Energy Economics 49 (2015) 660–668

Contents lists available at ScienceDirect

Energy Economics

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

Risk management and the stated investment costs by independent power producers

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ARTICLE INFO

Article history:
Received 18 February 2014
Received in revised form 8 January 2015
Accepted 28 February 2015
Available online 1 April 2015

JEL classification:
L94
D61
L33
L20

Keywords:
IPP
PPA
Privatization
Power generation
Electricity
Risk management

ABSTRACT

Evidence presented in this article suggests that in less developed countries the independent power producers (IPPs) have an incentive to overstate the investment cost as an instrument to mitigate the country risk in greenfield electricity generation projects. This technique is an effective risk mitigation strategy under the conventional financing and contractual arrangements in such markets. It, however, promotes the use of less efficient power plants. The distortion in the choice of technology results in economic losses over the life of the plants. The findings of this research have important policy implications that can assist regulatory bodies, governments, and international financing agencies to adopt a more informed approach to the integration of private investment into the electricity generation capacity of developing countries.

1. Introduction

Electricity shortages and unreliable power supply have been identified as major barriers to economic development (Rao, 2013; Stern & Enflo, 2013) and the most important constraint to economic growth in Sub-Saharan Africa today (Andersen & Dalgaard, 2013; Elumelu, 2013; Nadia, 2012). Many of these countries are heavily indebted, with severe restrictions on borrowing. At the same time their needs for capital to expand electricity generation, transmission, and distribution systems are growing rapidly. This is due to both the expansion in the coverage of the systems and, in recent years, the rapid growth rates of many of these countries.

The growth in the demand for capital investment in all forms of infrastructure is far outstripping the ability of the governments of these countries to source capital funds, either domestically, or from abroad by borrowing or securing foreign aid. Over the past two decades the public electric utilities of Sub-Saharan Africa have turned increasingly to the private sector to obtain both financing and operational management to build and operate generation capacity.

Most of these independent power producer (IPP) projects have been financed through project financing arrangements where funds have been largely sourced from abroad (Woodhouse, 2005a). Such arrangements must focus on the management of financial risk in order to make the project bankable and attractive to private investors.

A number of studies have discussed the reasons behind the success or failure of IPPs in developing countries. Some of the reasons put forward in the literature include a lack of interest in servicing the poor (Estache et al., 2001; Wamukonya, 2003), the high pace of reform, price-sensitive demand, a tendency towards cheaper technologies and smaller plant sizes (Wamukonya, 2003), an absence of effective competition or regulation (Phadke, 2009), poor investment climates (Eberhard and Gratwick, 2011), misplaced risk (Gratwick & Eberhard, 2008), fuel supply issues (Gratwick & Eberhard, 2008; Malgas et al., 2007), and the obsolescing bargain (Woodhouse, 2005b). However, no study has discussed the issue of distortions created by the IPP arrangements that have an impact on the economic efficiency of the sector.

There is a large body of research that focuses on the impact of regulatory frameworks on the investment decisions made by the private sector (Alexander et al., 1996, 2000; Camacho & Menezes, 2013; De Fraja and Stones, 2004; Kühn, 2002; Paleari and Redondi, 2005; Robinson & Taylor, 1998; Spiegel, 1994, 1997; Spiegel and Spulber, 1994, 1997; Taggart, 1981). The results of these studies are however only applicable

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http://dx.doi.org/10.1016/j.eneco.2015.02.022
0140-9883/

where some standard regulatory frameworks (price-cap, cost-of-service, etc.) are practiced, which is not the case for the IPPs operating in high-risk countries.

To attract private investors to high-risk markets, the public utility off-takes the output, pays for the fuel costs, and even indexes the payments in a foreign currency. These provisions are provided to an independent power producer (IPP) through a long-term power purchase agreement (PPA) (Gratwick & Eberhard, 2008; Hoskote, 1995). Such PPAs do not closely resemble the common regulatory frameworks observed in more developed, or less risky, markets.

Using the data from 41 combined-cycle power plants in 8 countries in Asia and the Middle East, Phadke (2009) shows that the stated investment cost of IPPs in developing countries is up to 50% higher in the absence of competitive bidding. As he noted, this does not necessary mean that the introduction of competitive bidding can reduce the investment costs by 50%. Some countries are simply unable to attract investors into the electricity sector under competitive procurement processes. The current study provides a more systematic explanation for the tendency towards the overstatement of investment costs, with particular attention to the role of country risk.

This article explores, and empirically tests, that the private investors turn to adding a markup on the investment cost to increase the return on the actual funds they put towards the project. This provision distorts the decision-making process, as the investment cost of alternative technologies is an important input in long-term resource planning tools.

