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O desafio da Infraestrutura no Brasil

Infraestrutura: O novo desafio brasileiro

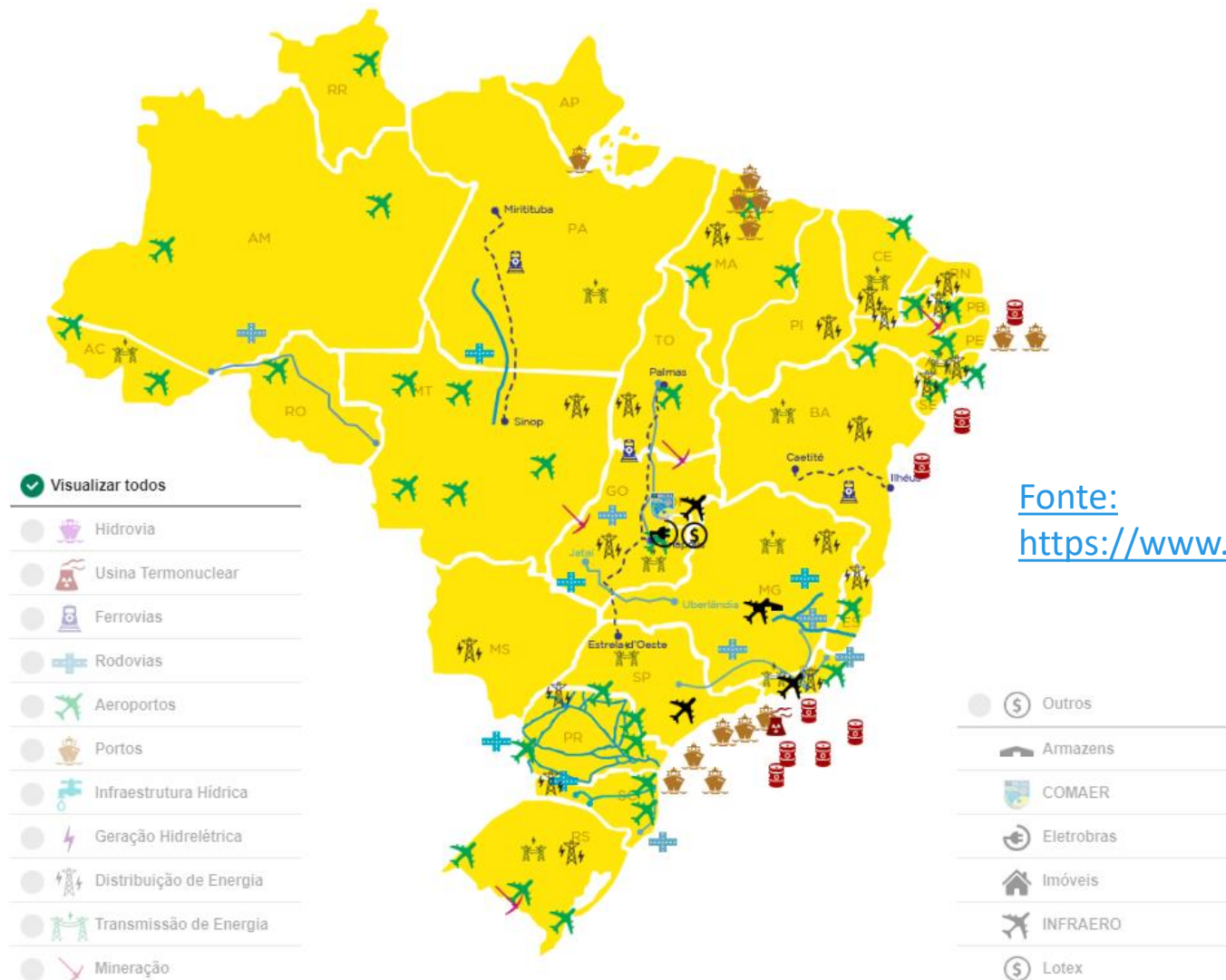
A retomada da economia brasileira demandará uma melhora na infraestrutura:

- Rodovias
- Aeroportos
- Instalações Portuárias
- Energia

Realidade:

- O governo Federal, Estadual e Municipal não dispõe de recursos para esses investimentos
- O governo conta com o interesse do setor privado
- O capital privado irá exigir um retorno compatível com o risco dos projetos
- Projetos de Infraestrutura apresentam riscos elevados

Concessões de Infraestrutura Previstas



Concessões de Infraestrutura Previstas

Rodovias:

- 25 estradas com 16.000 km até 2021
- US\$ 35 bilhões em investimentos

Aeroportos:

- 12 aeroportos concedidos em 2020
- Rio de Janeiro (SDU) e São Paulo (CGH) em 2022

Portos

- 59 projetos
- US\$ 400 bilhões em investimento

Óleo & Gás

- 13 projetos
- US\$ 8 bilhões

Projetos que não atraíram interesse

- Trem de Alta Velocidade Rio – São Paulo
 - 450km, 10 bilhões USD
 - Quatro leilões fracassados entre 2009 e 2015
- Rodovia Federal BR-163
 - 1500km, 2 bilhões USD
 - Dois leilões fracassados desde 2003, Parcialmente concedida em 2016
- Rodovia Federal BR- 262
 - 376 km, 1 bilhão USD
 - Sem lances no leilão de 2013
- Linhas de Transmissão ANEEL
 - 5,000 km de linhas, 2 bilhões USD
 - 50% dessas linhas não atraíram interessados

