Guarantees, Subsidies, or Paying for Success? Choosing the Right Instrument to Catalyze Private Investment in Developing Countries

Owen Barder and Theodore Talbot

Abstract

Governments, donors, and public sector agencies are seeking productive ways to 'crowd in' private sector involvement and capital to tackle international development challenges. The financial instruments that are used to create incentives for private sector involvement are typically those that lower an investment's risk (such as credit guarantees) or those that lower the costs of various inputs (such as concessional loans, which subsidise borrowing). We argue that the public sector is unlikely to have better information about risk and reward than the private sector, so using either instrument shifts downside risk from private firms to taxpayers. We propose a better contract to support private sector investment by enhancing the returns to the private sector, linking payments to specific, measurable, and agreed milestones or outputs. We argue that these contracts are less distortionary and produce better results for a lower expected cost than other incentive programmes. We motivate the argument with an economic and financial model and discuss political economy considerations that reinforce the current status quo in favour of generally suboptimal instruments such as guarantees and loan subsidies.

JEL Codes: F21, F35

Keywords: private investment, finance

Center for Global Development
www.cgdev.org

Working Paper 402
May 2015

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CGD is grateful for contributions from the Australian Department of Foreign Affairs and Trade and the UK Department for International Development in support of this work.

Owen Barder and Theodore Talbot. 2015. "Guarantees, Subsidies, or Paying for Success? Choosing the Right Instrument to Catalyze Private Investment in Developing Countries." CGD Working Paper 402. Washington, DC: Center for Global Development.
http://www.cgdev.org/publication/guarantees-subsidies-or-paying-success-choosing-right-instrument-catalyze-private

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Introduction

Governments and donors are increasingly interested in working with the private sector to meet development challenges and foster sustainable, long-term prosperity. There is an emerging consensus that the private sector is uniquely well-placed to provide the capital, innovation and skills to deliver both social and private returns, both of which are necessary conditions for increasing average income and quality of life in poor countries. But this consensus has not been accompanied by clarity about whether and how public policies can create appropriate incentives for private investment in developing countries.

Two rationales are usually cited to justify interventions by the public sector to "crowd in" private investment. The first is that there are social returns to such investment; we argue that this is a compelling case for public intervention. The second is that private firms systematically overestimate the risk of investing in socially valuable projects; we are not persuaded of this.

Having established a rationale for public intervention, we consider the policy options for governments, donors and foundations to crowd in investment by a private firm. There are broadly three types of instrument:

a. **Guarantees** that reduce risk by promising to re-pay some or all a project's value to a lender or the implementing firm if the project fails.

b. **Subsidies**, including concessional finance, that raise the investor's expected returns by lowering a project's costs.

c. **Raising returns** by paying for success, for example using contracts such as Advance Market Commitments, Development Impact Bonds, prizes, vouchers, purchase guarantees, and various kinds of payment by results.

These interventions can be designed to have the same expected cost to the public sector– none is intrinsically cheaper than the others. However, there are strong reasons to think that paying for success will result in better value for money. The intuition is that instruments that insulate investors from some or all of a project's risk will lead them to make less of an effort to select good projects and ensure that the projects are managed well, whereas instruments that raise returns for investors enhance investors' incentives to ensure that the projects are well chosen and effectively delivered.

Apart from avoiding the moral hazard of guarantees, there are other reasons to prefer paying for success. Such contracts permit contestability, avoiding the need for policymakers to pick winners. They do not pay out if projects fail, sheltering taxpayers from the poor decisions of policymakers who may be excessively optimistic (or misled) about a project's chances of succeeding. They build public support for intervention by paying for positive outcomes, rather than eroding support by paying out when a project fails. And they enable more precise targeting of the intervention on those outcomes that the public sector values most highly.

There are some specific circumstances in which guarantees or subsidised loans could be more effective interventions. But this is unusual. For a much larger number of projects than is now the case, aid agencies, private foundations, governments, and others wishing to support investment by the private sector should invest more in contracts that reward firms for positive outcomes rather than providing subsidies or guarantees that protect investors from the costs of failure.

The Tradeoff between Risk and Return

Private investors and the managers acting on their behalf evaluate investments based on expected return and their assessment of the risk. If the investor perceives the risks to be too high or their (private) expected returns to be too low, then they will invest elsewhere.

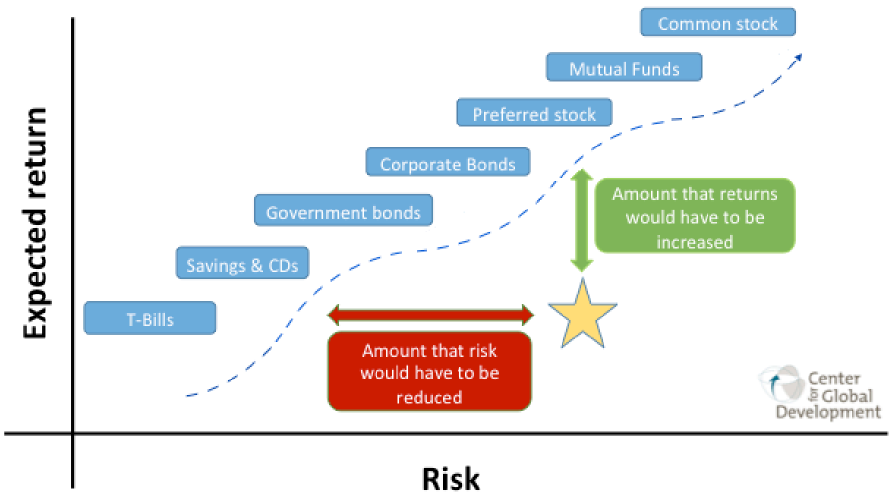
Figure 1 represents this graphically. The blue line represents the risk-return frontier –the range of risk and return combinations available to investors. The yellow star represents a project below and to the right of the investment frontier: the project offers a combination of perceived risk and private expected return that is less attractive than alternative options.[1]

Rather than invest in a project represented by the yellow star, investors making purely commercial decisions will choose to invest in alternative opportunities that either offer a higher expected return for the same level of risk, or obtain the same expected return but at a lower level of risk, or some combination of the two – that is, they will invest in a project on the blue line.[2]

[1] Note that we are explicitly not discussing whether or not the public or private sector should implement a project or, by extension, the appropriate size of the public sector relative to the private sector. Arrow and Lind (1970) famously show that the state may face a systematically lower discount rate than the private sector under restrictive assumptions about the bearing of risk from public projects and the covariance of project returns with taxpayers' incomes. Baumstark and Gollier (2014) and others argue that this result has been applied too generally– the cost of risk-bearing by governments is not systematically different from that of the private sector so risk premia (and therefore discount rates) should vary by project, irrespective of the actor undertaking the investment.

[2] An increasing number of so-called "impact investors" seek out social investments that may offer below-market financial returns relative to the level of risk. Those investors committed $10.6 billion in 2013 (Saltuk et al., 2014), but are not the focus of this discussion.

Figure 1- The risk-return relationship: for the public sector to induce private investment, it must increase the return or reduce the risk of projects below the frontier



If a public sector actor, such as a government or donor, wishes to encourage commercial investment in an activity perceived by the private sector to be below the risk-return frontier, then the policymaker either has to find a way to increase the expected returns (so moving the yellow star upwards), or reduce the risk (so moving the yellow star to the left), or some combination of the two.

The Case for Policy Intervention

If the private investor has correctly perceived the risk and the expected private return, and if there is no social benefit from the project beyond the private return, and if the project is below the risk-return frontier (that is, the expected returns are lower or the risks higher than for other available projects) then the policy-maker should not intervene to attract private investment to the project. To do so would shift capital from better investments along the risk return frontier to investments that are worse (because they are below the frontier and so have a lower rate of return). Doing this would make the community as a whole worse off by using scarce resources to support projects that underperform compared to alternative investments.

Basic economic theory dating back to Pigou (1920) shows that if there are social benefits from a project that are not captured by the private sector, private investment will be sub-optimally low. If the private sector is more risk averse than the public sector, or misperceives the risks attached to projects, then this drives private investment down further, increasing the gap between the observed private level of investment and the socially optimal level of investment.

The public sector may improve outcomes by supporting investment in projects that the private sector would not otherwise choose if one or more of the following three are true: (a) there are expected social returns in addition to private returns, from which the private investor does not benefit (but the rest of society does); (b) the private sector systematically overestimates risk associated with the project; (c) the private sector systematically underestimates the expected private returns. We consider these possibilities in turn.

