

**Blended Finance and Subsidies:**  
**An Economic Analysis of the Use of Grants and Other Subsidies in Project**  
**Finance by Multilateral Development Banks. \***

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## Abstract

The paper provides an economic analysis of the appropriate use of subsidies, including technical cooperation (TC) funds, in projects financed by multilateral development banks (MDBs). Special attention is paid to the EBRD. Most of its projects are in the private sector. EBRD projects must have ‘transition impact’, satisfy ‘sound banking principles’ and be ‘additional’ with respect to alternative, private sources of finance. We show that there is an economic cost to TC funds and how it can be measured in practice, and we analyze how blended finance (involving project finance and technical cooperation funds or other subsidies) should be treated in order to comply with sound banking principles and transition impact objectives. We advocate a more comprehensive, consolidated accounting of *all* costs incurred in investment projects, so as to enhance the transparency of MDB operations and thus to improve MDB accountability to shareholders, donors and tax payers. We also develop an analytical framework for determining the appropriate repayment of TC by a private sector client.

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## Introduction

In its selection of investment projects, the European Bank for Reconstruction and Development (EBRD) is guided by three basic principles. First, its investments should have *transition impact* - they should promote the transition process from a centrally planned to an efficient market economy. Second, its investments should meet *sound banking principles*- principal and interest on its loans should be paid in full and on time, and equity should earn a return commensurate with its risk.<sup>1</sup> Third, its finance should be *additional* - it should not displace, 'crowd out' or 'undercut' private sources of finance. These principles are reflected in the Bank's Financial Policies.

Other Multilateral Development Banks (MDBs) have objectives that are similar to the EBRD's *transition impact* objective. The World Bank (WB), the International Finance Corporation (IFC), the Asian Development Bank (AsDB), the Inter-American Development Bank (IDB) and the African Development Bank (AfDB) pursue what may be called *development impact*, key aspects of which are the elimination of poverty and the achievement of sustained economic growth. All these MDBs also require their financing to be *additional*. A principle like the EBRD's *sound banking* is found only for the IFC, which lends exclusively to the private sector.

Like the other MDBs, the EBRD uses subsidies in its projects. This is no surprise, since the mitigation of market failure, distortions and poverty are the *raison d'être* of these institutions. Subsidies are a natural instrument for addressing market failure, distortions and poverty. Market failure is often associated with, or even caused by, government or wider institutional failure, and in practice this may complicate the effective use of subsidies. These subsidies take a variety of forms, including technical co-operation (TC) and technical assistance (TA) funds.

Except for subsidies aimed exclusively and directly at humanitarian assistance and poverty relief, the purpose of subsidies is to change behaviour by changing incentives and information. Subsidies offer *conditional* carrots; the threat of removal of a subsidy can be used as a *conditional* stick. Subsidies induce desired changes in behaviour by changing pecuniary incentives faced by producers and consumers. An example is the use of subsidies for installing energy-efficient equipment in the homes or the workplace, when the environmental benefits from energy conservation cannot be fully internalised by the household or the enterprise through lower heating bills.

Subsidies can also be used for institution building, capacity building and knowledge transfer. The EBRD's SME and micro lending activities aim to transfer financial intermediation knowledge and skills either through existing banks or through purpose-designed intermediaries. Its turn around management (TAM) and Business Advisory Services (BAS) activities are examples of the use of subsidies to encourage the transfer of managerial knowledge and skills. The intent of these activities is to build a self-sustaining capacity in the enterprise, locality or region, a capacity that is not permanently dependent on external subsidies.

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<sup>1</sup> While sound banking principles are not defined in the Articles Establishing the Bank, they have been interpreted as meaning that pricing of lending and investment decisions should reflect appropriately financial risks and returns.

Unlike the other MDBs, the EBRD is not supposed to provide finance on concessional terms. Pure investment or project grants - without any associated conditionality - that is, unconditional grants that can be blended with non-concessional finance to produce blended finance with any degree of concessionality - are not permitted. Even where a grant provided through the EBRD may appear to be a straight, lump-sum subsidy to the project, conditionality should be attached to the grant to shape the incentives of clients and sponsors so as to mitigate market or institutional failure.

In this paper we discuss the appropriate use of subsidies in EBRD projects from the perspective of applied welfare economics. We also consider the relationship between the three guiding operational principles of the EBRD (transition impact, sound banking principles and additionality) and the appropriate use of subsidies from a welfare-economic perspective.

Sound banking principles, which require that the pricing of lending (and investment decisions generally) should reflect appropriately financial risks and returns, are sometimes interpreted as ruling out not only explicit ‘concessionary lending’, but also all other subsidies to projects financed by the EBRD. In Section III.2 we argue that this view is incorrect. There is also the argument that the use of subsidies by the EBRD in an investment project is *prima facie* inconsistent with the EBRD’s finance being additional. We argue against that view in Section III.3. Of course, the leading member of the EBRD’s mandate triad, ‘transition impact’, is the key to an understanding of the proper role of subsidies. The issues involved turn out to be amenable to conceptually straightforward analysis, and there should not be any disagreements about principles. The correct application of these principles in real projects is, of course, always difficult. The Bank’s operational approach to transition impact externalities is summarized in Section III.1.

We begin with a precise definition of subsidies in Section I. In Section II we review what applied welfare economics has to say about the conditions under which subsidies are appropriate. We then specialise the argument, in Section III, to the kind of subsidies most relevant to the EBRD’s Mandate -- those prompted by transition impact and environmental considerations. In particular, we analyze whether project-related subsidies, including grants such as TC funds from external sources that are channeled through or brought to the project by the Bank, are consistent with the principles of sound banking and additionality. We analyze how blended finance (involving both project finance and TC funds or other grants or subsidies) should be treated in order to comply with sound banking principles and transition impact objectives.<sup>2</sup>

Section IV provides some background on the EBRD’s repayment policy for TC funds. Section V examines whether there is an economic cost to TC funds, despite the fact

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<sup>2</sup> This issue is of more than academic interest. The IMF recommends that any new sovereign or sovereign-guaranteed lending to certain poor and heavily indebted countries be on highly concessional terms, in the sense of involving a pure grant element of at least one third. Several of these countries are EBRD countries of operations. Since sovereign lending from the EBRD’s own resources is typically at Libor + 100 basis points, achieving overall lending terms of 2/3 Libor inevitably involves blending the EBRD’s own resources with grant money. The only question that remains, if the EBRD is to remain active in sovereign operations in these countries, is where this grant money is to come from.

that they are ‘free’ to the Bank, and how, if there is a cost, it could be measured in practice. We discuss what cost of TC funds should be *imputed to (allocated to or attributed to)* a project in order to determine whether the Bank’s involvement in the project is appropriate. *Imputing* TC costs, however, is a separate issue from *charging for* or *recovering* TC costs from the client. In Section VI we discuss the criteria that should be used for the repayment of TC by a private sector client and describe an analytical model to calculate an appropriate *client payback ratio* (Appendix III provides details of the methodology). Section VII summarizes the main conclusions. It also highlights key unresolved issues. Section VIII presents some applications of the earlier analysis to selected EBRD projects.

In what follows, unless explicitly stated otherwise, we use the term ‘project’ as if it were synonymous with the Bank’s investment in the project. The financial rate of return (*FRR*) on a project is therefore identical with the return on investment (*ROI*) - the contribution to Bank profitability of the investment. Strictly speaking, this simplifying assumption is valid only if the Bank is the only investor in a 100 percent equity financed project – something the EBRD is not even allowed to do. The adjustments that need to be made when the EBRD is a minority shareholder, or one among several sources of funds (loans, credit lines, bonds etc) - where the *FRR* and *ROI* can differ - are quite straightforward. In the interest of brevity, we do not provide a complete taxonomy in this paper. We only raise the distinction where it matters.

Finally, except for the discussion of ‘sound banking’, which is relevant only to the EBRD and the IFC, our analysis of the appropriate use of subsidies, and the proposals for a comprehensive accounting for project preparation and implementation costs, apply to all MDBs. What we propose is a framework for enhancing the accountability and transparency of the use made by the MDBs of their shareholders’ and donors’ money. Ultimately, all resources used in MDB operations are tax payers’ money. For proper accountability, a presentation of the accounts that consolidates all ‘on budget’ and ‘off budget’ uses and sources of funds and all ‘on balance sheet’ and ‘off balance sheet’ assets and liabilities is a *sine qua non*.

## **I. What is a subsidy?**

It is important to distinguish between the question of whether there is a subsidy embedded in the pricing of a financial transaction or in the other conditions attached to it, and the issue of whether a subsidy is justified on welfare-economic grounds. We discuss the first issue in this section, and the second in Section III.

The term "subsidy" is often applied incorrectly to contexts that do not constitute a subsidy from an economic perspective. The subsidy concept has been extensively studied in the economic literature on public utility regulation.<sup>3</sup> This analysis is

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<sup>3</sup> The classic reference is Gerald Faulhaber [1975]. Faulhaber develops two price bounds that define the set of subsidy-free prices on the basis of the principle of Pareto superiority. This principle of Pareto superiority states that it is welfare improving if one party can be made better off without making any other parties worse off. The importance of subsidy-free prices is that they will be Pareto superior, and thus have a strong justification in terms of economic welfare. The lower bound for subsidy-free prices (which is relevant in the present context) is based on the generalised incremental cost test stated in the

completely generic and thus can be usefully applied to the EBRD context. We present the definition of a subsidy in the form of a test for subsidy-free prices.

### **Subsidy-free prices**

*Prices are subsidy-free if the price of each service is greater than or equal to the private incremental cost of that service,<sup>4</sup> and if the revenues from each subset of services are greater than or equal to the private incremental costs associated with that subset of services.*

This test is referred to as the *generalised incremental cost test*. If there is only one service, this reduces to the simple incremental cost test.

This concept of subsidy-free prices is not simply a definition - if it were, it would command no particular force. Its significance comes from the fact that, under the conditions most relevant to the Bank's operations, *if* a service can be provided at a subsidy-free price, this will enhance economic welfare. Therefore, it is the natural starting point for the analysis of the conditions under which the provision of a welfare-enhancing service requires subsidies.<sup>5</sup> We develop this theme in Section III.

There are two important things to recognise about this subsidy concept. First, the relevant concept of cost is *incremental cost*, not *average total cost* (which includes sunk or overhead costs). If a price for a service is below the average cost but above the incremental cost, it is subsidy-free. If we are dealing with some subset of services, then the revenues generated by the sale of those services must also collectively cover the incremental costs for that subset of services in order for the prices to be subsidy-free. But, again, the revenues from that subset of services do not have to cover any (arbitrary) portion of overhead costs that are common to the entire set of services (e.g., overhead costs that are not dedicated to that particular subset of services).

Second, as always in economics, the relevant cost must be defined as the *opportunity cost* of using the funds. To take an example, suppose a firm has inherited some capital plant free of charge. It can use this capital to produce one of several types of goods. Then even though the firm acquired the capital "free," there is an opportunity cost. As long as there is no excess capacity, providing an extra unit of one of the goods requires capital that would otherwise have been used to produce the other good, and thus involves foregone revenue. As we explain below, this point is important in understanding the relationship between TC funding and subsidies.

Again, we emphasise that subsidy-free prices are prices that generate sufficient revenues to cover any common incremental cost, but that this common incremental cost can be covered in any way by the different services. Subsidy-free pricing does *not* imply that any individual service cover a particular portion of the common cost -- e.g., it is *not required* that each individual service bear an equal fraction of the

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text. The upper bound is given by the stand-alone test - in the EBRD context, the effective upper bound to pricing is imposed by the behavior of competitive sources of private finance.

<sup>4</sup> For divisible investments, incremental and marginal costs are the same. For lumpy investment, the relevant concept is incremental cost, since marginal cost is not defined, strictly speaking.

<sup>5</sup> Economic welfare means *aggregate* economic welfare, or the total amount of gains by consumers and producers, that is, the sum of consumer and producer surplus.

common cost, or that the relative common cost burdens be proportional to sales, incremental cost or anything else.<sup>6</sup> What is required is that the combined revenues from all services must cover their incremental, common cost.

Two practical questions arise in applying the subsidy-free concept. Both are relevant to the consideration of TC funding and subsidies in the context of the EBRD's operations. The first is determining what the appropriate time horizon for measuring incremental cost should be. In particular, should we use short run or long run incremental cost?<sup>7</sup> The choice depends on the decision-making context - which costs actually vary with the decision in question. For example, in assessing whether, in the context of an established SME financing programme, the price of an individual financial loan to an SME is subsidy-free, the overheads would be excluded. But if the question is whether all SME lending in a particular country is subsidy-free, then the overall revenues from such lending must cover any overhead costs for the SME program in that country. As we shall see, this issue is also of key importance when we assess the opportunity cost of TC funds and of other forms of soft money used by the EBRD and other MDBs in their financial operations.

The second issue is determining how broadly the common costs (i.e., costs that are not project-specific) should be defrayed. For example, should project preparation costs for projects that were not implemented be recovered from implemented projects in the same sector and the same country, from all projects in that sector, from all projects in that country, or from all Bank projects? Resolving these questions will be partly a matter of judgement.

### *A Numerical Illustration*

Table I.1 illustrates subsidy-free prices for a hypothetical example. Suppose there are three services, with incremental costs of €10, €15 and €20, respectively. There are common costs of €50 for providing services 1 and 2, and common costs of €40 (e.g. overhead) of providing all three services. Denote the prices for these services as  $P_1$ ,  $P_2$  and  $P_3$ , and the quantities of these services by  $Q_1$ ,  $Q_2$  and  $Q_3$ . For simplicity, we assume that incremental costs and prices are independent of quantity in this example. Of course, the quantities will in general depend on the prices.

In this example, prices are subsidy-free if the following conditions hold:

1.  $P_1$  is greater than or equal to €10
2.  $P_2$  is greater than or equal to €15
3.  $P_3$  is greater than or equal to €20
4. Revenues generated by services 1 and 2 at least cover the total incremental cost plus common incremental cost for services 1 and 2:  $P_1 Q_1 + P_2 Q_2 > €10Q_1 + €15Q_2 + €50$ .
5. Total revenue must cover total incremental costs plus *all* common incremental costs:  $P_1 Q_1 + P_2 Q_2 + P_3 Q_3 > €10 Q_1 + €15 Q_2 + €20 Q_3 + €50 + €40$ .

