**INTRODUCTION**

The executive boards of Independent Regulatory Agencies’ (IRAs) hold decision-making, administrative, and financial autonomy, with fixed terms for their directors. This ”identity” itself ensures the independence inherent to the regulatory activity (Cavalcanti and Peci, 2001). Most of the theories that seek to understand IRA’s performance focus mainly on reasons that led to its creation, favoring its emergence as an almost natural consequence of the privatization process of public services or seeing intense mimetic pressures on the part of national and international organizations in the the adoption of this new institutional format (Beblavy, 2011; Christensen and Lægreid, 2005; Jordana et al., 2011). Delegation theories focus mainly on reasons for creating IRAs, as well as on the relationship between the agency (for which power is delegated) and its key policymakers in the post-delegation phase (Gilardi, 2002; Shapiro, 2002).

However, much of the theories mentioned above do not help to understand what happens in IRAs once the regulator delegation process has taken place (Schrefler, 2010). This research intends to depart from a normative orientation about the desirable characteristics of a regulatory body in order to achieve a desirable autonomy of action and seeks to understand if, after more than 20 years since its creation, the real dynamics of the Brazilian regulators approach this rhetoric of independence. The few empirical research that shares this empirical orientation has been carried out in the North American context (Eckert, 1981; Spiller, 1990) and indicate that, after term, regulators are rewarded with well-paid jobs in the regulated industry itself or in its partners and suppliers, corroborating theories of regulatory capture. In other words, IRAs are entities that can be captured by various interest groups.

This paper intends to understand the ”real” autonomy of the executive board. Sharing the premise that expertise and technical knowledge of the regulators are fundamental to assure the autonomy and technical and apolitical nature of the regulator itself, the longitudinal question that guided this research was: How does a change in autonomy affect regulators’ capture? The main goal is to understand how autonomy translates into the capture mechanism. Thus, this research intends to contribute to the ongoing debate and evolution of the studies of the regulatory area in Brazil seeking to map the inherent characteristics of this institutional model of public administration.

**THEORY**

The consolidation of the regulatory role of the State was accompanied by the establishment of specialized agencies that play a regulatory role over private companies in several sectors that include energy, water, telecommunications, pharmaceutical industry, among others, in several countries of the world (Jordana et al., 2011). The IRA model is rescued in this new context of the State’s regulatory role, based on the premise of credibility and guarantee of long-term contracts, in a post-privatization context.

For several authors, IRAs cannot be seen as organizations impervious to the influence of interest groups, since the process of selecting and appointing agency staff reflects some kind of political identity with the incumbent (Justen Filho, 2006; Meirelles and Oliva, 2006; Wu, 2008). Nunes (2007) notes that ”The personalities of independent regulatory authorities are chosen on the merits of the politicians who choose them (which is not a guarantee that such ”merits ”are real) (p.14). The author believes that the existing effort to emphasize that regulatory agencies are politically neutral technical agencies, which exercise imminently technical functions, is, in fact, futile, since they exercise political functions and make political decisions since they result in social and economic repercussions. policies.

On the basis of the questioning of the technicity of the IRAs, many perspectives exist that analyze the agencies from the point of view of capture. Stigler’s (1971) theory of economic regulation already stressed the important aspect of capturing regulators by the regulated industry. In his view, the benefits obtained by interest groups come from the use of the political machine to serve its purposes. Evaluating the industry-related interest groups in the United States, Stigler (1971: 3) states that ”regulation is acquired by industry and is designed and operated primarily for its benefit”.

In Brazil, it is clear to Nunes (2007) that competent people in a certain sector usually work in companies in this sector. It is not surprising, therefore, that the professionals are chosen for their experience and competence often leave regulated companies to join regulatory bodies. In addition, once the term of office has expired and some quarantine period has passed, there will be a desire for the former leader to return to the old place of work, and certainly to more prominent and better-paid places than that occupied before assuming the term in a collegiate board of an IRA.

Among the few empirical studies that have verified the professional trajectory of IRA directors from the point of view of capture, the work of Eckert (1981) and Spiller (1988) stands out. Both developed the methodology used to analyze the career trajectory of the regulators and used the starting point for the operationalization of the present research.

Eckert’s (1981) seminal study demonstrates that the typical career path of regulators consists of a strong performance in the public sector in the run-up to IRA’s direction with a high likelihood of subsequent allocation, either directly or indirectly, to the regulated industry that was under its jurisdiction. During the research, the author noted that the former leader tended to be captured by the companies he regulated. The author points out the rewards that regulators could get from the IRA board, since managers did not receive high salaries (the wage was fixed by statute): there was the expectation of high-paying jobs in the regulated private sector that surpassed the uncertain prospect of re-employment of the position in the board of directors.

One of the main problems of the regulatory agency is the competition between politicians and interest groups for the influence on the decisions of the bureaucrats - regulators. Spiller (1988), based on data previously collected by Eckert (1981), analyzed the regulators of three Interstate Commerce Commission (CAC) and the Federal Communications Commission (FCC) from several (eg: age, term of office, pre-agency and post-agency experience, agency discretionary budget, etc.) to create a model capable of estimating the likelihood that a regulator will act in the regulated industry following as the main determinants for this type of choice.

In some cases, the regulators were appointed to better positions or even positions in the ministry. According to Spiller, this is one of the ways politicians find to reward the regulators who have been faithful to them. He also distinguished the direct employment relationship, that is, an employee of a regulated company, the indirect relationship that means the provision of service to the regulated organization, such as working for a law firm that advises industry on its legal example. The author also points out that regulators have the power to distribute income from regulation. As regulators are appointed by politicians, they are able to derive benefits from potential regulators, whether in the form of advantages for electorally interesting segments or in the form of prior work on their teams.

