

AUCTIONS AS COMPETITION MECHANISMS AND THE BRAZILIAN ENERGY INDUSTRIES RECENT EXPERIENCE.

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Introduction

The legal and institutional changes through which most infra-structure industries in the Brazilian economy went through during the 1990s presented some similarities. Some of the major changes were the enactment of new laws, the creation of independent regulatory bodies and the promotion of a competitive environment in the markets.

Competition was implemented where it was possible by encouraging the entry of new players and implementing the end of public monopolies in key segments of the industries. In some sectors, moreover, competition was introduced through the adoption of bidding mechanisms. This paper analyses two particular choices: the bidding system for concession leases for oil & gas exploitation and the auctions for electricity commercialization. It intends to analyze the bids adopted in the commercialization of electricity and the concession of oil and gas exploitation fields. From the viewpoint of the set of rules initially applied, there will be presented and compared the results obtained, as well as the modifications, improvements and changes of path implemented afterwards.

I - Introduction

One of the primordial objectives of the reforms implemented in Brazil from the mid-1990's in the infrastructure sectors was the introduction of competitive pressures in industries traditionally characterized by an organization based on state-owned monopolies. According to Carneiro (2006), the convergence between the different models adopted in distinct segments was that the deregulation of these industries was, in general, based on the construction of market-oriented governance structures.

Changes both in the legislative and regulatory dimensions were adopted so that general rules could be enacted; they allowed, among other changes, the introduction of competition pressures in many segments of infrastructure industries¹. In some of them (particularly in the energy industries), it was not possible to create competitive markets and the solution adopted (for the introduction of competitive pressures) was the construction of auction mechanisms.

This choice, however, did not obtain the expected results. The electricity industry in Brasil went through a supply crisis in 2001, which was, in part, credited to the design of the wholesale market that had been created in 1996. In the segment of hydrocarbons exploration and production, likewise, the results and agent behavior observed were different from the expected ones.

The next section will present a short synthesis of the main contributions of the Auction Theory to the problem of introducing competition in segments where the typical market structure does not lead to efficient results. The third section will analyze the choices made (the adopted models and the implemented rules) in light of the outline presented previously, pointing to similarities and differences between the experiences. Finally, some preliminary conclusions will be presented.

¹ Glachant, J-M., 2002.

II – Auctions in the economic theory

Auctions have become popular instruments among governments and policy makers in general; from offering leases or public concessions to operating decentralized markets, passing through privatization of state owned companies, its use has grown in the last two decades (and so has its empirical significance²).

Brazil used auction mechanisms before the infrastructure reforms – typically when the government needed to buy supplies or in concession leases offers. The instrument is still extremely popular, and is mandatory for several public expenses (Law n. 8.666/93). With the increase of its utilization, with new types of auctions being designed and/or suggested as means of serving the public interest, those new rules must be analyzed in order to grant that the expected results will be reached in the best possible way.

The design of auction mechanisms, specially the introduction of pro-competitive rules in sale auctions is one of the themes that became popular study objects in the last decades, and presently auctions rules and instruments arrangement and interaction allow the prediction of whether or not the expected results are likely to be achieved (as both the literature and the empirical experience are better developed).

Two different situations will be analyzed, in this article: auctions for concessions leases for hydrocarbon exploration and production (a rights auction) and auctions for electricity commercialization (for the determination of the market long run price of electricity).

Regarding the first situation, Leal (1998) emphasizes that the main objective of a bidding process or sale of public goods, is the fact that the seller (the government) does not know the precise value of the good put for the sale (though in general a minimum price is stipulated) and the asymmetry of information characteristics of the transaction allow it as a way of extracting private information from the agents – at least in part. One of the commonest objectives of this type of mechanism is the maximization of the sale result for the society (represented, in the process, by the public agent promoting the auction).

Alternatively, the use of auctions as mechanisms of price determination is used, according to Carneiro (2006), because some goods do have not a value standard (for instance, because the price in question depends on the conditions of supply and demand at a specific moment in time, and is re-calculated in each transaction), as occurs to the electricity.