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<sup>6</sup> Such arbitrary rules for allocating common cost are frequently used in practice, but they do not have any justification in terms of subsidy-free prices and economic efficiency.

<sup>7</sup> The former is the additional cost of providing the good when we do not adjust the amount of physical plant; in the long run, we allow for all inputs to vary in an efficient way, including plant.

**Table I.1 : Illustration of Subsidy-Free Prices**

	Service 1	Service 2	Service 3
<b>Incremental Cost</b>	10	15	20
<b>Common Cost, Services 1 and 2</b>	50		
<b>Common Cost, All Services</b>	40		

**Criteria for Subsidy-Free Prices**

1. Prices must exceed incremental cost:

$$P_1 \geq 10, P_2 \geq 15, P_3 \geq 20$$

2. Revenues for services 1 and 2 must cover incremental cost plus dedicated common costs:

$$P_1 Q_1 + P_2 Q_2 \geq 10 Q_1 + 15 Q_2 + 50$$

3. Total revenues must cover full incremental costs plus all common costs:

$$P_1 Q_1 + P_2 Q_2 + P_3 Q_3 \geq 10 Q_1 + 15 Q_2 + 20 Q_3 + 50 + 40.$$

## II. Welfare-Economic Arguments for Subsidies

At the most general level, there is little disagreement about the appropriate and inappropriate uses of subsidies (or taxes).<sup>8</sup> Subsidies should be used to correct market failure and institutional failure, or to pursue distributional objectives. They should not be used to bestow rents on clients or to pay for costs that should properly be charged to the Bank's own operational budget.

Subsidies (or taxes) may be needed to align the private and social incentives to undertake an activity. When the private and social returns to some activity differ, we say that there is an externality. In principle, subsidies (or taxes) can improve economic welfare when they correct for externalities.<sup>9</sup> Formally, the treatment of taxes is symmetric to that of subsidies. Since the EBRD, like the other MDBs, has no sovereign powers of taxation, only subsidies will be considered in what follows.<sup>10</sup>

A second reason why subsidies may be desirable comes from fairness and social concerns. With widespread poverty in many of our countries of operations, especially in some of the CIS countries, affordability concerns often point to the need for properly targeted subsidies when reforms are undertaken to bring utility charges up to the levels warranted by commercial and environmental considerations.

A necessary and sufficient condition for the provision of a service to raise economic welfare is for the *Social Incremental Benefit (SIB)* of the service to be at least as high as the *Social Incremental Cost (SIC)* of providing it. The *Private Incremental Benefit (PIB)* of a service that is purchased voluntarily is at least as high as its price -- otherwise the service would not be purchased. For the service to be supplied by the market at any given price, that price should at least cover the *Private Incremental Cost (PIC)* of providing it. Therefore, for the market to support the provision of a service, its price should be below its *PIB* and above its *PIC*. For such private provision to be welfare enhancing, it is necessary and sufficient that the *SIB* of the service exceeds its *SIC*.<sup>11</sup> If there are no distortions, so that *SIB* equals *PIB* and *SIC* equals *PIC*, then provision of the service at subsidy-free prices will increase economic welfare. Even if there are distortions, provision at subsidy-free prices *may* still be economic welfare enhancing, but there are configurations of private and social costs and benefits that require either subsidies or taxes for welfare-enhancing provision by the market to take place.

Subsidies are required when the social incremental benefit of a service exceeds its social incremental cost (so provision is desirable) but, at the same time: *either* (1) the private incremental benefit of that service is less than its private incremental cost, *or*

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<sup>8</sup> The analysis of subsidies and taxes is symmetric. But since the EBRD cannot impose taxes, we focus the discussion on subsidies.

<sup>9</sup> We are abstracting from the important question as to whether the necessary information and administrative capacity to implement subsidies are available. Just because there may be an externality, it does not necessarily follow that subsidies provided by government (or other agencies) can actually improve matters.

<sup>10</sup> A complete taxonomy of the conditions under which subsidies or taxes are appropriate is available on request from the authors.

<sup>11</sup> Therefore, a sufficient (but not necessary) condition for the provision of a service at subsidy-free prices to enhance economic welfare is that its *SIB* be at least as high as its price and that its *SIC* be less than or equal to its *PIC*.

(2) the market price is set above private incremental benefit, so no market provision will take place. In those cases, private incentives will lead to an under-supply of the service, in the absence of a subsidy. In this case, a subsidy on a service can lower the price paid by the purchaser to a level below its Private Incremental Benefit, while keeping the price received by the seller above its Private Incremental Cost. This will permit the provision of the service by the market and align social and private costs and benefits.

For analytical completeness, we also point out that taxes are required when the Social Incremental Benefit of a service is below its Social Incremental Cost (so provision is undesirable), but the Private Incremental Benefit exceeds its Private Incremental Cost and the market price is below the *PIB* and above the *PIC*, so the market will supply the service. In that case, private incentives lead to over-provision of the service and a tax is required to realign private and social costs and benefits. A taxonomy of all possible configurations of private and public incremental costs and benefits is given in Appendix IV.

We can summarize the key point about subsidy-free prices as follows.

*The EBRD should only be contemplating involvement with projects for which Social Incremental Benefit exceeds Social Incremental Cost. When  $SIB > SIC$ , the application of the subsidy-free pricing rule will never lead to a project being implemented that ought not to have been implemented. It may, however, lead to projects not being implemented that ought to have been implemented. It is then that subsidies are desirable -- indeed necessary.*

This message is restated in slightly more general form in Table II.1 below.

<b>Table II.1</b>	
<b>When Are Subsidies/Taxes Required?</b>	
Market Provision is Possible <i>iff</i>	$PIB \geq Price \geq PIC$
Economic Welfare is Enhanced <i>iff</i>	$SIB > SIC$
Market Provision as Subsidy-Free Prices enhances Economic Welfare <i>iff</i>	$PIB \geq Price \geq PIC$ And $SIB > SIC$
Subsidy is Required <i>iff</i>	$SIB > SIC$ and either $PIC > Price$ Or $PIB < Price$
Tax is Required <i>iff</i>	$SIB < SIC$ and $PIB \geq Price \geq PIC$

### III. Subsidies and the EBRD Mandate

#### III.1. Subsidies and Transition Impact

Externalities can take many forms. The externalities most relevant to EBRD projects include ‘conventional’ externalities such as the environmental external costs or benefits associated with many EBRD projects. These include nuclear safety and the wider environmental benefits from projects that promote energy efficiency. They also include ‘transition effects’ or institution-building and institution-enhancing externalities. Among the EBRD’s transition impact indicators are demonstration effects (e.g. good governance), other types of informational externalities (particularly relevant in financial markets), the creation of backward and forward linkages, enhancing market institutions and making markets more competitive, and the transfer of market-oriented skills.<sup>12</sup>

The EBRD’s Transition Impact ‘Checklist’ (reproduced as Appendix I) highlights the central role that such externalities play in the project selection process. Sector ‘transition impact checklists’ have also been developed. The checklist makes it clear that externalities are at the heart of the transition impact of projects. But the fact that an investment project generates a transition impact does not *by itself* indicate that a subsidy is justified. The reason is that the expected risk-adjusted private returns to the project may be high enough to induce the investment anyway. In this sense, we should view substantial transition impact as a necessary, but not sufficient, justification for subsidies from an economic perspective.<sup>13</sup> Subsidies are required when, in the absence of subsidies, a project with substantial transition impact potential and acceptable transition impact risk would either not be undertaken at all, or would be undertaken on a sub-optimal scale.

#### III.2. Subsidies and Sound Banking Principles

Consistent with the Bank's Financial Policies, we interpret sound banking principles to require that project finance be priced with the expectation of generating a financial return commensurate with the project risks (including default risk). To put it another way, no loan or investment decision should be undertaken unless the expected net financial returns from the project (appropriately adjusted for risk) at least cover the incremental (opportunity) cost of the Bank’s funds.<sup>14</sup> This SBP criterion is a

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<sup>12</sup> For details of project-level "checklist" for transition impact, see [Geninfo/OpsCom/procedures/impact](#). For transition impact and additionality document guidelines, see [Geninfo/Ops Com/procedures/content](#), especially Sections 3.1 and 3.2.

<sup>13</sup> This argument applies to discrete investment projects (where the scale of the project is given). If project size can be chosen freely, then transition impacts (or other externalities) become a sufficient condition for subsidy since they constitute externalities that, if not addressed, will affect the size of the project chosen by the investor.

<sup>14</sup> Strictly speaking, the financial rate of return is normally calculated by the EBRD only for equity investments. For loans, while it is certainly the case that the financial rate of return of the project should be high enough to permit the payment of interest and the repayment of principal, stricter criteria than this are applied. This is in recognition of the reality of the often uncertain nature of the project’s returns, and of the problems that would occur if the time profile of debt service were not to match that of free cash flow available to finance the debt service. The ‘debt service coverage ratio’, which measures the adequacy of the borrowers cash flow to cover debt service costs, certainly will not be adequate if the *FRR* for the project is below the EBRD’s cost of capital. An adequate financial rate of return is therefore a necessary, but not a sufficient, conditions for sound banking in the case of loans.

necessary, but not sufficient, condition for project selection. It is not sufficient because the Bank's project finance is also required to be additional and to generate positive transition impact.

The central question here is: do sound banking principles rule out EBRD involvement in projects which enjoy some form of subsidy from the EBRD itself or from another source?<sup>15</sup>

The sound banking principle that project finance must be priced with the expectation of generating a financial return commensurate with the project risks needs to be made operational. The current practice of the Bank is to base the judgement about sound banking principles at least in part on the comparison of the *financial rate of return* on the investment (that is, on the *ROI* or, where the EBRD's investment comprises the totality of the project, on the *FRR*) with the EBRD's incremental cost of capital.<sup>16</sup> This does not make any adjustment for either explicit or implicit subsidies. It also does not allow for any divergence between market prices (which drive the *FRR*) and shadow prices. Passing the SBP test is a necessary condition for proceeding with the project.

It may not be easy, or indeed practicable, to calculate the *FRR* of a project whose cash flow cannot be identified easily. An example is a credit line to an existing Bank in one of the EBRD's countries of operation, designated for on-lending to SMEs.. Even if the returns to the intermediary bank on its SME lending can be identified, it may be very difficult to isolate those cost incurred by the intermediary that should be imputed to the SME lending programme. Joint costs and joint products make sound banking tests for separate activities very difficult. In order to undertake such projects, the requirement that the project satisfy sound banking principles must be waved, as it is non-operational.

If the sound banking test is passed by a project, an attempt can be made to 'correct' for any discrepancy between market prices and shadow prices by computing an *economic rate of return (ERR)* -- e.g., border prices are used when there are import tariffs. For certain types of projects -- such as SME credit lines to banks -- it may be particularly difficult to compute an *ERR*, and often this is not done in practice. Finally, a qualitative assessment of the likely transition impact of the project is made.

It is our view that, because sound banking principles are meant to reflect purely commercial considerations, they do not prevent the Bank from participating in projects that enjoy subsidies. As with a private commercial bank, if a client secures external grant funding so that a portion of the capital expenditure does not have to be

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<sup>15</sup> The subsidies may take various forms. They may be explicit, such as grants from donor governments that are shareholders of the Bank or other (non-shareholder) sources. They can also be implicit, in the form of tariffs, below-cost pricing of utility services, under-pricing of loan default risk and tolerance of default or of tax arrears. Subsidies can apply either to the revenue or the cost side of a project. All such subsidies make for a divergence between the market prices (used to evaluate financial returns) and shadow prices, measuring social opportunity cost.

<sup>16</sup> As pointed out in Footnote 15, an adequate financial rate of return is a *necessary* but not a *sufficient* condition for sound banking principles to be satisfied. Attention is also paid to the time profile of the project's net cash flow, and not just to its present discounted value. Debt service coverage ratios and similar indicators complement the *ROI/FRR* as indicators of commercial viability or sound banking for loans and other non-equity forms of financing.

debt-financed, the client becomes more credit-worthy. The EBRD would be justified in taking account of the financial benefit of that grant in making its lending decision. Similarly, if there is a guarantee from a creditworthy third party, the reduced cost to the Bank of its loan should be taken into account in the lending decision. According to sound banking principles, the costs of these grants or guarantees would not be netted out. Thus, the current Bank practice of considering the *ROI/FRR* rather than the *FCROI/FCFRR* to evaluate compliance with sound banking principles, is justified.

It is not entirely clear what the status of the *ERR* calculations is for purposes of project selection by the EBRD. For a project to have an *ERR* no less than the cost of capital is neither necessary nor sufficient for it to be financed by the EBRD. It is not necessary, because if a project satisfies sound banking principles *and* has strong transition impact, it would be likely to be a viable candidate for EBRD financing even if its *ERR* were negative. The conventional externalities that are captured by the difference between the *FRR* and the *ERR* could be dominated by the transition impact externalities. It is not sufficient because a project with an acceptable *ERR* could either fail the sound banking test or fail on account of inadequate transition impact. Divergences between the *ERR* and the *FRR* are best viewed as reinforcing or weakening the transition impact assessment in coming to a final judgement on the merits of a project. A positive gap between *ERR* and *FRR* lowers the transition impact threshold that must be passed for a project to qualify. A negative gap would raise that threshold.

*ERR* calculations rely on assumptions about discrepancies between market prices and shadow prices that may be difficult to verify in an objective manner. However, the opportunity cost of subsidies used in projects is an important and easily verifiable component of the discrepancy between *FRR* and *ERR* calculations. Therefore, we view it as important and desirable that the full opportunity cost of all funds used in a project be included in the wider evaluation of the private and social returns to the project. For the shareholders of a private commercial bank, external grants and other forms of subsidy have no opportunity cost attached to them. But, as argued in detail in Section VI below, there is an opportunity cost to the EBRD shareholders (governments, the EC and the EIB) associated with any subsidy that originates from such shareholders, including TC funds and grants. The fact that there is such an opportunity cost to the shareholders is relevant to the EBRD, either because it internalises such shareholder costs directly, or because allowing for these costs is necessary to ensure future replenishment of the pool of TC funds once the current allocation is exhausted.

Whichever of these two reasons for imputing an opportunity cost to TC funds is operative, it is important to identify this opportunity cost clearly in the accounting and project appraisal. One simple way to achieve this end is to compute a "*full cost financial rate of return*" (*FCFRR*) for every project (involving significant amounts of TC funds or other subsidies). The *FCFRR* would net out of the *FRR* any direct or indirect subsidies coming from shareholders.<sup>17</sup> This includes subsidies that may originate with the EBRD, as the agent of its shareholders -- e.g., when the Bank does not require repayment of donor-provided TC funds.