Case 1: Social Returns May Exceed Private Returns

It may often be the case that an investment generates social returns that are not reflected in the private returns that can be obtained by investors.

These positive externalities may include:

a. **vertical spillovers**: downstream firms may use new, better or cheaper inputs produced by the new firm, and the new firm might create demand for goods or services from other upstream producers in the economy;

b. **horizontal spillovers**: other firms may be able copy new techniques and innovations, or there may be benefits for the local labour force if a firm trains workers who can then work elsewhere;

c. **demonstration effects** by which the viability of a project shows other private investors that a given sector is profitable, crowding in further investments.

All these are positive spillovers from an investment over and above the private returns to investors. The vertical linkages and horizontal spillovers to other firms may be particularly important contributions to the acceleration of industrialisation in developing countries, and there is burgeoning evidence that this is one of the main avenues through which foreign investment improves the productivity of host economies (for example, Javorcik, 2004)

Such externalities also obtain in a well-functioning market, but the level of private investment in activities that generate them will be suboptimally low in the absence of policy intervention. There is therefore a sound rationale for public policy to support private investment where the social returns are larger than private returns. Public policymakers might be well-placed to identify those social benefits and design policies that increase private investment to bring them about.

Case 2: The Private Sector Systematically Overestimates Risk or Underestimates Returns

In the absence of perfect information, the private sector is sometimes wrong about risk and expected returns. But this is not enough, on its own, to justify a policy intervention to alter the risks perceived by private investors. To make the case that the private sector is not investing because it "misperceives" risks, the policymaker would need to believe all of the following:

a. private investors are systematically wrong: instead of sometimes under-estimating and sometimes over-estimating the risks, they systematically overestimate the risk relative to the returns;

b. private investors are persistently wrong: having miscalculated the risks initially, they do not discover their mistake and correct their method of assessing risk in future;

c. private investors are unanimously wrong: even if investors were wrong on average, the investment could still go ahead if the risks and returns were perceived correctly by a small number of investors provided that they have sufficient capital; and

d. the public sector is immune from all this: the policymaker can systematically assess the risks more accurately than every private investor.

That sets a demandingly high burden of proof on those who would use this argument to advocate public support for private investment. On the whole, it seems unlikely that the public sector can systematically outperform the private sector in either assessing the risks or evaluating the expected private returns of projects.

Policy Options to Support Investment

The discussion above suggests that there is a persuasive case for public support for investment where social returns exceed private returns, but that policymakers should treat with scepticism the claim that the private sector systematically misapprehends the private risks and returns.

Policies to support private investment can be broadly divided into three: those which reduce the risk to private investors, such as various kinds of loan guarantee and insurance; those which reduce the costs by providing subsidies (such as low-interest loans); and those which increase the expected private returns to investors.

None of these instruments is free. Guarantees to reduce risk to investors have an expected cost to the guarantor: some proportion of programmes will fail, in which case their guarantees will be called. Subsidies that lower the implementer's costs are paid directly by the taxpayer (through the proxy of the government or donor), and contracts that increase returns by paying for success mean the taxpayer has to pay up if a project succeeds.

As we show below (and in greater detail in Annex A), if the private sector and the public sector have the same information about risks, and the same risk appetite, then a contract that increases private returns has the same expected cost as a guarantee that reduces private risk.

Option 1: Guarantees

Guarantees are contracts that increase the incentives to invest or lend by shifting some or all of the costs of failure to the public sector (and therefore the yellow star in figure 1 to the left): if things do not work out and the firm defaults or the project underperforms, the government, donor, or public agency pays out. The guarantee can be provided to a financial institution, to mobilise greater lending to a project, or it could take the form of insurance to an investor to protect her from specific types of downside risk.

Guarantees are portrayed as providing three distinct, mutually-reinforcing benefits:

a. **cost:** because they are just commitments to repay loans in case of default and not outlays by the public sector, guarantees are claimed to deliver social returns at lower cost.

b. **leverage**: guarantees increase the total volume of lending because they enable private lending that otherwise would not have happened.

c. **additionality**: Because they increase lending through leverage, guarantees mobilise private investment for multiples of their nominal value.

We examine each claim in turn. (The implicit comparison for each is to a conventional spending programme, such as an aid project; other contracts to incentivise investment, such as those discussed below, may have similar benefits).

a. **cost**: Guarantees are "free" only if they never need to be paid. But if there was no chance that they would be called, they would have no value to the investors. If the investments were risk-free, banks would lend directly, obviating the problem guarantees are meant to solve[3]. Available data from rich countries suggests that, in reality, default rates for loans backed by public guarantees vary considerably, from lower than 5% in Germany to more than 40% in the UK (Riding and Haines, 2001). The value placed on a guarantee by the beneficiary is the same as the expected cost to the organisation that issues it.

b. **leverage**: even though guarantees are not "free", some agencies assert that leverage makes them a cheaper way to "crowd-in" private investment compared to alternatives. There are two problems with this reasoning. First, the alternatives, like subsidies and contracts that pay for success, also create leverage, since the level of

[3] Bulow and Rogoff (2005) provide a big-picture perspective on this problem, arguing that development financing should be primarily through grants because loans are worth much less than their book value when we properly account for the risks of default.

private investment they crowd-in exceeds their value. Second, there is an inherent trade-off between leverage and the expected costs of default: guarantees to riskier projects likely create more leverage, since those projects were less likely to be funded otherwise, but also increase the chance that those guarantees are called, increasing expected default costs; guarantees to less-risky projects carry lower expected costs of default, but create less "true" leverage (because less risky projects are more likely to be funded even without the guarantee).

c. **additionality**: We should be sceptical about how much additional private investment guarantees create. Honohan (2008) surveys this literature and finds that estimates of additionality are not econometrically identified (we often cannot show that guarantees cause additional lending because this lending might have happened anyway), vary a lot across countries and over time, and are relatively low. Similarly, Saadani et al. (2011) summarise several studies (mainly based on data from rich countries) that claim to find evidence of varying levels of additionality, but none are based on comparisons to a valid control group or counterfactual. For example, they cite interesting work by Boocock and Shariff (2005) evaluating a credit guarantee scheme in Malaysia, whose finding of additionality is based on interviews with the recipients of guarantees. On the other hand, Zia (2008) provides an interesting contribution by studying the effects on Pakistani exporters of cotton of being taken off a state-backed Export Finance Scheme. He finds that private firms reduced their exports while larger state-owned firms did not, and concludes that the finance scheme ameliorated the credit constraint on small firms. A well-designed evaluation could convincingly resolve the question of which type of contract crowds in more private investment[4], but generally we should not believe that guarantees encourage high volumes of truly additional investment.

Which types of risks can guarantees cover?

Risks vary substantially across projects, and various types of insurance have been tailored to meet them. Here, we use "guarantee" as something of a blanket term to refer to a range of instruments designed to mitigate risk. Girishankar (2009) breaks this down into a taxonomy that includes Partial Risk Guarantees (PRGs) to ensure payments if a government or other public agency does not deliver on its contractual obligations, Partial Credit Guarantees (PCGs) to cover private-sector banks or other lenders with respect to loans made to the public sector and Policy Based Guarantees (PBGs) that backstop sovereign lending, ostensibly to improve the terms on which some countries access the capital markets.

We include various kinds of insurance in this category, because insurance contracts also reduce risk borne by the insured; the World Bank Group's Multilateral Investment Guarantee Fund (MIGA) defines political risk insurance to cover risks "…associated with [host] government actions which deny or restrict the right of an investor/owner i) to use or

[4] Rigorously answering this question requires a valid counterfactual: what would credit provision have been if guarantees had not been rolled out? A randomised control trial (RCT) would be able to do this.

benefit from his/her assets; or ii) which reduce the value of the firm." In 2010, for example, the Overseas Private Investment Corporation (OPIC) provided political risk insurance for a post-earthquake project to rebuild Les Moulins d'Haiti, an industrial flour and animal feed mill. The instrument would cause OPIC to reimburse Seaboard Overseas Limited, an American firm contracted for the mill's rebuilding and maintenance, for costs arising from "political violence" (OPIC, 2010a). [5]

Other types of commercial risk insurance, in contrast, protect investors from risks that may be more directly within their control. In early 2014, USAID announced a $10 million facility to support increased lending to Kenyan clinics and hospitals to invest in medical equipment such as MRI machines and incubators manufactured by GE, an American firm (USAID, 2014). The USAID facility backstops loans by the Kenya Commercial Bank to these medical services firms, repaying half the face value of loans that default. The guarantee in this case ostensibly expands access to credit by covering the bank's commercial risks of making loans it otherwise would not.[6]

The absence of a reporting mechanism for these instruments, clear and agreed definitions of what constitutes a guarantee, and differences in how they should be valued for accounting purposes makes it difficult to estimate what share of guarantees are for commercial, rather than political, risks. Responding to an OECD survey of 24 development assistance committee donors and 17 international financial institutions, donors claim to have provided guarantees from 2009-2011 that "mobilised" $15.3 billion in additional investment (Mirabile et al., 2013). This headline figure is somewhat disingenuous: it refers to the total value of projects that received any kind guarantee, even if the guarantee only covered a portion of the debt or equity involved. Ramachandran et al. (2014) provide a useful data point: they calculate that of the $11.5 billion in guarantees provided by the largest development finance institutions[7] in fiscal year 2013, between $3-$3.5 billion was for political risk insurance.

