is ignored by entrepreneurs and financial investors but is otherwise observable. This assumption is similar to the one in Opps and Oehmke (2020). The positive social impact in this case could arise from reducing a negative externality associated with a project (such as pollution). Also assume that the social value is realised even if a project fails commercially (for example, road traffic is not sufficient for tolls to cover the construction costs but a road can still be used by residents).

Consider socially responsible investors who are also unconstrained when it comes to raising capital at the same cost of funds r^*. These investors internalise the social cost in their decision making, with utility function of

$U_s = x(1-p) - r^* + s$

These investors can finance a project as long as the realised value of the project satisfies

$y \geq \frac{w^*+r^*-s}{1-p} = y^{**}(p, s),\ \ y^{**}(p, s) \in (0; y^*)$

The probability of a project going ahead is given by

$P^{**}(p, s) = 1 - \frac{w^*+r^*-s}{(1-p)\hat{y}}$

First, it is clear that the reservation value of realised income, y^{**}, is lower than y^*. This means that there will be projects yielding a commercial value between y^{**} and y^* that are socially optimal but are foregone unless there are socially responsible investors willing to finance them.

As in the case of commercial investors, higher probability of default makes it less likely that a project concept – considered before its value y is verified – will translate into an actual project:

$$\frac{\partial P^{**}}{\partial p} = -\frac{r^* + w^* - s}{(1-p)^2\hat{y}} < 0$$

On the contrary, the higher the social value of project, s, the more likely a project is to be financed by a socially minded investor:

$$\frac{\partial P^{**}}{\partial s} = \frac{1}{(1-p)\hat{y}} > 0$$

The second mixed derivative of the probability of a project going ahead is given by:

$$\frac{\partial^2 P^{**}}{\partial p \partial s} = \frac{1}{(1-p)^2\hat{y}} > 0$$

This implies that the negative marginal impact that the probability of default has on the likelihood of a project going ahead is higher when a project's social impact is low. When social impact of the project is high, probability of default plays a smaller role in decision making by the socially responsible investor. In an extreme case, the social value of the project is high enough to fully compensates the social investor for the cost of funds and the entrepreneur for their effort, in a way that the project can be implemented regardless of the probability of default.

Finally, there exists a trade-off whereby an increase in social value of a project and an increase in the probability of default keep the likelihood of a project being implemented unchanged. This is given by

$dy^{**} = \frac{\partial y^{**}}{\partial s} ds + \frac{\partial y^{**}}{\partial p} dp = 0$

This yields

$$\left|\frac{ds}{dp}\right|_{y^{**}=const} = \frac{r^* + w^* - s}{1-p} > 0$$

In other words, a socially responsible investor could finance higher-risk projects if higher social impact justifies such a transaction. The riskier the projects and the higher the reservation wage of entrepreneurs, the steeper the trade-off (more social impact is required to offset higher risk of a project).

3.3. Project design by socially responsible investors

Assume now that socially responsible investor can also put in an effort *e* that raises the social impact of a project by λe. In other words, social investor can work on project design – for instance, lowering the emissions of a new facility. This effort is also costly for the entrepreneur. For simplicity, assume the required effort is μe. In this case the utility functions can be rewritten as

$U_s = x(1-p) - r^* + s + (\lambda - 1)e$

$U_e = (y-x)(1-p) - w^* - \mu e$

The entrepreneur will only agree to explore design of projects where commercial investors cannot provide financing since entrepreneur derives no benefit from enhanced social impact. For additional projects both the entrepreneur and the socially responsible investor can put in the required effort as long as

$$\frac{r^* - s - (\lambda - 1)e}{1-p} \leq x \leq y - \frac{e + w^*}{1-p}$$

This yields

$$y \geq \frac{r^* + w^* - s - (\lambda - \mu - 1)e}{1-p} = y^{***}(p, s, e) < y^{**}$$

The new cut-off for realised income is lower than effort-free cut-off as long as $\lambda \geq \mu + 1$, that is, the social value of project design work outweighs the cost of the joint effort of entrepreneur and socially responsible investor.

Available effort is likely to be finite, linked to staff time and expertise. If a socially responsible investor maximises the number of financed projects (not an unreasonable assumption in the context of multilateral development banks), project design efforts will target projects with otherwise lower probability of being implemented. In this case projects with lower assessed social impact and higher probability of default are more likely to undergo project design work on behalf of a socially responsible investor – for instance, efforts to improve corporate governance or environmental footprint of an investee company.

4. Data and estimation strategy

4.1. Projects implemented by the EBRD

The analysis is based on the universe of EBRD projects considered by the EBRD during 2010-18. A project first gets recorded when it comes to a review of a project concept by the Bank's investment committee. At that stage, a project is given a rating in terms of its

expected social impact, referred to as expected transition impact (ETI), on a scale from 0 to 100. The terminology reflects EBRD's history. The institutions was set up in 1991 to facilitate transition of economies with central planning towards well-functioning market economy. The latter is broadly understood to be competitive, well-governed, inclusive, resilient, integrated and green.