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<sup>17</sup> We first encountered the term ' Full Cost Financial Rate of Return' in EBRD [2001,2].

Because of the sound banking principle that EBRD investments must satisfy, EBRD loans do not contain a concessional element. All loans are priced at or above the EBRD's incremental cost of funds (proxied by the rate at which it can borrow in the market).<sup>18</sup> Projects for which the EBRD is but one among several sources of funds may receive an indirect subsidy from the EBRD's co-financiers, in the form of an interest rate that is below the co-financiers' incremental cost of funds. The other MDB's, except for the IFC, are permitted to offer finance on concessional terms, at a price below their incremental cost of funds.

Under current Bank practice, all issues of subsidies and other divergences between market and shadow prices are folded into the calculation of the *ERR*. We point to the practical merits of breaking the current treatment of subsidies into two stages. *The first stage* would be to calculate the *FCFRR*, which would net out all subsidies from shareholders. These subsidies include all *direct subsidies* as well as any (non-conditional) *interest rate subsidies* - measured by the difference between the MDB's incremental cost of funds and the interest rate on its loans.<sup>19</sup>

This full cost accounting will provide a transparent, and easy-to-monitor, indicator of the financial performance of projects that reflects the full opportunity cost of Bank funds. Importantly, it should be possible to compute the *FCFRR* for all projects, including those for which an *ERR* is not normally computed under current practice (e.g., SME and other credit lines). *The second stage* would remain the computation of a 'full' economic rate of return (*ERR*), which augments the *FCFRR* by attempting to adjust for all remaining implicit subsidies, regardless of their source, and for all other divergences between market prices and shadow prices. This second stage of the *ERR* calculation requires more constestable judgements and may involve significant additional work. We expect continuation of the current practice of calculating the full *ERR* only in a limited number of circumstances, when the gap between shadow prices and market prices is likely to be large and shadow prices can be imputed reasonably confidently.

It would make sense, in our view, to calculate an *FCFRR* for all projects involving significant TC funds or other grant money. Following current practice, the Banking Department would continue to compute an *ERR* where possible and when necessary (for instance, when there are significant differences between internal prices and international prices or when market wages in the formal sector exceed the social marginal product of labour), and to make a qualitative assessment of the full transition impact for all projects. Table III.1 provides a schematic representation of these various rates of return.

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<sup>18</sup> Likewise, equity capital invested by the EBRD in a project is assumed to earn a risk-adjusted rate of return equal to or greater than the EBRD's incremental cost of funds.

<sup>19</sup> Note that the EBRD and the IFC should not provide any interest rate subsidies themselves, for *sound banking* reasons.

**Table III.1**

<b>Sound Banking Principles</b>	<b>Financial Return to EBRD and Shareholders</b>	<b>Shadow Price Adjustments for ‘Conventional’ Externalities</b>	<b>Transition Impact</b>
Financial Rate of Return ( <i>FRR</i> )	Full Cost Financial Rate of Return ( <i>FCFRR</i> )	Economic Rate of Return ( <i>ERR</i> )	Transition Impact Assessment ( <i>TIA</i> )

*Notes:*

*FCFRR* = *FRR* netting out all direct subsidies and interest subsidies from shareholders

*ERR* = *FCFRR* netting out all other indirect subsidies (divergences between shadow and market prices affecting the project)

*TIA* = qualitative assessment of transition impact (potential and risk).

*A Numerical Illustration*

Table III.2 presents a hypothetical example. Suppose a project is expected to generate revenues of €100 and costs of €60 (in present value terms). The EBRD investment is €40 (there is no other investment involved). An external subsidy of €10 is received. In addition, there is a tariff on this good so that the domestic price is 25 percent higher than the border (shadow) price. Then the financial rate of return is  $(€100-€60)/€40 = 1.00$  or 100 percent. This is the criterion that should be used for assessing compliance with sound banking principles. The full cost financial rate of return, which nets out the external subsidy, is  $(€100-€60-€10)/€40 = 0.75$  or 75 percent. The economic rate of return, which adjusts the *FCFRR* for the distortion induced by the tariff, is  $(0.75 \times €100-€60-€10)/€40 = 0.125$  or 12.5 percent.

**Table III.2 Alternative Rates of Return for Projects with an External Subsidy and Market Distortions**

**Project Parameters**

Present value of revenues	= €100
Present value of costs	= €60
External subsidy (inc. in costs)	= €10
Market Price of good	= 25% higher than economic cost (due to tariff)
EBRD Investment (no other	= €40

**Rates of Return**

$$\text{FRR} = (\text{€}100 - \text{€}60)/\text{€}40 = 100\%$$

$$\text{FCFRR} = (\text{€}100 - \text{€}60 - \text{€}10)/\text{€}40 = 75\%$$

$$\text{ERR} = (0.75 \times \text{€}100 - \text{€}60 - \text{€}10)/\text{€}40 = 12.5\%$$

It is clear that for projects that benefit from significant TC funds or other grant money, the *FCFRR* will inevitably be below the *FRR*. Projects in the infrastructure sector, micro-finance and SME projects are likely to fall into this category. This is inevitable – a matter of arithmetic. But it is important to recognise that this constitutes neither an argument against implementing such projects nor an argument against calculating the *FCFRR*. A project does not have to *pass* an *FCFRR* test, the way it has to pass an *FRR* test to satisfy sound banking principles.

What it means is the following: *Projects with an acceptable FRR (that is, projects that satisfy Sound Banking Principles) but with a low FCFRR must be justified through the demonstration of likely strong beneficial externalities, that is either conventional externalities and/or transition impact, and/or social benefits such as poverty mitigation.*

The calculation and reporting of the *FCFRR* is no more than a systematic presentation, in one place, of information that is already available to the Operations Committee (Opscom) and the Technical Co-operation Committee (TCcom). It does not raise the hurdle a project has to overcome in order to be approved for EBRD funding or in order to qualify for TC funds. It does not change the sound banking principles test. By taking a comprehensive view of the cost of all funds that support a candidate EBRD project, greater clarity and transparency are achieved about the non-financial returns (transition impact, environmental benefits or social impact) that the project must generate in order to qualify for EBRD funding.

For practical, operational purposes, it is important to remember that the foregoing discussion assumed that the ‘project’ and the Bank’s investment in the project are one and the same. When the two differ, the methodology applies unchanged to the project. Where the calculation of a project-based *FRR* is feasible, and where significant TC or TA is associated with the project, our approach implies that the project-based *FRR* calculation should be supplemented with a project-based *FCFRR* calculation.

For the Bank’s financial investment in the project, a rate of return on investment (*ROI*) is calculated under current practice, showing the contribution of the investment to the profitability of the Bank. Where TC is not channelled to a project, but instead acts as a supplement to the Bank’s operational budget (e.g. TC for Bank due diligence costs not recovered from the client), our approach implies that the return on investment should be complemented with the calculation of a ‘full cost rate of return on investment’, or *FCROI*, which includes that TC as a cost. In this way, TC would be properly imputed to the investment and the true profitability of the investment to the Bank and its shareholders would be made apparent. Publishing this *FCROI* would lower the risk that there could be excessive substitution of TC-funded resources for the Bank’s own resources.

There remains one unresolved issue: which subsidies should be included in the *FCFRR* and *FCROI* calculations. We consider this issue fully at the end of Section V when the opportunity cost of TC funds and other grants has been discussed.

### III.3. Subsidies and Additionality

There is no conflict between ensuring that Bank finance is subsidy-free and the mandate for the Bank to be "additional." Additionality is the requirement that EBRD finance does not displace or crowd out private sources of finance. It is normally discussed in terms of the Bank providing clients access to finance where it would otherwise be absent, or in terms of the Bank providing a more suitable service or bundle of services (e.g., in terms of tenor or political comfort). From an economic perspective, these cases are equivalent to saying that the Bank can provide a particular bundle of finance and associated services at a lower price than what alternative private sources would charge if they offered an equivalent bundle of finance and services.

It is important to emphasise that this does *not* mean EBRD finance embodies a subsidy that permits it to undercut the private sources of finance. The relevant criterion for the existence of a subsidy is whether the price at which the Bank provides finance is below *the Bank's* incremental cost (including the opportunity cost of EBRD capital), *not* whether the price of Bank finance is below the price that private sources of finance would charge for equivalent finance and services.

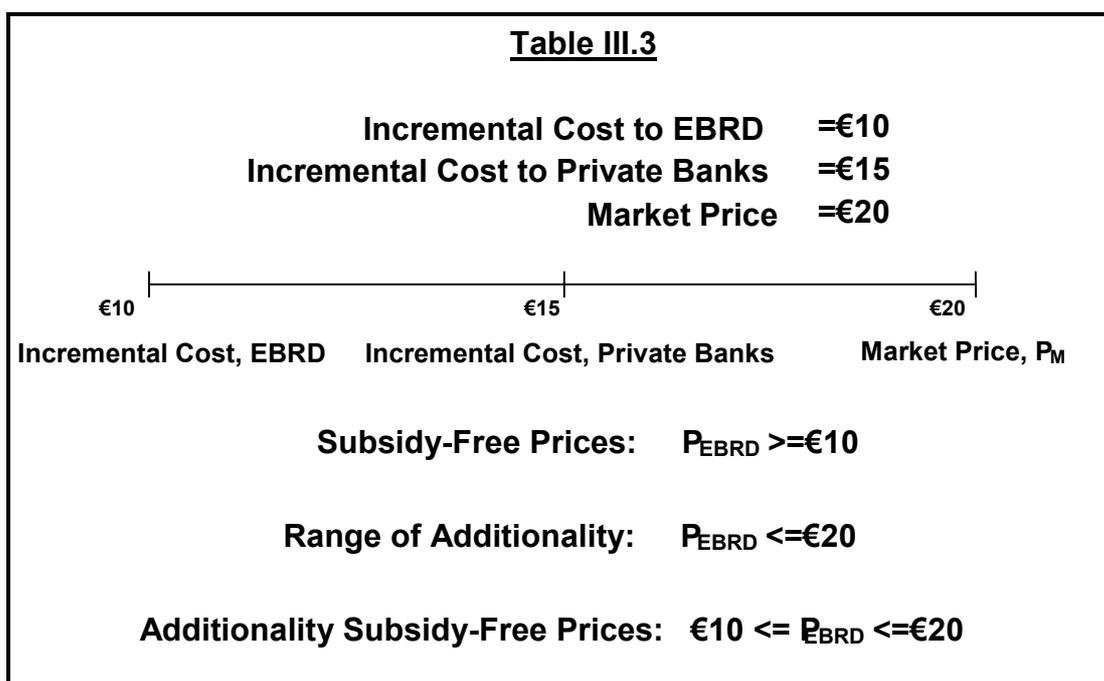
There is no intrinsic conflict between being additional and being subsidy-free. If credit markets are well-developed and fully competitive, then it would only be possible for the Bank to "undercut" the competitive price by using subsidies. However, in the transition context, where credit markets are subject to serious imperfections, this is no longer true. It is widely agreed that, when the private market is completely absent (a particularly severe example of market failure), the extension of credit by the EBRD is additional. But the same point applies in cases where the market imperfections are less extreme. There are many reasons why, in transition economies, the private supply price of finance (or of a particular bundle of financial characteristics) is both above the social opportunity cost of funds and above the EBRD's incremental cost of finance.

For example, when there is market power in credit markets, causing interest rates to exceed the private banks' incremental cost of funds, the EBRD can be additional if it provides similar services at a lower price. The same is true if asymmetric information leads to adverse selection and moral hazard in credit markets. Credit rationing is one possible outcome under such conditions, but less extreme outcomes than credit rationing are also possible, in which the private supply price of credit is merely excessive rather than infinite. In all these cases, the Bank can be additional *and* subsidy-free if it can attract business at prices that cover its opportunity cost of funds.

#### *A Numerical Illustration*

Table III.3 provides a hypothetical example. Suppose the incremental cost of a given bundle of funds and other desirable financial characteristics to the Bank is €10. The market price of an equivalent bundle of funds and other desirable characteristics is €20, and the corresponding incremental cost for those private banks is €15. Then EBRD finance is additional as long as its price is below the market price of €20. EBRD finance is subsidy-free provided that its price is €10 or greater. Even if the

EBRD had an incremental cost of €16, above the private market, it would be additional and subsidy-free as long as it priced between €16 and €20.



#### III.4. Choosing the Right Instruments for Intervention

A key lesson of modern welfare economics is that, for intervention to be effective in dealing with market imperfections and externalities, it is important that the appropriate form of intervention be used (e.g., a subsidy or some form of reimbursable assistance). If the instrument is a subsidy, it should be targeted directly at the distortion causing the externality. Likewise, for subsidies to be cost-effective instruments for redistribution or poverty relief, they should be designed to minimize distortions, including the real administrative resource cost of effecting any transfers. We illustrate these points with three examples.

First, consider the typical case of an entrepreneur in a start-up company who faces cash constraints for a potentially profitable investment project because of imperfect capital markets. Suppose the entrepreneur could capture the financial returns from the project, if the investment is made -- that is, he faces a pure cash flow problem, not a problem arising from externalities generated by the project. Then the correct remedy is for the Bank to relax the cash constraint either through a loan or by taking an equity position in the company. A subsidy is not justified because there is no fundamental externality. On the other hand, if the social returns from the project were not fully appropriated by the investor, and the private returns would not induce him to undertake the project, then a subsidy would be justified.

Second, consider the case where there is inadequate investment in the skills and knowledge base for managing a micro-finance, lending programme. Suppose the only form of market failure is imperfect capital markets -- say, neither the micro-finance lending institution (MFI) nor its employees can borrow on reasonable terms to obtain the resources required for human capital formation, due to asymmetric information,

lack of collateral and a poor culture for secure transactions. The appropriate response would be to provide such financing at the appropriate 'shadow' rate of interest, reflecting the social costs of funds. Instead of, or in addition to, these borrowing constraints, MFIs might face the problem that it cannot expect to recoup the resources it invests in its workers' training, because the workers can leave with their new embodied knowledge without compensating the MFI. One solution would be to make educational or training loans directly to the workers. If poor creditworthiness (because of lack of collateral) renders this infeasible, a subsidised loan or a grant to the MFI would be the appropriate instrument.

