



ENAOP

2019

INOVAÇÕES EM AUDITORIA
DE OBRAS PÚBLICAS

11 a 13 | VITÓRIA - ES
SETEMBRO

Realização:



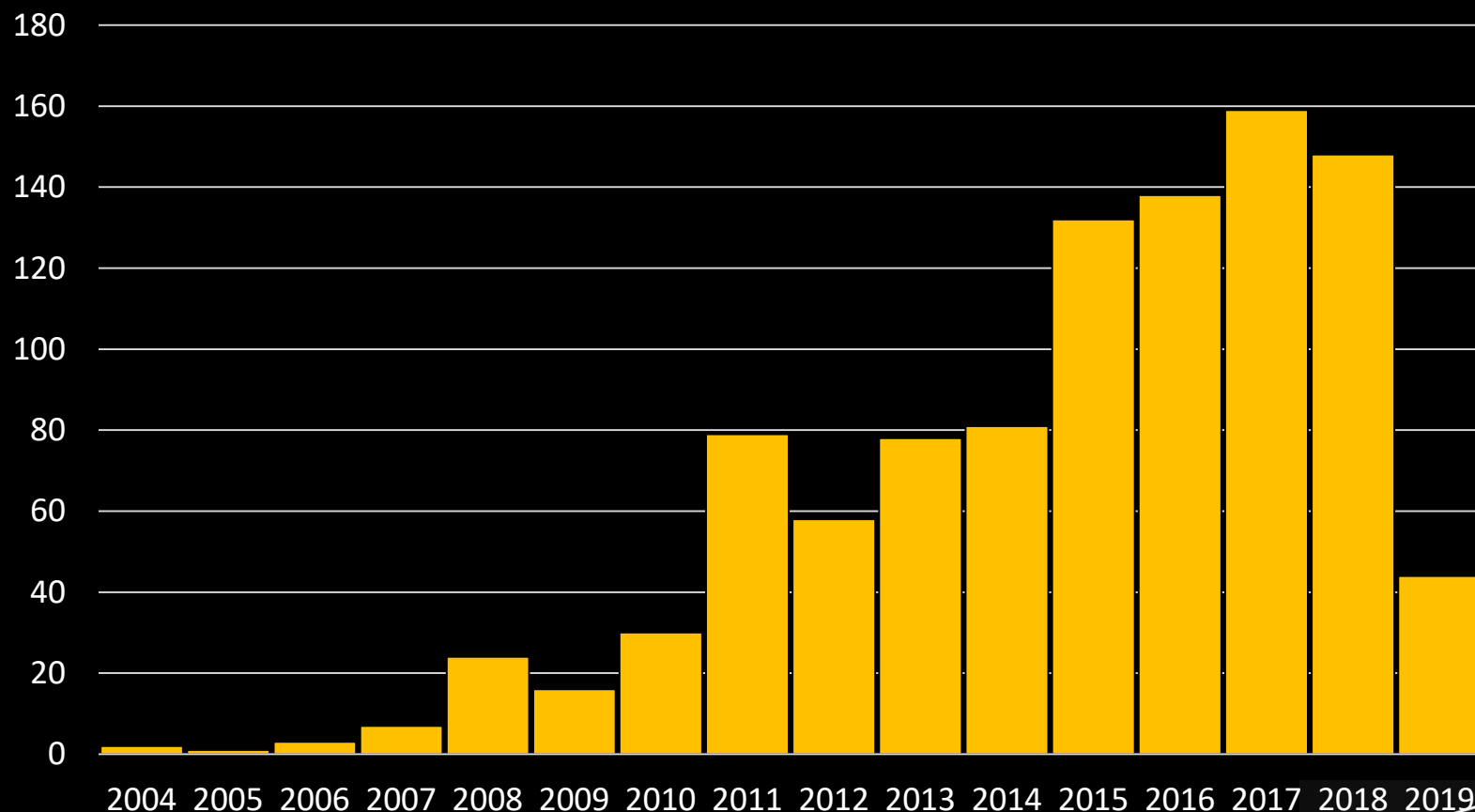
Novas Possibilidades de Detecção de Colusão em Licitações de Obras de Engenharia



Regis Signor
Perito Criminal Federal
regis.rs@dpf.gov.br

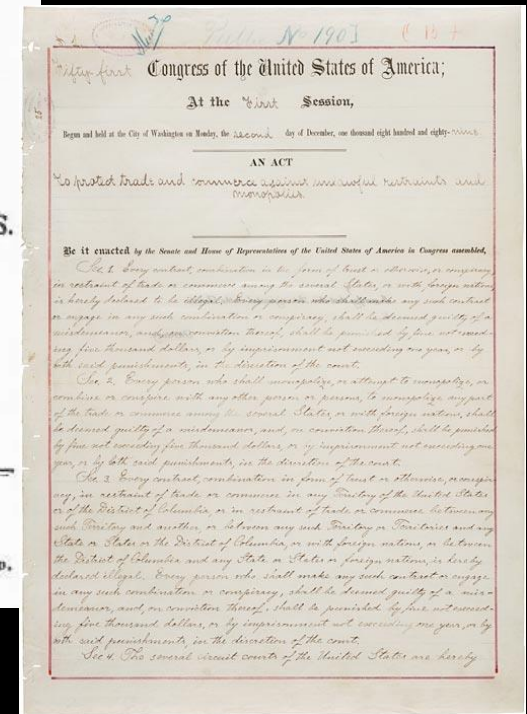
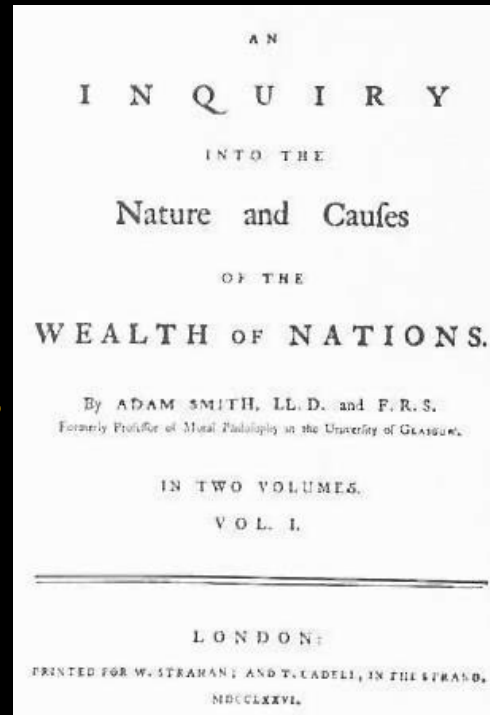