Option 2: Input Subsidies, Including Concessional Lending

An alternative to raising expected returns by using guarantees to lower the costs of failure is to move the yellow star in Figure 1 upwards by reducing the cost of inputs.

[5] Even for such exogenous risks, however, there may be opportunities for investors to minimise the effects of the risk, which a guarantee would make them less likely to consider. For example, even though the risk of floods is exogenous, putting buildings on high ground rather than within flood plains is a choice for the investor. So even guarantees against exogenous risks can create moral hazard. Furthermore, guarantees that do not create moral hazard nonetheless incur expected costs, which we argue below could be spent better through contracts that reward success.

[6] An earlier version of this paper stated that the guarantee was "tied aid" because the capital held against potential loan defaults appeared to have been paid by USAID. In fact, the capital held against the expected loss for this guarantee was paid by General Electric, one of a small number of guarantees that have been structured like this that USAID has implemented. Though this is still a use of an aid agency's organisational overhead to facilitate US exports, it is not tied aid in the strict sense.

[7] These are: OPIC, CDC, PROPARCO, the Multilateral Investment Guarantee Agency (MIGA), the International Finance Corporation (IFC), and the African Development Bank (AfDB).

Here we use the example of concessional lending, a subsidy on the cost of capital, which raises a project's expected rate of return by lowering the financial burden of debt. This usually means letting a project borrow at a lower interest rate than it would get from a private lender, but could take the form of a grace period during which no interest has to be repaid, a longer loan tenor than private lenders would be willing to provide, accepting lower seniority status for a project's debt, or providing a direct loan because no willing private lenders exist (IFC, 2011).

There is some confusion in the project finance literature about where guarantees end and concessional lending begins. By backstopping a loan, some guarantees may also lower a project's cost of capital from other lenders – a private bank might offer a firm with a guarantee a lower interest rate because it knows the loan will be repaid in case of default. To avoid ambiguity, we consider guarantees purely as tools to increase returns by lowering the costs borne by an investor in case of failure (but without raising returns through lowering the cost of capital), and concessional loans purely as tools to increase returns by lowering costs (without repaying loans if an investor defaults). Concessional loans are therefore a particular kind of input subsidy.

Concessional loans are often presented as providing the liquidity that investors need to pay start-up costs. But in principle, any input subsidy that reduces the initial costs of the investment, and so moves the yellow star up to the risk-return frontier, would similarly unlock private capital.

Perry (2011) aggregates data on concessional finance from development institutions to private firms in developing countries and finds a rapid increase in the level of lending. Loan disbursements (a more accurate measure of actual flows than loan approvals) to the private sector in developing countries increased from around $3 billion in 1998 to US$13.3 billion in 2008, dropping to US$12.2 billion in 2009 after the international financial crisis (the last year in his time series). Moreover, while the full set of development finance instruments also includes equity and guarantees, concessional lending dominates, accounting for 80% or more of total development finance to private firms in most years.

Option 3: Paying For Success

An alternative approach to subsidising inputs or reducing risk is to provide a subsidy that is linked to specific measures of a firm's success or performance. This moves the yellow star in Figure 1 upwards by increasing the returns, rather than by reducing the costs.

For example, the advance market commitment (AMC) and development impact bonds (DIBs) are both mechanisms to distribute subsidies in such a way as to pay for success: in the case of the former for meeting vaccine development targets of cost, quantity and quality, and in the case of the latter for a broad range of outcomes that can be agreed between funding agencies and implementers and which can be transparently measured. As of late 2014, a DIB is being used to increase access to education for girls in Rajasthan, and a social impact bond is being used to combat recidivism in the UK. This highlights the point that while contracts to pay for success may initially appear to be uniquely suited for projects in which outcomes can be neatly conceptualised as measurable units (for example, kilowatt hours of electricity produced or number of phone lines serviced), in reality agencies can write effective contracts for a large range of social and economic projects.

Like concessional loans, these contracts also increase liquidity and enable firms to raise investment to meet up-front costs. An AMC, for example, increases the return to investors by guaranteeing to buy a service, stream of services, or product that meets objective cost and quality criteria– it is the promise of greater future profits (the investment's discounted net present value) that motivates the firm, and which enables them to raise finance from private capital markets or fund the investment out of retained earnings (Barder et al., 2005). Similarly, in a development impact bond, investors provide working capital to service providers on the back of a promise that they will recover their investment through payments from a donor or government if the service or product is delivered (Center for Global Development, 2013). Such contracts can be open-ended, paying in proportion to success, or they can be capped (for example, the AMC pays up to a fixed total.)

Contracts that reward success rather than subsidise failure may have powerful incentive effects, but contracting on the right outcomes remains a key challenge. This is not a trivial problem, but there has been considerable work on this in the context of AMCs and DIBs. More generally, many of the challenges of monitoring service providers to find out if they have earned their higher returns have been explicitly addressed by work on payment by results (PBR) and cash on delivery aid (COD), financing modalities that shift some delivery risk to implementers by paying for transparent, measurable outcomes rather than inputs (Birdsall et al., 2010).

A related challenge may be the optics of contracting on outcomes. As we show below, the subsidy paid to firms through instruments that pay for success can be calibrated to have the same expected cost as alternative instruments- like tax breaks or setting up special economic zones- that are popularly used to promote specific sectors or encourage foreign entrants[8]. In practice, though, it might be difficult for policymakers to gain political consensus for paying a 'bonus' to a foreign firm compared to bearing the 'hidden cost' of unpaid taxes. This might make it harder to implement paying for success, but is a feature rather than a bug: such paying for success 'bonuses' are likely to be subject to more scrutiny and evaluation than tax breaks, forcing policymakers to justify them more carefully.

Paying For Success in Practice

What might paying for success look like in practice? Cannock (2001) discusses the case of an experimental scheme to leverage private investment in telecoms connectivity for rural areas of Peru. In 1992, the Peruvian government created a fund (Fondo de Inversión en

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[8] Klemm and van Parys (2009) conclude that such tax incentives are effective in promoting FDI into Latin America and the Caribbean, but not Africa– itself a further reason for innovation in how subsidies are distributed

Telecomunicaciones, or FITEL) mandated to pay for improvements in rural connectivity and a specific target of providing payphone service in 5,000 rural towns and public internet access in 554 district capitals. The state telecoms regulator, Ospitel, defined the target population as those living in poor, rural areas with 500-3,000 inhabitants. Rather than defining a subsidy for providing service in these areas (where service provision was risky and came at higher cost due to lower economies of scale and higher investment costs associated), FITEL tendered the project so that firms could win concessions by bidding on the level of subsidy they needed to meet rollout and performance targets.

The pilot project was remarkably successful: competitive bidding resulted in a subsidy 41% lower than the regulator's estimate and 74% less than the offer for service provision by the incumbent telecoms firm operating in the pilot area. Cannock cites estimates that this pilot scheme required a subsidy of $11 per person served in the target areas but mobilized US$22 per inhabitant in private investment: a convincing case of additionality. Linking the subsidy to indicators also motivated performance: early in the project, the regulator levied a fine on the winning bidder for poor service provision that was equivalent to over a month of revenues.

Brook and Smith (2001) provide a book-length study of the promises and pitfalls of this kind of output-based approach to incentivising private sector investment and performance. They note several other relevant cases in which contracting on success incentivised the private sector's involvement, including subsidies for water provision in Chile and Guinea and paying Romanian clinics to provide better preventative care.

The Expected Costs of Each Approach Are the Same

One reason that donors may choose guarantees rather than input subsidies or to pay for success may be that they believe that they are a cheaper way to bring about additional private sector investment. This intuition is usually wrong. We show below that the expected cost of paying for success is generally the same as the expected cost of reducing risk– in short, cost should not be the deciding factor between these approaches.