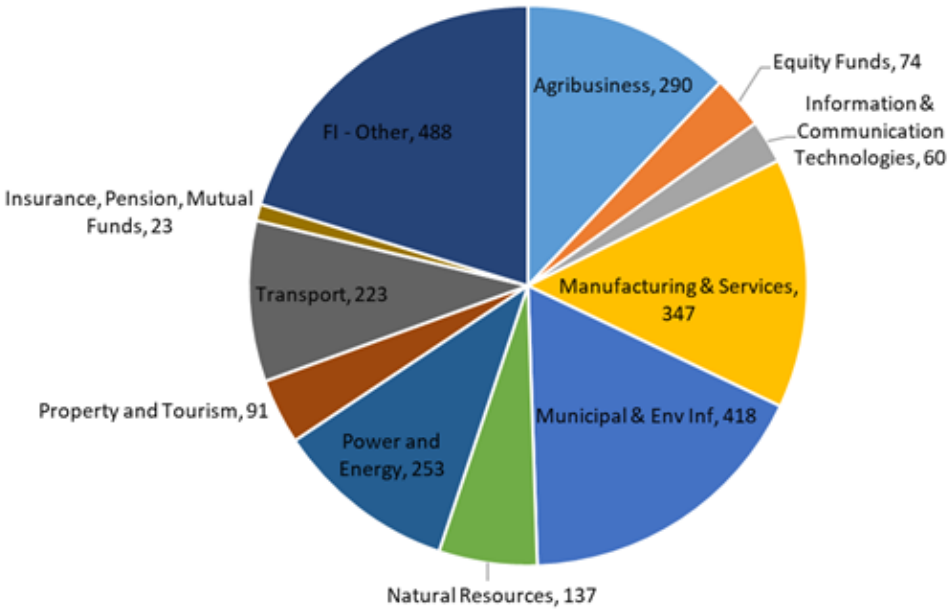
The sample comprises 2,404 projects that have been assessed at the concept review stage during 2010-18 and for which ETI and other data are recorded. Projects that came for a concept review later are excluded from the analysis as their "survival" was too early to assess at the time of writing; projects that passed concept stage earlier do not have the assessed probability of default recorded in the data.

The universe of investments done by the EBRD is fairly varied. Around 15 per cent are equity projects, the rest are debt or hybrid instruments, typically with a tenor of 5-7 years, although this varies from short-term facilities to loans with tenors in excess of 20 years. The loan amounts vary greatly with an average amount in the sample of around €27 million.

Some projects are backed by provision of technical assistance by the EBRD (for instance, analysing corporate governance standards of a client and developing a corporate governance action plan to address the identified areas of weakness).These are typically financed by donor funds, including those set aside from retained profits of the EBRD.

Around 20 per cent of projects are with sovereign borrowers or are guaranteed by the Ministry of Finance. Of non-sovereign projects some are with state-owned enterprises and banks; the vast majority are with private-sector clients. A significant minority of projects involve co-financing with outside investors (mostly in the form of syndicated loans led by the EBRD). The sector scope of projects is broad and generally balanced (see Chart 1). Table 1 summarizes various project characteristics including their average size.

Chart 1. Distribution of project concepts by sector



Sources: EBRD calculations.

Notes: Based on 2,404 projects that were presented for concept review during 2010-18.

Table 1. Descriptive statistics

VARIABLES	mean	median	st. dev.	min	max
Concept "survived" -- project signed	0.543	1	0.498	0	1
Expected transition impact at concept review	57.62	60	14.99	5	100
Probability of default rating	6.083	6.3	0.819	2.300	8
Sovereign	0.050	0	0.218	0	1
State, non-Sovereign	0.226	0	0.418	0	1
Repeat client dummy	0.527	1	0.499	0	1
Project in local currency	0.237	0	0.425	0	1
Operation amount (USD mln)	59.35	33.12	79.44	0	1,221
Operation amount (USD mln), log	3.502	3.53	1.159	0	7.108
Operation amount below 10m	0.145	0	0.352	0	1
Syndication (external co-financing)	0.079	0	0.269	0	1
Equity	0.171	0	0.376	0	1
Corporate governance work requested	0.210	0	0.407	0	1

Sources: Authors' calculations.

Notes: Based on 2,404 projects that were presented for concept review during 2010-18.

The analysis takes into account a wide range of project characteristics. In addition to the characteristics listed above, the analysis looks at the currency of the transaction (local versus foreign); type of instrument (equity versus debt); and the date of signing (to account for any seasonality effects).

Importantly, project records include the name of the economist reviewing given project. This enables us to control for reviewer fixed effects (and thus the set of reviewer skills and attitudes) when it comes to analysing requests related to project design to achieve higher development impact. In addition, controlling for the Banking sub-team (interaction between sector and geographical region) ensures that identification comes from comparing projects that are responsibility of the same director or senior banker who signs off on project details and takes part in various internal discussions.

4.2. Project assessment throughout the project preparation cycle

Projects presented at the concept review need to pass several tests. First, they need to adhere to sound banking. The Risk Management department assesses the probability of default of a client on a scale approximating risk agencies' scale with around 20 notches (from highest quality credit to equivalent of default). If a project has a guarantee attached, for example from apparent company abroad, the analysis looks at the strongest score of the borrower and guarantor (typically, that of a guarantor). Probability of default is generally viewed as a sufficient statistic for allocating capital based on commercial return (see, for instance, Besley et al., 2020). In addition, projects need to be acceptable from the integrity point of view.

