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“An Auction Approach to Procurement Analysis in Large-scale Infrastructure Projects: The Case Study of Brazilian High Speed Rail”

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1. Introduction

Large infrastructure projects are usually accompanied by large up-front investments, which lately have led governments to transfer the financing of infrastructure sectors traditionally provisioned by the State to the private sector. However, there are many risks associated with large infrastructure projects, commonly cost overruns, delays, low demand, as well as conflicting interests among the plurality of stakeholders. The management of which risks should be guaranteed by the government and which will be better absorbed by private investors will be discussed in this study.

This study explores the challenges of risk-sharing, in the context of large infrastructure projects, in particular, high-speed rail projects and the implications of the introduction of government support mechanisms to eliminate risks to be borne by the private sector. The model developed in this research works with the hypothesis of the introduction of the government guarantee scheme, Minimum Revenue Guarantee (MRG), in order to direct risk-sharing conflicts towards a more favorable environment for agreement, in

the context of the Brazilian High Speed Rail project, known as TAV.

2. Research Objectives

The objective of the present study is to analyse the strategic interactions among players involved in the bidding process of the TAV project and explore possible outcome scenarios and its implications.

The following research objectives are addressed:

- 1- Analyze the behavior of public and private parties within the public procurement environment, in the context of the Brazilian High-Speed Rail Project, and derive the threshold for the MRG.
- 2- Verify if the introduction of the MRG improves the conditions of the project to attract investors to the bidding process and estimate the impact of the guarantee to the public's budget and company's revenue.

3. Methodology

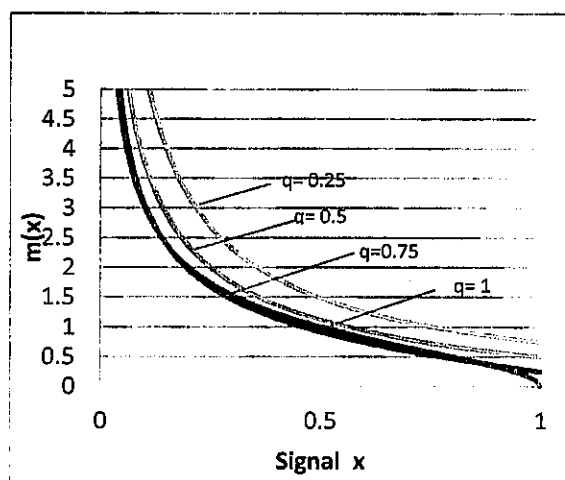
In order to address the research objectives, this study has adopted a game theoretical framework to analyse the behaviour of players involved,

public and private parties, in the procurement environment, in the context of the Brazilian High-Speed Rail Project, through the model development of the case study as a common value auction, in order to define the Bayesian-Nash equilibrium.

The analysis of the outcome scenarios has been conducted through a Monte Carlo simulation to verify the impacts of the adoption of the mentioned support mechanism and estimate the variation of profits for private sector and government, according to the adopted level of MRG and revenue sharing factor q .

4. Results and Discussion

The result of the analytical solution for the equilibrium in a two bidders' case is shown in the figure below:



The general trend shows that the lower the estimation on the project, the higher will be the demanded level of MRG.

Furthermore, it was observed that the level of MRG increases, as the revenue sharing factor q decreases,

which can be interpreted as an attempt of the company to lower its risks.

It was also verified that this effect is more sensitive for lower values of q ; thus, the more the project is considered risky for the company, the amount of required MRG is higher.

This study has concluded that as the introduction of the MRG mitigates the risks to be borne by the company, more bidders have an incentive to join the bidding process, once there is a positive expectancy of profit.

5. References

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