LAUDOS PF: “CONLUIO”

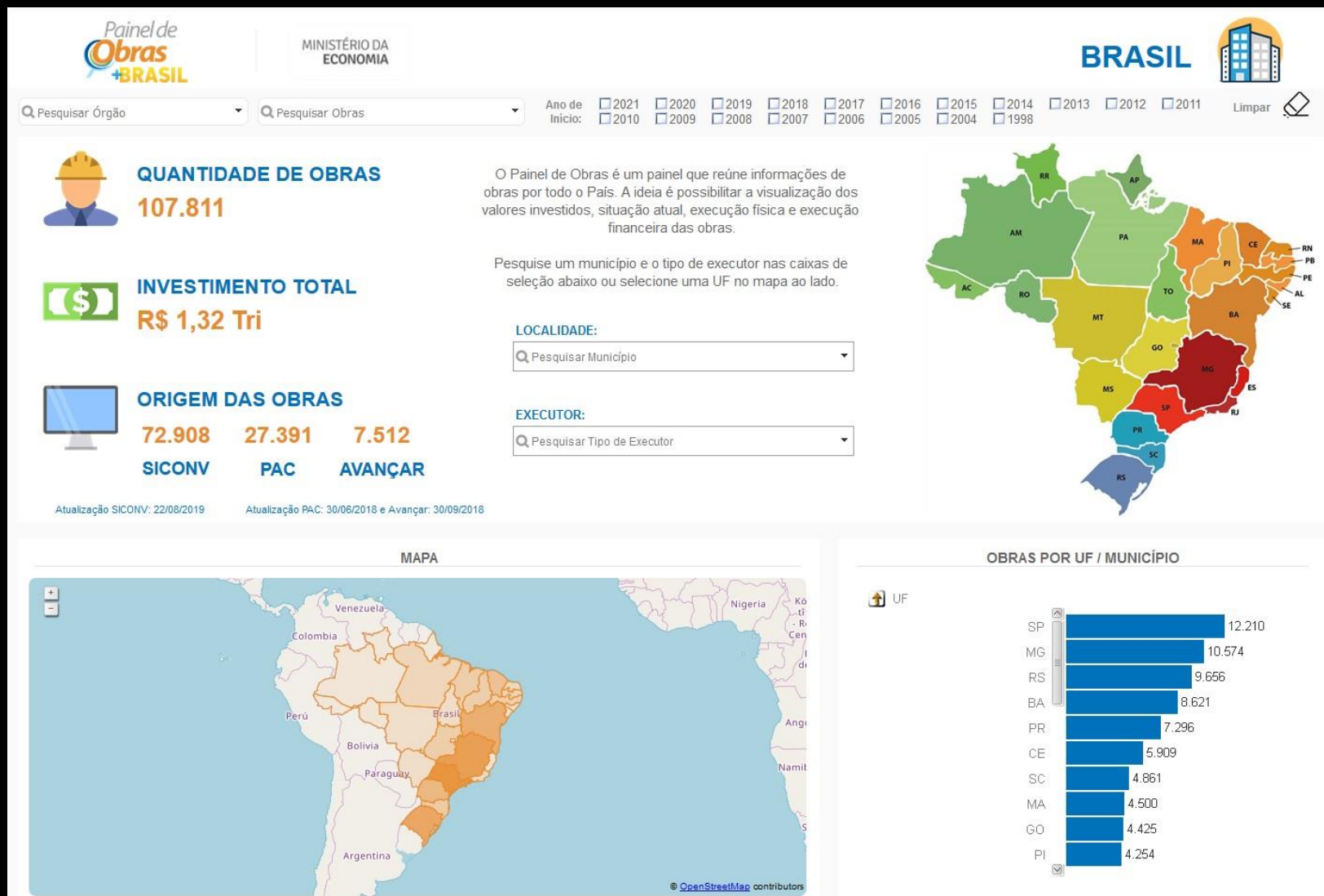


FENÔMENO GLOBAL E ANTIGO

- **Smith (1776):** “As pessoas de uma mesma indústria raramente se reúnem, ainda que para divertir-se, sem que suas conversas terminem sempre em uma conspiração contra o público”.
- **Sherman Act (1890).**



POTENCIAL

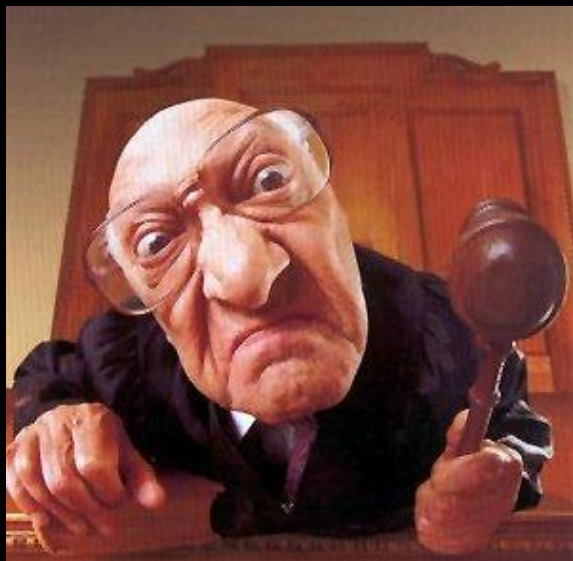




DIFICULDADES (MUNDIAIS)

