Governance strategies and transaction costs in a renovated electricity market

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ABSTRACT

This study applies a transaction cost economics (TCE) framework to examine how economic agents adopt governance strategies in Brazil's recently renovated electricity market. In light of a well-established TCE model, four attributes of transactions (i.e., asset-specificity, uncertainty, complexity, and frequency) are examined for three unregulated transactions between generating firms and final consumers. The qualitative analysis of attributes unfolds into a comparative analysis of theory-predicted governance strategies versus strategies observed in the marketplace. It is argued that Williamson's model continues to effectively predict the most efficient governance strategy in the sense of minimizing transaction costs and safeguarding idiosyncratic assets. Misalignment between theory predictions and observations, however, suggests that two additional concepts – implementability and reputation – must be examined alongside with Williamson's four attributes of transactions in order to better explain strategic decisions in Brazil's electricity market. Capital availability, existence of compatible partners, and reputation play crucial roles in explaining those decisions.

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1. Introduction

There is broad commitment to reduce emissions of greenhouse gases (GHG) caused by anthropical activities (UN, 2002, 2012; UNFCCC, 1998). How these commitments are translated into national energy policy differs by country and is dependent on many factors including: existing institutions, availability of natural resources, and energy supply chain structures. Consider the renewable energy policies adopted in the U.S. and Brazil. In the U.S., the Renewable Portfolio Standard (RPS) has caused only a mild disturbance in the dynamics of the energy market. The federal program defines proportion goals of clean electricity for 30 states but grants autonomy to state authorities of how to reach those goals. The Brazilian initiative, on the other hand, has had much deeper institutional implications. The Electricity Sector Reform and Brazilian renewable energy initiative (i.e., National Program of Incentives for Alternative Electricity Sources — *Proinfa*, in Portuguese) not only offered favorable financial support to new renewable power generators but also re-defined the rules governing transactions in both wholesale and retail power markets.

In light of these events and based on the importance of the topic at hand, practitioners seek innovative organizational strategies to accommodate the entry of renewable sources in recently renovated markets. Applied economists also seem intrigued with these issues and question how energy sectors will adapt as renewable energy policies gain momentum (What are the equilibria in these games?). Scholars have examined several questions associated with the re-organization of energy industries. While some studies analyze the evolution of institutions governing energy sectors (Borenstein, 2002; Joskow, 2000; Signorini et al., 2015), others examine how incumbent and entrant firms re-define governance strategies (Altman and Johnson, 2008; Delmas and Tokat, 2005; Weseen et al., 2014). This paper is also interested in the latter.

Empirical studies of organizational structure and governance strategies often apply Transaction Cost Economics (TCE) theory to guide the analysis. The TCE framework indicates that four underlying attributes of a transaction (i.e., asset specificity, uncertainty, complexity, frequency) must be taken into account if trading parties seek to implement the most efficient governance strategy to coordinate transactions (Williamson, 1985, 1996). Other factors related to the decision of governance choice include implementability (Peterson et al., 2001), the reputation (Masten, 1996), and trust (Gulati, 1995) of the exchange partners. Williamson (1996) further suggests that there is a spectrum of mechanisms that may be selected to govern a transaction and that

there is a "best" alternative[1] for every discrete combination of transaction attributes. These governance mechanisms include: spot markets, specification contracts, relation-based alliances, equity-based alliances, and vertical integration (Peterson et al., 2001).

The TCE approach (Williamson, 1985, 1996) provides a rich theoretical framework to examine the adoption of alternative governance mechanisms to coordinate exchange relationships. The framework presents two main advantages over other economic perspectives on the firm (i.e., agency theory and property rights theory). For one, TCE situates the firm in a wider institutional environment allowing it to be analyzed as an organization (Dietrich, 1994). Secondly, TCE offers a framework in which transaction attributes remain invariant and are assessed independently of the chosen governance mechanism (Dow, 1987). This methodological consistency creates the necessary grounds for what might be called "theoretical comparative advantage" (Dietrich, 1994 p. 2).

However, some scholars have questioned whether TCE is the most appropriate theory to predict optimal governance structures (Foss, 1996; Kim and Mahoney, 2005; Mahoney, 1992; Mahoney and Pandian, 1992). Others have found that TCE is insufficient to explain why businesses in the same complex industry adopt different governance strategies to support exchange and yet both strategies could be efficient alternatives (Delmas and Tokat, 2005). In light of these criticisms, this paper focuses on the governance strategies adopted by power generating firms and final consumers in Brazil's renovated electricity market. The primary objectives of this study are to examine (i) *how* trading parties settle governance strategies under the new set of institutions governing Brazil's electricity sector, and (ii) whether Williamson's framework suffices to explain adoption of those strategies. It is argued that two additional concepts – implementability and reputation – broadly discussed elsewhere might enhance the capability of TCE in predicting parties' choice of governance strategies.