Projects are also assessed in terms of their expected social impact, refereed to internally as transition impact. Historically, the first block of this assessment looked at the extent to which a project contributed to improving the structure of markets by boosting competition or linkages in the value chain. Second, the assessment credited efforts to develop market-supporting institutions such as new legal frameworks for public-private partnerships. The third block comprises development of new skills, innovation in terms of products, production processes and financing instruments and improvements in terms of quality of management and corporate governance. Additional consideration is given to a project's visibility and potential to be replicated across the economy.

Over time, the assessment has evolved to subsume traditional development objectives such as economic inclusion, economic integration, financial resilience, the environmental impact, competitiveness and high-quality governance. This interpretation was formalised in 2016. To the extent that the scoring methodology has undergone revisions over the years, these could be captured by year fixed effects in the regression analysis.

When reviewing a project concept, the team of economists assigns an expected transition impact (ETI) rating on a 0 to 100 scale. This scale is largely ordinal (higher scores correspond to projects with greater expected impact) and the distribution of scores has a mode at 60.

Economists also record actions required to improve or substantiate a given rating. These are typically features of project design such as the type of end-borrowers or loans for a credit line to a financial institution (for instance, targeting smaller clients, energy efficiency projects or providing financing in local currency rather than US dollars). The reviews often flag a need for increased transparency in terms of corporate disclosure or a corporate governance action plan to strengthen the protection of rights of minority shareholders, appoint independent directors to the board and address other weaknesses in terms of corporate governance.

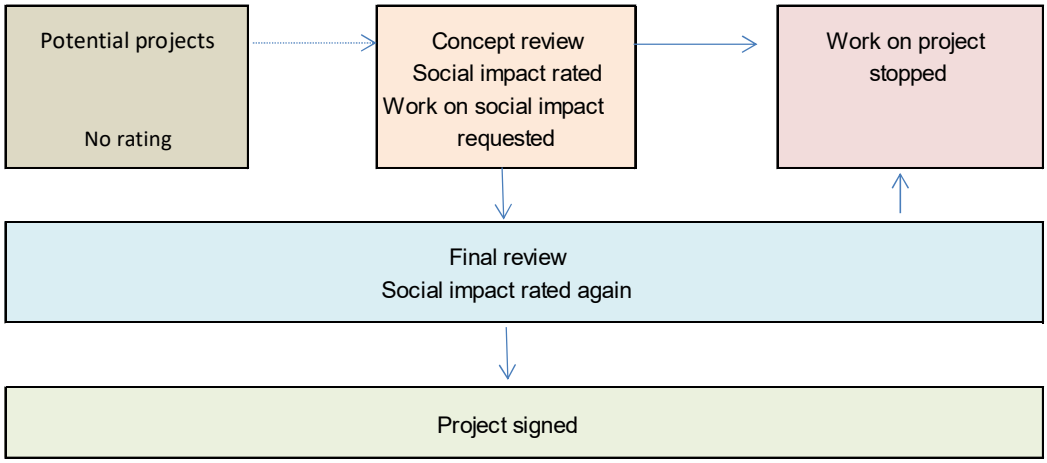
Many projects do not return to final review due to poor risk-return profile based on client's credit quality rating, low perceived social impact of the intervention, integrity or environmental concerns or for a variety of idiosyncratic reasons. Other projects (around 51 per cent of the total in the sample) advance to the final review by the investment committee, approval by the Bank's Board of Directors and signing.

At the final review stage the social impact of the projects is again assessed by the team of in-house economists, based on the initial rating and any enhancements to project design negotiated between the concept and the final review stages.

At the final review stage, transition impact benchmarks are also introduced to monitor the progress towards project objectives. For example, this could be restructuring of ownership achieved by a certain date, appointment of a pre-agreed number of independent directors by a certain date, establishment of an audit committee of the board, presentation of audited IFRS accounts by a state-owned firm and so on.

The social impact of a project is further monitored at the project implementation stage, with the rating (called the portfolio transition impact, PTI) adjusted depending on progress towards the stated goals against pre-agreed benchmarks. The overall project assessment cycle is schematically summarized in Chart 2.

Chart 2. Schematic representation of project assessment cycle



Sources: Authors.

Average PTI closely tracks average ETI (typically average PTI is slightly higher). This is because ETI, by definition, takes into account the risk that a certain feature of the project may not materialise despite best efforts. In other words, a project with ambitious benchmarks (for instance, a restructuring of a state-owned monopoly into separate firms with associated reform of corporate governance) and lower chance of success may have the same assessed transition impact as a project with a lower degree of ambition (for instance, introduction of independent directors) but a high chance of success.

For this reason it is useful to employ the same average value when computing z-scores (normalised values) of expected transition impact at the concept review stage, final review stage and at the time of project implementation or completion. In other words, all z-scores for social impact used in the analysis are calculated with respect to the average ETI across all signed projects. All three measures are approximately normally distributed with mean zero and standard deviation of one (see Table 1).

4.3. Recording corporate governance-related objectives of the projects

The analysis in this paper seeks to identify projects that sought to address issues related to clients' corporate governance. This information is not automatically recorded in information management systems and the assessment was based on the reading of economists' project notes at concept and final review stages.