The identification of the institutional rules of each auction is important, as the rules influence the agents' strategies and bids, and also determine the allocation efficiency of the goods object of the auction.

The economic literature identifies auctions as competitive or non-competitive auctions; the first ones are our focus in this paper. There are five basic types of auctions for sales: English (or price ascendant auction), Dutch (or price descendant auction), discriminatory auction (first price auction), second price auction and double auction.³

Furthermore, competitive auctions can be classified, according to its configuration, in open and closed bids auctions, uniform price auctions and multiple price auctions; and private and common value auctions⁴.

² It should be pointed out, however, that there are far more literature on sales auctions than there are on acquisition auctions..

³ Due to this paper length limit, we will not attain on each specific kind and its particularities. For further descriptions of each auction see, for instance, Carneiro (2006) e Duraes (1997).

⁴ The first distinction refers to the way bids are presented: in open auctions, the bids are proposed publicly, and in closed bids, they are presented in sealed envelopes, that are opened at the same time. The second distinction refers

As there are many possibilities, the choice of the auction design is a crucial decision for the policy maker. One of the aspects that interest the most public bureaucrats when determining sales auction rules is the results on the literature concerning the potential revenue of each type of auction and its results in terms of resource allocation (this is, for instance, the situation on the hydrocarbons exploration and production leases⁵). On electricity commercialization auctions, on the other hand, the results must balance distinct objectives: the price determined should attend both the tariff moderateness goal and investment incentives (for supply security). In both situations, the convenience of each auction modality depends on several hypothesis on the market characteristics, on the goods characteristics, on the bidders risk aversion behavior, on the number of bidders and on the information available.

Also, the policy choice that determines the kind of auction in each industry must be appropriate (compatible) to the objectives presented. It should, in addition, take into account the fact that the set of rules adopted determines the result⁶.

III – Auctions in the Brazilian Energy Industries

Though auctions are able to present results that are close to the ones expected in competition, the use of inappropriate types (unsuitable for the peculiarities of each sector) can be disastrous. It is, then, necessary not only a compatibility evaluation of model chosen with the objectives claimed, but also a careful analysis of the industry characteristics where the auction is inserted. Practical questions, like budgetary restrictions, market concentration and demand and supply elasticity must be addressed. Particularly, market power is especially relevant for the Brazilian hydrocarbon industry.

Given that the regulatory process reflects, in a large extent, a learning process for the regulatory agency; the models of auction chosen must be object of improvements in time, always taking as a north the objectives of public interest defined, in the Brazilian case, by the law.

Two distinct experiences will be analyzed in this section: auctions for oil and gas exploration and production leases (promoted by the National Oil, Gas and Biofuels Agency - ANP) and the electricity long run commercialization auctions promoted by the National Electric Energy Agency - ANEEL.

to the price paid by the participants: if all winning bidders pay the same price, it is a uniform price auction; if not (each bidder pays its individual price), it's a multiple price auction. Finally, auctions can be classified as private or common value auctions according to the bidders' evaluation of the good: in private value auctions each bidder evaluation is subjective and non dependent of other bidder evaluation, as in common value auctions each bidder value the goods from the same objective value. So, in private value auctions, the price determination is an individual problem and each bidder has its own valuation (distinct from the other participants). Alternatively, on common value auctions, we have goods that have a unique value for all bidders, and everyone's valuation is connected (Carneiro, 2006).

The auction mechanisms that will be studied in this paper are traditionally identified as common value auctions; i.e. the same object is auctioned to all bidders, and there is a standard value defined by the auctioneer (the regulatory agencies of each industry), although each bidder has private information that allows him to determine its bids and infer other players bids.

⁵ Vickrey was one of the first authors to study auctions from this point of view. In his works, he analyzes open auctions *versus* sealed auctions comparing each one's results in terms of revenue. He also presents attempts to characterize "optimal auctions" and "income maximizing auctions", but uses very strong hypothesis (Duraes, 1997).