Projetos concedidos que fracassaram

- Rodovia BR-040/DF/GO/MG/RJ
 - Obras interrompidas, Concessionária em litigio com o Governo
- Aeroporto de Viracopos
 - Leilado em 2012, conta com uma dívida de 2.88 bilhões
 - Previsão de 18 milhões de passageiro, em 2018 teve 9,3 milhoes.
 - Concessionária em recuperação judicial e quer devolver a concessão
- Aeroporto Internacional do Rio de Janeiro
 - Leilado em 2013
 - Concessionário não cumpriu as obrigações, renegociado em 2018
- Rodovias Federais
 - BR-101/ES/BA, BR-060/153/262/DF/GO/MG, BR-163/MS, BO
 - Diversas concessões de rodovias federais licitadas entre 2013 e 2015 estão em litigio com o governo

Investimento Privado em Infraestrutura

Desafio: Como atrair investidores para projetos de alto risco

- Contratos de PPP
- Divisão do risco entre o público e o privado
- Desenho de mecanismos de mitigação de risco
- Contratos de seguro são como opções

Mecanismos de Mitigação de Risco

- Contraprestações Fixas
- Garantia de Demanda Mínima (MRG)
- Garantia de Valor Presente das Receitas (LPVR)
- Extensão de prazo de Contrato

VLT Carioca – Rio de Janeiro

Características:

- 28 km de linhas
- 46 estações
- US\$ 500 milhões de investimento
- Cláusula de Mitigação de Risco
 - 270 contraprestações mensais
 - Garantia de Demanda Mínima se demanda for mais do que 10% abaixo do esperado



Análise de Risco em Projetos

Como alocar riscos em contratos de PPP?

- Riscos devem ser suportados pela parte que possui maior capacidade para lidar com ele
- Riscos suportados pelo ente privado são tipicamente riscos de construção, taxa de juros e risco cambial.
- Riscos de desapropriação e liberação da faixa de domínio e riscos ambientais são tipicamente arcados pelo governo
- Riscos de mercado, se excessivos, podem ser compartilhados

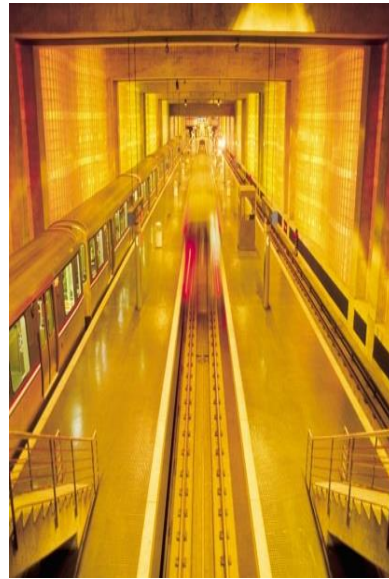
Modelando Riscos de Projeto

- Os riscos de um projeto podem ser modelados estatisticamente através de modelos de simulação
- Incertezas são modeladas como distribuições de probabilidades
- Parâmetros de modelagem podem ser determinados através de dados de mercado, séries históricas ou estimativas gerenciais

Análise de Risco em Projetos

Como alocar riscos em contratos de PPP?

- Riscos devem ser suportados pela parte que possui maior capacidade para lidar com ele
- INSERIR – CASO DA LINHA 4, E CASO DA BR-163 SLIDES
- INSERIR – COPIA DA CAPA DOS DOIS PAPERS



GOVERNMENT SUPPORTS IN PPP CONTRACTS: THE CASE OF THE SÃO PAULO SUBWAY

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Farol Apoio Marítimo

15th International Conference on Real Options, Turku, Finland, 2011

LINHA 4-AMARELA

Serão 12,8 km e 11 estações



- The first subway line of São Paulo was inaugurated in 1972
- By 2010 there were four lines in operation with 65 km and 48 stations
- In 2005 the concession for the construction and operation of the Line 4 for the value of US\$ 1.7 million was auctioned.
- The contract documents included risk mitigation guarantees of MRG and exchange risk.
- The value of these guarantees was estimated to be 5% the contract value



Case Study

Government Supports in Public–Private Partnership Contracts: Metro Line 4 of the São Paulo Subway System

Luiz E. Brandão¹; Carlos Bastian-Pinto²; Leonardo Lima Gomes³; and Marina Labes⁴

Abstract: In November 2005, the state government of São Paulo, Brazil, announced the intention to bid a 30-year contract to build, operate, and explore passenger services for the Metro Line 4 of the São Paulo Metropolitan Subway System. Given the high risk of the project, to attract private investors the bid documents stipulated that the government would offer risk-mitigation mechanisms such as subsidy payments and a minimum demand guarantee (MDG). Because an MDG has option-like characteristics, the real-options approach is used to analyze the effect of these incentives on the value and the risk of the Metro Line 4 concession project, and their cost and risk to the government. The results indicate that the incentives proposed are effective in reducing the risk, and increase the net value of the project by 36% at a cost to the government of 5% of the total value of the project. Additionally, it is shown that for a given cost, the most effective risk-reduction mechanisms are the ones that include a higher portion of minimum demand guarantees relative to the subsidy payment. The approach developed can assist transportation authorities in designing optimal incentive mechanisms. **DOI:** [10.1061/\(ASCE\)IS.1943-555X.0000095](https://doi.org/10.1061/(ASCE)IS.1943-555X.0000095). © 2012 American Society of Civil Engineers.