To fix ideas, consider a stylised example. Suppose there is an investment opportunity with a return of $10 if it succeeds and zero if it fails. In the event that the project succeeds, there is also a social payoff (in excess of the private payoff) of $5. The risk to these returns is characterised by an 80% chance the project will succeed, so a 20% chance it will fail.

The firm will capitalise the project with $5 in debt[9] at a 20% interest rate. For the same level of risk, suppose that the firm's alternative (available on the risk-return frontier) is to invest in a security that has an expected pay off of $3.

[9] This capital structure is exogenous (it does not change in response to the different financing scenarios). For simplicity, we assume the costs of default are only the repayment of the loan's face value.

The firm's payoff from project in 'expected net present value' terms is a function of the chances of success or failure. The expected value of success depends on the value of a positive outcome, less the repayment of the debt's face value and interest payments; the expected cost of failure depends on the costs of repaying the loan's face value. Using π_P to denote payoffs of the private investor, π_S for payoffs to society, π_G for payoffs to the public sector, we can write the investor's expected payoff as:

$$\mathbb{E}(\pi_P) = 0.8(10 - 5 - 0.2 \times 5) - 0.2(5) = 3.2 - 1 = 2.2$$

The firm rejects the project because this is lower than the outside option of investing in a security with the same level of risk and earning \$3, so the social payoffs π_S are \$0, the private returns π_P are \$0 and the costs borne by the donor or government π_G are \$0.

The Cost of Providing a Guarantee

The donor would like to use the private firm to achieve the project's positive social returns. To do this, it guarantees the firm's debt, reducing the downside risk of the investment. To make the firm just indifferent between a security with the same level of risk and this project, the donor needs to reduce the debt to be repaid in case of failure by some amount. Using CG to denote the cost to the public sector, this is:

$$3 = 0.8(4) + 0.2(-5 + CG)$$

implying $CG = 4$. This means the donor or government accepts the liability of re-paying \$4 in case of failure but gets no positive payment if the project succeeds; the public actor must accept an expected cost in order for society to reap the positive expected return.

Under the loan guarantee, the firm is just indifferent between the socially valuable project and investing in a security. The expected payoffs are $\pi_P = 3$ to the private sector (investor), $\pi_S = 0.8 \times 5 = 3.2$ to society, and $\pi_G = 0.8(0) - 0.2(4) = -0.8$ to the donor.

The cost of giving a subsidy

The donor could also increase the firm's expected returns by providing a lump-sum subsidy, lowering the costs of inputs, or lowering the cost of capital using a subsidised loan.

If the donor or government wants to provide a subsidy through concessional lending, we determine the interest rate r that makes the investor just indifferent between the project and a security on the risk-return frontier:

$$3 = 0.8(10 - 5 - r \times 5) - 0.2(5)$$

giving $r = 0\%$. In other words, for these (arbitrary) values, the investor would require an interest-free loan to achieve an expected payoff of 3.

The donor or government will get the loan's face value back in case the project succeeds and earn nothing if it fails. In this case, the public sector's payoff is the expected value of this loan adjusted for the opportunity cost of not lending the same amount of money to a project with the same chances of success that would pay the market interest rate: the expected return for this level of risk, as determined by the efficient frontier. In numbers,

$$\pi_G = [0.8(5) - 0.2(5)] - [0.8(5 + .2 \times 5) - 0.2(5)] = -0.8$$

The key insight is that loan guarantee carries the same expected cost if the government's payoff includes the value of the concession. The payoff to the firm with no intervention is \$2.2, so expected returns need to be increased by \$0.8 to make investors just indifferent between the outside option of a security with this level of risk or investing in the socially valuable project.

An alternative to guaranteeing debt is for a donor to increase expected return by providing a subsidy to the firm if the project succeeds. Below, we outline the positive effects associated with paying for success, and here we show that these contracts should generally have the same expected cost.

The Cost of Paying For Success

A contract to pay for success that pays \$0.8 only if the project is successful has a value, B, determined by

$$0.8 = 0.8(B) + 0.2(0)$$

or $B = \$1$. If making the investor indifferent causes the project to go ahead, the payoffs are once again $\pi_P = 2.2 + 0.8(1) = 3$ to the private sector (investor), $\pi_S = 0.8 \times 5 = 3.2$ to society, and $\pi_G = -0.8(1) - 0.2(0) = -0.8$ to the public sector.

Equivalent Costs

Collecting these payoffs shows that guarantees, subsidies linked to performance, or concessional lending cost the same amount: all of these interventions raise expected returns from success or lower expected costs of failure. Therefore, we should not believe that providing guarantees or concessional lending is a cheaper way to create incentives for private sector involvement.

Expected payoffs	No intervention	Loan guarantee	Subsidy	Pay for success
$\mathbb{E}[\pi_P]$ Investor	2.2	3	3	3
$\mathbb{E}[\pi_G]$ Government	0	-0.8	-0.8	-0.8
$\mathbb{E}[\pi_S]$ Society	0	3.2	3.2	3.2

This stylised example ignores complexities like discount rates, multiple time periods, or different probabilities of failure at different stages of implementation. Including those features, as we do in a simple financial model below, does not change the main result: if the government and the private sector share the same view of the risk, then the expected costs of offering a guarantee, providing a subsidy, or paying for success should be the same for the donor, and equal the expected benefit to the implementer. All are better than no intervention at all.

The Advantages of Paying for Success

In principle, all these types of instruments have the effect of increasing private investment by the same amount for the same expected cost to the public sector. This might lead to misplaced complacency about the choice of instrument. For the rest of this paper, we take as given that the expected costs are the same, and look at the way that the different instruments might affect behaviour in different ways, and so have different overall impacts on the desired outcomes.

There are seven possible reasons why instruments that pay for success may have better long-run effects than guarantees that cost the same amount. Linking the pay-outs to success could:

a. **improve performance management**: Managing innovation requires "failing fast" (that is, identifying and exiting unsuccessful approaches) and "failing forward" (that is, learning from mistakes). Generally, investors need to face appropriate incentives to ensure that the project succeeds. Atkin et al. (2014) generate a striking, rigorous example of this by randomly exposing Egyptian carpet manufacturers to the export market: the demand shock raised profits, quality, and productivity. If investor effort is important for the project's success, then guarantees that insulate the investors from the cost of failure will tend to reduce the likelihood the project is successful and sustainable, and reduce the expected social returns.

b. **reduce moral hazard**: The more investors are insulated from the risk of a project, the less time and effort they will invest in careful due diligence before they invest, so firms will take on higher risk projects (Stiglitz and Weiss, 1981). Eichengreen (1996) provides a colourful example of this by examining the case of debt subsidies to US railroad companies during the 1800s– these firms overpaid themselves using borrowed money precisely because the government bore the costs of their defaults. Moral hazard is likely to be more problematic for guarantees that cover risks that are most within the control of investors. To return to the examples above, when USAID enters into an agreement to reduce losses to banks that expand access to credit, it induces the bank to make riskier loans than it otherwise might not. When OPIC provides insurance for assets that may be damaged by political violence, it reduces the costs to service providers arising from risks that are more likely to be truly exogenous. A parallel argument applies to the lenders: as Adams et al. (1984) argued in the case of rural credit schemes, lenders have an incentive to shift their riskiest borrowers to loans backstopped by the public sector, effectively increasing expected losses. Paying for success, in contrast, enhances the incentive for investors and lenders to investigate carefully which projects are most likely to succeed.

c. **improve targeting**: The authorities may want to target a subsidy on investments with the largest gap between private and social returns – for example, focusing on the most socially valuable products or the most disadvantaged communities. Mechanisms to pay for success can be tailored to target the subsidy on precisely these outcomes, whereas guarantees and input subsidies are a far blunter instrument. For example, if you want more investment in cures for neglected diseases, you want to make the subsidy bigger for the diseases that cause a bigger burden on health so that firms have more reason to pursue those solutions. A general guarantee provided to a fund that invests in neglected diseases (such as the guarantee provided to the Global Health Investment Fund[10]) provides the same implicit subsidy to every medicine that is researched as a result, irrespective of whether the gap between social return and private return is large or small in that case.[11] Generally, a guarantee subsidises all activities a firm undertakes (including those unrelated to the targeted project) while a contract to pay for success can be targeted towards those activities that are most closely linked to the socially-valuable outcomes.