⁶ Carneiro (2006) presents an interesting synthesis of agent strategies in each type of auction. The author presents, also, analyze of special cases in each model (collusion, entry, winners' curse, risk behavior and resource allocation).

III. 1 – Oil and Gas Leases Auctions

ANP adopted, for this rights allocation auction, a competitive first price, closed envelope, multiunit, simultaneous auction.⁷ (*i.e.* the winner is the highest bid, and all bids must be presented in sealed envelopes, which must contain bids for all the areas in which the agent has interest)

The economic theory indicates that the type chosen by ANP is adequate to the hydrocarbon industry characteristics. Particularly, the type chosen fits the objectives declared for the auctions (declared previously to each one on the pre-editals)⁸.

First of all, hydrocarbon reserves are items with resale possibilities, but the market value is estimated with an unknown characteristic (the presence of oil and gas fields in each area) – a common value auction is, therefore, required.

The adoption of a first price, sealed envelope auction, however, induces the bidder to offer a bid lower than its subjective evaluation of the good (it can be proved that, if there are no incentives for a different behavior, bidders will offer a price just high enough to beat the second best offer). The auction rules should be, then, designed in order to induce the maximum approximation between the bidders' offers and their real evaluation⁹.

Finally, the adoption of royalty payments as informational variable¹⁰ not only stimulates competition (the winning bid must present strong proposals both in its ex-ante but also in its ex-post offer), but transfers part of the bidders' risk for the auctioneer (in this case, for the Brazilian government), as he will, too, depend on a posterior result to collect part of its revenue.

An auction pre-notices usually present similarities regarding the auction operationalization. The show, also, the rules evolution and adequacy to the objectives proposed. And, given the existent relation between type of the auction and the strategic and/or cooperative behavior by the agents, to monitor and to restrict such behaviors is imposed to the regulatory agency. Otherwise, the agents will internalize this omission on its strategies, the results will be worst and serious agents might loose interest in participating on futures auctions.

⁷ Clearly auctions of oil and gas leases must be considered multi-unity auctions. There are, however, countless difficulties to the development of a general theory for the sale of more than an object simultaneously. The main one is new strategic relations possible because of the combinations of the sold goods.

The economic theory shows that in a context of multi-unity auctions, the format adopted by the auctioneer alters significantly the results not only regarding strategic behaviors, but also regarding the bidders' decision rules and the auctions expected result. The objects can be sold sequentially or simultaneously, and in the Brazilian case the former was chosen.

⁸The broad goals in terms of energy policy are determined by the law. The directives that must be observed in the process, however, are fixed by the National Council of Energetic Policy (CNPE) in its Resolutions.

As diretrizes que devem ser observadas pela ANP na implementação da política energética nacional são fixadas pelo Conselho Nacional de Política Energética (CNPE) em suas Resoluções. Os objetivos de cada rodada são explicitados nas Audiências Públicas que as precedem. Por exemplo, os objetivos da 8ª Rodada de Licitação foram apresentados em Audiência Pública pelo Diretor Nelson Narciso, sendo eles: i) a atração de novos investimentos; ii) a ampliação das oportunidades de trabalho/indústria nacional; iii) a promoção de desenvolvimento na área de E&P; iv) a recomposição das reservas nacionais; e v) a redução da dependência externa.

⁹ The rules should, then, induce the agents to offer signature bonus and minimum exploration programs that best represent their expectative, so that the winner is the one that has the highest expectative regarding one particular area (and his bid was sufficiently close to his disposition to pay).

¹⁰ In the oil and gas leases auctions, the payment carried out by the bidder is not an exclusive function of the bid: it is also a function of the additional information acquired on subsequent moments. In other words: before the auction, neither ANP nor the bidders know if a particular area will produce oil. It is adopted, then, a variable payment mechanism (the royalties) that transfers part of the informational income from the winning player to the government.