CE Database subject headings: Infrastructure; Subways; Railroad stations; Contracts; Government; Brazil.

Author keywords: PPP; Infrastructure; Minimum demand guarantees; Real options; Valuation; Optimal design of incentives.

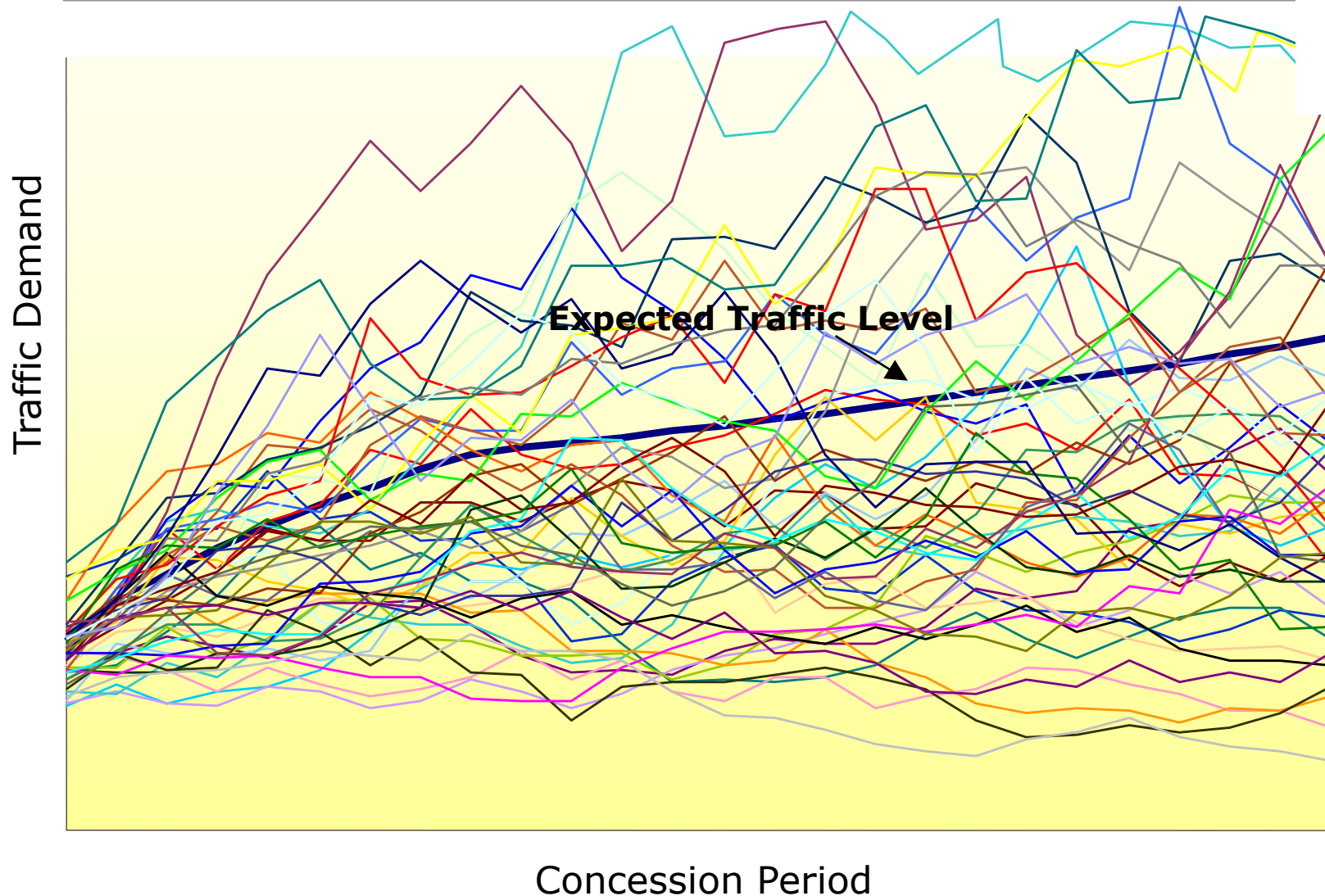
Introduction

In November 2005, the state of São Paulo, Brazil, announced the intention to bid a 30-year contract to build and operate the Metro Line 4 of the São Paulo Metropolitan Subway System, the largest in the country. The line, which was to be built in two phases at a total cost of 3.34 billion Brazilian Reais (R\$1.00 = US\$0.50), would have a length of 12.8 km with 11 stations, and would connect the downtown area to the west side of the capital, adding to the