d. **promote contestability and reduce corruption**. One of the disadvantages of many public subsidy mechanisms is that they require the donor or government to pick a winner in advance, potentially choking off competition or increasing the returns to corruption. But if the authorities pay for success rather than reducing risk, they can more easily create a more contestable market because the subsidy can be provided to whoever produces the positive outcomes. This means that any firm can innovate and compete to provide the service and benefit from the subsidy. For example, any firm able to produce drugs to treat neglected tropical diseases could earn higher returns from an Advance Market Commitment, obviating the need for the donors to choose amongst competing research strategies. Guarantees and concessional loans, in contrast, generally require the public body or someone acting on their behalf to decide in advance which firms or which sectors will benefit from them.

e. **avoid the costs of optimism bias**: It is easy for authorities and firms to develop a shared, sincere but ultimately misplaced optimism about a project, resulting in good-faith decisions to support projects that ultimately fail. Frankel (2011) is a recent contribution to the wider literature examining excess optimism in fiscal forecasting by governments; he confirms that this upward bias is statistically and economically significant and strongly pro-cyclical in a large sample of countries. If the authorities provide guarantees, this will prove expensive because more projects will fail than

[10] See http://ghif.com/about/

11 It might be possible to refine a loan guarantee to make it a bit more targeted, but this is difficult to do since a guarantee attaches to financing and firms rather than results.

they expect. But if the authorities instead support such projects by paying for success, then taxpayers will not have to bear the costs if policymakers turn out to have been too optimistic.

f. **build public support**: When a loan guarantee incurs a budgetary cost – inevitably, some do – it will be because a project or programme has failed. When a contract to pay for success generates a payment, it will be because a project has succeeded. Keeping in mind our argument that the expected costs are the same, politicians and the general public are much more likely to continue to support programmes that pay out for success, rather than paying debts to investors when projects fail or paying for subsidies regardless of performance.

g. **reduce monitoring and evaluation costs**: Lending to a private firm or providing them with input subsidies requires a lot of costly oversight to ensure that the funds are properly used. Financial transparency is essential, of course, but only some borrowers have the capacity to fulfil these commitments (or are based in an ecosystem where other firms, like accountancy firms that can do trustworthy financial audits, can do so), and providing due diligence imposes transaction costs. Both these effects segment the market for concessional finance so that only the "least worst" firms have access to soft loans or guarantees. Contracts to pay for success, in contrast, refocus the burden of monitoring on results, which can both increase the number of eligible firms and reduce the costs of monitoring.

The table below summarises our view of how contracts to pay for success compare to the other instruments a policymaker might use.

	Guarantees	Subsidies	Pay for success
Avoid moral hazard in project selection	✗	✓	✓
Better performance management	✗	✓	✓
Improve targeting	✗	✗	✓
Promote contestability	✗	✗	✓
Avoid the costs of optimism bias	✗	✗	✓
Build public support	✗	✗	✓
Reduce monitoring and evaluation costs	✗	✗	✓

Of course, choosing to pay for success does not automatically generate all these potential benefits: public agencies that want to subsidise success still need to carefully consider which outcomes to contract on, how those outcomes are measured, and the extent to which contracting on those outcomes could distort implementers' incentives. But in general, this approach can avoid the moral hazard inherent in guarantees and other unintended consequences, such as loss of contestability, that are inherent in both guarantees and input subsidies.

All of these reasons suggest that mechanisms to subsidise success will in general be better value for money and more effective than either guarantees or general subsidies. An input subsidy such as a concessional loan is a little better than a guarantee because it is less likely to create moral hazard in project selection and may result in better project management; but paying for success is still likely to be better than either guarantees or concessional loans, for the reasons listed above.

A Simple Financial Model of Paying For Success: Expanding Access to Education in Kenya

How might this kind of contract work in the context of a real, socially valuable investment? In December 2013, the Overseas Private Investment Corporation[12] (OPIC) announced a $10 million concessional loan to Bridge International Academies ("Bridge"), an innovative start-up based Kenya whose mission is to dramatically lower the costs of education for poor people. We use the details of this loan and Bridge's expansion- together with plausible assumptions where the data are not publicly available- to demonstrate that paying for success, providing a guarantee, or, as OPIC opted to do, subsidising inputs can all be implemented for the same price.

OPIC chose to support Bridge by offering a loan at below-market rates[13]. The OPIC handbook indicates that the loan's interest rate is based on US treasury bills (paying historically low yields) of the same tenor plus a premium of 2%-6%. In a financial model set out in Annex B, we assume a 4% concessional rate and that borrowing from a private bank for the same project would have cost Bridge 10% per year[14]. (The real figures are not published, so these are simply plausible estimates to illustrate our argument).

Cost-saving innovations, like spending little on construction by using three building templates, providing scripted lessons, and closely monitoring performance enable Bridge to deliver strong educational outcomes for students at a cost of roughly $6 per student per month in areas where average income is as low as $60 per person per month. OPIC's loan is

[12] OPIC is a publicly backed investment agency that provides concessional finance such as loans, loan guarantees, and equity investments to projects that have strong development potential. The Center for Global Development has previously argued that as a private investor in projects and firms perceived as risky by traditional sources of capital, OPIC has delivered substantial, cost-effective development impact (Leo et al., 2013).

[13] The total project value of $26 million was funded through the loan from OPIC and two equity investments: one from the International Finance Corporation (IFC), the private finance arm of the World Bank, for $10 million and the remaining $6 million from CDC, the UK's development finance institution.

[14] Project documents show that the loan's tenor is 10-years, with further concession in the form of four-year grace period. For simplicity, we assume that the entire principle is repaid in the final (10th) year of the loan, while interest is charged from year four onward.

meant to enable Bridge to build 237 new schools over the next decade that will eventually enrol 300,000 additional pupils.

We combine information about revenue, forecast enrolment, capital expenditures for building schools, and costs per student to arrive at the project's earnings in each year as Bridge's stock of schools increases. These cash flows are discounted by the return on equity[15] and added together to get a present value of the school-building project to Bridge of $19.13 million. (An important note is that we ignore the project's terminal value, the value of running these schools beyond year 10).[16]

We evaluate the project's net present value as the sum of the present values of these cash flows, plus the tax benefits (the "tax shield") of debt, less the costs of paying back the loan. The project's value under the lower, concessional interest rate of 4% offered to Bridge is $9.15 million, which goes down to $5.90 million if Bridge had borrowed at the higher, private-sector interest rate of 10%.

	Net present value (USD mn.)
Concessional financing	$9.15
Private financing	$5.90

The value of the concessional loan, which we denote L, is the difference in these net present values: $L = 9.15 - 5.90 = \$3.26$ million.

The loan's expected value to Bridge depends on the project's likelihood of succeeding. As we have argued, we do not have better information on this than the private sector's evaluation of the risk. We measure this default risk based on the difference between the present value of the loan at the private sector's 10% interest rate and that of the risk-free option of buying US treasury bonds, which pay a lower interest rate but carry no risk of default. The intuition is that the higher interest rate compensates the lender for the risk the loan will not be repaid. As Annex B shows, this gives an expected probability of success, denoted p, of 0.75. This makes the project's expected net present values under the higher and lower cost of borrowing $1.97 million and $4.42 million respectively.

	Expected net present value (USD mn.)
Concessional financing	$4.42
Private financing	$1.97

The expected value of OPIC's concessional loan to Bridge is therefore $4.42-$1.97= $2.45

[15] Interest payments on debt are tax-deductible, so we use a 38% corporate tax rate from the Kenyan tax code for overseas-registered firms because Bridge Academies' parent company is headquartered in Delaware.

[16] There are many ways to generate terminal values, but all have the effect of dramatically changing net present values in response to small changes in assumptions about future growth rates. We ignore these complications here to focus on our main result about equivalent costs of various instruments that incentivise private investment.

million. This is the target benefit to Bridge: any alternative instrument to incentivise Bridge would have to provide at least this level of expected value.

For example, OPIC could have used a loan guarantee. In case of failure, the guarantee would shift repayment risks from Bridge to OPIC, and it is the value of this reduction in downside risk that could make Bridge indifferent between borrowing from a bank and getting a concessional loan. In this case, the guarantee's required value, which we denote CG, is realised only if the project fails with a probability $(1-p)$. We can determine its required value from $\$2.45 = (1-p)(CG)$, giving $CG = \$9.92$ million, so OPIC would need to guarantee $9.92 million of the $10 million loan to provide an expected benefit to Bridge equivalent to that of the concessional loan.