A third example arises with affordability issues often associated with otherwise desirable energy tariff reform. During central planning, tariff collections often amounted to no more than a tiny fraction of long-run marginal cost. Bringing tariffs up to levels consistent with commercial viability often means a large increase in cost to energy users. In addition there are likely to be negative environmental externalities associated with energy generation, transmission, consumption and waste disposal. Economically efficient tariffs may imply hardship for the poor. To achieve the important efficiency gains from rational energy pricing, while at the same time mitigating hardship for the poor, an appropriate transfer payment (subsidy) would need to be made to them. But it is critical that the design of the subsidy mechanism preserves the correct incentives for efficient production and use of energy.

The key point is that subsidies must be justified by a misalignment between the incremental private and social costs and benefits, as described in Table II.1. The existence of capital market or other institutional imperfections will normally justify some form of intervention by the Bank on transition impact grounds, but it does *not* by itself justify provision of a subsidy. Moreover, it is important from a transition impact perspective that any necessary subsidies be appropriated designed and targeted for be effective and economically efficient.

For many MDBs, the cost of their loans reflects a concessional (subsidy) element that is motivated by distribution or poverty considerations, rather than efficiency issues related to conventional externalities, development impact or transition impact. Proper targeting remains essential in these cases.

#### **IV. Background on Repayment Policy for TC**

The EBRD Technical Cooperation Fund Program (TCFP) is financed entirely by grants from donor governments and agencies.<sup>20</sup> The total amount provided to date is Euro 813 million. About 29% of TC funds are untied (i.e., consultants from any country can be used), 39% are partially tied (only consultants from the donor country or countries of operation), and 33% are fully tied. TC is provided to all of the 27 countries of operations. About three-quarters of TC funding is provided in direct support of the development and implementation of EBRD investments, including feasibility studies, due diligence, finance design, procurement support, and project implementation support. Funds that are repaid are channeled back to the original donor fund, or to the TC Special Fund (TCSF) over which the Bank has full discretion

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<sup>20</sup> For details of the TCFP see "Technical Cooperation," EBRD (May 2000).

(established in 1998).<sup>21</sup> Table A.1 in the Appendix provides details of cumulative TC and signed investments by sector. Finance, manufacturing and transport account for most of the expenditure of TC funds. As a percentage of signed investments, SME-related finance and the TAM/BAS programs are the leading outlets for TC.

Perhaps surprisingly, the rules regarding repayment of TC funds are not codified. The Bank's revised Technical Cooperation Policy of 2 May 1995 introduced the possibility of requesting reimbursement of TC funds for the preparation of private sector operations (particularly when western joint-venture partners are involved) and certain public sector operations. Reimbursement is normally only required if the TC leads to an investment, but repayment can also be required in other cases where the TC Committee deems it appropriate (conditions remain unstated). The TC Committee, which approves TC operations, also decides on whether the TC funds are to be repaid and the conditions for such reimbursement. In practice, interest is never charged.<sup>22</sup>

*While the repayment rules for TC remain unclear, in practice only a tiny fraction of project-related TC funding is repaid.* The total amount of TC commitments during the period 1991-99 was EURO 647 million. About 70 percent, or EURO 455 million, is project-related. Of this amount, only EURO 13.5 m., less than 3 percent, had been repaid as of the end of 1999.<sup>23</sup> No interest has been charged.

In addition to TC funds from donor governments, the EU provides ISPA funds, which are used primarily in municipal infrastructure projects. Unlike TC funds, ISPA funds are grants (no repayment) that can be used either for project finance or technical assistance. From the perspective of this paper, however, ISPA and TC funds are analytically equivalent. As we will see, both have an economic (opportunity) cost even though they are "free" money, and they should be treated the same in ensuring the Full Cost Financial Rate of Return (*FCFRR*) of the project is properly calculated (see discussion in Section III).

## **V. What is the Opportunity Cost of TC Funds?**

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<sup>21</sup> TC for due diligence and other project preparation expenses may be allowed by the TC Committee when an "investment proposal has the potential to be developed into a credible candidate for a Bank loan or equity investment and the prospective borrower does not have the financial means..." (TC Policy Review, p.4). TC for project implementation is reserved for projects in lower-income countries and for cases where the TC requirements are clearly shown in the Board-approved financing plan.

<sup>22</sup> For TCFP funding excluding the EU Bangkok Facility, the EBRD Operations Manual states: "if the TC operation is reimbursable, then the funding request should include written confirmation ... in which the client agrees to repay the cost of the TC operation if and when the TC operation leads to an investment." The standard format of a mandate letter includes a reimbursement provision. But the conditions under which reimbursement is sought from a particular project required are unstated. The EU Bangkok funds are treated essentially the same way, with the guiding criteria for reimbursement being the private nature of the project and the presence of foreign investors in the project design.

<sup>23</sup> The repayment rates vary by sector. Finance-related TC accounts for more than half of the total TC during 1991-99, but has the lowest repayment rate, at 0.7 percent. Manufacturing projects account for about 14 percent of total TC and have a repayment rate of 3.3 percent. Energy and extractive activities also account for about 14 percent of the total, and have the highest repayment rate, at 7.1 percent. Computations are based on information was obtained from Kjell Nordlander, EBRD Official Co-financing Unit.

What opportunity cost should the Bank impute to TC funds and other grants for the purpose of calculating the Full Cost Internal Rate of Return? Note that we are referring to *imputing*, not to *charging for* in the sense of *recovering* the costs from the client or from anyone else. The issue of what constitutes the opportunity cost of TC funds is separate from the question as to whether, to what extent and from whom these costs should be recovered.

Technical co-operation funds are costly to the countries that provide them (of course, there are offsetting benefits). But what is the opportunity cost of these funds to the EBRD? At first, it may appear that there is no opportunity cost since TC funds are "free" to the Bank and they must be used for specified purposes (i.e., they are not fungible funds). We argue that this view is incorrect, regardless of whether one takes a short-run or a long-run view of the opportunity costs.

### **V.1. The opportunity cost of TC funds in the short run**

At any point in time, the total amount of TC funds available to the Bank can be taken as fixed. It does not matter what considerations may have motivated the donors to provide these funds; and it does not matter what the value to the donors may have been of the best alternative use to which these funds could have been put. Just as capital that has been 'sunk' - that is, committed to a particular irreversible use - has no opportunity cost to the user, so TC funds *as a whole* have no opportunity cost to the Bank, once they have been awarded or donated Bank's TCFP or TCSF.

However, even though the proposition that TC funds, once donated to the Bank, have a zero opportunity cost is correct for TC funds taken *as a whole*, it is not true for TC funds applied to any individual project. The opportunity cost to the Bank of using TC funds on a particular project is the value-added such funds would generate if they were used in the next-best project (i.e., the project where they would have the next highest value added).<sup>24</sup> Thus, even if there were no opportunity cost of TC funds to the Bank as a whole, there would still be an opportunity cost to the Bank at the individual project level, as long as there is at least one alternative project to the one being considered, that would produce additional transition impact returns if TC were diverted to it.<sup>25</sup> Only if there is a TC 'glut' - that is, more TC available than can be used effectively - would there be no opportunity cost to the Bank at the individual project level.

Since there is no TC 'glut', the issue of the appropriate allocation of scarce TC funds among competing projects is a key one for the Bank. Thus far, SMEs, MFIs and the infrastructure sector have been the main beneficiaries of TC funds (see Appendix II). This is not surprising, as transition externalities, environmental externalities and social impact figure prominently in these kinds of projects.

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<sup>24</sup> Value-added here must be understood in terms of the objectives of the EBRD, and thus will involve both aspects of transition impact and financial returns. For more discussion, see Section VII and Appendix I.

<sup>25</sup> If TC funds are restricted by the donor country to some subset of uses (e.g., use in particular sectors or countries), then the opportunity cost to the Bank is zero at that level of aggregation.

The sectoral Transition Impact checklists developed at the Bank represent an attempt to develop a systematic framework for recording and evaluating the key transition impact externalities that are likely to be found in the various sectors. At this stage, they are purely qualitative in nature, so comparing transition impact across sectors or even among different projects in a given sector will have to rely on subjective judgements. Even so, the great advantage of the approach is that the judgements and trade-offs are made transparent, so the parties involved can, even when they disagree, be clear about what it is that they disagree about.

## **V.2. The opportunity cost of TC funds in the long run**

It is our position that there is an opportunity cost to the EBRD of TC funds taken as a whole, except under special and, in our view, implausible circumstances. There is an opportunity cost unless the Bank adopts a short-run, myopic point of view of TC funds in the sense that it does not expect or plan for replenishment of current TC funds by the donors in the future, or the Bank does not ‘internalise’ the opportunity cost of TC to the shareholders.

We first examine the short-run or myopic perspective. Consider the example of an entrepreneur who is trying to determine the opportunity cost of capital used in his business. The proposition that TC has a zero opportunity cost in the aggregate is analogous to this entrepreneur jumping from the *correct* proposition that physical capital (plant and equipment) has a zero opportunity cost once it has been ‘sunk’, to the *incorrect* conclusion that any investment in capital that yields a return higher than the zero opportunity cost of ‘sunk’ capital constitutes a proper use of resources. Clearly, if one takes the long-run point of view, which treats the investment decision as a choice, the gross returns to the investment should cover capital depreciation plus the return foregone on the next best use of the capital, which we can take to be the appropriate rate of interest.

If we view the Bank as a ‘going concern’ - existing beyond the date on which existing TC funds will be exhausted - then the opportunity cost of TC funds *taken as a whole* is the best alternative use of TC resources from the point of view of donors (EBRD shareholders) who provide these funds. Recognising the opportunity cost of TC funds to our shareholders does not require us to internalise (in any kind of empathetic manner), the costs or benefits of TC to our shareholders, just as recognising the opportunity cost of capital when deciding on whether or not to pursue an investment opportunity does not require one to ‘internalise’ the wishes and desires of those providing funds to the market. All it requires is the recognition that our TC funds will not be replenished if they do not yield a return to the donors/shareholders, at least equal to their opportunity cost.

This still leaves two questions. First, what is the opportunity cost of TC funds to our donors/shareholders and second, what are the returns our donors/shareholders expect to get by providing TC funds to the Bank?

As regards the opportunity cost of TC funds to the shareholders, there is an easily computed, operational measure. TC funds provided by donor governments to the EBRD could have been used instead for a wide range of purposes, including

increasing other forms of public spending and financing tax cuts. They also could have been used to repay donor government debt or to invest in financial assets (or indeed to add to the EBRD's capital). If donor governments are sufficiently rational to equate the net benefit of its resources in all possible alternative uses, the donor government's marginal cost of borrowing or return on investment would be a measure of the opportunity cost of TC provided by them to the EBRD. There are, of course, a large number of donor governments who may not all have the same opportunity cost of borrowing. The EBRD's cost of capital is a practical measure of the opportunity cost to the Bank of TC funds from many donor sources. Like the EBRD's capital, TC funds are taxpayer's money.

This approach, which identifies the opportunity cost of TC funds to the Bank with the donor-shareholders' cost of borrowing, only requires that the Bank views its interactions with the donors as a repeated event. The need to replenish TC funds in the future, or to attract additional funds today, requires the Bank to act as if it treats the donor countries, the EC and the EIB, which are shareholders of the Bank, as part of the Bank. It is the realities of the TC 'market' - competing for donor funds - which require the Bank to recognise the opportunity cost of TC funds to its shareholders.

If, in addition, the Bank 'internalises' the objectives and constraints of its donor-shareholders, the previous argument is strengthened. In that case, the Bank can be viewed as an institution to which the contributing states delegate the pursuit of a mandate (which is common to the Bank and its shareholders), and to which the donor-shareholders provide the capital resources and TC funds necessary to pursue this mandate. Effectively, the Bank becomes a 'veil' for the money of the shareholders, and the relevant incremental cost of the Bank's operations should include the opportunity cost of the TC to donor shareholders.<sup>26</sup> From this perspective also, a useful operational way to estimate the EBRD's opportunity cost of TC funds is to equate the EBRD's cost of TC funds with the Bank's cost of capital.<sup>27</sup>

If the opportunity costs of TC funds to the donor shareholders are counted, then the benefits for those shareholders generated by the TC should also be counted. What are the objectives motivating shareholders/donors to make TC available to the Bank? One answer is to view the publicly stated objectives of the Bank (in particular, the social returns to promoting the transition and addressing environmental externalities) as reflecting all objectives of the donor shareholders. Since the participation of donor shareholders is voluntary and the donors have voting rights, this view has considerable justification.

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<sup>26</sup> In principle, the cost to donor governments may differ somewhat from the amount of the TC for two reasons. First, there are typically economic costs in raising finance, so that opportunity cost of one EURO is larger than one. Second, there may be gains to the country from restrictions on the use of the TC (e.g., tying it to domestic consultants), which lowers the net cost of TC financing to the donor government. In practice, it is difficult to take these issues into account.

<sup>27</sup> The argument is straightforward: TC funds provided by donor governments to the EBRD could have been used instead to repay donor government debt or to invest in financial assets (or indeed to add to the EBRD's capital). The donor government's marginal cost of borrowing or return on investment would therefore be a measure of the opportunity cost of TC provided by them to the EBRD. The EBRD internalises these costs to the shareholders. The EBRD's cost of capital is a practical (and uniform) measure of the opportunity cost to the Bank of TC funds from many donor sources.

However, a case can also be made that the donor shareholders have additional objectives when they make TC funds available than maximising the transition impact of the Bank's operations. Among these further objectives could be national prestige, national influence or the desire to have nationals employed as consultants (when the use of TC funds is "tied", that is, restricted as regards national eligibility). The recognition of these 'other donor objectives' does not affect the assessment of the opportunity cost of TC funds. It does mean that the benefits of the TC funds anticipated by the donor include not just the transition impact, environmental externalities and social objectives, but also these 'other donor objectives'. Allowing for these 'other donor objectives' would lower the transition impact and environmental benefits 'hurdle' that Bank projects would have to meet in order to qualify for TC. Note that, as regards the Bank's mandated objectives, restrictions on the use of donor funds such as the tying of aid, will lower the returns whenever the constraints bind. We consider it to be an open issue whether the EBRD should allow for these 'other donor objectives' in reaching a conclusion on the appropriate use of TC funds in projects.