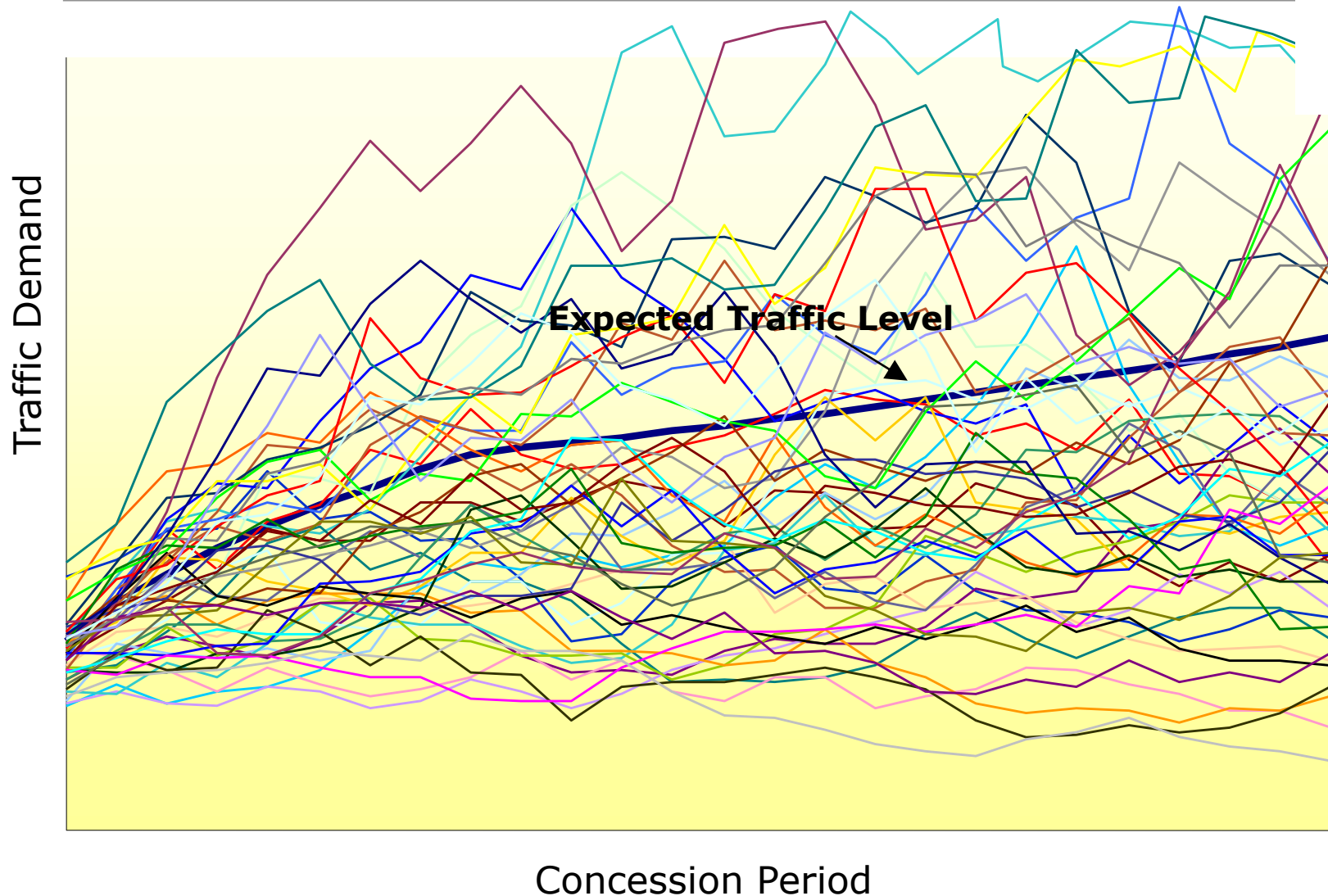
(PPP), which for the first time allowed the government to provide project incentives such as financial subsidies, minimum demand, exchange rate, and return-of-investment guarantees and other benefits to reduce the risk and increase the attractiveness of this class of projects to the private investor. Because of this, the contract offered some unique features in the form of risk-mitigation mechanisms that would have important consequences for the valuation of the project. In the case of the concession of Metro Line 4, the government offered three types of support: a financial subsidy, a per-