Finally, OPIC could have used a contract to pay for success to incentivise Bridge's involvement. In this case, the contract could take the form of a per-student subsidy for each student enrolled. How much would OPIC have to increase returns to provide Bridge the same level of expected benefit as a cheap loan? Based on Bridge's discounting of future revenues, we show in Annex B that such a scheme implies an average subsidy of about $0.23 per student per month, or $2.58 per student per academic year.

Equivalent Costs, Different Incentives

Once again, the nominal costs of these three instruments appear different, but their expected costs are to OPIC and value to Bridge are the same.

Since the subsidy per child enrolled is paid only in case the project succeeds, the expected cost to the donor is the value of the required subsidy times the probability of success, or $p \times (-B) = p \times -\$3.26 = -\$2.45$ million. Similarly, because the loan guarantee is only called if the project fails, the expected cost to the donor will be the chance of failure multiplied the cost of the guarantee, or $(1-p) \times (-CG) = (1-p) \times (-\$9.92) = -\$2.45$ million. Finally, the value of the concessional loan is the difference in expected present values of lending at 4% to Bridge and the value of lending at 10% to a project with the same risk, which simplifies to $p \times (-L) = p \times -\$3.26 = -\$2.45$ million.

OPIC could have given the same support to Bridge as they did through a concessional loan by partially guaranteeing a commercial loan– or by offering to pay Bridge $2.58 per student per year. The expected cost to the US Government would have been the same in each case, but the impact on the decisions taken by Bridge and by other investors would be quite different.

In particular, we assumed that enrolment would be the same in all three scenarios to highlight the fact that increasing returns can be done at the same expected cost as providing subsidies or guaranteeing a loan. In reality, if OPIC paid Bridge for enrolment (and took care to stipulate in its contract that any additional children would get the same quality of schooling, and subsequently monitored quality), Bridge would probably be even more focused on expanding enrolment and the quality of education. Instead, if OPIC had used a loan guarantee, Bridge would simply not have to repay the loan if it could not meet its enrolment targets and the project failed. And the concessional loan that OPIC did choose reduces the costs of whatever Bridge does, whether or not it contributes to enrolment or educational outcomes. A contract to pay for success based on enrolment figures would allow OPIC to target the subsidy on the outcome most closely associated with the social return that they (and we) care about: increasing access to affordable, effective education.

Furthermore, a guarantee or a subsidised loan has the effect of crowding out competitors. The subsidised loan was provided to Bridge. By contrast, if OPIC had offered to pay $2.58 per year for a student receiving a good quality education, that offer could have been open to any firm. A new, innovative start-up could have set up its own schools to compete with Bridge– this could be a domestic firm that might be less likely to be able to negotiate up-front funding from an international agency. Thus the effect of the loan that OPIC actually gave to Bridge may be to enable Bridge to expand but at the expense of crowding out innovation and investment in the market as a whole.

Finally, OPIC could have provided a more targeted subsidy – for example, a larger payment for girls going to school than boys, or a premium for children in rural areas (like those that DFID is offering to the Ethiopian government[17]). A subsidised loan or a guarantee, by contrast, cannot be tailored to the results for which policymakers want to create particular incentives.

When Might a Guarantee Be Useful?

We have argued that paying for success can be done at the same expected cost as issuing a guarantee or using concessional finance, but that doing so generates valuable, positive incentive effects on investors' behaviour.

There are, however, three rare circumstances in which measures to reduce the risk of investments are cost-effective and useful compared to measures to pay for success (with some important caveats):

a. **because of a "protection racket" externality**: some private investors' risks might benefit from a unique positive externality associated with getting a risk guarantee from a powerful international agency. Purely hypothetically, part of the risk of failure in facing Bridge's project could be that local authorities might illegally appropriate school buildings or other capital. If the project were covered by political risk insurance from the Multilateral Investment Guarantee Agency (MIGA), the threat of civil prosecution in foreign courts might raise the costs of this action from the government's perspective, thereby discouraging it. This is an externality because it is a reduction in the real world risk of the project, over and above the transfer of

[17] See Rogerson (2011) "What if development aid really rewarded results?" http://www.oecd.org/dac/47041528.pdf

risk from the project to the agency issuing the guarantee. OPIC provides examples such advocacy on its website, ranging from making representations to a tax ministry to "defer enforcement actions" until an investor's court case had gone through additional appeals to "engaging in multiple discussions" with a city to secure an award to a US investor for seizure of assets and income by a local partner (OPIC, 2014b). In most cases, we should generally be cautious about conceding this possibility– these examples are driven by agencies' discretion and are not a feature of guarantees per se. More generally, donors and governments often suffer from excess optimism about the extent to which their "technologies", such as their ability to plead guaranteed firms' cases, provide technical assistance, or deliver entrepreneurship training actually change a project's chances of success.

b. **when there are information asymmetries**: if private investors systematically and persistently overestimate the risks, but the public authorities do not, then the expected cost to the public sector of issuing a guarantee may well be lower than the expected cost of alternative mechanisms to increase private investment by the same amount (this follows from the seminal paper by Arrow and Lind, 1970). In Bridge's case, this would be an overly pessimistic evaluation of the probability the project will fail, which would raise the nominal cost of a loan guarantee– but since the private sector had misjudged the risk of failure, the loan guarantee would be less likely to be called, reducing its expected cost. However, as discussed above, it is very hard to believe that the private sector is systematically wrong about evaluating risks and payoffs, and that the public sector is better placed to do so. If an investor can persuade OPIC that the risks are low, but cannot persuade a bank, is OPIC or the bank more likely to be right?

c. **as a commitment mechanism**: public authorities may use a guarantee to make a credible disclosure of private information or to pre-commit themselves to certain behaviours. For example, suppose investors believe that there is a risk that the authorities might change a regulation in a way that would be harmful. The authorities may have no intention of making such a change, but might not be believed if they say so, for example because of time inconsistency (Kydland and Prescott, 1977). By guaranteeing the investment against losses from regulatory changes, the authorities can persuade investors of their intention to keep the regulations unchanged. In Bridge's case, for example, a local authority could commit to providing its schools a regular supply of water or electricity over the course of year. Failure to meet these supply targets could trigger payouts from the authority to Bridge. This is effectively a version Ramachandran et al.'s (2014) proposal that governments in developing countries should write insurance contracts that bind them to making high profile payments to private investors in case of insufficient service delivery.

Why Have Policy-Makers Preferred Reducing Risk to Increasing Returns?

If paying for success is equivalent in cost terms to other strategies to crowd in private sector investment, why have donors and governments traditionally relied on tools like guarantees and subsidies? There are a few reasonable explanations:

a. **policymakers do not understand** that the expected costs of these interventions are the same, and incorrectly believe that a guarantee 'leverages' more private investment than paying for success. In fact, as we show above, the costs of increasing returns should generally be the same as the costs of decreasing risk.

b. **policymakers benefit from them** through crony capitalism arrangements in which officials and elites capture rents because they can allocate scarce resources such as credit or hard currency. Johnson and Mitton (2003), for example, study the case of capital controls in Malaysia, showing that they were a mechanism through which politically connected firms could be favoured. (This is a risk for any kind of resource transfer, of course, and poorly designed or opaque contracts to pay for success could also be abused). Donors are happy to give guarantees and loan subsidies to their national companies, and may prefer this to more competitive mechanisms such as raising returns.

c. **policymakers suffer from an optimism bias** that the risks are lower than they really are, which makes guarantees seem cheaper. Policymakers may convince themselves that they know more than the private sector about the real risks of an investment. However, if this were really the case they should be able to make the relevant information public, thereby encouraging the investment without having to pay to reduce risk or increase returns.

d. **policymakers want to kick the can down the road** because budget rules often do not require them to include the expected costs of guarantees within their budgets, so enabling the authorities to bypass their own budgetary constraints. Shi and Svensson (2006) is a good example of a large empirical literature showing that our intuition that politicians like to 'spend today and pay tomorrow' is reflected in cross-country public finance data (and that political pressure, like elections, increases the desirability of spending today). Keeping expenditures on budget is a good thing: it means that expenditures are debated when they are made and the decision makers responsible are held to account.

e. **policymakers are used to them** because many donors and public agencies have experience structuring guarantees, while instruments like AMCs or DIBs are relatively recent innovations.

Budgetary Treatment

A final point deserves special mention: the choice of which instrument to use does not happen in a political vacuum, and both civil servants and policy-makers may have strong incentives to spend today but attribute costs to budgets later.