The conclusion from this analysis is that there is an opportunity cost to TC funds, and that operationally it can be approximated by the EBRD's cost of capital. Therefore, failure to attribute (that is, to *impute*) the cost of TC funds to projects would constitute a failure to properly identify an economic subsidy.

We can now try to provide a better- motivated answer to the question raised in Section III.3: which subsidies should be included in the *FCFRR* calculations? There is an easy answer if the project is identical with the Bank's investment in the project and all TC is administered by or passes through the Bank. In that case all grants and subsidies benefiting the project should be included in the *FCFRR* calculations (which would be the same as the *FCROI* calculations).

When the project and the Bank's investment are not identical (that is when the Bank is but one among several sources of funds for the project and/or some TC or TA benefiting the project is not administered by or allocated through the Bank), the TC and TA included in the *FCFRR* calculations will not in general be the same as the TC and TA included in the *FCROI* calculations. To calculate the *FCFRR* for the project, all TC and TA should be taken into account. But to calculate the *FCROI*, that is, the full cost contribution of the investment to the Bank's profitability, only that TA administered by or allocated through the Bank that would directly affect the profit and loss account if it, had not been present, should be taken into account.

TC that acts as a supplement to the Bank's operational budget (e.g. TC for Bank due diligence costs not recovered from the client) should clearly be taken into account in the *FCROI* calculations. But TC channelled to a project by other agents, independent of the Bank's actions, such ISPA grants, should not be included. Of course, it is likely that the Bank's financial return on its investment is not independent of the amount of such grants, and those grants may also be provided by Bank's shareholders. Nevertheless, it is not feasible to determine the impact of such ISPA grants on the Bank's financial returns. The reason is that the Bank tends to be one investor among several in the kind of infrastructure investments that attract ISPA grants, and its investment tends to take the form of (frequently sovereign guaranteed) loans. While ISPA grants should be taken into account in calculating the *FCFRR* of the project as a

whole, they are probably best ignored in the calculation of the *FCROI* of the Bank's investment in the project.

### **V.3. Imputing costs to TC: The 'competitive environment'**

Even if the logic of the argument about the imputation of an opportunity cost of TC is granted, there remains a delicate institutional issue. Assume the EBRD implements the policy of reporting an *FCFRR* for any project involving non-negligible TC funds or other grants and subsidies. If none of the other MDBs followed suit, would the EBRD put itself at a competitive disadvantage in obtaining future TC funds from our donor-shareholders?

We believe the opposite to be the case. The very fact that we attribute a realistic opportunity cost to our TC funds and other grants and subsidies means that we treat these funds with respect. By performing and reporting the *FCFRR* calculations, we recognise that we are the custodians of taxpayers' money – a scarce commodity with a positive opportunity cost, which should be priced properly. We add to the transparency and openness of our procedures by presenting a comprehensive, full account of all costs and returns. We build a visible bridge between the activities of Opscom and of TCcom. It is hard to see how this could hurt our position with our donor-shareholders.

It is also important to recognise that greater transparency in the use of subsidies by MDBs is part of the shape of things to come. Identifying and accounting for the use of subsidies is an issue attracting growing attention within the World Bank. The intense scrutiny of the operations and procedures of the MDBs by some of the important donor governments, and by the G7, will before long extend to budgetary issues and the use of TC funds and other grants and subsidies. It is much better to be pro-active than reactive in this field. If we can lead the discussion, it will boost the EBRD's position vis-à-vis the major other claimants on scarce TC resources. We recommend that the EBRD take the lead on this issue by proposing the creation of an *MDB/IMF Working Group on Subsidies in IFI Operations*.

## **VI. The Appropriate Repayment Criteria for TC**

There is an important distinction between *imputing* (allocating or attributing) the cost of TC funds to a specific project and *charging* the cost to and *recovering* it from clients involved in the project or from the EBRD. It is the difference between valuing inputs and outputs at shadow prices and charging these shadow prices to the participants in the project - that is, turning shadow prices into market prices. Imputing the cost of TC to the associated projects will allow for both *ex ante* and *ex post* evaluation of transition and environmental impact at the project level to be related to TC investments. Charging these costs the client and/or to the EBRD makes sense if only if this improves the incentives for proper use of the TC funds.

The analysis that follows assumes that the client maximises profits – an assumption appropriate for a private sector client but not necessarily for a public sector client. To fix ideas, consider the hypothetical case where the TC increases the financial returns

to the project, but does not affect the transition impact of the project. In this case, the investor should pay fully for that cost, as he would for any other value-adding input. In the opposite hypothetical case where TC only increases the transition impact of the project, it would be unwarranted from an economic perspective to require the investor to repay the cost of TC. But even in this case, there should be clear accounting procedures that impute the TC to the project, in order to determine whether the incremental transition impact or environmental impact justifies the opportunity cost of the TC. The actual (cash) cost would have to be recovered from (paid by) the donor-governments' TC funds, and viewed as the price paid for enhancing transition or environmental impact of projects.

To recapitulate, the cost of TC funds should be imputed to projects if the opportunity cost to the Bank of such funds is positive.<sup>28</sup> To determine whether and to what extent charging TC to the client of the Bank (that is, recovering the cost of TC from the client) makes sense, we have to consider the impact of the cost and availability of TC on client and Bank behaviour. Consider the client first. At least in principle, the client could contract separately for TC services from other private sources, paying the market price of TC. If TC increases the expected risk-adjusted, net profitability of the project (after allowing for the market cost of TC), the borrower has the incentive to undertake it.<sup>29</sup> In that case, bundling TC with project finance represents a constraint on the borrower. It imposes an incremental private cost equal to the difference between the TC funding and the cost at which the borrower could have contracted for equivalent services independently in the market. In that case, reimbursement should be set at the amount for which the recipient would have contracted for the services from other private sources (at market prices).

Now consider the opposite case, where TC funds increase the transition impact, but not the financial profitability, of projects. Since the transition impacts cannot be captured by the cash flows of the project, the borrower has no incentive to use TC. In this case TC funds help the Bank pursue its mandate to promote the transition, which represents social but not private returns, and thus the cost should be absorbed by the pool of TC funds rather than by the project. The Bank's investment finance capital should not be used to finance TC, if we interpret Sound Banking Principles to mean that the capital base of the Bank must be preserved, and a competitive, risk-adjusted rate of return should be earned on it.

To put the point differently, if TC enhances transition impact but not the financial performance of the project, the cost of TC should be viewed as the price of benefiting from those externalities that transition impact represents. In this case, the TC should be *imputed* to the project but the investor should not have to *pay* the cost. It should be recovered from the pool of TC funds (by the donor governments). This approach ensures that there is no subsidy in the generation of private, financial returns to the

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<sup>28</sup> This is equivalent to saying that the Bank has a fiduciary responsibility to ensure that TC is well used.

<sup>29</sup> This argument applies both to the case where TC only increases the financial return to the project, and the case where TC increases both financial return and transition impact *in fixed proportions*. In both these cases, the investor has the incentive to undertake TC in the same way that the Bank would. Appendix III analyses the more general case where there is substitution (a trade-off) between financial returns and transition impact -- so that the incentives of a private investor to undertake TC may diverge from the Bank's (social) incentives.

investor. In that case, the TC subsidy is directed exclusively at, and justified by, the externalities (social returns) generated by the project.

Of course, in practice TC improves both the transition impact and financial performance of projects (see Transition Impact Retrospective, 2001). In Appendix III we provide an analytical framework that recognises this fact, and enables us to derive the appropriate TC payback ratio. This amounts to determining an appropriate 'TC co-financing' rule for the client, in the case where the TC provided for the project by the donor would, fully or in part, have been procured in the absence of donor-funded TC, by the client, with his own resources and at cost.

The basic idea behind the derivation of the payback ratio is simple. We compare two levels of TC and two levels of EBRD project costs. The *first* are the levels of TC and EBRD resources that maximise the transition impact of projects, subject to a 'sound banking' constraint that sets a minimum acceptable net financial return to projects, and when the TC and EBRD resources are priced at their respective marginal costs. This amounts to maximising the 'full cost transition impact.' We call these the "socially optimal" input levels and denote them by  $x^s$  and  $z^s$ .

The *second* are the levels of TC and EBRD resources that an investor would choose if he were maximising the *net* financial returns of the project, *and* where those maximised returns are at the same level as the one used in the sound banking constraint. This corresponds to the 'full cost internal rate of return', as this concept is used in EBRD [2001,1] -- i.e., gross returns minus the cost of TC inputs and of EBRD project inputs, both valued at their marginal costs. We call these the "privately optimal" input levels and denote them by  $x^p$  and  $z^p$ .

If these two levels of TC were the same, the investor should be charged for the full amount of the TC. But if  $x^s$  is larger than  $x^p$ , then the difference reflects the additional TC that the Bank undertakes in pursuit of its transition mandate, but which would not be undertaken if the Bank were acting purely to maximise financial returns. The investor should pay only for the TC that he would choose in pursuit of maximum (private) returns. Thus the investor should pay for the fraction  $x^p/x^s$  of the total TC funds, which we call the "TC client payback ratio."<sup>30</sup>

Numerical simulations in Appendix III provide an illustration of this approach. The client payback ratio is calculated for different values of the two main parameters in the model: the degree of substitution between transition impact and financial returns in designing TC, and the degree of returns to scale in TC. The TC payback ratio depends heavily on the degree of substitution, but is not sensitive to the degree of returns to scale. When there is no scope for substitution, the simulations show that the TC payback ratio should be 100 percent. When there is some, but very limited substitution, which may well be a relevant characteristic of many real-world projects, the payback ratio is in the range of 50-100 percent. But in cases where there is greater substitution, the TC payback ratio can be less than 25 percent. Without a detailed consideration of a representative portfolio of real projects, one cannot be confident

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<sup>30</sup> If it turns out that  $x^p > x^s$ , then the logic of the argument suggests that the investor should be charged for more than the total TC -- i.e., the Bank should "tax" the use of its TC. Since investors have alternative private sources for TC inputs, it is not practicable to implement such a tax. Therefore, we set the TC payback ratio at unity in such cases.

about the likely range of the substitution parameter. However, if we give credence to the common observation that transition impact and financial returns tend to go together in practice, and if we interpret this as reflecting low substitutability in project design between transition impact and financial returns, a relatively high payback ratio is implied.<sup>31</sup>

## VII. Guidelines Suggested by Economic Theory for Treatment of Subsidies and TC Funds

### VII.1. The rationale for subsidies in EBRD operations and the Bank's mandate

- The paper considers the appropriate use of subsidies by the EBRD and other MDBs. It contains a methodology for a comprehensive accounting for, and where appropriate charging for and recovering, all costs incurred in the preparation and implementation of projects. This provides a framework for enhancing the accountability and transparency of the use made by the MDBs of their shareholders' (and ultimately the tax payers') money.
- The EBRD's existence is motivated by market failure, institutional failure, government failure, distortions and externalities. Subsidies are a key instrument for addressing these efficiency problems as well as for targeting poverty and other social problems. They achieve this by influencing the behaviour of households, enterprises and other economic agents through changes in the pecuniary incentives they face and through improvements in the quality of economically relevant information, knowledge and skills. For the EBRD, subsidies are often motivated by *transition impact* considerations. Subsidies are not inconsistent with sound banking principles or with the Bank's finance being *additional*
- The EBRD only proposes projects for which the *social incremental benefit* exceeds the *social incremental cost* -- that is, projects that ought to take place from an social welfare point of view, even if current market and non-market incentives militate against it. Projects for which the social incremental benefit is less than the social incremental cost, that is, projects that ought not to take place but may nevertheless be supported by current incentive structures, should be addressed by the fiscal authorities with taxes and/or by regulatory authorities with regulatory constraints.
- There are two categories of EBRD projects for which subsidies are warranted, and indeed necessary. The first category consists of projects for which the private incremental cost exceeds the private incremental benefit. A subsidy is called for because the private return and cost configuration implies that the project will not be undertaken, even though the social return and cost configuration implies that the project is worth doing. Training costs could produce such a configuration. If the returns to costly education and training cannot be captured by the enterprise paying for them, education and training will be under-provided. Training and education subsidies can be part of the solution to this problem. The second category of projects for which subsidies are warranted are those for which private incremental benefit exceeds private incremental cost, but price is set above private

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<sup>31</sup> The fact that financial returns and transition impact are positively correlated does not necessarily imply low substitutability and hence a high payback ratio. The reason is that even if the TC only affects transition impact, these gains will only be realised if the project succeeds commercially.

incremental benefit, so there is no demand for the service. Again a subsidy is called for to achieve a price to the purchaser that is below private incremental benefit and a price to the seller that is above private incremental cost. Monopoly power could account for such a configuration

- The subsidy-free pricing rule (price at or above private incremental cost) will never cause a project to be implemented that ought not to have been implemented (there are no *Type I* errors, or errors of commission). The subsidy-free pricing rule can, however, cause projects not to be implemented that should have been implemented (that is, there can be *Type II* errors, or errors of omission).
- Neither conventional externalities (e.g environmental benefits) nor transition impact are relevant for determining whether the project meets sound banking principles. Only the same financial risk and return considerations that concern private investors are relevant. Sound banking principles imply that the ‘financial rate of return’ (*FRR*) on a project (or, when the Bank’s investment represents but a part of the project, the ‘rate of return on investment’ (*ROI*) for a Bank investment), should *not* net out TC, grants or other subsidies associated with the project (or with the Bank investment). This is consistent with current Bank practice.
- The EBRD can be additional, even when it provides subsidies, as long as these subsidies further transition impact, internalise conventional externalities or target social objectives. Depending on the specifics of the project, subsidies may, or may not, raise the financial rate of return on that project. Subsidies should not *just* raise the financial return on a project. Any increase in the *FRR* (or *ROI*) should be associated with an enhanced transition impact, positive conventional externalities or better social outcomes.