Detecção

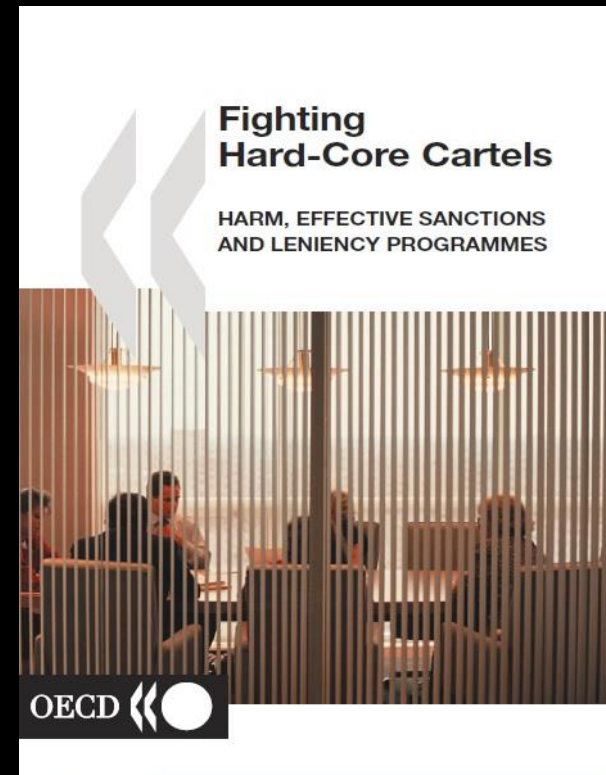
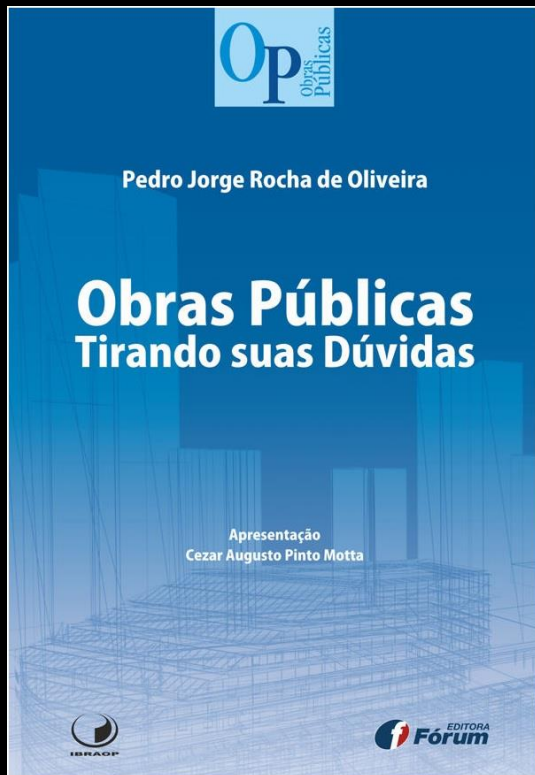
Comprovação



Mensuração



MÉTODOS (MUNDIAIS)



MÉTODOS (MUNDIAIS)