The overstatement of investment costs promotes the use of less efficient power plants, which increases the share of fuel as an input. This also increases the potential cost of mitigating the uncertainties around the fuel supply and its price. With a provision embedded in the PPAs that stipulate that the fuel costs are passed through to the public utility, the cost of the additional fuel consumption and the uncertainties around fuel price and its availability are passed to the consumers in the form of higher prices. Therefore, the potential risk facing the IPP is mitigated, but at a significant social cost.

2. Risk management and the stated capital cost

To cover the cost of risk in partnerships with the private sector in infrastructure projects, governments and regulators often allow in their negotiations for a higher rate of return on equity. Despite this, most IPPs in less developed countries seek multilateral guarantees from organizations such as MIGA (Multilateral Investment Guarantee Agency) before entering into an agreement with local authorities. These provisions, among others, referred to as "risk engineering" by Woodhouse (2005a), are often insufficient to mitigate the risk and attract private investment in many situations.

Political justification is a major problem in increasing the target rate of return to equity in the agreement beyond a certain limit. These rates are stated in the contracts and can be compared with guaranteed returns for private investment in all other sectors in the economy. High guaranteed rates of return on equity make such contracts an easy target for those who would like to accuse the government of corruption, of being too generous, or of being unable to negotiate efficient deals. The usual victim in such cases is the IPP. In other words, increasing the risk premium into the target rate of return in the IPP contract above a certain threshold can backfire and further increase the political risk associated with the project.

The investment cost of power plants is made up of numerous items, many of which are project-specific. The estimation and comparison of some of these components by the regulators or financing institutions require the use of experts. Such information asymmetry exists in many regulated industries. PPAs are negotiated based on the stated investment costs put forward in the proposals submitted by the potential IPPs. If a satisfactory PPA can be negotiated to repay the financing for an overstated investment cost this will allow for an increase in the absolute amount of borrowing. Therefore the balance of the actual investment cost that is provided by the equity will become smaller than what the IPP would have contributed in the absence of an overstatement.[1]

In the market for long-term power purchase agreements (PPAs), competition is only present at the bidding stage. Even then only a limited number of bidders are present, and creating a competitive environment remains a challenge in many developing countries. Furthermore, if this is the way that all the bidders manage their risk, there is little reason why this investment cost markup will be reduced with more competition.

Phadke (2009) introduced the relationship between the return on equity and an overstated investment cost. Payments made to the IPP under a typical PPA will cover the investment cost, operating costs, financing costs, and a target rate of return on equity. If we put the operating costs aside, the actual return on equity (ROE_a) can be estimated based on the PPA payments (P_{PPA}) and the actual equity contribution (E_a) as shown in Eq. (1).

$$ROE_a = \frac{P_{PPA}}{E_a} = \frac{(1-d) \times C_{PPA} \times ROE_{PPA}}{C_a - (d \times C_{PPA})}. \quad (1)$$

The payments made to the IPP (P_{PPA}) are calculated based on a fair rate of return specified in the contract (ROE_{PPA}), the share of debt in the financing arrangement (d), and the PPA's stated investment costs (C_{PPA}).

The amount of borrowing is normally defined as a percentage of stated investment cost and the equity contributes the balance. Therefore, the actual equity contribution (E_a) depends on the actual investment cost, excluding the markup (C_a), and the share of debt (d).

If the actual and stated investment costs (C_a and C_{PPA}) are equal, then the return on equity (ROE_a) will be exactly the same as the one reflected in the contract (ROE_{PPA}).

$$C_a = C_{PPA} \Rightarrow ROE_a = ROE_{PPA}. \quad (2)$$

If, however, the investors overstate the investment cost, the actual return on equity (ROE_a) will be different compared to the target return stated in the PPA. An overstated investment cost affects both the nominator and the denominator of the fraction in Eq. (1). If the investment cost is overstated by λ percent, as shown in Eq. (3),

$$C_{PPA} = (1 + \lambda) \times C_a \quad (3)$$

then

$$ROE_a = \frac{(1-d)(1+\lambda)}{1-d-d\lambda} ROE_{PPA}. \quad (4)$$

The overstatement (λ) not only increases the stated equity contribution by $(1 + \lambda)$, it also reduces the actual contribution of equity by $d\lambda$ as the absolute amount of borrowing has increased proportionately to the overstatement of the investment cost. Table 1 shows this relationship under the assumptions that the contract guarantees a 20% rate of return on equity ($ROE_{PPA} = 20\%$) and debt covers 80% of investment ($d = 80\%$).

This formulation and example show that a slight overstatement of investment cost will have a considerable impact on the return on equity. From Table 1, Row 5, we see that an overstatement of the investment cost by 12% will double the rate of return on equity. It is far easier to increase the return by overstating the investment cost rather than increasing the target rate of return for equity in the PPA contract, which can easily be compared with other projects and hence creates significant political risk.

As a result of this overstatement, the charges to the buyers of the electricity throughout the PPAs will be increased. The capacity

[1] An inflated investment cost that is financed will allow the IPP owner to collect the margin upfront, usually through non-arms length construction contracts.