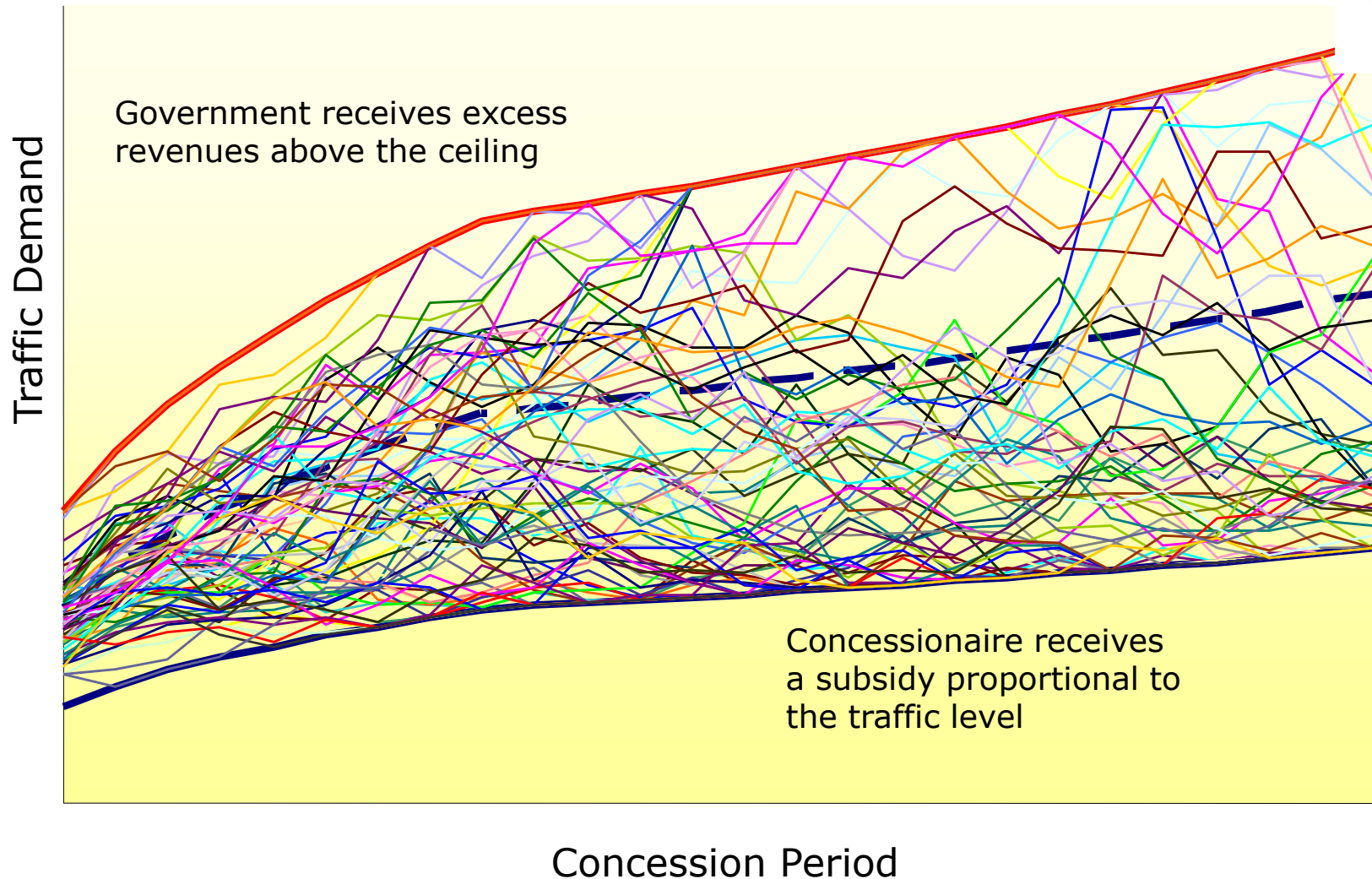
Traffic Uncertainty



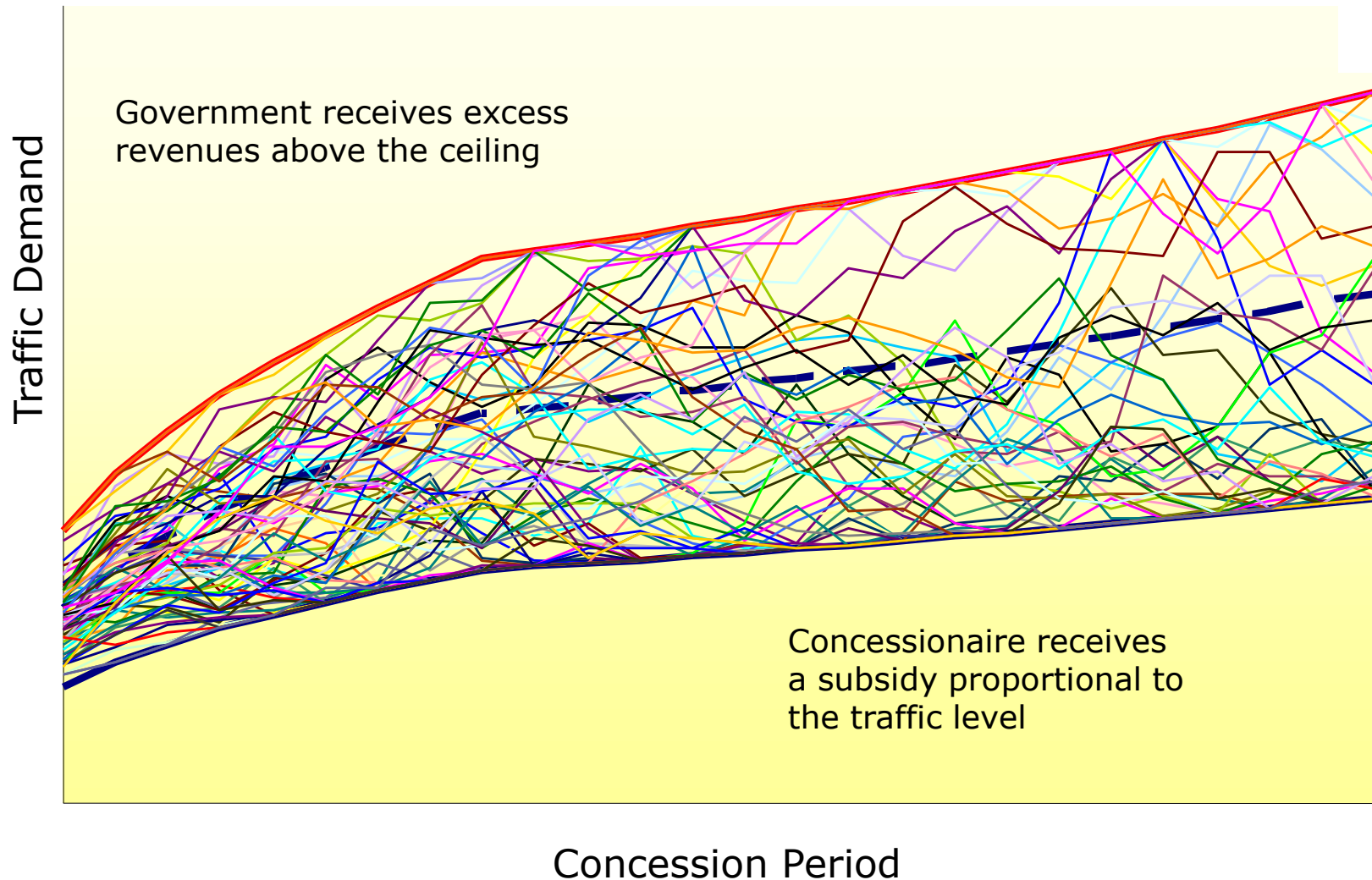
Traffic Uncertainty



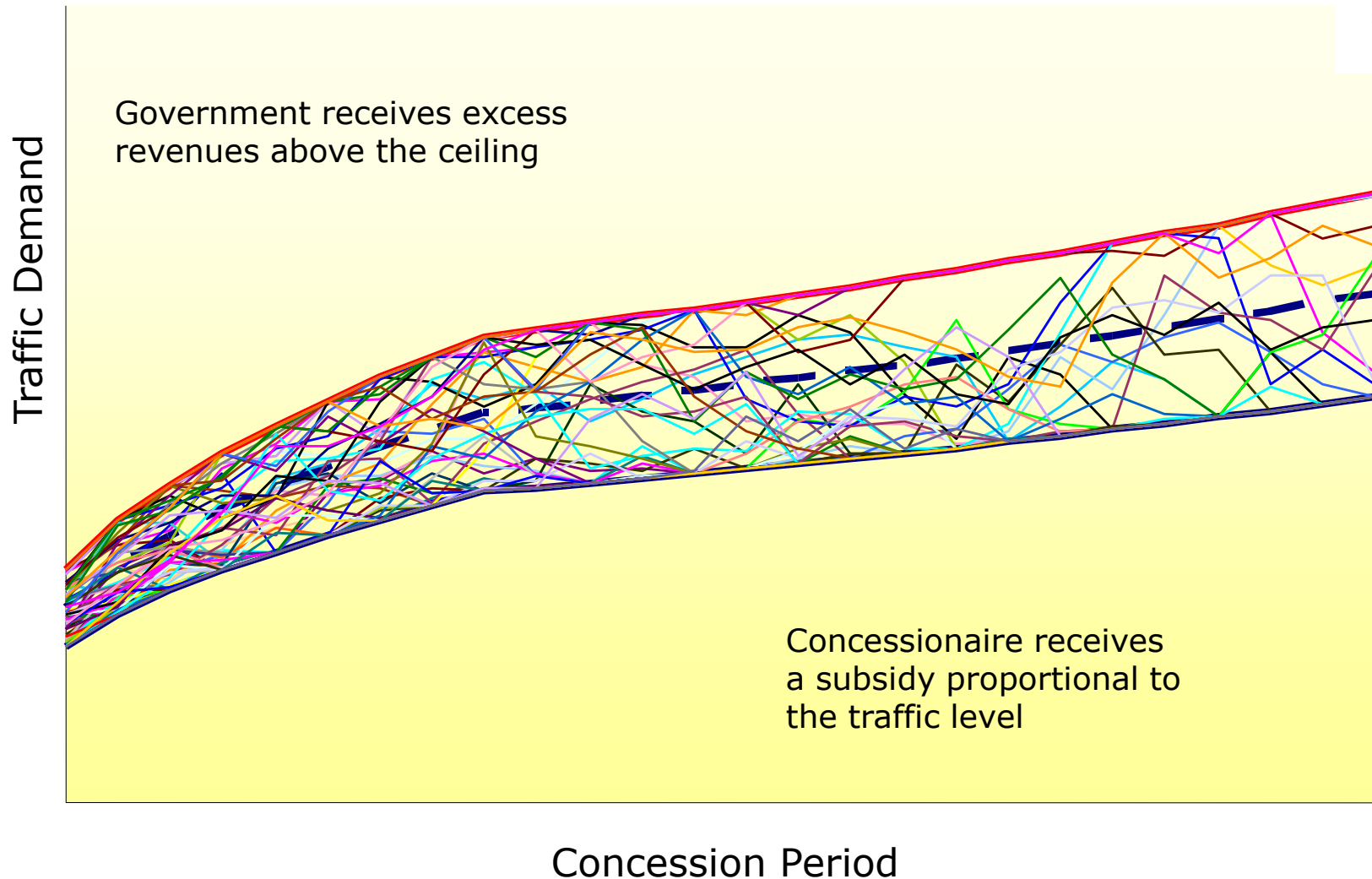
Collar Mechanism



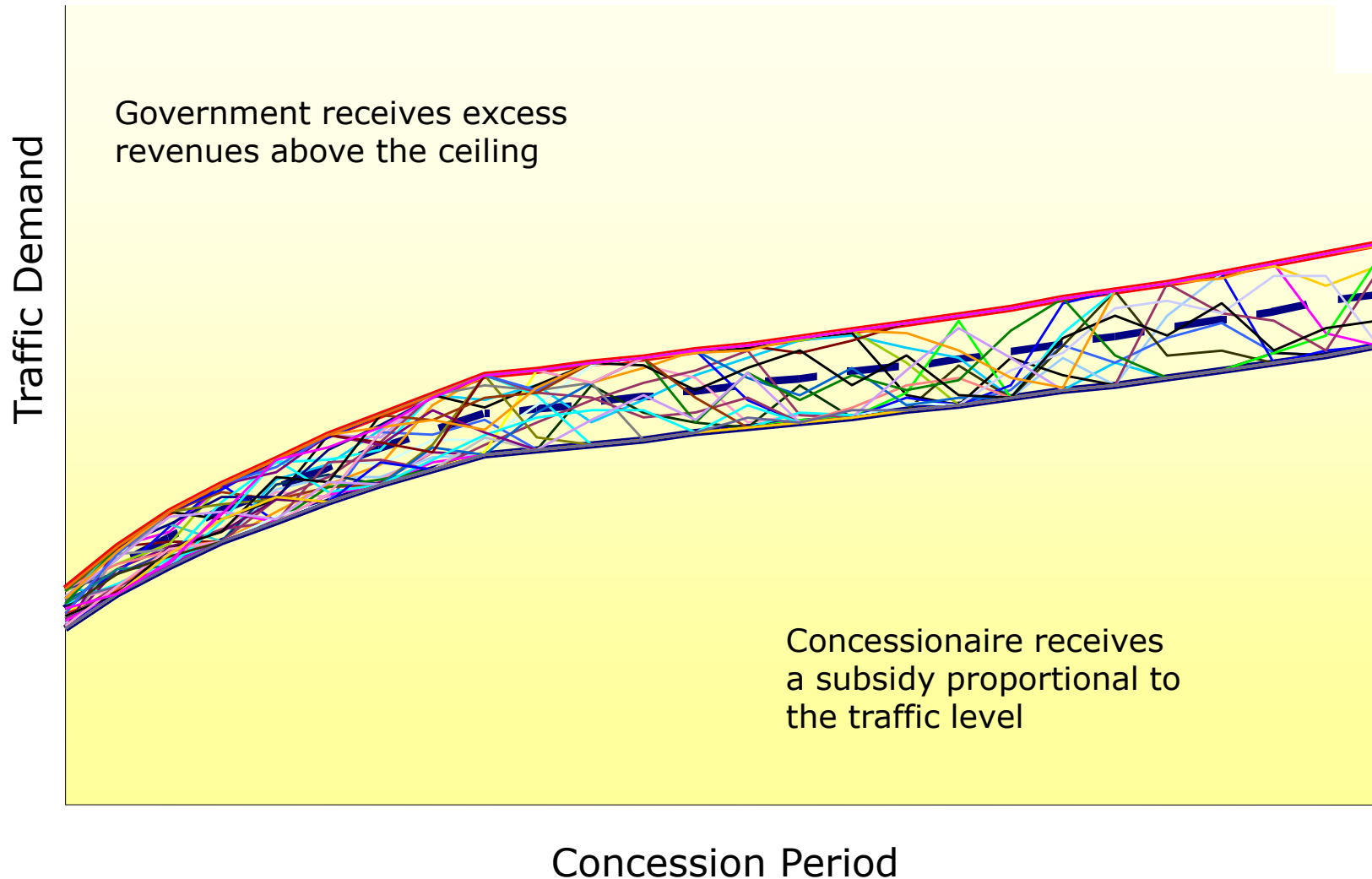
Collar Mechanism



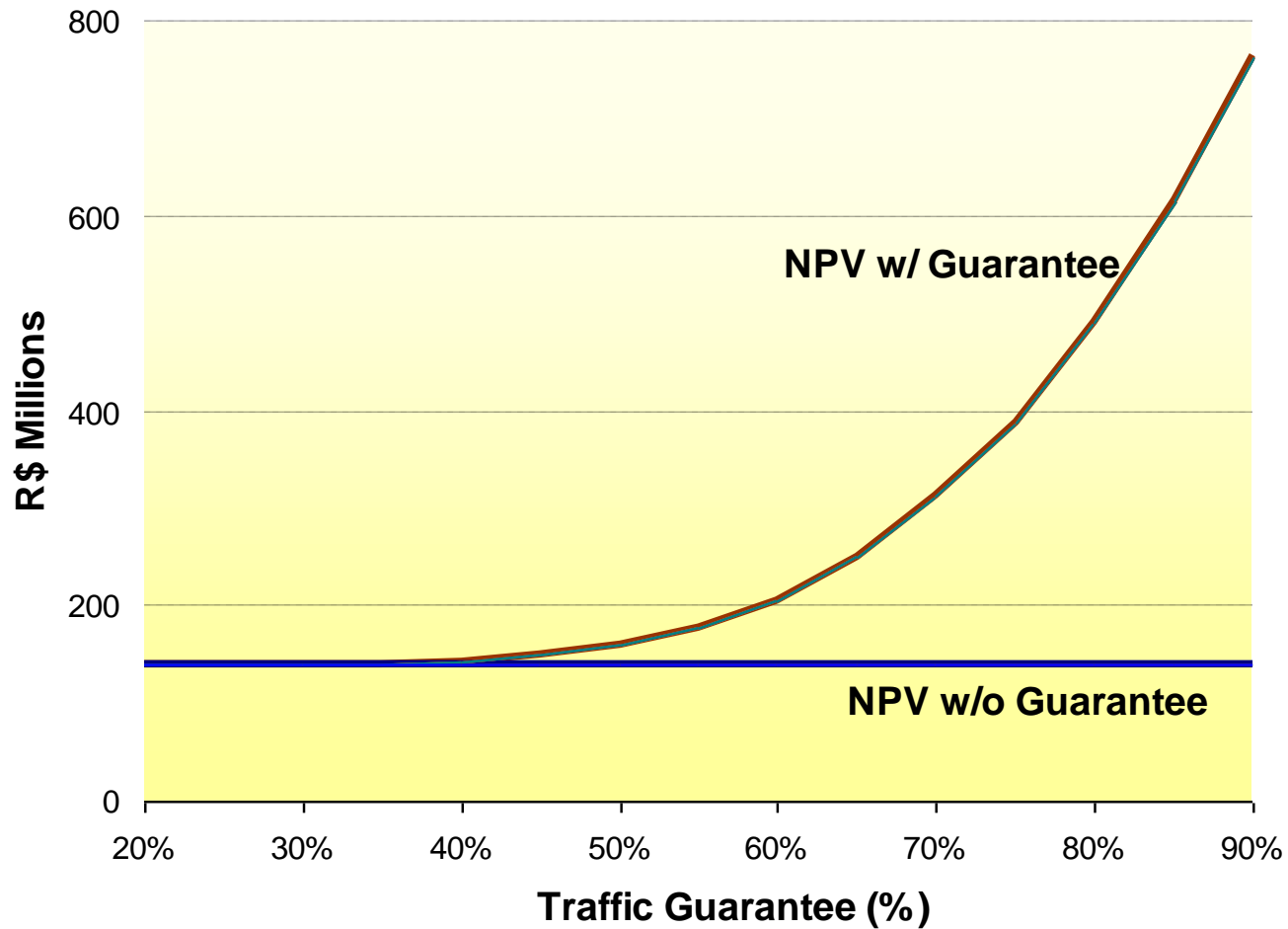
Collar Mechanism



Collar Mechanism



Impact on Project NPV



The option value of government guarantees in infrastructure projects

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The participation of private capital in public infrastructure investment projects has been sought by many governments who perceive this as a way to overcome budgetary constraints and foster economic growth. For some types of projects, this investment may require government participation in the form of project guarantees in order to reduce