## **VII.2. The Opportunity cost of TC funds and the ‘Full Cost Financial Rate of Return’**

- TC funds are taxpayers’ money. TC funds in the aggregate therefore have a positive opportunity cost, which can be approximated for practical purposes by the EBRD’s cost of capital. These costs should be imputed to the incremental projects that they permit to go forward.
- In recognition of the opportunity cost of grants and other subsidies from the shareholders/donors, our methodology proposes that a "full cost financial rate of return" (*FCFRR*) should be computed for every *project* for which (a) it is practically feasible to calculate a conventional financial rate of return for the *project* (*FRR*), and (b) a significant element of TC or other grants and subsidies is involved. For each *investment* by the Bank, a “full cost rate of return on investment” (*FCROI*) should also be calculated. This corrects the conventional measure of the contribution of the investment to the profitability of the Bank (the return on investment or *ROI*) for the opportunity cost of grants and other subsidies bundled with its investment by the Bank. Unlike the EBRD and the IFC, the other MDBs provide concessional finance. The *FCFRR* and *FCROI* would also account for the subsidy bestowed by charging an effective interest rate below the lender’s incremental cost of funds.
- At any point in time, the pool of TC funds is given. As long as TC funds are scarce, this calls for allocating TC funds to those projects for which it has the highest incremental transition impact, environmental impact and/or social impact.

- When there are significant differences between shadow prices and market prices (say, because of import duties, export taxes or domestic price controls), an economic rate of return (*ERR*) should be computed for a project. This is current EBRD practice. The *ERR* shadow price adjustments should be made to the *FCFRR* (not the *FRR*).
- A full transition impact assessment (*TIA*) should be made for each project. The *TIA* should supplement the *ERR* (or the *FCFRR*) with a qualitative assessment of the transition impact of the project. This is current EBRD practice.

### **VII.3. Charging for and Recovering TC Funds**

- The paper develops a practical methodology for determining when and to what extent TC costs should be charged to and recovered from private sector clients. Implementation will inevitably involve judgement.
- Intuitively, the degree of TC cost recovery from private sector clients should depend on the extent to which the TC funds enhance transition impact rather than financial returns. This rule should apply regardless of whether the co-sponsors are private or public, Western or otherwise.
- The *TC client payback ratio* (the share of total TC charged to and recovered from the client) can, in principle, be different for different kinds of projects. For administrative simplicity, it may be necessary to establish just a few payback ratios that could each be applied to the TC linked to a range of investment projects.
- Even if repayment were required by all *implemented* projects, there would remain a subsidy to project development, as non-implemented projects do not repay. If the costs of TC finance for non-implemented projects are covered by projects that are implemented, on average, then there is no *ex ante subsidy*. But this would require that implemented projects would, collectively, have to pay back more than the TC funds actually dedicated to that project, in the form of a ‘project development insurance tax’. This would be justified by the positive transition impact of the project development activities.

### **VII.4. Open issues**

- Where donor shareholders are motivated in the provision of TC funds or other grants by objectives other than transition impact, environmental externalities or social concerns, should these ‘other donor objectives’ be taken into account in EBRD project selection and design?
- If there is agreement that all MDBs should agree on a common approach to, and accounting for, the use of TC funds and other subsidies and grants, should the EBRD take the lead in making this part of the agenda for one of the existing MDB/IMF Working Groups or in creating a special Working Group to deal with this issue?

## **VIII. Applications of the Guidelines to EBRD Projects**

***Issue 1: Should EBRD co-finance projects that benefit from targeted subsidies from donor funds?***

An example is the way in which the level of ISPA (European Union) grants are treated in municipal environmental infrastructure projects in Poland. The procedure is to cost the project fully, including capital and operational expenditures, and then to calculate a tariff structure that ensures that the debt service ratios are met. Given affordability constraints, tariffs are adjusted downward and the ISPA grant adjusted upwards until a balance is reached. This practice of not netting out the grant before calculating the financial rate of return was done partly on the argument that these projects generate positive environmental impacts.

The analysis in this paper tells us that such projects should be treated the same as any other projects. Compliance with sound banking principles should be based on the *FRR*. But the full cost financial rate of return should also be computed, which clearly takes into account all direct subsidies from EBRD shareholders. Beyond this, such projects should be judged on the standard criteria of additionality, conventional externalities (e.g. environmental benefits), distributional consequences and transition impact. The environmental benefits that are expected from the project have no bearing on the issue of meeting sound banking principles. They must be taken into account when the *FCFRR* is juxtaposed with the conventional externalities, transition impact and other non-financial desiderata, including social consequences, which will determine whether the project should go ahead.

A second example is the use of subsidies to meet regulatory requirements. This is illustrated by the Polish dairy project, in which the EBRD used EU grants to subsidise loans for technical equipment to meet EU health standards. As with other projects, the appropriate test of whether this project met SBP is the *FRR*. The EU grants should be netted out in the computation of the *FCFRR* and the *ERR*. The *ERR* should allow for the conventional externalities. Together with the transition impact assessment, the evaluation of any identifiable social consequences of the project and the determination of the additionality of the Bank's financing, sound banking principles, the *FCFRR* and the *ERR* provide all the information required for a decision on the project.

## **Issue 2: Should EBRD subsidise investments that improve energy efficiency?**

This issue arises in energy efficiency projects and other projects with environmental benefits for which the Bank is seeking grant funding from the Global Environment Facility (GEF). As with all projects, such environment-related projects must first satisfy the SBP criterion based on the *FRR*. Transition impact aspects of the project, including environmental considerations, are not relevant to that decision. When the SBP criterion is passed, the project is expected to generate a sufficient private return to the investor to justify the project. Therefore, no subsidy is required to bring forth the investment project. However, there may be particular costs in project design or implementation that are aimed at increasing the external environmental benefits and the transition impact of the project. These include energy efficiency, reduced atmospheric, water and soil pollution, and improved governance through better regulation. If the client cannot capture these environmental benefits or the transition impact gains, then the client should not be required to pay for the associated TC costs.

But this applies to all projects that generate significant transition impact and/or external environmental benefits.

### **Issue 3: Should EBRD subsidise direct lending to SME's?**

As with all projects undertaken by the Bank, SME projects are expected to generate positive transition impact. They are also likely to have desirable social consequences through employment creation or maintenance. It is also true that credit markets in transition countries are under-developed and suffer from a variety of market imperfections, including incomplete information, credit rationing, and market power. These imperfections provide greater scope for the EBRD to be additional, but they do not affect the subsidy analysis in this paper. As with other projects, SME projects should meet the SBP criterion based on the *FRR*. This ensures that there will be no subsidy to the capacity of the project to generate financial returns that can be appropriated by the client. As with other projects, TC and other costs that are dedicated to enhancing project transition impact, which the client is unlikely to capture, should be imputed to the project but repaid out of the pool of TC funds or out of EBRD operational funds (see Section VII for discussion of the TC *client payback ratio*).

There are two main ways in which SME's are supported directly. The first is through advisory services, such as through the TAM Programme (for which firms are not charged). Analytically, these services should be treated the same as any TC funds. Note that there is nothing wrong, in principle, with TC funds being *necessary* for an SME programme (or any other project) to be commercially viable. Their use will be justified if, and only if, the transition impact or other external benefits associated with the programme can be demonstrated to exceed the cost of the subsidy.

Another channel for direct support is an interest rate cap on credit lines. But whether such caps would constitute an economic subsidy depends on whether they are set below the incremental cost of the EBRD plus the on-lending costs of the administering banks. Any cap is subsidy-free provided that it is set above this level, even if it is below the existing market rate of interest. If the cap were set below the relevant incremental cost, then it would be a subsidy and it should be treated as outlined in Section III.2. -- it should be netted out in the computation of the *ERR* but not in the computation of the *FRR* or, because it is not an explicit or direct subsidy, in the computation of the *FCFRR*. It may be difficult to measure the size of the implicit subsidy in such caps, since one would need to know the interest charged to each firm without the cap (and the queue of borrowers itself depends on the cap). In view of the difficulty in computing this subsidy with credit lines, one reasonable approach is to require that any interest rate caps on EBRD credit lines be set above the incremental cost of EBRD funds. Allowance for on-lending costs could be incorporated, in a rough and ready way, by requiring some percentage mark-up on the Bank's incremental cost in computing the minimum level for acceptable interest rate caps.

### **Issue 4: Should the EBRD subsidise banks in order to reach SME's? How should performance-related subsidies in credit lines be treated in evaluating sound banking principles?**

The same analysis applies to this example. However, there is one difference -- the TC involved in financial intermediation projects is typically aimed at improving the institutional infrastructure and human capital in local banks that can sustain ongoing lending to SME's. It might be argued that it is hard for banks to capture the returns to this kind of TC investment. This is due to mobility of their skilled labour and to the non-appropriability of other social returns associated with a thriving SME sector, such as the encouragement of entrepreneurship and a culture of enterprise in countries that have had no functioning private sector for half a century or more, demonstration effects etc.. To the extent that this is true, some portion of the TC should be borne out of TC funds rather than by the clients. However, there is not much economic justification for providing subsidy to the investment finance itself (which is channelled to SME's and presumably recouped by the banks, if they act prudently).

A good example is the move toward donor-funded, first loss guarantees, including the US SME Trust Fund and the Trade Facilitation Programme for south eastern Europe. For compliance with sound banking principles, the economic value of these guarantees should not be netted out in the computation of the *FRR*. Since the subsidy is not an explicit or direct subsidy, it also will not figure in the calculation of the *FCFRR*. It does have to be allowed for, however, in the computation of the *ERR*. In practice, especially for credit lines, it may be difficult to get a precise valuation of such guarantees ex ante, but some attempt to do so is warranted.

Performance-related discounts have been used in some credit lines (e.g., the EU/EBRD SME Facility). In effect, the participating banks receive a reduction in interest rate charges if they meet certain quantity and quality criteria on the loans they make. Such performance-related discounts (which are designed as an incentive mechanism) do not necessarily constitute economic subsidies. In particular, they are subsidy-free if they reflect incremental cost savings for the EBRD that may occur by intensifying incentives to move the credit line more effectively.

## Appendix I

### QUALITATIVE ASPECTS OF TRANSITION IMPACT OF PROJECTS: A CHECKLIST

The checklist covers only those potential effects of a project on the host country that relate to the conversion from a command economy to an economy driven by well-functioning markets. It does not cover direct income and resource-effects of a project, and environmental impact only indirectly to the extent that it is a consequence of the broadening and deepening of markets. Applications of the checklist should therefore preferably be viewed in conjunction with an analysis of the financial and economic rate of return and of the wider environmental and social impact of a project. The checklist is "generic" in the sense that, in principle, its categories fit all project types (e.g. SMEs, infrastructure projects, technical assistance). Sector-specific guidelines are available for financial sector and infrastructure projects.

#### **Project contributions to the structure and extent of markets**

1. *Greater competition in the project sector:* A project can promote greater competition in its sector of activity. Increased competitive pressure is likely to improve the efficiency with which resources are utilised, demand is satisfied, and innovation is stimulated. However, in some circumstances a project might lead to a slackening of competitive pressure on market participants, including the project company itself.
2. *Expansion of competitive/market interactions in other sectors:* A project can help to set business relationships in other markets on a more competitive basis. The benefits for the transition process would be similar to those described under the impact discussed above. There are two important ways in which markets can be extended and their functioning improved by projects:
  - (i) Through interactions of the project entity with suppliers and clients.
  - (ii) Through project contributions to the integration of economic activities into the national or international economy, in particular by lowering the cost of transactions.

To have a structural effect, these contributions should not be "one-off" but enhance competitive market interactions on a sustained basis. This would generally be achieved either through the formation of actors, methods of work, policies and institutions which last, or through interactions that have a strong demonstration effect.

#### **Project contributions to the institutions and policies that support markets**

1. *More widespread private ownership:* A project may result in increased private ownership through privatisation, or new private provision of goods and services. This can generally be expected to strengthen market-oriented behaviour, innovation, the pool of entrepreneurship and, more generally, commitment to the transition. Private ownership is also in itself part of the transition objective.(*cntd*)

With the right kind of business standards, regulation and legal environment private ownership is complementary to, and often a condition for, the expansion and improvement of markets.

4. *Institutions, laws and policies that promote market functioning and efficiency:* A project may help to create or reform governmental or private institutions, policies and practices whose function is to enhance entrepreneurship and the efficiency of resource allocation. This is particularly relevant where not only the project entity itself but also other economic activities benefit. Four types of contribution are of particular importance here:
- (i) The creation/strengthening of public and private institutions that support the efficiency of markets.
  - (ii) Improvements to the functioning of regulatory entities and practices.
  - (iii) Project contributions to government policy formation and commitment, promoting competition, predictability and transparency.
  - (iv) Contributions to laws that strengthen the private sector and the open economy.

#### **Project contributions to market-based conduct, skills and innovation**

5. *Transfer and dispersion of skills:* Projects can directly contribute to providing and improving the skills required for well-functioning market economies. This may include management, procurement, marketing, financial and banking skills. Such a transfer represents a relevant transition impact only when the skills are likely to be spread so as to benefit non-project entities (otherwise they are simply costs like any others). Skill transfers are often complementary to other transition-related project impacts such as institution-building, market expansion and demonstration effects.
6. *Demonstration of new replicable behaviour and activities:* A project may lead the way by showing other economic actors what is feasible and profitable and thereby inviting replication. There are three types of demonstration effect which are of particular importance here:
- (i) Demonstration of products and processes which are new to the economy.
  - (ii) Demonstration of ways of successfully restructuring companies and institutions.
  - (iii) Demonstration to both domestic and foreign financiers of ways and instruments to finance activities.
7. *Setting standards for corporate governance and business conduct.* By implementing high standards of corporate governance and business conduct in entities supported by the Bank, projects may contribute to the spreading of behaviour and attitudes that enhance the legitimacy and functioning of the market economy. This is a form of demonstration effect which functions by establishing reference points for other firms and individuals concerning businesses that they wish to invest in or interact with. Where role models for business conduct and corporate governance are rare, such pressures are less likely to materialise. A difference with institutional change as discussed under point 4. is that such behaviour may not be codified in a formal way. (cntd)

The main points in the checklist together with some illustrations are summarised in the Table below.

