Economic Modelling 59 (2016) 508–519

Contents lists available at ScienceDirect

Economic Modelling

journal homepage: www.elsevier.com/locate/ecmod

An analysis of government loan guarantees and direct investment through public-private partnerships☆

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ARTICLE INFO

Article history:
Received 18 February 2016
Received in revised form 28 June 2016
Accepted 9 August 2016
Available online xxxx

JEL classification:
G11
G13
G14
G31
G38

Keywords:
Government loan guarantee
Financial guarantees
Government direct investment
Public-private partnerships (PPPs)

ABSTRACT

This paper compares two forms of government support: loan guarantee and direct investment through public-private partnerships (PPPs). With loan guarantee, government provides financial guarantees to enhance project creditworthiness. With direct investment, government invests capital directly in the project. In both forms of support, the government receives shares proportional to its financial commitment. We find that loan guarantees are more effective in reducing project borrowing costs. In a perfect information environment, loan guarantee support will yield more wealth to the government than a cost equivalent direct investment. But, in an informationally asymmetric environment where the government knows less about project quality than do private partners, in other words the so-called plum problem rather than the familiar lemon problem, this implication is mitigated. We show how the portion of shares given to the government can be a bargaining tool and can mitigate information asymmetry when structuring PPPs.

1. Introduction

The last decades have seen an unprecedented increase in capital-intensive projects worldwide that are financed mainly through special-purpose vehicles or entities (SPV/SPE).[1] The literature points to many advantages of SPVs or SPEs such as mitigation of under-investment, lower agency costs of free cash flows, less information asymmetry and signal costs, better structuring of debt, containment of risk, improved corporate organization and management compensation, and better corporate governance (e.g., Finnerty (2013), Gatti (2012) and Subramanian and Tung (2016)). Since capital-intensive investments, such as public infrastructures, power plants and green energy, and other forms of sustainable development projects, involve huge amounts of financing and are highly levered (e.g., Esty, 2003, 2004), project initiators usually resort to loan guarantees and/or public-private partnerships (PPPs) to share project risk and improve project creditworthiness, hence aiming for better cost management and resource allocation (e.g., Grimsey and Lewis (2002) and

☆ We thank Flavio Bazzana, Pascal François, Agarwal Sumit, and seminar participants at the 2008 annual conference of the CIRPEE in Orford (Canada), 2009 annual meeting of the European Financial Management Association in Milan (Italy), 2010 17th Annual Meeting of the Multinational Finance Society in Barcelona (Spain), 2010 Mathematical Finance Days organised by the Institut de Finance Mathématique of Montreal (IFM2) in Montreal (Canada), 2010 Eastern Finance Association annual meetings in Miami Beach (Florida, USA), for their valuable comments and suggestions. We acknowledge the financial support from the Institut de Finance Mathématique of Montreal, the Fonds Québecois de la Recherche sur la Société et la Culture (FQRSC), the Social Sciences and Humanities Research Council of Canada (SSHRC), the Fonds Conrad Leblanc in Insurance, and the Fonds de soutien à la recherche (SAR) of the Faculty of Business Administration at Laval University. All errors are the authors' sole responsibility.

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[1] A well-known form of capital-intensive financing is project finance. Project finance is an arrangement where one or more sponsors (shareholders) create a project company with a view to repaying the lender largely out of the project's future cash flows.

http://dx.doi.org/10.1016/j.econmod.2016.08.012
0264-9993/

Grout (2003)).[2] To tackle the latest subprime credit crisis of 2007–2009, the Obama Administration proposed public-private partnership investment programs as part of their rescue plan.

This paper studies two general forms of government support, loan guarantees and direct investment, in public-private partnerships (PPPs). A loan guarantee is a promise from a government or public institution, like export credit agencies (ECA) or multilateral organizations, to make good on loan payments if the project company defaults.[3] With direct investment, the government participates directly in the project by investing an amount of capital in return for shares in the project, thereby, sharing in the profits. In other words the government and the private partners operate as a PPP. With loan guarantees, the government reduces the tax deductible interest payments and thus creates more taxable income for itself. With direct investment, the government receives a share of the profit, in addition to the tax revenue. Both forms of support are viable ways to assist a project that otherwise may be abandoned for lack of financing due to institutional constraints and credit rationing that pervade a capital-intensive environment.