P. Ballesteros-Pérez et al. / Automation in Construction 31 (2013) 215–229

J. Constr. Eng. Manage., 2015, 141(7): 04015010

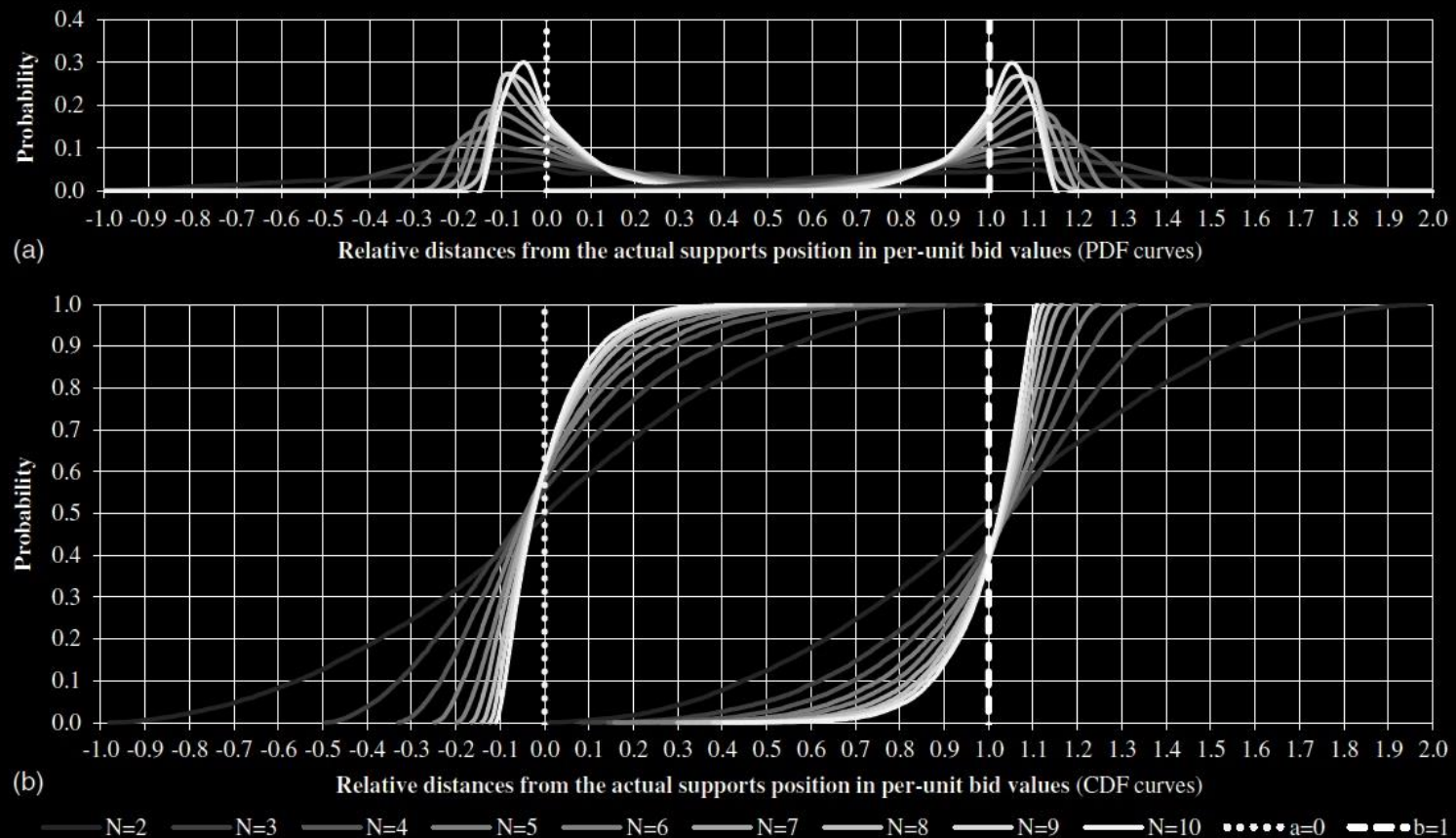
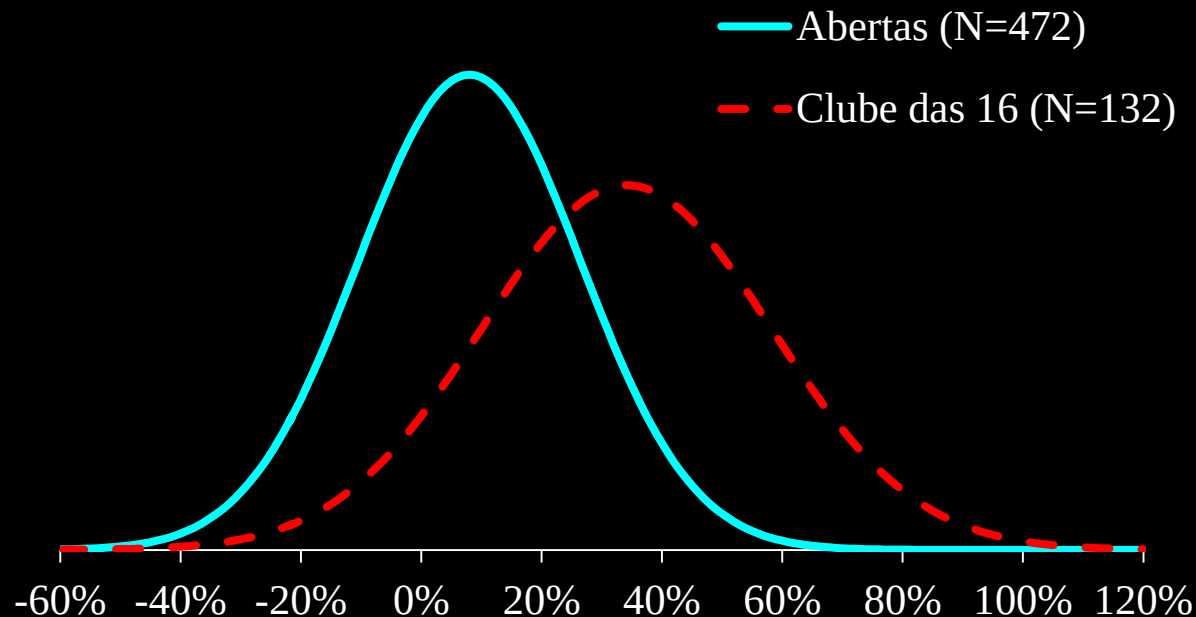


Fig. 2. Curves of the bid distribution support positions a and b : (a) probability density function curve; (b) cumulative distribution function curve

