FGV CERI
CENTRO DE ESTUDOS EM REGULAÇÃO E INFRAESTRUTURA

SMART METERING REGULATION IN BRAZIL: POTENTIAL IMPACTS FROM REGULATORY DELAY

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ROADMAP

INTRODUCTION

- Introduction of a new feature in a regulated industry as the power sector, such as smart metering, is different from the introduction of a new good in a non-regulated business

- Brazil is far behind european countries in smart metering implementation

- In Brazil, implementation of the smart metering has to be authorized by ANEEL, the Brazilian Energy Commission, and the smart metering equipment itself has to be homologated by Inmetro, the National Institute for Measurement, Quality, and Technology

- This paper aims to measure potential losses in consumer welfare from regulatory delay of smart metering implementation approval by the regulator in Brazil

Literature Review

OSTER AND QUIGLEY (1977)

Regulatory framework could negatively impact an industry:

For the construction sector, they argue regulation delayed the diffusion of certain techniques.

HAUSMAN (1997)

Estimated the cost of regulatory delays by valuing the economic gains that consumers would have had if the service had been available during the period of regulatory delay.

Case of voice messaging services in the US

- Implemented more than **10 years after AT&T's** first proposal of implementation to the regulator.
- Estimates **this delay costed billions** of dollars for consumers
- The same methodology applied to the regulatory delay concerning the **introduction of the cellular telephone service showed an approximated cost of US$100 billion to costumers**

Regulatory delay for the introduction of new telecommunication services in the US has caused large losses in consumers' welfare

SCHIAVO ET AL (2013)

Italy as a case study

Analyses how energy regulation can change to support the current transformation

They described the recent regulatory interventions in the domain of smart grids, smart metering and electromobility, with a specific emphasis on the provisions aimed at fostering innovation - an issue that until recently has received almost no attention in the literature nor in the practice of regulation.

Brazilian Regulation and Brazilian Smart Metering Projects

Implementation of the smart metering has to be authorized by ANEEL, the Brazilian Energy Commission, and the smart metering equipment itself has to be homologated by Inmetro, the National Institute for Measurement, Quality, and Technology.

Brazilian Regulation and Brazilian Smart Metering Projects

2002

Electronic meters have been regulated by **Inmetro**

New electronic meters have been subject to model approval by Inmetro (Portaria #262/2002, and Portaria #149/2004)

2005

The Institute established the minimum requirements for equipments in Brazil, through the **Metrological Technical Regulation** ("Regulamento Técnico Metrológico" - RTM), which included energy meters (**Portaria #66/2005**).

Institute established rules for verification of the meters (initial verification - #239/2005, and #162/2006 - and maintenance verification - #287/2006, complemented by #346/2007 and #347/2007 – which extended the deadlines for meter verification).

2007

Inmetro approves a new RTM **(#431/2007**).

2009

Inmetro began discussing smart metering implementation in Brazil

2012

The Institute launched a new RTM for energy electronic meters **(#587/2012, modified in #82/2013)**

2013

A new RTM with additional requirements was approved in 2013 **(#402/2013)**

2014/2015

Another in 2014 **(#520/2014),** complemented in 2015 **(#95/2015).**

BRAZILIAN REGULATION AND BRAZILIAN SMART METERING PROJECTS

- ANEEL:
- 2018: Public Consultancy about binomial tariffs - Regulatory Impact Analysis Report #02/2018-SGT/SRM/ANEEL, Technical Note 277/2018-SGT/SRM/ANEEL
  - ANEEL considered an acquisition and installation price of R$500 per meter, and a R$11,02 cost per consumer, per month.
- Brazilian Smart Metering projects:
  - CPFL group is planning to implement smart metering in 9,2 million consumers in 10 years.
  - Light (distribution company in Rio de Janeiro) plans to invest 900 million BRL to automatize measurement of 1,5 million consumers.
  - Enel is analyzing the viability of a massive roll-out for its concession area in São Paulo.

BRAZILIAN REGULATION AND BRAZILIAN SMART METERING PROJECTS

- FGV CERI developed a CBA analysis for this massive roll-out of smart metering implementation in Enel São Paulo's concession area -> the analysis showed net benefits for this case.

- Equipment (smart meter, balance meter and concentrators)
- Installation costs
- Adequacy of already existing installation spots
- Communication systems
- Company staff for project management
- Company staff for operational functions
- Marketing expenses
- Depreciation of current meters

→

15-year horizon
€120 installed meter cost

Results showed a R$5,00 cost per consumer, per month

DATA, EMPIRICAL ANALYSIS AND RESULTS

HAUSMAN (1997):

$$CV = \left[\frac{(1-\delta)}{(1+\alpha)} y^{-\delta}(p_1 x_1) + y^{1-\delta}\right]^{1/(1-\delta)} - y$$

Where:

- $p_1 x_1$ is the expenditure (per capita or divided by the numbers of consumers in the concession area) on the new venture
- y is the current level of income for the representative agent (consumer in the same concession area)
- α is the price elasticity
- δ is the income elasticity.

DATA, EMPIRICAL ANALYSIS AND RESULTS

	Scenario 1	Scenario 2	Scenario 3
Income Elasticity (delta)	0,282		0,282
Price Elasticity (alfa)	-0,154	-0,154	-0,154
Income (R$/month)	4756,0	4756,0	4756,0
Expenditures with new venture (p1x1) (R$/month)	5	5	11,02
CV - Compensating Variation	5,911200871	5,910165485	13,03103315

From Schutze (2015)

From IBGE (2018)

From ANEEL (2018)

From FGV CERI (2019) – CBA Smart Metering

DATA, EMPIRICAL ANALYSIS AND RESULTS

- Income elasticity has no significant effects; CV is more sensitive to the expenses related to the new venture by themselves.
- Because it is possible to not take into account the income effect, Compensating Variation (CV) becomes equal to the variation of Consumer Surplus (CS) – hence, it is possible to estimate CS in present value terms.
  - total amount of consumers: 7 millions of units
  - duration of concession contract: 30 years
  - regulatory rate of return -> regulatory WACC for distribution firms in Brazil: 8,09% (inflation adjusted)

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  - Result: **6 billions of Brazilian reais** as an estimation for variation in the consumer surplus (CS) in the case of delaying smart metering project in Enel operational area.
- Another point of view: comparing estimated CV and the expenditures related to the implementation of the new venture
  - "willingness to pay" (WTP) for the consumers is higher than total costs in R$/month/consumer (we are considering the CV as a proxy for WTP in this case).

CONCLUSIONS

- Our preliminary results indicate a relevant welfare loss for consumers in the case of delaying of implementation of a smart metering program in Brazil.
- Using São Paulo state as a case study, we also estimate monetary effects in present value terms and a proxy for the "willingness to pay" related to the implementation of a new venture (smart metering devices).
- Therefore, preliminary simulations suggest that there are expressive welfare gains from avoiding regulatory delay – in the Brazilian case, the delay related to the certification of smart metering devices.
- As a topic of future research, we propose a Computable General Equilibrium model, in order to estimate potential welfare loses due to the delay taking into account the possible spillovers on the overall Brazilian economy.

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