After consideration of the results obtained in those auctions since its implementation, in 2003 was introduced a change in the rules, aiming to stimulate the entry of new agents through the reduction of behavioral barriers to entry (represented by the strategies of the incumbent enterprises in the sector) and disincentive some strategies perceived as opposite to the public interest objectives. The change was based in the understanding that better and more pro-competitive rules would not only favor smaller companies entry but they would also stimulate competition among the agents already present on the hydrocarbon industry.

The new rule, adopted initially for mature basins, consisted in the limitation of 02 (two) bids (as operator) per company and per area¹¹. On the next year, an adjust was necessary and the limit was extended to 04 (four) fields per sector and became part of the rules for the following auctions.

From the observation of the results achieved (after change of the rules) and the agent's behavior in the other basins (for which there was no limit), ANP decided to enlarge the restraint, that would be applied for almost the totality of the areas offered, unifying the bidding rules.

The rules unification generated praises from medium and small companies, but was subject of strong complaints, mainly from Petrobras and a few other companies, that were adopting strategies that, although not illegal, were incompatible with the objective proposed. Although the Ministry tried to intervene in the process, in the name of the predominance of the public interest over the private one, the new rules were maintained.

The attempt of interference of the Ministry of Mines and Energy (MME) in the process, however, stressed out the necessity of a strong autonomy for the regulatory Agency (as it is easy for politicians to confuse public and private objectives, and to confuse the countries welfare with the public company results in terms of profits)

The "8th Brazil Round" was early interrupted by a judicial decision. ANP found itself, therefore, obliged to discuss in judgment the legitimacy of the rules changes (and the Agency's competence to do so). That represents not only an improper interference of the Judiciary in the regulatory Agency's decisions, but weakens the credibility of the process, as the return of the rules to its original status-quo may be interpreted as undue interference in the regulatory process.

III. 2 – Electricity Commercialization Auctions

The reforms of the electricity industry in many countries passed by the adoption of some kind of auction mechanism in the energy commercialization segment, as a way of reproducing the market governance system of resources allocation¹². Despite present since the beginning of the reforms, the auctions applied differs among them not only in time and in country, having its use been modified with the observation of the initial results of other experiences, as well as with the modification of the objectives of the governments and regulatory agencies.

Following the example of others countries, Brazil initially designed its electricity industry starting from the premise of that electricity was a commodity (Carneiro, 2006), and therefore could be commercialized in wholesale, short-term, markets (the interaction among supply and

¹¹ Item 4.8 of the pre-notice of the "5th Brazil Round".

¹² The Brazilian Electricity Industry uses other types of auctions (for instance, the auctions for transmission lines leases). Energy commercialization auctions, however, were chosen because this case present a very good example fo the evolution of norms and the role of public institutions in rapture periods.

demand would give the efficient price would provide market incentives for long run investment in electricity generation).

MAE was designed as a multi-unit auction model with uniform price and sealed bids (since the bidders do not share information among themselves) in which the prices and quantities were to be determined by the agents bids.¹³ MAE's flaw's in terms of investment allocation were noticed, but there was a lot of resistance to the changes suggested at that time. The failure of MAE's experience, which led to the so-called "Crise do Apagão", caused the revision not only of the model of action adopted, but also the basis premises that were behind this choice.¹⁴

When of the crisis period in Brazil, the international experience have long identified some fails in the mechanism – such as price manipulation by some agents and the trend to market concentration – and adopted measures to correct them (by reformulating the short-term auctions formats or using other types of auctions)¹⁵. In particular after it was verified that the bilateral energy concentration and that the mechanisms of short-term contraction were not being suitable to guarantee long term supply and prevent other energy crisis, other types of auctions were used to commercialize energy in the long-run (specifically auctions for the distributors to buy energy).

Given the main goals of having low tariffs and making sure of the energy supply (which require rules that foster private investments), a great change was implemented. This change encompassed not only the auction systematic, but also the institutional frame of the energy sector.¹⁶

Regarding energy commercialization, two trade environments were created by the Law n° 10.848/2003: the Free Contracting Environment (ACL) and the Regulated Contracting Environment (ACR). The distinction between them is both in the commercialization mechanism and in the consumers allowed to enter each one (sellers may operate in both environments).