MÉTODO ESTATÍSTICO



Diferença entre as propostas e a estimativa BR

$$H_0: \mu_1 = \mu_2$$

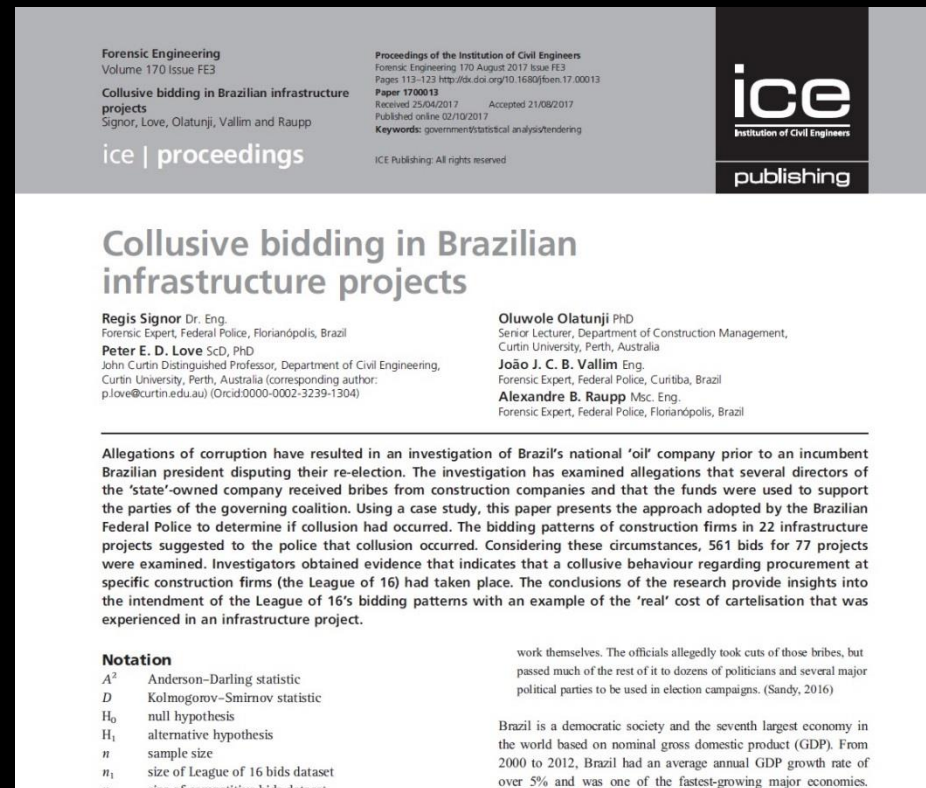
$$H_1: \mu_1 \neq \mu_2$$

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = 11,53$$

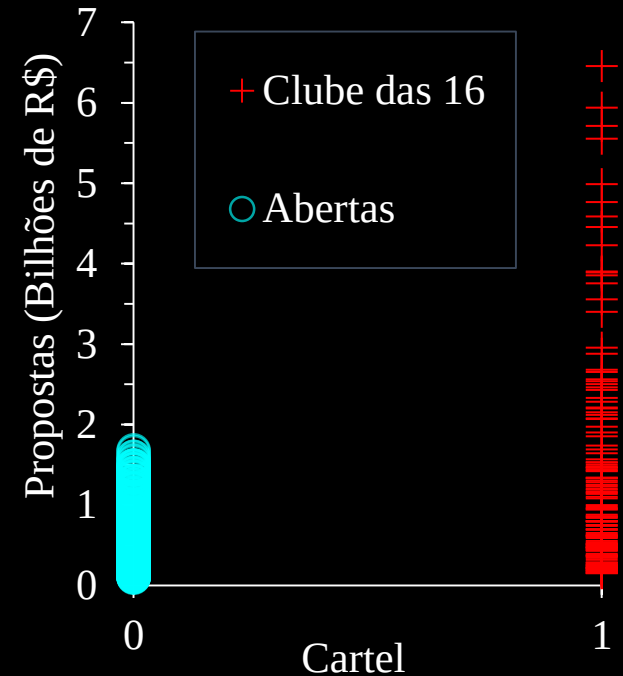
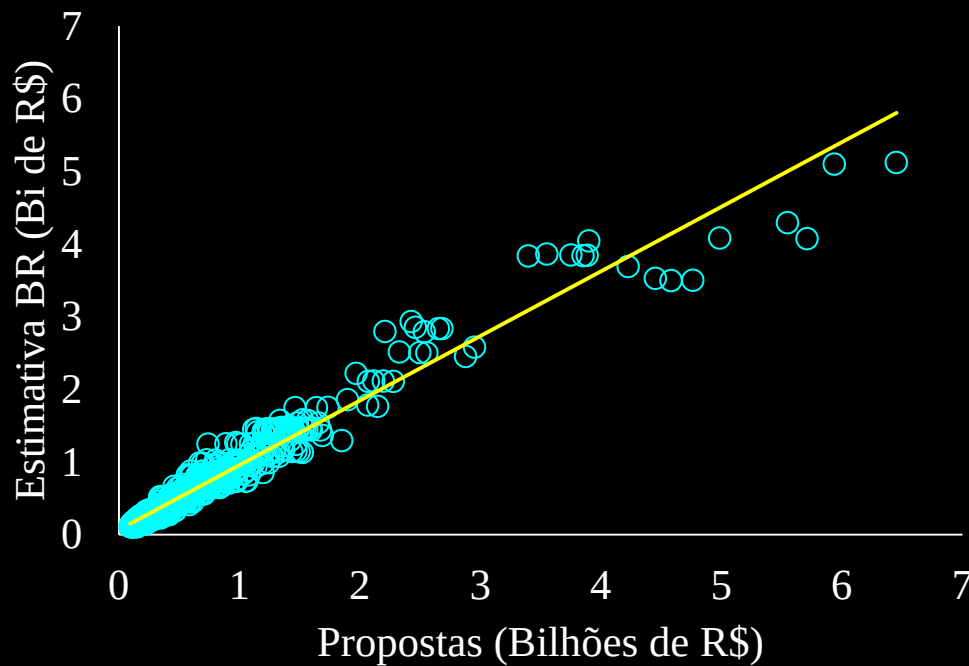
$$t_{\text{crít}} (\alpha=0,05; 131) \approx 1,98$$

MÉTODO ESTATÍSTICO

- Detecção: $\pm$
- Comprovação: ✓
- Mensuração: ✓



MÉTODO ECONOMETRICO



$$\ln Prop = 1.0196 \times \ln(EstBR) + \frac{0.3797}{NPropVal} +$$

$$+ 0.0882 \times Inv + 0.0036 \times TC + 0.1461 \times Cartel - 0.127$$

MÉTODO ECONOMETRICO

- **Detecção: $\pm$**
- **Comprovação: ✓**
- **Mensuração: ✓**

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Article



It is not collusion unless you get caught: the case of 'Operation Car Wash' and unearthing of a Cartel

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Alexandre B. Raupp** and Oluwole Olatunji^{††}

The authors acknowledge the Brazilian Federal Police and Curtin University for supporting the strengthening of scientific evidence.