First, analysts working in the Office of the Chief Economist of the EBRD manually assessed whether a project presented for concept review during 2013-18 needed additional work on corporate governance. This was coded as a dummy variable (one where corporate governance work needed to be strengthened as part of economists' assessment).

The classification of other concept reviews and the classification of all final reviews is based on automated text analysis building on machine learning (see Devlin et al., 2018). In particular, the algorithm read through all final reviews of the EBRD and assigned a probability to a project addressing a particular set of issues, such as corporate governance or development of market framework in a particular sector. The basic training of the software involved reading a public corpus of articles such as those on Wikipedia and BookCorpus (collection of text of 500 thousand books), a total of 110 million data points.

The basic training was further complemented by training specific to review of EBRD projects by economists. This refinement was based on manual coding of actions suggested by economists as part of concept reviews of a subset of projects – namely those reviewed by the Operations (Investment) committee during the period 2013-18 and subsequently reviewed by human analysts (1,184 projects reviews in total). Of these, 1,126 project reviews were randomly selected for training purposes and 125 were set aside to measure goodness-of-fit out-of-training-sample.

Infrequently, projects may have multiple concept or final reviews (if further actions are needed before a review is passed). In these cases all reviews were independently coded while the analysis in the paper focuses on the first concept review (when a project is first presented) and the last final review (where final decision is taken).

The software was also asked to code all concept reviews assigning a probability that a particular feature of a project (such as enhanced corporate governance of a potential client) was flagged by economists at a time of Concept review as a desirable feature of the project. The results of the automated coding were compared with those of coding done by human analysts (employees of the Office of the Chief Economist of the EBRD) where the two samples overlapped (a total of 1,402 project reviews, of which 1,184 projects overlap). The probabilities were also converted into the respective dummy variables based on whether the probability exceeded 0.5. The choice of this threshold does not affect the results in any significant way as most assessed probabilities are below 0.1 or exceed 0.8 (that is, they are clustered close to zero or one).

Machine-based and human-based coding of Concept reviews agreed 94.8 per cent of the time (in the testing subsample the agreement was observed approximately 88 per cent of the time). The machine-based coding was calibrated in a way that balanced a reasonably low likelihood of assigning a certain feature to a project which was not assigned by a human ("false positive" observed with a conditional probability of 5.4 per cent) and a moderate rate of false "negatives" (situations where human coders thought improvements in corporate governance were requested but machine-based coding did not support this view, 4.9 per cent conditional probability). The calibration generally favoured avoidance of false positives at the expense of higher rate of false negatives in the training sample (8 out of 28).

Overall, work on corporate governance was requested at the time of the review of a project concept in around 22 per cent of cases. This percentage is similar based on project coding by analysts (22 per cent) and by an algorithm in a substantially larger sample (21 per cent).

5. Results

5.1. Project survival

The first part of the analysis looks at the determinants of survival of projects. In this analysis the probability of a project being signed conditional on its concept having been presented for a review ($Survival_i$ =1) is linked to a project's expected transition impact (*ETI*), the assigned probability of default rating (*PD*) and a number of other project characteristics (X_i) such as the ownership of the client. Variants of the model also allow for a varying marginal impact of probability of default on the likelihood of survival by including the corresponding interaction term between the expected transition impact and probability of default, in line with the stylized facts derived from the model. Equation (1) and its variants (without the interaction term) are estimated as a probit model as well as linear probability model.

$$P(Survival_i = 1) = \Phi(\alpha_i + \beta_1 ETI_i + \beta_2 PD_i + \varphi ETI_i * PD_i + \beta_3 X_i + \varepsilon_i) \quad (1)$$

The results presented in Table 2 indicate that project with higher social impact have a higher probability of survival but, estimated linearly, this effect is not statistically significant. In part, this reflects the fact that estimations already take into account positive associations between project survival and project characteristics that can be observed directly, such as transaction denominated in the currency of the borrower's jurisdiction (local currency) or a project taking place in a low-income country or equity involvement that allows for deeper work on corporate governance, transparency and environmental performance.