Better public finance laws could nudge policy-making in the right direction by forcing financial decision makers to score expected spending more accurately on contemporary budgets. For example, in 1990 the US Congress enacted the Federal Credit Reform Act, requiring federal agencies issuing a loan guarantee to face an attributed budget cost based on the guarantee's expected future pay-out. If done correctly, it minimises legislators' ability to ignore the future costs of promises issued today[18]. In most other countries, though, these liabilities do not become budgetary costs until the risk materialises and the project in question defaults, unable to meet its financial obligations. In a time of tight budgets for development, we should expect strong pressure to subsidize the private sector through guarantees rather than grants, because the full costs of issuing guarantees appear later. This pressure should be resisted. There would be fewer distortions to decision-making, and more transparency about public finances, if contingent liabilities were accurately recorded on the public sector balance sheet.

That said, contracts to pay for success can, like guarantees, enable public agencies to leverage private sector investment without a full, immediate budgetary cost. Contracts to pay later, contingent on success, are often not scored in the budget; and if public finance rules require that they are, they should be scored at their expected present value, reflecting discounting and pricing in the probability of payment.

Therefore, from the point of view of budgetary treatment, there should be little to distinguish guarantees, subsidies, and contracts that pay for success.

Conclusion

Thankfully, it is no longer controversial that the private sector has a valuable role to play in development, and that the state cannot replicate this role. Since the private sector is a valuable partner and because some projects have social benefits that are sometimes much greater than the private returns they provide, there is a sound rationale for the public authorities to intervene to crowd in private investment.

Policymakers sometimes cite an alternative rationale for public investment: that the private sector has systematically overstated the risk. This is much less persuasive. It would require the public sector to be systematically more accurate than private investors in its evaluations of risk. The erroneous belief that the private sector has overstated risk can lead policymakers to believe that compensating for risk- for example, by using a loan guarantee- is the best

[18] The law requires the discounted present value of the guarantees to be scored in the budget (using discount rates derived from US Treasury securities of a relevant maturity).

solution for underinvestment. But if the private sector is correct about risks, as we should suspect, the costs of these guarantees will be higher than the authorities predict, generating losses that are ultimately borne by taxpayers.

Loan guarantees may be useful in particular circumstances, especially if they enable the authorities to commit to reduce investment risks that they control or reduce the risks of failure to a greater extent than their cost. Similarly, subsidies may be appropriate for some projects, for example when specific outcomes are difficult or impossible to measure (or the costs of doing so are too high).

For the vast majority of projects, though, the market failure is that social returns go unrealised because private returns are too low to attract investment given their risk. Policymakers should therefore make much more use of instruments that create incentives for investors by paying for success, through contracts that raise returns based on specific, transparently measured, and mutually agreed outcomes, or contracts that combine some level of guarantees with such rewards for performance.

Contracts that pay for success mobilise private capital just as effectively as spending the same amount of public resources only on guarantees and loan subsidies, but also have important benefits that the other approaches do not. They improve incentives for investors to choose and manage projects effectively, promote more contestable markets while reducing the costs of optimism bias, build public support by paying for success rather than failure, and reduce the need for policymakers to try (and too often fail) to pick winners.

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Annex A

Investments are combinations of uncertain returns $\tilde{r}$, expected returns $E(\tilde{r}) = \bar{r}$, and standard deviation (risk) σ. As in figure 1, there is a positive relationship between expected return and risk, so $\bar{r} = m\sigma$, with $m > 0$. Investors have access to a common set of combinations of risk and return along the capital-market line, and this set of investments represents the maximum level of expected return available per unit risk.

Some investment a is associated with less risk and lower return than some investment c, $\bar{r}_a < \bar{r}_c,\ \sigma_a < \sigma_c$. Some socially valuable investment b has expected returns that are low given its levels of risk, $\bar{r}_b < \bar{r}_c,\ \sigma_b = \sigma_c$. Since investment b carries social returns in excess of its private returns, the public agency may wish to incentivise the private investor by increasing her returns or decrease her risk. Writing the project's expected payoff as

$$\pi_b = \tilde{r}_b + h(\tilde{r}_b - \bar{r}_b) + t$$

gives it return $\bar{r}_b$and variance $(1+h)^2\sigma_c^2$, where h is a mean-preserving spread on $\tilde{r}$. Choosing a value of h below zero decreases the investment's risk, while choices of t greater than zero increase the investment's expected return. The return per unit risk is the also the slope of the capital market line, $m = \frac{\bar{r}_b + t}{(1+h)^2\sigma_c^2}$.

This clarifies the public sector's set of policy choices: it can make the social investment attractive to the private investor at point c by keeping the level of risk the same and increasing returns, implying $h = 0$, requiring $t = (\bar{r}_c - \bar{r}_{a,b})$ or it could choose choosing $t = 0$ and $h = [(\sigma_a/\sigma_c) - 1] < 0$. Combinations of (h, t) between these values move the project along the locus of risk-return combinations on the capital market line between a high risk, high return investment c and the comparatively low-risk, low-return investment a.

The cost of moving an investment to the efficient frontier by reducing risk must be equal to the cost of doing so by increasing returns. To see this, imagine it costs some amount ϵ to reduce risk from σ_c to σ_a, and $\epsilon < (\bar{r}_b - \bar{r}_c)$. But then it would be possible to pay this and earn a risk-adjusted return (call it j) $\frac{\bar{r}_j}{\sigma_a^2} > \frac{\bar{r}_a}{\sigma_a^2}$. This point lies above the capital market line in return-risk space, violating the assumption that the set of points along the capital market line are the maximum expected returns available per unit risk. This is a contradiction.

Therefore, if investors face a common risk-return frontier and the set of trade-offs along the frontier is efficient, we should expect that the cost of lowering h is the same as increasing t. Put differently, we cannot reduce risk for a lower cost than the change in expected returns associated with those risks.

Annex B

Valuation framework

We use a simple but internally consistent framework to value Bridge's expansion plan and show that different incentive schemes are cost equivalent.

We define the value of the project as a function of the discounted present values of the cashflows from operations $PV(C)$, debt service $PV(D)$, and the tax shield $PV(T)$.

The net present value of the project is

$$v^{H,L} = PV(C) + PV(T^{H,L}) - PV(D^{H,L})$$

The project's cash flows are determined based on project documents submitted to OPIC. The planned expansion will allow Bridge to enrol an additional 300,000 pupils in 237 new schools, implying an average of 1,266 students in each school, each paying $p = \$6$ a month in fees, or \$66 a year based on the average Kenyan academic year of between 11 months.

While the marginal costs of paying for additional pupils is low, we capture the monthly cost of inputs like instructional materials by estimating a cost per pupil of \$3 per month, c. Capital expenditure costs are incurred for building new schools, and Bridge keeps these low by using three standardised design templates, with an average cost per school of $x = 25{,}000$. Since 237 schools will be built over the project's 10-year horizon, we assume an average of 23.7 schools will be built per year.

Consistent with Bridge's existing schools, we assume that each school is fully subscribed at completion (after capital expenditure is made at the start of each year), so enrolment is given by $q_t = 23.7 \times 1{,}266 \times t.$ Therefore C_t is driven by school roll out less capital spending $X = 23.7 \times 25{,}000$ and taxes at rate τ, or $C_t = [(p - c)q_t - X](1 - \tau)$.

This is the unlevered free cash flow (UFCF), which we discount at a modest return on equity r_e required by the equity holders (CDC and IFC).

The present value of debt service and repayment will depend on whether Bridge pays the market interest rate r^H or the concessional interest rate r^L, where the superscripts denote 'high' or 'low', so $r^H > r^L$. Because the OPIC loan features a four-year grace period, these payments begin in year 5 and the full face value of the loan is repaid in year 10 in the case of the concessional loan with interest rate r^L. Non-concessional loans do not have a grace period, so interest costs begin in the first year. The cost of debt service is discounted at the risk-free rate r, and the tax shield on interest payments is determined by the corporate tax rate τ.

The present value of cash flows, borrowing costs, and tax shields are given by

$PV(C)$	$PV(C) = \sum_{t=1}^{T=10} \frac{C_t}{(1+r_e)^t}$
$PV(T^{H,L})$	$PV(T^{H,L}) = \sum_{t=1,4}^{T=10} \frac{\tau \cdot r_d^{H,L} D}{(1+r)^t}$
$PV(D^{H,L})$	$PV(D^{H,L}) = \sum_{t=1,4}^{T=10} \frac{r_d^{H,L} D}{(1+r)^t} + \frac{10}{(1+r)^{10}}$

For simplicity, we set the terminal value to zero, since small differences in discount rates and growth assumptions would dominate the differences in project valuations we are interested in showing.