The ACL constitutes a free bilateral market (very similar to the MAE), but only industries and other large consumers may operate in it. The environment were electricity distributors must contract 100% of its demand prevision is the ACR¹⁷; in it, electricity trades is operated through medium and long run electricity contract auctions^{18, 19}.

¹³ Offer curves were created through the bids made by energy generators. Confronted with the demand curves resulted from the demand bids, the offer curves represented the energy prices in each time.

¹⁴ Roxo (2005) claims that the intensity of the energy supply crisis that took place in Brazil imposed a step back to an environment of strong coordination of companies and institutions of this sector. The measures employed overcame the crisis, but were not enough to ensure safety to the energy supply. As a result, a complete process of revision of the legal framework established in the 90s was triggered. In 2003, a new institutional model for the energy sector was implemented.

¹⁵ According to Carneiro (2006), the rules implemented in the second half of the 1990's determined that energy commercialization and pricing policy should come from bilateral negotiation among between the agents. These structure, however, did not reach the intended goals.

¹⁶ The ANEEL remained as regulating agent and conceding power, being also directly responsible for the recently created CCEE (Energy Trade Chamber) and for the coordination of the energy auctions. The MME plays a key role in planning and coordinating the industry, assessing and approving the measures, rules and documents. It was also created the so-called Energy Research Company (EPE), in reply to the facts that caused the 2001 crisis (the general idea was that EPE would better plan and monitor the industry).

¹⁷ Distribution companies must inform their demand prevision and the electricity amounts necessary to attend them to the MME. Based on this information, ANEEL provides auctions among generators for supplying distributors during that period of time, at a given price.

¹⁸ There are also small adjustment short-term auctions (for the distributors), where 5% of the total demando predicted can be bought or sold (the idea is to reduce to a minimun these agents necessity for electricity in real time) – as they commercialize larger contracts, their operations could disturb the short-term market and open space for strategic behaviors.

¹⁹ For further information on long run energy auctions and the transition period, see Decree n° 5.163/2004.

The auction mechanism, then, is no longer responsible for investment incentives and allocation: based on EPE's studies the MME has been planning the industry expansion centrally and indicating the expansion requirements. Auctions are responsible, now, mainly for price determination.

Carneiro (2006) points out, however, that clear rules were not presented by the law (only general characteristics and mechanisms). In this scenario, the institutions' actions and choices are fundamental, as they determine the auction rules, and they (the rules) are different in each auction (so are the agents' strategies).

In the new electricity sector institutional framework, then, the instrument that makes feasible an adequate supply allied to tariff moderateness is still an auction. After the bad results perceived with the adoption of a pure, short term auction, however, the need to implement long term contracts in energy commercialization was perceived. Additionally, given the particular characteristics of the industry, different types of auctions – and not only one single model/market – were implemented.

IV – Conclusion

The reforms which energy industries in Brazil went through aimed at the potential results of competitive mechanisms. In some segments, in particular, the introduction of the competition was verified through alternative structures of governance, which sought to reach the results expected of the competition in terms of resource allocation efficiency and social welfare.

Mechanisms of auction were adopted not only as part of an exogenous competition policy, but as fundamental instruments in the sectorial policies implemented. As each industry had its particular characteristics and objectives, the designs adopted in each one were distinct. Institutional behavior (from the regulatory Agencies) and political interference (mainly from the MME), however, were not.

In the hydrocarbons industry, exploratory concession leases auctions are utilized successfully throughout the world (the model adopted is rarely questioned, and the suggestions of improvements in general concentrate in adjustments to each specific situation). In the electricity industry, on the other hand, many auction mechanisms utilization experiences lead to failures (in fact, even experiences often presented as 'success cases' have their critics).