Table 2. Determinants of project survival

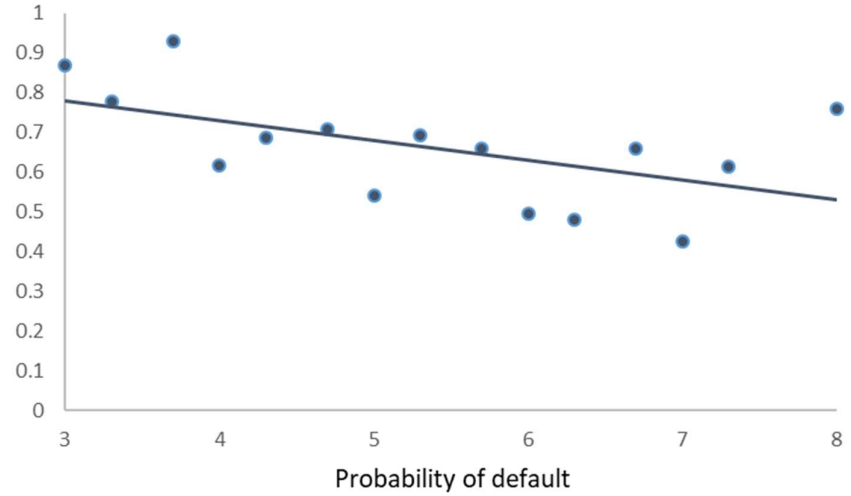
Dep. var: Likelihood of project	(1) LPM	(2) LPM	(3) LPM	(4) Probit	(5) Probit	(6) Probit
Expected transition impact		0.00123*	-0.00877*		0.00364*	-0.02602*
at concept (ETI)		(0.001)	(0.005)		(0.002)	(0.015)
Probability of default (PD)	-0.06659***	-0.06766***	-0.15856***	-0.19718***	-0.20111***	-0.46783***
	(0.014)	(0.014)	(0.047)	(0.040)	(0.041)	(0.136)
ETI*PD			0.00164**			0.00485**
			(0.001)			(0.002)
State non-Sovereign	0.05626*	0.06836**	0.06864**	0.15384*	0.18962**	0.19005**
	(0.031)	(0.032)	(0.032)	(0.090)	(0.092)	(0.092)
Sovereign	0.17638***	0.18156***	0.18571***	0.52667***	0.53609***	0.55096***
	(0.062)	(0.063)	(0.063)	(0.184)	(0.187)	(0.187)
Equity	-0.19437***	-0.19497***	-0.19636***	-0.56586***	-0.56888***	-0.57679***
	(0.030)	(0.030)	(0.030)	(0.087)	(0.088)	(0.088)
Guarantee instrument	0.04583	0.04894	0.04486	0.15107	0.15857	0.15095
	(0.067)	(0.068)	(0.068)	(0.198)	(0.198)	(0.199)
Local currency	0.13450***	0.13184***	0.13284***	0.39100***	0.38215***	0.38571***
	(0.032)	(0.032)	(0.032)	(0.091)	(0.091)	(0.091)
Repeat client	0.03946*	0.03953*	0.03984*	0.11282*	0.11312*	0.11459*
	(0.022)	(0.022)	(0.022)	(0.063)	(0.063)	(0.063)
Syndication	0.01756	0.01306	0.01145	0.05147	0.03770	0.03264
	(0.038)	(0.038)	(0.038)	(0.106)	(0.106)	(0.106)
Operation amount (USD, log)	-0.00204	0.00002	-0.00109	-0.00559	0.00040	-0.00237
	(0.013)	(0.013)	(0.013)	(0.037)	(0.037)	(0.037)
Amount below USD 10m	0.06644*	0.06668*	0.06213	0.19286*	0.19466*	0.18144
	(0.040)	(0.040)	(0.040)	(0.114)	(0.115)	(0.115)
Constant	0.95676***	0.88839***	1.45260***	1.33212*	1.12908	2.79391***
	(0.251)	(0.254)	(0.375)	(0.698)	(0.707)	(1.077)
Country FEs	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Month FEs	Yes	Yes	Yes	Yes	Yes	Yes
Banking team * Region FEs	Yes	Yes	Yes	Yes	Yes	Yes
R^2/pseudo-R^2	0.173	0.172	0.174	0.132	0.132	0.133
Observations	2443	2430	2430	2417	2404	2404

Sources: Authors' calculations.

Notes: Robust standard errors in parentheses. ***, **, * denote significantly significant differences at the 1%, 5% and 10% levels, respectively. Estimated using linear probability model and probit.

As expected, projects with higher probability of default, on average, have a lower probability of survival (a one standard deviation reduction in probability of default is associated with around 6 percentage point drop in the likelihood of a project being signed). This relationship holds when not controlling for ETI or unconditionally (see Chart 3).

Chart 3. Probability of default assigned to a project concept and probability of survival



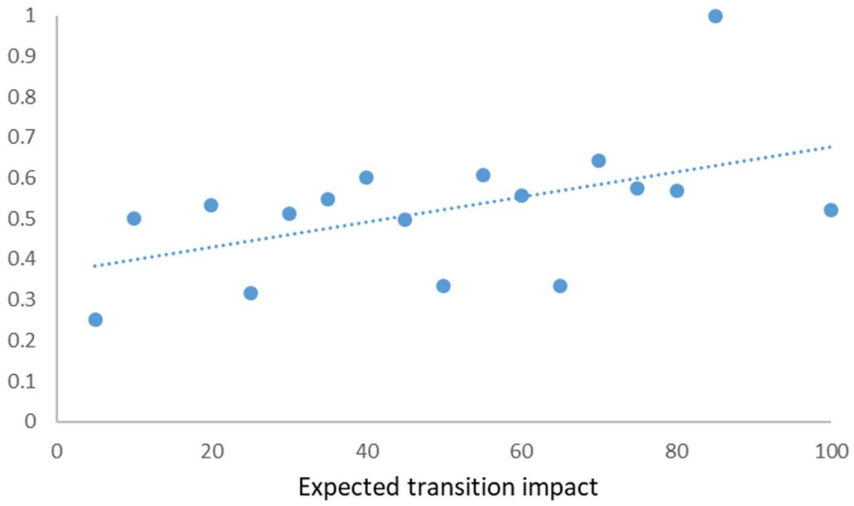
Source: EBRD and authors' calculation.