the risk to the private investor, and as a consequence, the government assumes a contingent liability which may have significant future budgetary impacts. We present a minimum traffic guarantee (MTG) real options model that differs from most of the literature in the field by using market data to determine stochastic project parameters. This model can be used to assess the value of these guarantees, allows the government to analyse the cost–benefit of each level of support, and proposes an alternative to limit the exposure of the government while still maintaining the benefits to the private investor. We apply this model to the projected 1000 mile long BR-163 toll road that will link the Brazilian Midwest to the Amazon River. We conclude that the use of public–private partnerships (PPP) with guarantees and caps on total government outlays can be modelled effectively using option pricing methods and can be a solution to attract private investment to high risk public infrastructure projects.

Keywords: Real options, infrastructure projects, toll roads, government guarantees, concessions.

THE RIO DE JANEIRO INTERNATIONAL AIRPORT CONCESSION: A CASE OF OPTION OVERVALUATION?



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Real Options Conference 2018
Dusseldorf, June 21-23

Naielly Lopes Marques – PUC-Rio
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Leonardo Lima Gomes – PUC-Rio





The Rio De Janeiro international airport privatization: a problem of overbidding?

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ABSTRACT

We analyze the case of the Rio de Janeiro International Airport concession, which suffered severe financial difficulties after it posted the highest auction bid premium of the 2011–2013 Brazilian government airport privatization program. Given that this airport had significant potential for future expansion, we investigate whether this could have justified the high bid, or whether the value of this flexibility was overestimated. The concession is analyzed using the real options approach because these expansion opportunities have option-like characteristics. The results suggest that these options may have been overpriced, because they are insufficient to justify the bid premium offered.

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KEYWORDS

Airport concessions; bid premium; infrastructure projects; real options



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