ABSTRACT

In this article, we present findings from the Brazilian Federal Police's ongoing investigation referred to as 'Operation Car Wash', which led to an accusation of collusive bidding being presented to a cartel that comprised 16 construction contractors. While plea bargains from several contractors within the cartel have materialized, additional evidence needs to be provided by the investigations officials to ensure the adequate application of justice. In this article, we provide scientific evidence that can be used by the Brazilian criminal courts to demonstrate the presence of collusive bidding. The contributions of this article are two-fold: (i) a robust and reliable econometric model to prove the presence of collusive bidding is implemented, which meets the basic criteria defined by the judicial system for scientific evidence; and (ii) the negative economic impact of collusive bid rigging is quantified, which was much higher than the percentage admitted by those involved in their leniency agreements.

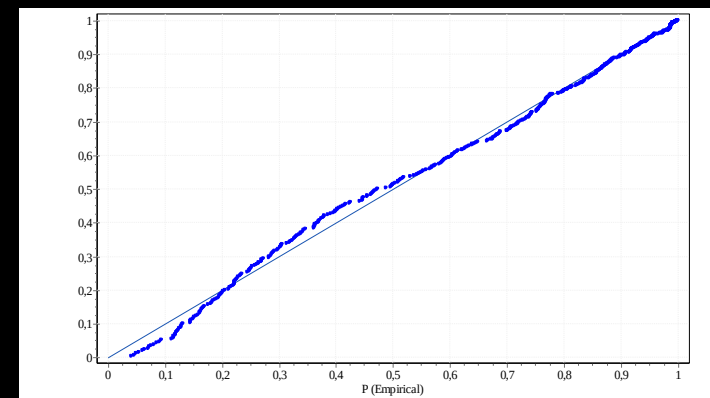
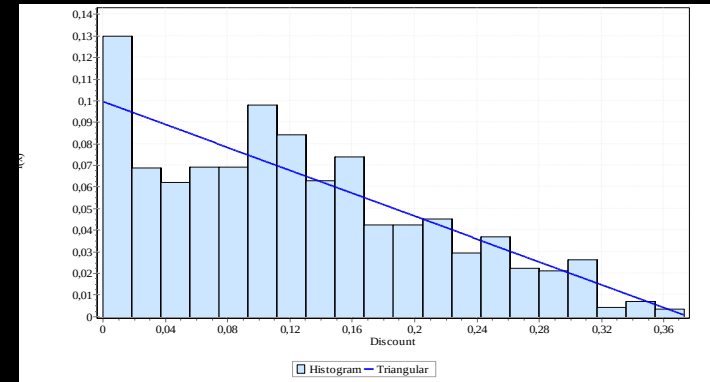
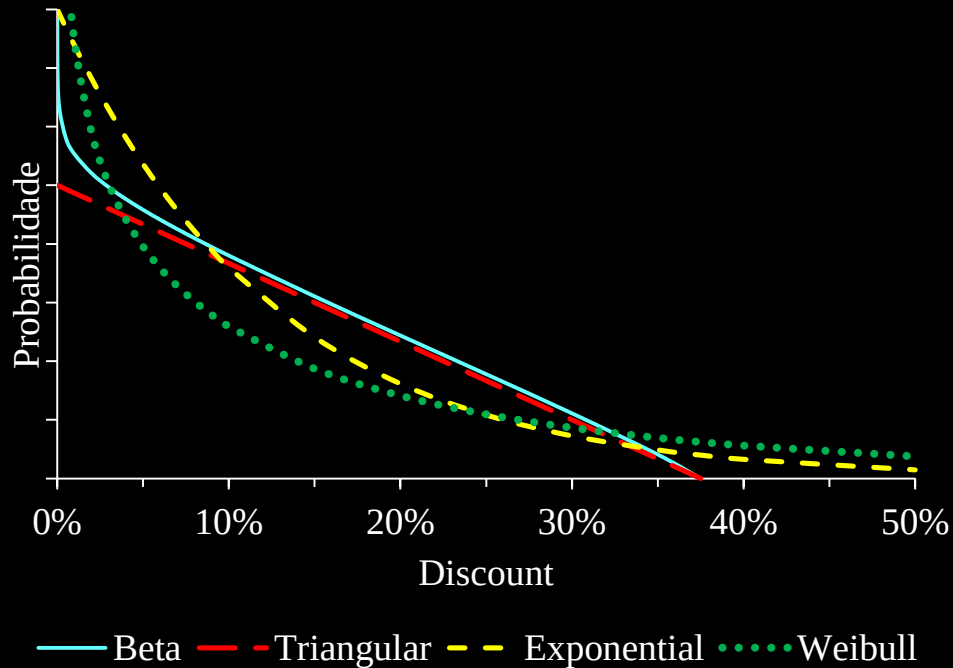
KEYWORDS: Cartel, price fixing, econometric model, economic harm
JEL CLASSIFICATIONS: K42