Note: Average likelihood of project survival for each value of probability of default.

Project concepts with higher expected transition impact are more likely to be signed – whether unconditionally (see Chart 4) or controlling for other factors. In practice, this relationship may be somewhat weakened by challenges of developing and implementing the most ambitious projects with particularly high social impact rating. Those may actually be somewhat less likely to materialise for circumstances outside direct control of the investor

(for instance, in the case of a privatisation, restructuring of a large state-owned enterprise or public-private partnership tendering failing to go ahead).

Chart 4. Expected social impact assigned to a project concept and probability of survival



Source: EBRD and authors' calculation.

Note: Average likelihood of project survival for each five-point interval of expected transition impact.

Adding an interaction term between the expected transition impact and the probability of default allows for the marginal impact of probability of default on project survival to be a function of a project's social impact, in line with the stylised facts derived from the model. As predicted, the coefficient on this interaction term is positive and statistically significant.

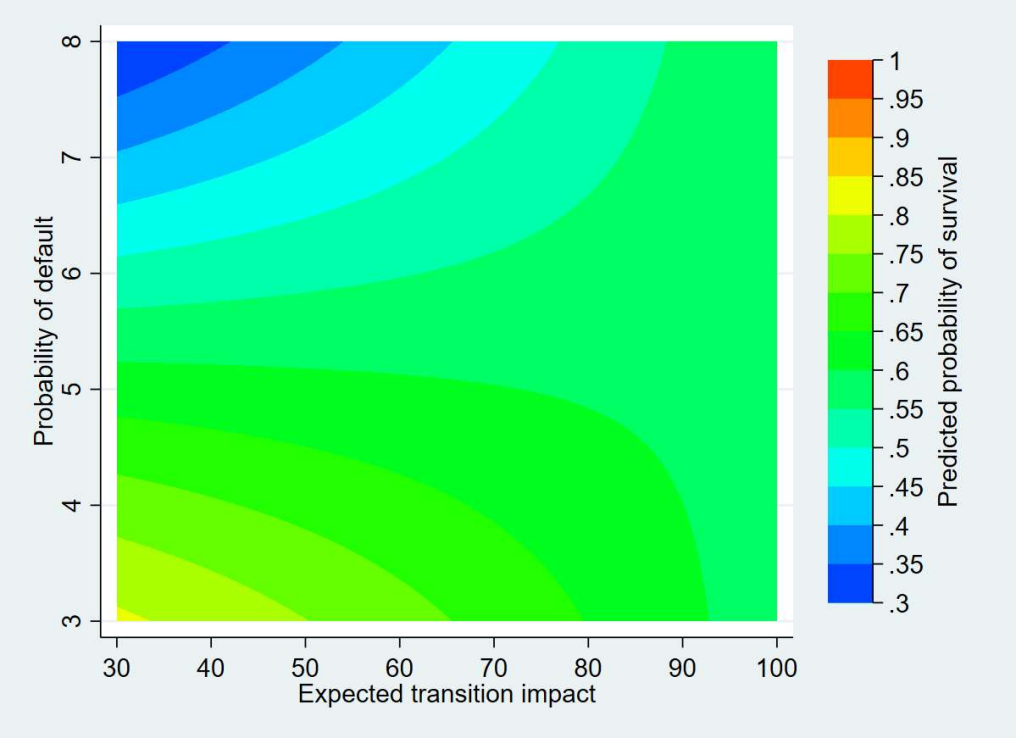
Taken together, the estimates suggest that the probability of default matters little for the likelihood of survival of projects with high social impact (see representation of the joint impact of probability of default and social impact on the likelihood of survival, Chart 5). In contrast, projects with weaker assessed social impact are substantially more likely to get implemented if they are stronger from a risk-management perspective. By implication, the likelihood of commercially riskier projects with lower social impact being signed is particularly low.

As far as project survival is concerned, an emerging trade-off between the strength of the project from the risk management and social impact perspectives can be quantified. Consider a typical project (close to the median) with an expected transition impact of 60 and a probability of default rating of 6. If probability of default rating weakens by a notch (around 0.4 of a standard deviation), probability of survival is unchanged should social impact be 13-15 points higher (an increase close to one standard deviation). Similarly, a project with stronger credit rating and a weaker social impact can also have the same probability of survival. A relatively high estimated trade-off ratio is consistent with the EBRD dealing with higher-risk projects in less developed economies, as discussed in the previous section.

As far as other variables are concerned, projects with repeat clients have a higher chance of materialising (it tends to be easier to agree a deal with an existing client given anchored pricing expectations; projects with repeat clients are also less likely to face unresolved integrity issues). A project with a sovereign or a sovereign guarantee and those with public-sector clients are more likely to survive, as are projects where investment is envisaged in local currency. Local-currency projects tend to have stronger risk profile as well as stronger social impact (development of local capital markets and contribution to greater financial resilience of the sector tend to be credited as part of the social impact assessment).

Concepts of equity investment, on the other hand, are less likely to survive. Although they tend to carry a more favourable assessment of social impact (including rooted in potential improvements in corporate governance) these projects tend to be more complex and agreement on a price of entry may be more difficult to achieve than for a debt transaction. Investment amounts, in contrast, do not have a significant bearing on the probability of project survival, except a number of streamlined management and board approval processes in place for smaller projects make such projects slightly more likely to be signed (a separate dummy variable is included to account for such a threshold effect).