In particular, Brazil faced problems with the mechanisms chosen in the electricity industry's first reform. The model established in the decade of 1990, based on a wholesale short term market, entered into collapse, failing completely in attending its main objectives. The flaws noticed before the crisis were not corrected (partially due to evaluation mistakes and partially due to a resistance – from the market – to changes). As a result, in 2003 the market institutions were reformulated and a new institutional framework and contracting mechanisms were created.

In the hydrocarbon sector such rupture is not observed: concession leases auctions have been promoted since 1999, and the rules are virtually the same. The results, however, are not entirely satisfactory (some of the main objectives were not fulfilled, and non-desirable strategic behaviors were observed), which led to the gradual implementation of changes.

The process of definition of new auction mechanisms was started by a major supply crisis that left no other alternative. The need for changes in the rules was clear, was expected by all agents, and the legitimacy of the ANEEL for establishing these rules was not questioned in a significant way.

In the hydrocarbon industry, on the other hand, the adjust attempt was strongly rejected by the dominant agent of the industry and, occasionally, bunged by the Judicial Power. Despite the objectives determined in the law or the concession leases auctions are not being attended in the best possible way, the necessary modifications were interrupted in his beginning.

Finally, in both the cases the empirical experience is lower than a decade and few works on the subject were published. Auction mechanisms design in Brazil, however, involves several questions and the particularities of each sector still need to be better researched. In this process, the restraint of political interference and the validation of technical decisions is urgent. Also, the the objectives of public interest aimed should be clear, and sealed against eventual contaminations with private, profit driven interests of the public companies.

Carneiro (2006) points out that mechanisms built through consensus between some of the agents involved are risky. In infrastructure sectors the auction mechanism adopted should reflect competitive objectives, that can only be reached through a institutional agent (independent regulatory agencies) capable of imposing rules that can be accept as attending all social groups

References

- ALMEIDA, E. L. F. e PINTO JR., H.Q. (2005). "Reform in Brazilian Electricity Industry: The Search for a New Model". *International Journal of Global Energy Issues*, vol. 23, No.2/3, 2005, p. 169 - 187 .
- CARNEIRO, M. C. F. (2006) "Os Leilões de Longo Prazo do Novo Mercado Elétrico Brasileiro". Dissertação de Mestrado. Instituto de Economia/Universidade Federal do Rio de Janeiro.
- DURÃES, M. S. D.. "Teoria dos Leilões: Abordagem comparativa com ênfase nos leilões de títulos do tesouro no Brasil e em outros países". Monografia vencedora do 2º Prêmio STN de Monografias – 1997, sob o tema: "Tópicos Especiais de Finanças Públicas". Brasília. Outubro, 1997.
- GLACHANT, J-M. (2002). "The making of competitive electricity markets in Europe". In J.-M. Glachant & D. Finon (eds), *Competition in European Electricity Markets: A Cross Country Comparison*, Edward Elgar, chapter 1.
- HARRIS, M. e RAVIV, A. (1988) "Allocation Mechanisms and the Design of Auctions". *Econometrica*, nº 49, ps 1477-1499.
- INDUSTRY CANADA (1995). "Competition Policy as a Dimension of Economic Policy: a Comparative Perspective". *Occasional Paper Nr 7*, May.
- KIRKNER, D.J. e SPENCER JR, B.F. (1996), "Monotonic Loading of Brittle Materials: A Stochastic Damage Model," 7th ASCE Specialty Conference on Probabilistic Mechanics and Structural Reliability, Worcester, Massachusetts, August 7—9, 1996. Proceedings, 354—357.
- LEAL, C. F. C. (1998) "Ágios, Envelopes e Surpresas: Uma Visão Geral da Privatização das Distribuidoras Estaduais de Energia Elétrica". *Revista do BNDES*, 05 (10).
- ROXO, L. F. (2005) "Credibilidade das Reformas: Uma Análise do Setor Elétrico Brasileiro". Dissertação de Mestrado. Instituto de Economia/Universidade Federal do Rio de Janeiro.