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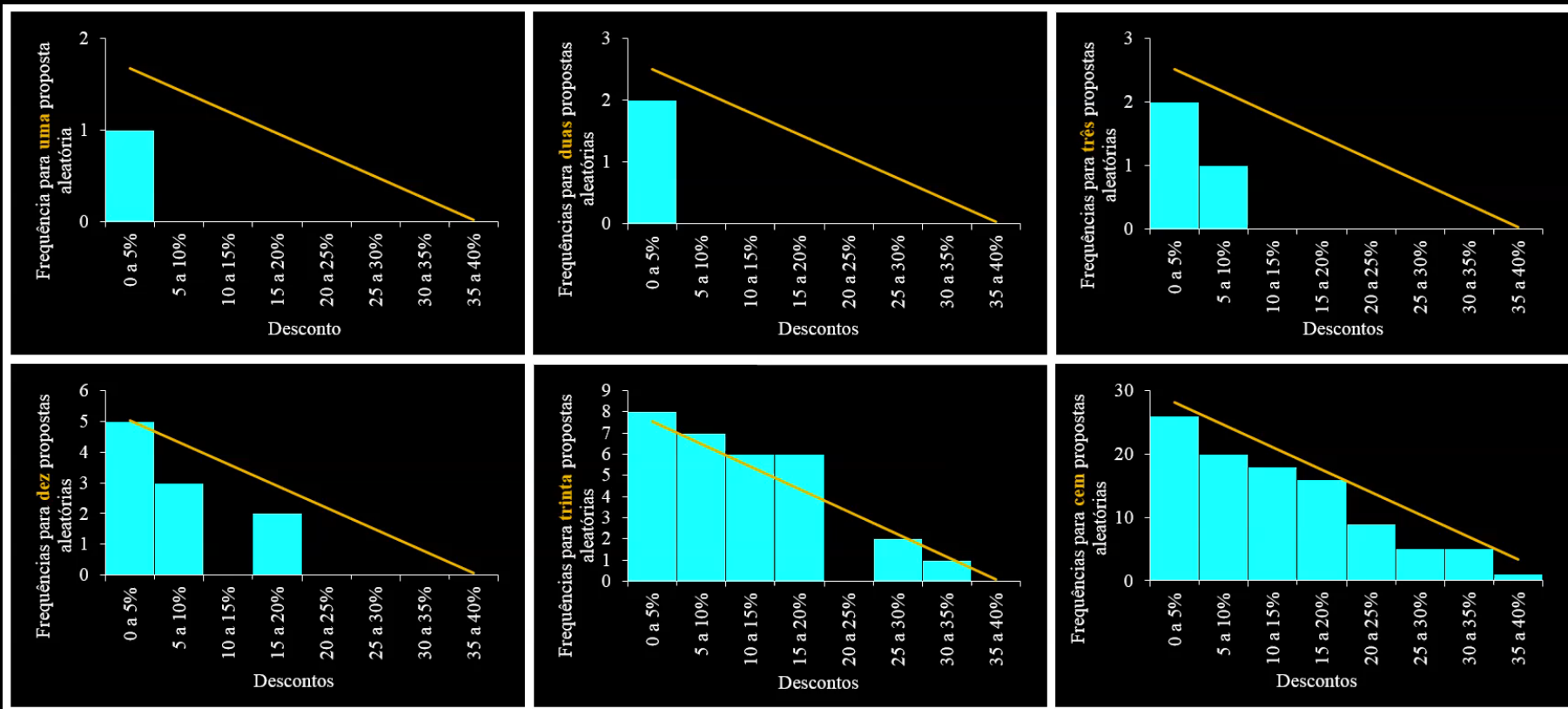
MÉTODO PROBABILÍSTICO

- Co-ludir = jogar juntos;
- A base do método é o estudo do comportamento conjunto dos competidores;
- Qual a probabilidade de todos os competidores apresentarem propostas elevadas ao mesmo tempo?