The Brazilian electricity sector provides a particularly interesting environment for this analysis for two reasons. *First*, the financial stimuli (e.g., tax incentives, favorable loans) offered to generators and consumers of clean energy helped Brazil solve imbalance problems while diversifying its energy mix, and consequently mitigating emissions of GHGs. *Second*, the Electricity Sector Reform (1995–1998) and subsequent amendments established two trading channels — one for regulated transactions and the other dedicated to unregulated transactions between independent consumers or special consumers and generating firms. This paper focuses specifically on transactions conducted in the unregulated channel[2] as parties in this channel are authorized to freely choose governance strategies. The same cannot be stated for transactions conducted in the regulated channel. Put differently, the Brazilian electricity market characterizes a rich setting for analyzing *how* firms choose governance strategies, where conventional and renewable energy generators integrate the supply side of the industry.

We recognize that a precise review of institutions is crucial for understanding the drivers of governance mechanism adoption. This paper, nevertheless, provides an abbreviated review of the organizational structure of the Brazilian electricity industry and directs readers to Signorini et al. (2015) for a comprehensive analysis of institutions and institutional evolution. Although we are aware that this approach has its disadvantages, it opens space for a sophisticated qualitative analysis as required by grounded theory (Glaser and Strauss, 1967; Strauss and Corbin, 1990), the analytical framework used in this study. Besides,

conducting the review of institutions elsewhere allows ample treatment of institutional change and economic development (North, 1990, 2005; Shirley, 2005), essential background work for understanding how economic agents define governance strategies.

This article is organized as follows. Section 2 presents the analytical methodology and data. Section 3 describes the transaction cost economics (TCE) framework. Section 4 reviews the current organization of Brazil's electricity sector with emphasis on the free market channel. Section 5 applies the TCE theory (i.e., Williamson, 1985, 1996) to predict the most efficient governance strategy for three transactions between generating firms and final consumers. Section 6 discusses about the misalignments between predicted and observed governance strategies and introduces refinements that might enlighten further understanding of governance strategy choice. Section 7 concludes our analysis.

2. Analytical methodology and data

This study uses a grounded theory approach (Glaser and Strauss, 1967; Strauss and Corbin, 1990, 1994) to examine three electricity transactions in Brazil's free market channel and to test whether TCE theory (Williamson, 1985, 1996) suffices to explain which governance mechanism is adopted in each context. Grounded theory is a qualitative research method that has been found to be superior to alternative methods as it allows greater understanding of a certain applied economic phenomenon in a natural and holistic context (Bitsch, 2005, 2009; Peterson, 2011; Sterns et al., 1998). Scholars that use grounded theory, however, are cautioned to stay detached from the case because any personal opinion incidentally included in the analysis might compromise its validity (Strauss and Corbin, 1994; Yin, 2009). In general, grounded theory fits best for qualitative analysis if the: (i) research focuses on open-ended questions, (ii) researcher is interested in contemporary context, and (iii) investigator has no control over the set of events analyzed (Yin, 2009). This study meets these conditions. From an outside perspective, it examines *how* economic agents participating in Brazil's electricity market currently select governance arrangements.

Specifically, this paper follows the grounded theory approach presented by Strauss and Corbin (1994). In doing so, we qualitatively analyze the four transactional attributes identified by Williamson (i.e., asset specificity, uncertainty, complexity, and frequency) for each transaction of interest. After critically assessing their significance level, we use the TCE framework to predict the most efficient governance strategy. Sequentially, we compare whether the predicted governance strategies are consistent with the actual strategies chosen by economic agents. Misalignments between predicted and adopted strategies suggest that TCE becomes more compelling when refinements are taken under consideration. Two complementary concepts are introduced as necessary to provide further explanation of observed misalignments.

Data used for this study were collected from primary and secondary sources. The institutions governing transactions were summarized based on industry reports, specialized publications (Almeida, 2005; Castro et al., 2008; Correia, 2010; Neves and Conejero, 2010), and websites of political bodies associated with the energy sector — Ministry of Mines and Energy, Energy Research Corporation (EPE in Portuguese), Electricity Regulatory Agency (ANEEL in Portuguese), Chamber of Electrical Energy Commercialization (CCEE in Portuguese), and National System Operator (ONS in Portuguese). Primary data were collected from a series of structured interviews conducted between May 25th and July 16th, 2010 with sector experts who represent a range of interests: government, industry, and academia. In total, 15 experts were interviewed, including: seven decision makers at power generating plants; five members of consulting companies/market facilitators; one project manager from a design-building company; one member of CCEE; and one member of ONS. The data collected in interviews are used as supporting arguments throughout the study. A copy of the interview instrument is available from the authors upon request.

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[1] TCE theory recognizes that Pareto efficiency, or first-best outcome, is seldom obtainable. The term "best" alternative as used here refers to the most efficient governance strategy, resulting from a comparative analysis of potential strategies. TCE theory, nevertheless, suggests that any governance strategy chosen by decision makers is likely to carry some degree of inefficiency in the traditional neoclassical sense of the word due to bounded rationality (Simon, 1978) and information asymmetry (Arrow, 1963).

[2] The market channels are formally called "environment for regulated transactions" (*ambiente de contratação regulada*, in Portuguese) and "environment for free transactions" (*ambiente de contratação livre*, in Portuguese). This article will from here on refer to them as "regulated market channel" and "free market channel", respectively.