Value of Lending

OPIC has three lending options: lending to Bridge at the concessional interest rate r^L, to a private sector firm at the non-concessional rate r^H, or in a riskless asset and earn the risk-free interest rate r^H. Generally, $PV(D^{H,L,T}) = \sum_{t=1,4}^{T=10} \frac{r_d^{H,L,T} D}{(1+r)^t} + \frac{10}{(1+r)^{10}}$.

Assuming a concessional interest rate of 4%, a private sector lending rate of 10% (which also excludes the four-year grace period OPIC offers), and a risk-free rate of 2.5% gives the following present values in millions of USD for these lending possibilities

$PV(D^T)$	$\sum_{t=1}^{T=10} \frac{r_d^T D}{(1+r)^t} + \frac{10}{(1+r)^{10}}$	\$10.00 million
$PV(D^L)$	$\sum_{t=1}^{T=10} \frac{r_d^L D}{(1+r)^t} + \frac{10}{(1+r)^{10}}$	\$11.31 million
$PV(D^H)$	$\sum_{t=1}^{T=10} \frac{r_d^H D}{(1+r)^t} + \frac{10}{(1+r)^{10}}$	\$16.56 million

Project Value

Based on project document submitted to OPIC, Bridge's planned expansion calls for building 237 new schools in 10 years. The average cost of a new school is just \$25,000, which Bridge achieves by standardising its school designs based on three basic templates and using simple building materials. The additional schools will enrol 300,000 pupils, implying an average of 1,266 students in each school, each paying \$6 a month in fees. While the marginal costs of paying for additional pupils is low, we capture the monthly cost of inputs like basic instructional materials by estimating a cost per pupil of $4 per month.

OPIC decreases the project's risk by offering financing at below- market rates. While it does not disclose the terms of its lending, the OPIC handbook indicates that the loan's interest rate is set at its cost of capital plus a risk premium of 2%-6%. The organisation benefits from a very low cost of capital afforded by US treasury bills of the same tenor as the loan.

Yields are low by historical standards: we assume that 10-year US treasury bills (i.e., securities with the same tenure as the loan to Bridge) pay 2.5% (denoted r, the discount rate) annually, and simplify by ignoring their semi-annual coupon payments. Tacking on a 2.5% risk premium means the loan to Bridge has a 4% interest rate, r^L.

The cost of borrowing from a private lender is greater than the concessional rate offered by OPIC because the private lender perceives the risk of project default to be higher. We assume that a loan for the same tenure and the same grace period from a private lender would carry a higher 10% interest rate, r^H, and modest required return on equity of 5%. Finally, the Kenyan corporate tax rate for a non-domiciled firm is 38% (Bridge International Academies is incorporated in Delaware).

Under these assumptions, the project's net present values in millions of USD are

	$PV(C)$	$PV(T^{H,L})$	$PV(D^{H,L})$	
$v^L =$	$19.13 mn.	$1.33 mn.	$11.31 mn.	$9.15 mn.
$v^H =$	$19.13 mn.	$3.33 mn.	$16.56 mn.	$5.90 mn.

Implied Default Risk

The private sector interest rate compensates private lenders for the project's risks of default. Crucially, we regard the private sector interest rate as a valuable information signal: it tells us the "true" probability of failure.

The probability of success implied by the private sector's interest rate is denoted δ, so the expected value of lending at interest rate r^H is given (in millions of USD) by $pPV^H - (1 - p)10$.

Since the alternative is to make a risk-free loan to the US treasury (buy a 10-year treasury bill), so δ is determined from $\delta PV^H - (1-p)10 = PV(D^T)$ or

$$p = [PV(D^T) + 10)][PV(D^H) + 10]^{-1}$$

With the assumed interest rates and project values above, this gives $p = 0.79$.

The crucial insight is that we consider that this is the "true" default probability: there is no private information about the project's risk that OPIC has but that the private sector lender (offering a higher interest rate, implying a higher risk valuation) does not.

Expected Net Present Value

This gives the expected net present value of the project in millions of USD under different financing scenarios.

	$pv^{H,L} - (1-p)10$
$\mathbb{E}[v^L]$	\$4.42 mn.
$\mathbb{E}[v^H]$	\$1.97 mn.

Valuing Interventions

OPIC opted to incentivise Bridge's investment through concessional lending. The above gives us a minimally arbitrary framework in which to show that concessional lending should be cost equivalent to increasing returns through and providing a loan guarantee.

We use the counterfactual case: if Bridge had been required to secure a private sector non-concessional loan, how would OPIC make the social start-up just indifferent between the value of the project under concessional lending and non-concessional lending?

Put differently, any risk reduction or returns increasing scheme must have an expected value exactly equal to the difference in project values, $\mathbb{E}[v^L] - \mathbb{E}[v^H]$.

- **Concessional loan**

OPIC has opted to increase Bridge's expected returns by decreasing the social investor's cost of capital. The value of this concession is given by the difference in expected values, or $L = [PV(D^H) - PV(D^L)\,] + [PV(T^L) - PV(T^H)]$.

The intuition is that the value of the concession increases in the difference in present value of debt repayment and decreases in the difference in the present value of the respective tax shields $L = \$3.26$ million.

- **Guarantee**

Providing a guarantee shifts repayment risks in case of failure from Bridge to OPIC. The value of this reduction in downside risk that makes OPIC just indifferent between the project values under higher and lower costs of capital is given by

$$\mathbb{E}[v^L] = pv^H - (1-p)(10-G)$$

This can be written to show that a guarantee is simply a reduction in the costs of failure for the investor

$$\mathbb{E}[v^L] - \mathbb{E}[v^H] = (1-p)(G)$$

Rearranging gives

$$G = -(pv^H - \mathbb{E}[v^L])(1-p)^{-1} + 10 = {(\mathbb{E}[v^L] - \mathbb{E}[v^H])}\Big/{(1-p)}$$

For Bridge's project and the payoffs above, this gives $G = \$9.92$ million. To make the investor just indifferent between concessional and non-concessional financing, OPIC would need to guarantee this amount of the $10 million loan.

- **Pay for success**

The project's value under the higher private sector financing cost is lower than that under subsidised finance.

If we consider that the higher cost of finance reflects and accurate evaluation of project risk, we would like to determine how much returns to be increased under the private sector cost of borrowing in order to make the investor just indifferent between the two financing possibilities.

The bonus is only paid conditional on the project being successful, so the value of this bonus is given by $\mathbb{E}[v^L] - \mathbb{E}[v^H] = pB$, or

$$B = (\mathbb{E}[v^L] - \mathbb{E}[v^H])(p)^{-1}$$

For the values we have assumed, this gives $B = \$3.26$ million.

If this were a lump-sum subsidy, it would be unlikely to incentivise performance in the way we discuss. How might the donor contract on the subsidy to encourage Bridge to enrol a larger number of students?

One approach would be to off to pay Bridge a bonus-per-student of b. The average per student required can be calculated based on how Bridge discounts these future gains:

$$B = \sum_{t=1}^{T=10} \frac{bq_t}{(1+r)^t}$$

so that b is the average subsidy per student on the discounted present value of future enrolments. This gives an average real expected subsidy of $b = 0.23$ per student per month (23 cents), or $2.58 per student per year based on the assumed 11-month academic calendar.

Equivalent Cost to Donor

Providing a concessional loan, boosting returns, or providing a guarantee are equivalent in terms of expected cost from the donor's perspective.

- **Paying for success**

Using the implied default probability gives the expected cost C_B to the donor, which will only pay to increase returns with probability p if the project does not default

$C_B = p \times -B = p \times -\$3.26 = \$2.45$ million

- **Guarantee**

The private sector lender will only call the guarantee if the project defaults with probability $(1 - p)$. This means the expected cost C_G to a donor of guaranteeing the debt is

$C_G = (1 - p) \times -G = (1 - p) \times -\$9.92 = \$2.45$ million

- **Concessional loan**

In this case, OPIC has opted to capitalise the Bridge school expansion project by providing subsidised lending. The full cost of concessional lending includes the opportunity cost of failing to lend to an alternative project that has the same risk and earning the (greater) interest rate $r^H > r^L$.

The expected cost C_C to a donor of concessional lending is given by $C_C = p[PV(D^L) + PV(T^L)] - (1 - p)10 - [p[PV(D^H) + PV(T^H)] - (1 - p)10]$. Simplifying gives $C_C = p[PV(D^L) + PV(T^L) - PV(D^H) - PV(T^H)]$.

Using L for the value of the subsidy through concessional lending shows that

$C_C = p \times -L = p \times -\$3.26 = -\$2.45$ million