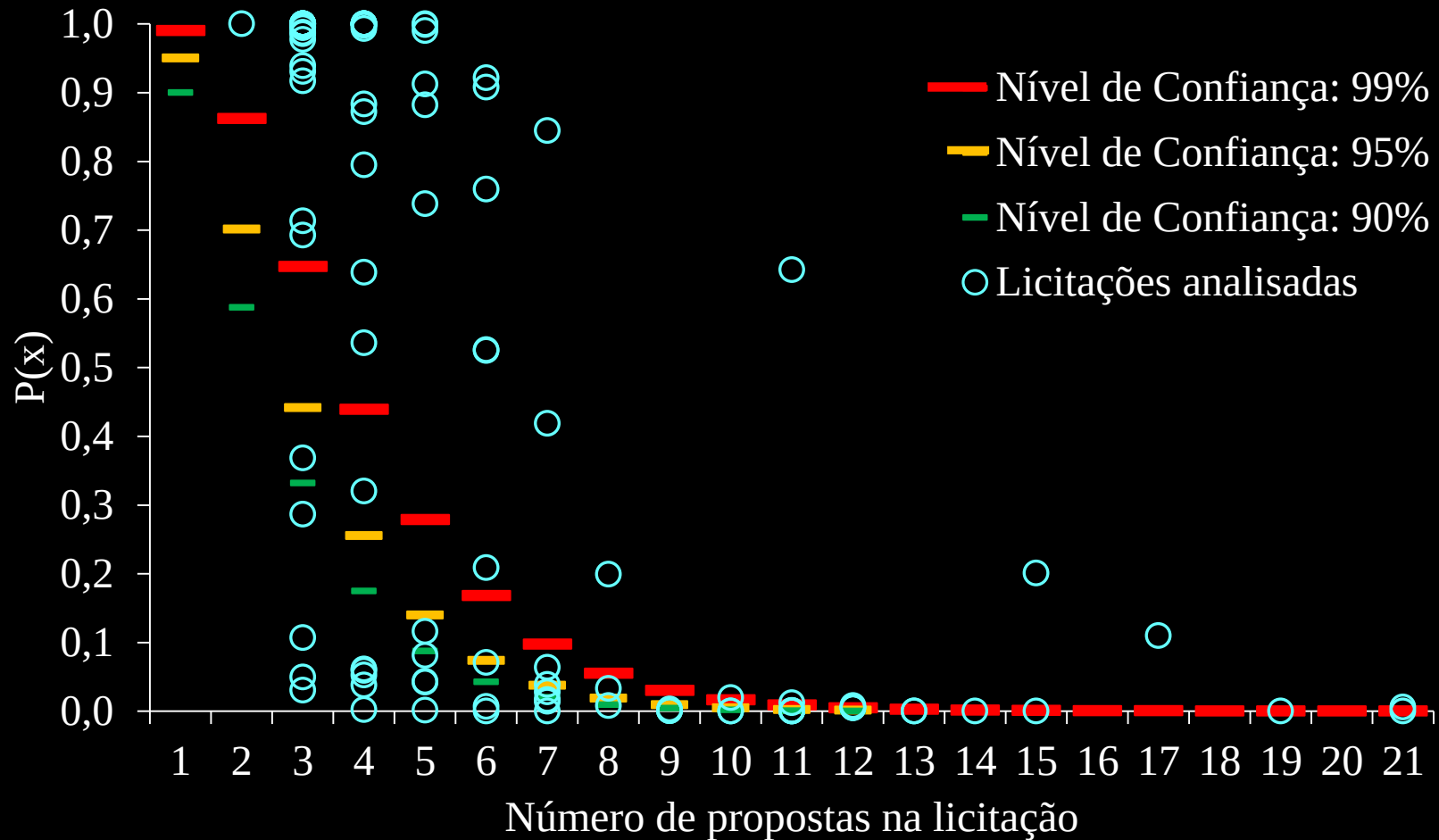
MÉTODO PROBABILÍSTICO



MÉTODO PROBABILÍSTICO

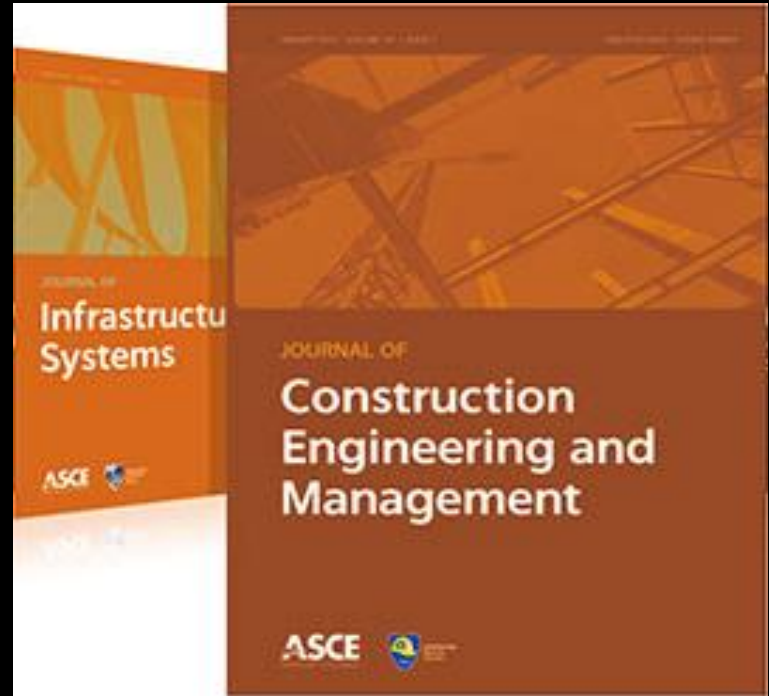


MÉTODO PROBABILÍSTICO



MÉTODO PROBABILÍSTICO

- **Detecção:** ✓
- **Comprovação:** ✓
- **Mensuração:** $\pm$



MÉTODO PROBABILÍSTICO

- **Adaptável para licitações com e sem limite superior pré-definido;**
- **Requer duas informações:**
 - **Cenário de referência - licitações “honestas”;**
 - **Orçamento oficial - mediano de mercado.**

MÉTODO PROBABILÍSTICO

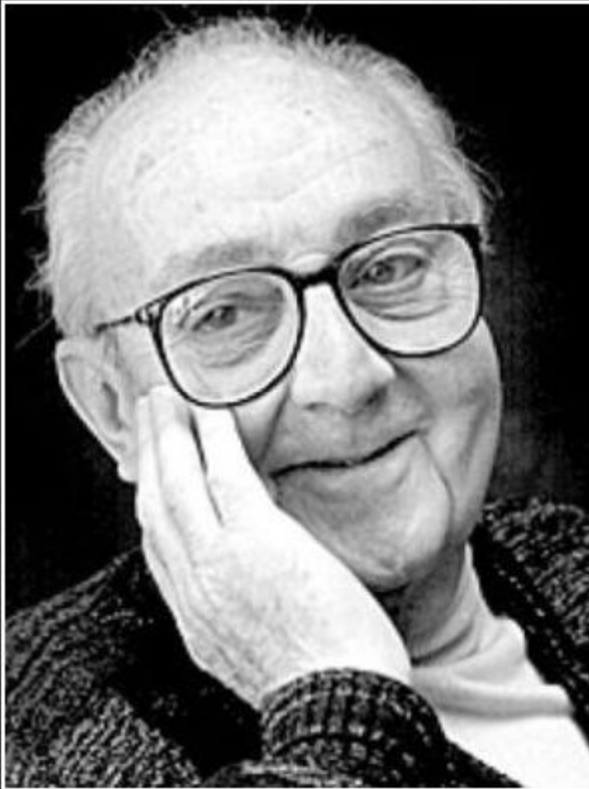
- **Automatizável, pode ser facilmente incorporado aos sistemas dos TCE's para uso na fase administrativa (prevenção).**

Número de competidores	Orçamento oficial (valor limite)	Valores das propostas	Desconto	Prob. $D_r > D_i$	Prob. Conj.	Nível de confiança		
						95%	99%	99,9%
1								
2								
3	388.677,22	375.235,21	3,5%	0,824	0,712	Cartel	Cartel	OK
		378.469,12	2,6%	0,865				
		388.587,56	0,0%	0,999				
4								

PANORAMA

- Para a finalidade penal, qualquer método de detecção dependerá de comprovação da investigação.
- Para a finalidade administrativa, todo método é válido para tentar evitar o desvio de recursos em obras públicas.

UM POUCO DE FILOSOFIA



All models are wrong, but some are useful.

— *George E. P. Box* —

AZ QUOTES

AGRADECIMENTOS

- **Ao IBRAOP;**
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 - João J. B. **Vallim**
 - Pedro** S. Oliveira Jr.
 - Oluwole **Alfred** Olatunji
 - Peter** E.D. Love.



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A todos os presentes, pela
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