Category	Impact	Illustrations
Project contributions to the structure and extent of markets	<i>Competition:</i> Greater competition in the project sector	Project contributions to greater efficiency, innovation and customer orientation of other suppliers through competitive pressure
	<i>2. Market expansion:</i> Expansion of competitive /market interactions in other sectors	Stimulation of competitive behaviour through the project entity's interactions with suppliers and clients
		Project contributions to the integration of economic activities into the national or international economy, in particular by lowering the cost of transactions
Project contributions to the institutions and policies that support markets	<i>3. Private ownership:</i> More widespread private ownership and entrepreneurship	Significant increase or consolidation of private provision of goods and services and support for entrepreneurial initiative
	<i>4. Frameworks for markets:</i> Institutions, laws and policies that promote market functioning and efficiency	Creation/strengthening of public and private institutions that support the efficiency of markets
		Improvements to the functioning of regulatory entities and practices
		Contributions to government policy formation and commitment, promoting competition, predictability and transparency
		Contributions to laws that strengthen the private sector and the open economy
Project contributions to market-based behaviour patterns, skills and innovation	<i>5. Skills:</i> Transfer and dispersion of skills	Project contributes to significant upgrading of technical and managerial skills in the economy beyond the project entity
	<i>6. Demonstration effects:</i> Transfer of new behaviours and activities	Demonstration of (replicable) products and processes which are new to the economy
		Demonstration of ways of successfully restructuring companies and institutions
		Demonstration to both domestic and foreign financiers of ways and instruments to finance activities
	<i>7. Standards:</i> Setting standards for corporate governance and business conduct	Improved ethical and governance standards that are highly visible and invite replication in non-project entities

## Appendix II

### Cumulative Committed TC Funds and Signed Investments, by Sector

Sector	Total Committed TC (000's, EUR)	TC Related to Project Investments (EUR)	Signed TC- supported Investments (EUR)	TC per EUR Investment (%)	Investment- related TC per EUR Investment (%)
Agriculture, Forestry, Fishing	4038	2201	285,222	1.4	0.8
Commercial Tourism	1402	71	5100	27.5	1.4
Community/Social Services	54,856	8793	463,244	11.8	1.9
Construction	18,755	13,073	551,369	3.4	2.4
Energy	86,481	51,471	2,184,040	4.0	2.4
Extractive Industries	9305	5543	324,648	2.9	1.7
Finance/Business	366,705	81,089	3,048,452	12.0	2.7
RVF,RSBF,DIF,PPF	207,696	12,334	166,227	124.9	7.4
Manufacturing	105,820	18,818	1,324,531	8.0	1.4
TAM/BAS	70,259	1306	48,634	144.5	2.7
Telecommunications	18,712	11,909	576,166	3.3	2.1
Transport/Storage	53,349	36,196	1,750,143	3.1	2.1
Total	720,757	229,164	10,512,916*	6.9	2.2

*Notes:* Computed from information provided by Kjell Nordlander, Co-Financing Unit, EBRD.

\* The total involves some double counting between sectors because some investments are supported by more than one TC project. The correct total for cumulative signed investments is 8,272,204 EUR.

## Appendix III

### Derivation of the Client Payback Ratio for TC Funds

In this Appendix we present a simple conceptual framework for determining what proportion of TC funds should be repaid by the clients in private sector projects. We use a range of reasonable parameter values to illustrate the likely range of appropriate payback rules for the Bank.

Each project generates two types of output – financial returns and transition impact. Two inputs are used (other than the financial investment made in the project): technical co-operation funds and the EBRD's own project-related costs. There may be some scope for choosing the mix of these outputs, for any given level of inputs. For example, TC can be used to design the project to generate greater transition impact and less profitability (e.g., by outsourcing project input requirements to local suppliers who may, for some transitional learning period, be higher cost than alternative, foreign sources). Similarly, there may be some scope for substituting between the use of TC funds for outside consultants and internal EBRD inputs. The formulation we use allows for an arbitrary degree of such scope for substitution both between the two outputs and between the two inputs. One special case of the analysis is where there are no substitution possibilities between transition impact and financial returns, or between TC funds and EBRD inputs.

The production function can be written:

$$(1) \quad F(y, \pi, x, z) = 0$$

where  $y$  denotes transition impact,  $\pi$  is profitability or gross financial returns (i.e., financial returns before the cost of TC and the EBRD's resources are subtracted),  $x$  is the level of TC funds, and  $z$  is the level of the EBRD's resources.<sup>32</sup> We assume that  $F(y, \pi, x, z)$  is increasing in outputs  $y$  and  $\pi$ , decreasing in inputs  $x$  and  $z$ , concave (which ensures that the second-order conditions for the optimisation problem will hold), and twice continuously differentiable. All variables are denoted in dollar terms – for transition impact, this means  $y$  represents the social value of the transition impact. We denote the marginal cost of  $x$  and  $z$  by  $w_x$  and  $w_z$ , respectively.

#### *TC client payback ratio*

The analysis is based on a comparison between two levels of TC and two levels of EBRD project costs. The *first* are the levels of TC and EBRD resources that maximise the transition impact of projects, subject to a 'sound banking' constraint that sets a minimum acceptable net financial return to projects, and when the TC and EBRD resources are priced at their respective marginal costs. This amounts to

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<sup>32</sup> This formulation involves a plausible assumption that greatly simplifies the analysis. In general we would think of three inputs, investment finance ( $\phi$ ), TC ( $x$ ) and EBRD project costs ( $z$ ), as generating the two outputs, financial returns ( $\pi$ ) and transition impact ( $y$ ). The general form of the production function is  $\Phi(y, \pi, \phi, x, z) = 0$ . In analysing the choice of the TC and EBRD project inputs and the mix of outputs, we abstract from the level of investment finance. This is legitimate provided the production function can be written in the weakly separable form  $\Phi(y, \pi, \phi, x, z) = \Phi(F(y, \pi, x, z), \phi)$  -- so that the *marginal tradeoffs* between transition impact, financial returns, TC funds and EBRD project costs are independent of the level of investment finance.

maximising the ‘full cost transition impact.’ We denote these input levels by  $x^s$  and  $z^s$ .

The *second* are the levels of TC and EBRD resources that an investor would choose if he were maximising the *net* financial returns of the project, denoted  $p$ , and where those maximised net returns are at the same level as the one used in the sound banking constraint. Net returns equals gross returns minus the cost of TC inputs and of EBRD project inputs, both valued at their marginal costs, that is,  $\pi / p + w_x x + w_z z$ . This net return corresponds to the ‘full cost internal rate of return’, as this concept is used in EBRD [2001,1] --. We denote these input levels by  $x^p$  and  $z^p$ .

If these two levels of TC,  $x^p$  and  $x^s$ , are the same, the investor should be charged for the full amount of the TC. If they are not the same, then the difference  $x^s - x^p$  reflects the additional TC that the Bank undertakes in pursuit of its transition mandate. To put this another way, if the Bank chooses different levels of TC and EBRD inputs than a private investor would choose, *for the same project*, then this difference should be paid for by the shareholders of the Bank, or the donor governments providing TC funds. The investor should only incur the cost of the TC that he would choose in pursuit of maximum (private) returns. Thus the investor should pay for the fraction  $x^p/x^s$  of the total TC funds. We call this the “*client payback ratio*,” which we denote by  $R$ .

If it turns out that  $x^p > x^s$ , then the logic of the argument suggests that the investor should be charged for more than the total TC -- i.e., the Bank should “tax” the use of its TC. Since investors have alternative private sources for TC inputs, it is not practicable to implement such a tax. Therefore, we take the payback ratio as unity in such cases.

### *Formal Derivation*

We first compute  $x^s$  and  $z^s$  by maximising transition impact subject to a profitability constraint (that is, subject to a ‘full cost’ financial constraint). First, use equation (1) to write  $y = H(\pi, x, z)$ . Then the Bank’s decision problem is

$$(2) \quad \underset{\pi, x, z}{\text{Max}} H(\pi, x, z) \quad \text{subject to } p \geq p_0$$

The behavioural assumption is that the Bank is trying to maximise the transition impact of its projects, subject to the constraint that each project meets the full cost financial return constraint. Since there is a trade-off between  $y$  and  $\pi$ , the Bank would not want profitability to exceed the level  $p_0$ . If it did, it would be possible to increase the transition impact of Bank projects, for a given amount of TC and EBRD’s own inputs.

The optimal levels of TC and EBRD inputs for the Bank solve the first-order conditions

$$(3) \quad H_x(p_0 + w_x x + w_z z, x, z) = 0 \quad \Rightarrow \quad x^s = g^s(w_x, w_z; p_0)$$

$$(4) \quad H_z(p_0 + w_x x + w_z z, x, z) = 0 \quad \Rightarrow \quad z^s = h^s(w_x, w_z; p_0)$$

Equations (3) and (4) equate the marginal return (in terms of transition impact) and the marginal cost of TC and EBRD resource inputs, respectively. The second-order conditions are:  $H_{xx}(p_0 + w_x x + w_z z, x, z) < 0$ ,  $H_{zz}(p_0 + w_x x + w_z z, x, z) < 0$ , and  $H_{xx}(p_0 + w_x x + w_z z, x, z) H_{zz}(p_0 + w_x x + w_z z, x, z) - (H_{xz}(p_0 + w_x x + w_z z, x, z))^2 > 0$ , where  $x = x^s$  and  $z = z^s$ .

To compute  $x^p$  and  $z^p$ , the investor maximise the profit of the project net of the costs of TC and the EBRD's own inputs. Of course, the investor would prefer to set  $y < 0$  if that increased financial returns. For example, monopoly status attached to an infrastructure project would increase financial returns but possibly have negative transition impact by foreclosing entry. Consistent with EBRD operational guidelines, we assume that the Bank imposes the constraint  $y \geq 0$  on private investor. Since there is a trade-off between  $\pi$  and  $y$ , for given levels of  $x$  and  $z$ , the investor sets  $y = 0$ .

Use equation (1) to write  $\pi = G(y, x, z)$ . Since net returns are defined as  $p = \pi - w_x x - w_z z$ , the decision problem is

$$(5) \quad \underset{x, z}{\text{Max}} p = \underset{x, z}{\text{Max}} G(0, x, z) - w_x x - w_z z$$

The privately optimal levels of TC and of EBRD project inputs solve the following first-order conditions:

$$(6) \quad G_x(0, x, z) = w_x \quad \Rightarrow \quad x^p = g^p(w_x, w_z) \text{ and } z^p = h^p(w_x, w_z)$$

$$(7) \quad G_z(0, x, z) = w_z$$

where a subscript denotes a partial derivative. Equations (6) and (7) equate the marginal private return and the marginal cost for both TC and EBRD inputs. The second-order conditions are:  $G_{xx}(0, x, z) < 0$ ,  $G_{zz}(0, x, z) < 0$ , and  $G_{xx}(0, x, z) G_{zz}(0, x, z) - (G_{xz}(0, x, z))^2 > 0$ , where  $x = x^p$  and  $z = z^p$ . We denote the value of the maximum financial return by  $\hat{p}$ .

In order to make the comparison between the Bank and investor's choice *for the same project*, we parameterise the production function in (1) so that  $\hat{p} = p_0$ .

The appropriate "client payback ratio" is given by  $R = \min(x^p/x^s, 1)$ .

### Numerical Illustrations

For the simulations we use the constant elasticity of substitution (CES) production function:

$$(8) \quad [\alpha y^{\rho} + (1-\alpha)\pi^{\rho}]^{\lambda/\rho} = A[\beta x^{\delta} + (1-\beta)z^{\delta}]^{1/\delta}$$

The parameter  $A$  reflects the efficiency level, but in our context it is best to think of this as the “quality” of the project. For any given level of expenditures of TC and Bank resources, a “higher-quality” project yields greater financial returns and transition impact. The analysis that follows is for any *given level of project quality*. Therefore, we set the parameter  $A$  such that the level of *maximised* profit generated by  $x^{\rho}$  is the same as the level of profit used in the constraint for the Bank’s decision problem.

The parameter  $\lambda$  in (8) corresponds to the elasticity of total costs with respect to the level of outputs, given a constant mix of inputs and outputs. For example,  $\lambda=1.2$  implies that when both outputs are increased by  $k$  percent, total costs rise by  $1.2k$  percent – thus the *average cost* of generating outputs has risen by 20 percent. An equivalent way to say this is that the degree of returns to scale in this joint production function is  $1/\lambda$ . There are diseconomies of scale (i.e., increasing average cost of outputs) whenever  $\lambda > 1$ .

This specification embodies two distinct elasticities of substitution. The first is between transition impact and profitability and is given by  $\sigma = 1/(1-\rho)$ . The value of  $\sigma$  indicates the degree to which the mix of these two outputs can be varied by the design of TC and EBRD inputs. Higher values of  $\sigma$  indicate greater scope for substitution. When  $\sigma = 0$  there is no scope for substitution (the “fixed coefficient” case). The second elasticity of substitution is between TC funds and EBRD’s own inputs (e.g., the use of outside consultants versus internal resources), and is given by  $\eta = 1/(1-\delta)$ .

The specification in (8) imposes separability between outputs and inputs. This implies that (1) the marginal rate of substitution between financial returns and transition impact is independent of the mix of (TC and EBRD) inputs, and (2) the marginal rate of substitution between TC and EBRD inputs is independent of the mix of outputs. This property allows us to solve the problem in two steps. The first step is to choose inputs  $x$  and  $z$  to minimise costs, for any given level of outputs. This implies a given input *mix*. Holding this mix constant, we then solve the private and social optimisation problems to determine the optimal input *levels*.

### *Step 1. Determining the Optimal Input Mix*

Since TC funds and internal EBRD resources are denominated in dollar terms, we set  $w_x = w_z = 1$ . For any given output values, total costs are minimised by setting the marginal rate of substitution between  $z$  and  $x$  equal to the input price ratio. Using (8), this yields

$$(9) \quad z/x = (\beta/(1-\beta))^{-\eta}$$

Let  $B^*$  denote the RHS of (9). Then we can write the RHS of (8) as  $ABx$ , where  $B = [\beta + (1-\beta)B^*]^{\delta/1-\delta}$ .

## Step 2. Determining the Optimal Input Levels

Now using the first order conditions (3) and (4), we get the following analytic solution for  $x^p$ :

$$(10) \quad x^p = (AB)^{1/(1-\lambda)} [\lambda (1-\alpha)^{1/\rho} (1+B^*)]^{\lambda/(1-\lambda)}$$

Using the first-order condition (6) and some algebraic simplification, we derive the following equation that implicitly determines  $x^s$ :

$$(11) \quad ax^b - cx - d = 0$$

where the parameters  $a$ ,  $b$ ,  $c$  and  $d$  are defined as follows:  $a=(AB)^{\rho/\lambda(\rho-1)}$ ,  $b=(\rho-\lambda)/\lambda(\rho-1)$ ,  $c=\{\lambda(1-\alpha)(1+B^*)\}^{1/(\rho-1)}(1+B^*)$ , and  $d=\{\lambda(1-\alpha)(1+B^*)\}^{1/(\rho-1)} p_0$ .