Chart 5. Estimated project survival probability depending on social impact and probability of default assigned at the concept review stage



Sources: Authors.

Note: Predicted probability of a project presented for a concept review being eventually signed based on the probit specification reported in Table 2 with interaction terms between probability of default and expected transition impact.

Regressions also control for countries, seasonality (month of review), the banking sub-team in charge of the project (interaction of sector and geographical region such as Central Asia) as well as the identity of the economist reviewing the project. When it comes to country fixed effects, they tend to be lower in countries with higher per capita income: here social impact (and additionality) considerations appear to dominate risk management ones. No strong seasonal patterns are revealed. The results of probit estimations are similar.

5.2. Social impact assessment and corporate governance work

The analysis now moves from the selection (survival) of project concepts to projects design, with particular reference to work undertaken to strengthen corporate governance and transparency of a client. This work typically tales form of a review of corporate governance practices of a potential client, which can lead to a corporate governance action plan being agreed. Such plans may target, for instance, creating a board of directors or introducing independent directors to the board, developing internal controls and anti-corruption mechanisms, changes to the way procurement is run, reorganisation and / or disclosure of ownership structure, participation in the extractive industries transparency initiative (EITI) in

the case of large companies in the commodities sector, strengthening of internal and external audit functions and a number of other undertakings, in line with best international practices (see EBRD, 2017, for a discussion).

The basic model links the likelihood of a suggestion to work on client's corporate governance (CG_i, a dummy variable) made at the time of review of project concept by the reviewing economist to a variety of project characteristics including the expected transition impact and probability of default ratings. As before, the model is estimated as probit or linear probability model.

$$P(CG_i = 1) = \Phi(\lambda_i + \mu X_i + \gamma ETI_i + \lambda PD_i + u_i) \quad (2)$$

The results (presented in Table 3) suggest that a request for work on corporate governance issues is strongly negatively correlated with the assessed transition impact at the concept stage. A potential bias, if anything, could work in the opposite direction: work on corporate governance is taken into account as part of the review of transition impact of the project and thus could mechanically be associated with higher expected social impact.

Empirical evidence thus strongly suggests that corporate governance work is requested in the context of projects with an otherwise weaker assessed social impact (as well as weaker financials). A one standard deviation reduction in the expected transition impact is associated with a 6 percentage point higher likelihood of corporate governance work being suggested, compared with the average request rate of around 21 per cent. This may be because the social impact of other dimensions of a project is perceived to be weaker and corporate governance dimension is needed to justify the use of development bank's funds. Or this may be because weaknesses of corporate governance jeopardize achievement of other dimensions of social impact such as financial and operational restructuring of a state-owned company or tariff reform.

Indeed, projects with state-owned companies are more likely to carry a request to strengthen corporate governance. This also analyses controls for a combination of sector, geographical region and countries at the concept stage.

Table 3. Correlates of requests to work on corporate governance (CG) of prospective investee companies

	Manually coded CG	Algorithmic CG	Manually coded CG	Algorithmic CG
	LPM		Probit	
Expected transition impact at concept (ETI)	-0.00343***	-0.00161**	-0.01599***	-0.00838**
	(0.001)	(0.001)	(0.004)	(0.003)
State non-Sovereign	0.12650**	0.11137***	0.59472***	0.54977***
	(0.039)	(0.026)	(0.166)	(0.119)
Sovereign	0.01304	0.06091	0.09865	0.24144
	(0.077)	(0.052)	(0.361)	(0.246)
Equity	0.29501***	0.27174***	1.11003***	1.01544***
	(0.039)	(0.025)	(0.154)	(0.101)
Guarantee instrument	-0.06772	-0.06099	-0.36948	-0.49565
	(0.084)	(0.056)	(0.467)	(0.339)
Probability of default (PD)	0.05207**	0.03744**	0.26459**	0.17174**
	(0.019)	(0.012)	(0.086)	(0.053)
Local currency	-0.05901	-0.02348	-0.23242	-0.09422
	(0.040)	(0.026)	(0.172)	(0.117)
Repeat client	-0.01422	0.00375	-0.07545	0.01757
	(0.028)	(0.018)	(0.119)	(0.080)
Syndication	-0.00156	-0.03743	0.02706	-0.16526
	(0.048)	(0.031)	(0.205)	(0.142)
Operation amount (USD, log)	-0.02566	-0.00053	-0.11396	0.00689
	(0.017)	(0.011)	(0.073)	(0.047)
Operation amount below 10m	-0.16144**	-0.04366	-0.77943**	-0.17906
	(0.056)	(0.033)	(0.246)	(0.149)
Constant	0.25517	-0.12293	-0.22892	-2.75041**
	(0.334)	(0.210)	(191.868)	(1.023)
Country FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Month FEs	Yes	Yes	Yes	Yes
Banking team * Region FEs	Yes	Yes	Yes	Yes
Banking team FEs	Yes	Yes	Yes	Yes
Economist FEs	Yes	Yes	Yes	Yes
R-squared	0.270	0.239		
Adjusted R-squared	0.122	0.164		
Pseudo R-squared			0.250	0.231
Observations	1185	2358	1055	2179

Notes: Robust standard errors in parentheses. ***, **, * denote significantly significant differences at the 1%, 5% and 10% levels, respectively. Columns 1 and 3 include only projects where corporate governance work was coded manually; columns 2 and 4 also include projects with corporate governance work coded based on software-based text analysis.