We extend previous studies on the role of government support for project development (e.g., Barbosa et al., 2016; Chaney and Thakor, 1985; Galai and Wiener, 2003)[4] by explicitly including information asymmetry between the contracting parties. Indeed, with many capital-intensive investments, private entrepreneurs are better informed than the host government. This is referred to in the literature as the plum problem (e.g., Chen, 2005) as opposed to the lemon problem (e.g., Akerlof, 1970).[5] We have included this feature by introducing information asymmetry between the government and the other stakeholders through the cash flows' volatility. We assume that the government knows the distribution of project risk but not its estimated value, while the lenders and the private partners are perfectly informed about project risk. When the government and private partners enter into a PPP, the government is granted part of the project profit, which in a perfect world should be highly correlated with the government's financial contribution. We have studied an agency conflict between the government and the private partners by analyzing the difference between the government's actual share of the total profit and its deemed fair share. This paper therefore contributes to the existing literature in at least two regards. To our knowledge, this is the first paper to explicitly account for this plum problem under these types of government financing supports. Second, our proposed model provides a unified framework to compare two very important modes of government intervention in project financing nowadays.

We find that, as expected, both forms of government support enhance project's creditworthiness. All else being equal, a loan guarantee directly reduces the probability of loss for lenders and thus the project's borrowing costs. In an asymmetric information environment in which the government knows less about the project quality than do private partners, i.e., the plum problem, private partners should seek a loan guarantee from the government, unless they are willing to give up more control over the project. In a perfect information or a weakly asymmetric information environment, they may gain more from a direct investment arrangement than from a loan guarantee. If the government does not receive a large enough share of the profits, the cost of the direct investment will exceed the earnings (e.g., tax revenue, its share of the total profit, and other social benefits). For its participation in the project, the government is granted shares of the new project in exchange for its direct investment, and profits are distributed proportionally to share-ownership. Therefore to receive more benefits from the project, the government needs to bargain for more shares in order to have a big proportion of the distributed profits. Thus, the number of shares to be given to the government can be though as a bargaining tool for the government, where it can request more shares as a precondition for its investment, and this will have a mitigating effect on the information asymmetry. The government should require more control over the project when information is asymmetrical, especially for very capital-intensive projects, because as a major shareholder, it can request more information on the project and obtain it.

The remainder of our paper is structured as follows. Section 2 presents the model. In this section, we derive the payoffs to the government and to the project sponsors and we introduce the different forms of government support and their potential impacts on all stakeholders. Section 3 provides a general discussion of the findings through several numerical experiments. Section 4 is the conclusion. The proofs are presented in the Appendix.

2. The model

We consider a single project implemented through a special-purpose vehicle (SPV) as a stand-alone firm, i.e., the project is an independent and separate entity. It is owned by sponsors and its cash flows are used to pay off the stakeholders. In this framework, lenders depend on project performance for repayment rather than on the sponsors as such. The principal commitment from the sponsors is their capital contribution.

The project requires an initial investment I. Cash flow at time t is A_t and is characterized by a risk-neutral[6] stochastic process

$$\frac{dA_t}{A_t} = (r_f + g - \delta)dt + \sqrt{V}dZ_{1t}, \tag{1}$$

where r_f is the continuous risk-free interest rate in the economy assumed to be non-stochastic, g is the externally financed project asset growth, δ is the asset payout rate, $\sqrt{V}$ is the volatility of project assets, and Z_{1t} is the Wiener process with risk-neutral probability. Project cash flows are thus represented as the present value of all expected cash flows (e.g., Lucas and McDonald, 2006). One concern here is the uncertainty surrounding valuation of future cash flows. We are aware of this point, but since not the main focus of our study, we assume that the present value of total expected cash flows follows a geometric Brownian motion process with a risk level $\sqrt{V}$ that the project manager has chosen or knows.[7]

We assume a simple capital structure of single loan and equity contracts. There will be neither dividend payments nor intermediate payments on the debt before it matures. The project will mature

[2] Public-private partnerships (PPPs) can take different forms such as build-operate-transfer (BOT), build-transfer-operate (BTO), build-own-operate (BOO), buy-build-operate (BBO), and design-build-operate (DBO), among others (e.g., Esty, 2004; Finnerty, 2013; FitchRatings, 2004; Yescombe, 2007). Since the focus is not to study the different forms of PPPs per se, we leave these interesting issues for future research.

[3] Export credit agencies (e.g., US Ex-Im Bank, UK Export Credits Guarantee Department (ECGD), Export Development Canada (EDC), COFACE-France) and multilateral development banks (e.g., African Development Bank, Asian Development Bank, Inter-American Development Bank, World Bank MIGA) are some of the main providers of financial guarantees, especially for large-scale projects (see for example Dailami and Leipziger (1998), Ehrhardt and Irwin (2004), Garcia-Alonso et al. (2004)).

[4] For empirical studies on the relationship between public and private investments, see for instance: Bodman et al. (2012), Dreger and Reimers (2016) and Voss (2002), among many others.

[5] Here, the lemon problem is due to the local government knowing more about the project than do the private partners.

[6] See Harrison and Kreps (1979) and Merton (1973) for the use of contingent claims analysis (CCA) in pricing assets.

[7] We could have introduced jumps in the cash flows process to account for potential shocks affecting the cash flows, but we leave this interesting feature for future research since we want to keep the analysis simple and work with closed form solutions.