The second-order conditions require  $\lambda > 1$ , i.e., there must be diseconomies of scale to ensure an interior solution.<sup>33</sup> We compute the solution to (11),  $x^s$ , using a standard numerical solution algorithm available in the SAS software package.

The simulations for the client payback ratio,  $R$ , are described below and in Table A.2.

### Calibrating the Parameters

We set  $\beta$  to equate the optimal input mix  $z^s/x^s = \{\beta/(1-\beta)\}^{-\eta}$  with the observed mix at the EBRD, which is close to 0.5.<sup>34</sup> Thus  $\beta$  depends on the assumed value for  $\eta$ .

To set  $\alpha$ , note that the optimal ratio of outputs is  $y/\pi = \{(1-\alpha)/\alpha\}^{-\sigma}$ . Given  $\sigma$  and an assumed value for the ratio of social returns to private returns, which is  $(y+\pi)/\pi$ , we get  $\alpha$ . We use  $(y+\pi)/\pi=1.5$ ; results are similar for 2.0.

The other parameters are as follows:

$p_0 = 1.2$  (minimum net financial return of 20%); results are similar for 1.5.

$\lambda = (1.1, 1.25, 1.5)$

$\sigma = (0.25, 0.50, 0.75)$

$\eta = (0.50, 1.25, 2.0)$

The top half of Table A.2 presents the client payback ratios. The key parameter is  $\sigma$ . When there is very low substitution between transition impact and financial performance ( $\sigma < 0.25$ ), the client payback ratio is over 50%. When there is no substitution ( $\sigma = 0$ ), the payback ratio is 100%, regardless of the other parameter

<sup>33</sup> Note that we have diseconomies of scale with respect to just the *two* inputs, TC funds and Bank's own resources. This is consistent with decreasing, constant or increasing returns with respect to the *three* inputs, TC funds, Bank's own resources and the size of the loan.

<sup>34</sup> Based on the ratio of committed TC to the operational budget of the Bank (including depreciation) in fiscal year 2000.

values. For a given degree of substitution, the payback ratio is somewhat smaller when the diseconomies of scale are sharper (higher values of  $\lambda$ ), but the TC payback ratio is much less sensitive to this parameter than to the substitution parameter.

**Table A.2. Client Payback Ratio (%)**

	<i>Output Elasticity of Costs</i>		
	$\lambda = 1.1$	$\lambda = 1.25$	$\lambda = 1.5$
<i>Output Elasticity of Substitution (<math>\sigma</math>)</i>			
$\sigma = 0.0$	1.00	1.00	1.00
$\sigma = 0.25$	0.52	0.48	0.43
$\sigma = 0.50$	0.18	0.16	0.13
$\sigma = 0.75$	0.02	0.01	0.01

The preceding analysis assumes that the client is a profit maximising agent. While this is a reasonable assumption in the case of private sector projects, it is unlikely to be correct for public sector projects. *Mutatis mutandis*, an approach similar to the one outlined here for the private sector could also be developed for the public sector. What is needed are an objective function for the public sector client and a 'project production function' that represents the technical relationship (the trade-off) between transition impact and the objective pursued by the public sector client.

## Appendix IV

### When are Subsidies or Taxes necessary? A Taxonomy

For simplicity consider a lumpy investment of fixed size.

#### Notation

$P$ : Price

$PIC$ : Private incremental cost

$SIB$ : Social incremental cost

$PIB$ : Private incremental benefit

$SIB$ : Social incremental benefit

We focus on the following three conditions that must be satisfied in order that provision of a service at a subsidy-free price enhances economic welfare:

(1) Participation constraint for the purchaser (voluntary exchange):  $P \geq PIB$

(2) Participation constraint for the seller (voluntary exchange):  $P \leq PIC$

(3) Incremental economic welfare improvement criterion:  $SIB \geq SIC$

For a voluntary exchange to occur, (1) and (2) must be satisfied, that is,  $PIB \leq P \leq PIC$ . For voluntary exchange ('the market') to support a Pareto improvement, (1), (2) and (3) must be satisfied.

The proposed subsidy-free pricing rule is:  $P \leq PIC$

The following questions are asked:

- When does the subsidy-free pricing rule support an investment that ought to take place or prevent an investment that ought not to take place? We will label these configurations by  $A$ . Neither a subsidy nor a tax is called for.
- When does the subsidy-free pricing rule support an investment that ought not to take place? We will label these configurations by  $B$ . This calls for a tax.
- When does the subsidy-free pricing rule fail to support an investment that ought to take place? We will label these configurations by  $C$ . This calls for a subsidy.

There are  $4! = 24$  permutations of  $PIC$ ,  $SIB$ ,  $PIB$  and  $SIB$ , labelled 1 – 24 in Table AIV.1 below. There are  $5! = 120$  permutations of  $P$ ,  $PIC$ ,  $SIB$ ,  $PIB$  and  $SIB$ , but only half of these are relevant, as we impose the subsidy-free pricing rule  $P \leq PIC$ .

**TABLE AIV.1**

					<b>Provision Increases Welfare?</b>	<b>Prices that Satisfy the Subsidy-Free Pricing Rule</b>	<b>Welfare Implications of Subsidy-Free Pricing Rule and Remedies</b>
1a b c	PIB	SIB	PIC	SIC	Yes	PIB \$ SIB \$ P \$ PIC \$ SIC PIB\$P\$ SIB \$ PIC \$ SIC P \$ PIB \$ SIB \$ PIC \$ SIC	A A C; Subsidy=P-PIB
2a b c c	PIB	SIB	SIC	PIC	Yes	PIB \$ SIB \$ SIC \$ P\$ PIC PIB \$ SIB \$ P\$ SIC \$ PIC PIB \$ P \$ SIB \$ SIC \$ PIC P \$ PIB \$ SIB \$ SIC \$ PIC	A A A C; Subsidy=P-PIB
3a b	PIB	PIC	SIB	SIC	Yes	PIB \$ P \$ PIC \$ SIB \$ SIC P \$ PIB \$ PIC \$ SIB \$ SIC	A C; Subsidy=P-PIB
4a b	PIB	PIC	SIC	SIB	No	PIB \$ P \$ PIC \$ SIC \$ SIB P \$ PIB \$ PIC \$ SIC \$ SIB	B; Tax=PIB-P A
5a b c d	PIB	SIC	SIB	PIC	No	PIB \$ SIC \$ SIB \$ P \$ PIC PIB \$ SIC \$ P \$ SIB \$ PIC PIB \$ P \$ SIC \$ SIB \$ PIC P \$ PIB \$ SIC \$ SIB \$ PIC	B; Tax=PIB-P B; Tax=PIB-P B; Tax=PIB-P A
6a b c	PIB	SIC	PIC	SIB	No	PIB \$ SIC \$ P \$ PIC \$ SIB PIB \$ P \$ SIC \$ PIC \$ SIB P \$ PIB \$ SIC \$ PIC \$ SIB	B; Tax=PIB-P B; Tax=PIB-P A
7a b c	SIB	PIB	PIC	SIC	Yes	SIB \$ PIB \$ P \$ PIC \$ SIC SIB \$ P \$ PIB \$ PIC \$ SIC P \$ SIB \$ PIB \$ PIC \$ SIC	A C; Subsidy=P-PIB C; Subsidy=P-PIB
8a b c c	SIB	PIB	SIC	PIC	Yes	SIB Subsidy=P-PIB \$ PIB \$ SIC \$ P \$ PIC SIB \$ PIB \$ P \$ SIC \$ PIC SIB \$ P \$ PIB \$ SIC \$ PIC P \$ SIB \$ PIB \$ SIC \$ PIC	A A C; Subsidy=P-PIB C; Subsidy=P-PIB
9a b	SIB	PIC	PIB	SIC	Yes	SIB \$ P \$ PIC \$ PIB \$ SIC P \$ SIB \$ PIC \$ PIB \$ SIC	C; Subsidy=P-PIB C; Subsidy=P-PIB
10a b	SIB	PIC	SIC	PIB	Yes	SIB \$ P \$ PIC \$ SIC \$ PIB P \$ SIB \$ PIC \$ SIC \$ PIB	C; Subsidy=P-PIB C; Subsidy=P-PIB
11a b c d	SIB	SIC	PIB	PIC	Yes	SIB \$ SIC \$ PIB \$ P \$ PIC SIB \$ SIC \$ P \$ PIB \$ PIC SIB \$ P \$ SIC \$ PIB \$ PIC P \$ SIB \$ SIC \$ PIB \$ PIC	A C; Subsidy=P-PIB C; Subsidy=P-PIB C; Subsidy=P-PIB
12a b c	SIB	SIC	PIC	PIB	Yes	SIB \$ SIC \$ P \$ PIC \$ PIB SIB \$ P \$ SIC \$ PIC \$ PIB P \$ SIB \$ SIC \$ PIC \$ PIB	C; Subsidy=P-PIB C; Subsidy=P-PIB C; Subsidy=P-PIB
13	PIC	PIB	SIB	SIC	Yes	P \$ PIC \$ PIB \$ SIB \$ SIC	C; Subsidy=P-PIB
14	PIC	PIB	SIC	SIB	No	P \$ PIC \$ PIB \$ SIC \$ SIB	A
15	PIC	SIB	PIB	SIC	Yes	P \$ PIC \$ SIB \$ PIB \$ SIC	C; Subsidy=P-PIB
16	PIC	SIB	SIC	PIB	Yes	P \$ PIC \$ SIB \$ SIC \$ PIB	C; Subsidy=P-PIB
17	PIC	SIC	SIB	PIB	No	P \$ PIC \$ SIC \$ SIB \$ PIB	A
18	PIC	SIC	PIB	SIB	No	P \$ PIC \$ SIC \$ PIB \$ SIB	A
19a b c v	SIC	PIB	SIB	PIC	No	SIC \$ PIB \$ SIB \$ P \$ PIC SIC \$ PIB \$ P \$ SIB \$ PIC SIC \$ P \$ PIB \$ SIB \$ PIC P \$ SIC \$ PIB \$ SIB \$ PIC	B; Tax=PIB-P B; Tax=PIB-P A A

20a b	SIC	PIB	PIC	SIB	No	SIC \$ PIB \$ P \$ PIC \$ SIB SIC \$ P \$ PIB \$ PIC \$ SIB P \$ SIC \$ PIB \$ PIC \$ SIB	B; Tax=PIB-P A A
21a b c d	SIC	SIB	PIB	PIC	No	SIC \$ SIB \$ PIB \$ P \$ PIC SIC \$ SIB \$ P \$ PIB \$ PIC SIC \$ P \$ SIB \$ PIB \$ PIC P \$ SIC \$ SIB \$ PIB \$ PIC	B; Tax=PIB-P A A A
22a b c	SIC	SIB	PIC	PIB	No	SIC \$ SIB \$ P \$ PIC \$ PIB SIC \$ P \$ SIB \$ PIC \$ PIB P \$ SIC \$ SIB \$ PIC \$ PIB	A A A
23a b	SIC	PIC	PIB	SIB	No	SIC \$ P \$ PIC \$ PIB \$ SIB P \$ SIC \$ PIC \$ PIB \$ SIB	A A
24	SIC	PIC	SIB	PIB	No	SIC \$ P \$ PIC \$ SIB \$ PIB P \$ SIC \$ PIC \$ SIB \$ PIB	A A

There are in total 60 distinct configurations of  $P$ ,  $PIB$ ,  $PIC$ ,  $SIB$  and  $SIC$  that satisfy the subsidy-free pricing rule  $P \leq PIC$

Of these 60 subsidy-free price configurations, 30 give the ‘right’ allocation. That is, when  $SIB > SIC$ , the project is undertaken, and when  $SIB < SIC$ , the project is not undertaken.

For the remaining 30 subsidy-free price configurations, a ‘wrong’ allocation resulted. For 10 of these, the application of the subsidy-free pricing rule would result in a project being undertaken that ought not to be undertaken ( $SIC > SIB$  and  $PIB < P < PIC$ ). The remedy here would be to tax the provision of the service. Of course, the EBRD, like other IFIs, has no taxing power, so these cases are not directly operationally relevant. For the 20 other subsidy-free price configurations that resulted in a ‘wrong’ allocation, projects were not undertaken that ought to be undertaken ( $SIB > SIC$  and  $P > PIB$ ). The remedy here is to subsidise the provision of the service.

The relative numbers in each of the three categories has no bearing on the relative frequency with which these cases are likely to be encountered in practice.

For practical purposes, the EBRD should only consider projects for which  $SIB > SIC$ , that is projects that ought to take place. Projects for which  $SIB < SIC$ , that is, projects that ought not to take place, should be addressed by the fiscal authorities with taxes and/or by regulatory authorities with regulatory constraints designed to stop them from happening.

Considering only projects for which  $SIB > SIC$ , we see that there are two kinds of circumstances under which a subsidy is warranted. The first is the case where  $PIC > PIB$ . Rows 9a, 9b, 10a, 10b, 11b, 11c, 11d, 12a, 12b, 12c, 13, 15 and 16 in Table AIV.1 cover this case. A subsidy is called for because the private return and cost configuration implies that the project will not be undertaken while the social return and cost configuration implies that the project is worth doing. Training costs could produce such a configuration. Knowledge and skills acquired during training in some private enterprise are embodied in the worker and portable to jobs outside the enterprise providing the training. The obvious solution, make the worker pay for (part of) the training is often not feasible because workers lack the financial means and the borrowing power to finance their own education and training. If the returns to costly education and training cannot be captured by the enterprise paying for the education

and training, education and training will be under-provided. Training and education subsidies can be part of the solution to this problem.

The second set of circumstances is where  $PIB > PIC$ , but the price is set above  $PIB$ , so there is no demand for the service. Rows 1c, 2d, 3b, 7b, 7c, 8c and 8d in Table AIV.1 cover this case. Again a subsidy is called for to achieve a price to the purchaser that is below  $PIB$  and a price to the seller that is above  $PIC$ . Monopoly power could account for such a configuration

Note that, restricting ourselves to the case where  $SIB > SIC$ , in all sub-cases, the subsidy-free pricing rule  $P \geq PIC$  will never cause a project to be implemented that ought not to have been implemented (there are no Type I errors). The subsidy-free pricing rule can, however, cause projects not to be implemented that should have been implemented (that is, there are Type II errors).

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