5.4. Discussion

The estimation suggest complex trade-offs between commercial profile and expected social impact of investment projects implemented by a development bank. Such trade-offs are routinely discussed at meeting of an investment committee which includes, separately, members with explicit responsibilities for risk management and social impact. In this setup, projects appear to be simultaneously selected on their social impact and commercial risk profile.

The selection appears to be facilitated by the fact that the expected social impact is summarised in a single project-level score that encompasses various dimensions of the impact

and takes into account the counterfactual situation in which a project does not go ahead, consistent with the results of a model of impact investing by Opp and Oehmke (2020).

The results suggest that investors that are committed to delivering social impact may benefit from a similar institutional setup, where expected social impact of the project could be summarised in an index in the same way as credit quality of a client is commonly summarized in probability of default or a credit score. Advances in machine learning and artificial intelligence could help to minimise the overheads associated with such structures.

The estimated size of a trade-off between financial risk of a project and its social impact (measured with respect to likelihood of a project concept progressing to implementation stage) is meaningful. If it becomes part of decision making of a significantly large number of socially conscious investors, it may significantly increase risk tolerance with respect to socially valuable projects. This should relax financing constraints for such projects but also lower returns for socially responsible investors (consistent with findings of Luo and Balvers (2017) and a number of other studies). This may somewhat lower their appetite for foregoing financial return in search of social impact. In the long run, however, this should also increase supply of projects with high social impact and lower supply of socially suboptimal projects. Socially minded investors can accelerate this shift by supporting design of socially attractive features.

As far as "traditional" multilateral development banks are concerned, the analysis suggests that project selection indeed plays an important role in helping to target – and achieve – social impact. At the same time, project design – concerted work on building desirable features into projects such as strengthening of the corporate governance of a potential client – also plays an important role. Going forward, development banks could document more precisely both the project selection and the project design part of their work and further improve quantification of the social impact achieved. The 17 sustainable development goals adopted by the United Nations (UN) is a possible framework for articulating and aggregating various dimensions of social impact into an index.

5.5. Robustness checks

To investigate the impact of machine-based coding of project reviews we repeat the analysis in three ways. First, we restrict the sample to projects where coding of concept reviews was done analysis and assign dummy variables based on the "human" coding. Second, we use the same sample but assign the coding based on the text analysis performed by an algorithm. Third, we run the analysis on a broad sample using machine coding. Reassuringly, the results of the analysis are qualitatively and quantitatively similar.

6. Conclusions

The paper used a novel dataset on project implemented by the European Bank for Reconstruction and Development in 2010-18 as well as machine-learning based text analysis techniques to examine project selection and project design at a multilateral development

bank, with particular reference to work on strengthening standards of corporate governance and disclosure of bank's clients. The analysis exploited the fact that details of the projects are recorded at least twice: when a concept is first reviewed by the investment committee and when the final particulars of a project are approved, with less than half of project concepts being eventually approved and signed by the bank.

The analysis showed that projects considered by the EBRD are simultaneously selected on the quality of credit and their social impact. In addition, the social impact of some projects is strengthened between the concept and final stages of approval. In particular, more than a fifth of project concepts reviewed by EBRD include requests to carry out work to strengthen client's corporate governance and standards of disclosure. These requests tend to target projects where expected social impact is otherwise weaker and clients are otherwise believed to have higher probability of default.

To the best of our knowledge, this is the first study to quantify the interplay of social and financial objectives of a large investor and the way these objectives jointly affect project selection and design. In particular, the system implemented at the EBRD relies on quantification of the social impact of a project at an early stage of consideration. Investment committee includes separate officers that are responsible for risk management and for social impact of the projects. As a result, decision making process internalises both objectives. The survival of projects that carry strong social impact is relatively little impacted by credit rating of the client. In contrast, projects where social impact is assessed to be relatively weak are much more likely to be implemented if the client is perceived to be financially strong.

An increasing number of banks and institutional investors state multiple objectives covering environmental and social goals in addition to the goal of maximising return on capital. The paper provides empirical evidence that one way to meaningfully incorporate such objectives, and the associated trade-offs, into decision making is to quantify social impact in ways similar to quantification of financial risks, and to do so from early stages of project analysis. This is broadly consistent with a theoretical argument by Opp and Oehmke (2020) who model the impact of project choices by commercial and social investors and highlight the role that a social responsibility index can play. Social impact assessments can also strengthen incentives to design projects in a way that increases their impact, in addition to selecting projects with higher potential impact.

Internal assessment of social impact need not be prohibitively expensive. Machine learning and artificial intelligence, coupled with some human guidance, could provide meaningful social impact assessments in a cost-effective way.

While examples in the paper focused on corporate governance work, the same logic applies (within a development bank and more broadly) to other aspects of social impact, such as supporting economic development in disadvantaged regions, developing worker skills, improving environmental footprint, supporting adaptation to climate change or improving standards of procurement, to name a few.

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