The competition between politicians and interest groups for the influence on the decisions of the bureaucrats is narrated as one of the main problems of the agency in the seminal study of Spiller. The hypothesis is that much of this compensation takes the form of well-paid post-agency jobs, directly or indirectly related to the regulated economic sectors. In his analysis, working for regulated companies, their partners or suppliers after the end of their term in a regulatory agency may be an indicator that the regulator is rewarded for decisions he has taken to benefit the regulated industry.

In this research, we analyze some critical dimensions regarding the Brazilian regulators’ autonomy, focusing on their professional and political trajectories during pre- and post-term period. Thus, when analyzing these dimensions, it is possible to observe whether, in practice, the autonomy of Brazilian regulators is a myth or a fact, observable in the daily routine of regulation.

**METHODS**

This study draws on balanced panel data over several indicators related to the expertise of the regulators from IRAs collegiate board from 1997 to 2018. The data set covers regulators from ten federal regulatory agencies: National Civil Aviation Agency (ANAC), National Film Agency (ANCINE), National Electrical Power Agency (ANEEL), National Telecommunications Agency (ANATEL), National Waterway Transportation Agency (ANTAQ), National Ground Transportation Agency (ANTT), National Health Surveillance Agency (ANVISA), National Health Agency (ANS), National Petroleum Agency (ANP), and National Water Agency (ANA). Because of its recent creation, the data do not cover the National Mining Agency (ANM), which replaced the previous National Department of Mineral Production (DNPM) in December 2017. The collegiate board from a federal regulatory agency consists of directors chosen by a specific process: the chief of the executive branch, i.e., Brazil’s president appoint them to Senate confirmation before taking over the office.

Our study sample is made up of tracking 117 directors’ occupational trajectories five years before and five years after term and report yearly based information. The main source of data is the Federal Senate of Brazil that provides the curricula vitae for every director nominated to compose the collegiate board of a federal regulatory agency. These CVs highlight the academic training, level of education and experience of professionals. We investigated political affiliation in the Supreme Electoral Tribunal (TSE) database, which provides a list of affiliates per party in each state of the federation. We also extract data from the Annual Social Information Report (RAIS), an official registry of all formal workers in Brazil, to capture social characteristics, e.g., employer, occupation according to the Brazilian Classification of Occupations (CBO), compensation and work hours. Finally, we collected both governmental and non-governmental print (newspapers, magazines) and electronic (websites) media to cover information such as allegations of corruption, legal proceedings, and political scandals. Table 1 reports the individual variables and data sources considered in this article.

**Table 1** Definitions of Study Variables and Data Sources

|  |  |  |
| --- | --- | --- |
| Variables | Definitions | Data Sources |
| Gender | Man or Woman | RAIS |
| Political Affiliation | If one is found on the list of affiliates per party in each state of the federation and/or holds a legislative, administrative or judicial office (either appointed or elected) | TSE and Senate |
| Academia | If one has a Doctoral or Master of Science degree and/or holds a position in academia | Senate |
| Regulatory Agency | If one is a public servant on behalf of a regulatory agency | Senate |
| Public Service | If one is a public servant on behalf of any government department excluding regulatory agencies | Senate |
| Industry | If one works in the regulated industry | RAIS and Senate |
| Consultancy | If one works as a consultant that provides professional advice related to the regulated industry | RAIS and Senate |

Based on the premise that careers are treated as a sequence of job positions over time (Spilerman, 1977), recently one strand in the literature has applied longitudinal data techniques to compare career sequences to map patterns. We analyzed the data using the Optimal Matching Analysis(OMA), introduced in career analysis by Abbott and Hrycak (1990) and revised by Abbott and Tsay (2000), Aisenbrey and Fasang (2010), and Dlouhy and Biemann (2015). First, the technique defines the distance between sequences as the number of changes needed to transform one sequence into another. The lower this "cost," the more similar these sequences are. Second, the operations allowed to transform one sequence into another are the substitution, insertion, and elimination (indel operations, or indel operations) of a given state. The output of the comparison between the strings is a symmetric matrix that displays the distance from one sequence to all others. Finally, this matrix is used to cluster sequences that are more or less similar, even though they are not necessarily the same.

Thus, besides the coding of sequences and the time frame, there are two critical decisions in applying OMA: the deletion/insertion and replacement costs between the states, when applicable; and the criterion for grouping the sequences. Simulations were conducted using the R statistical programming language. The TraMineR package was used for the sequence analysis, as described by Gabadinho et al. (2011). The TraMineR algorithm is essentially that of Needleman and Wunsch, with standard optimizations (Gabadinho et al., 2011).

The transition costs between states were based on transition probabilities. This choice has been a growing trend in the literature (Aisenbrey and Fasang, 2010; Dlouhy and Biemann, 2015). Mathematically, the transition cost from state *i* to state *j* (*i ≠ j*) is equal to 2 – *p(i|j) – p (j|i)*, where *p(i|j)* is the transition rate between states *i* and *j* in the sample. The rationale behind this approach is that the transitions observed more frequently are less costly than less frequent transitions. By definition, the probability of a transition from one state to itself is equal to one, which makes the transition cost zero.

The clustering method was Ward’s hierarchical cluster, a standard in the literature. The choice of the number of clusters involved the analysis of some measures available in the R cluster package of and visual dendrogram inspection. No definitive criterion to choose the number of clusters exists; some methods and indicators aid researchers in this decision, but they often do not point towards a single solution. In the end, the choice of this number is somehow subjective. Herein, we chose a four clusters solution based on three indicators, the dendrogram and the analytical power of such a solution compared to alternatives. All code used to conduct the simulations and generate plots, as well as the simulation results presented herein, are available upon request.

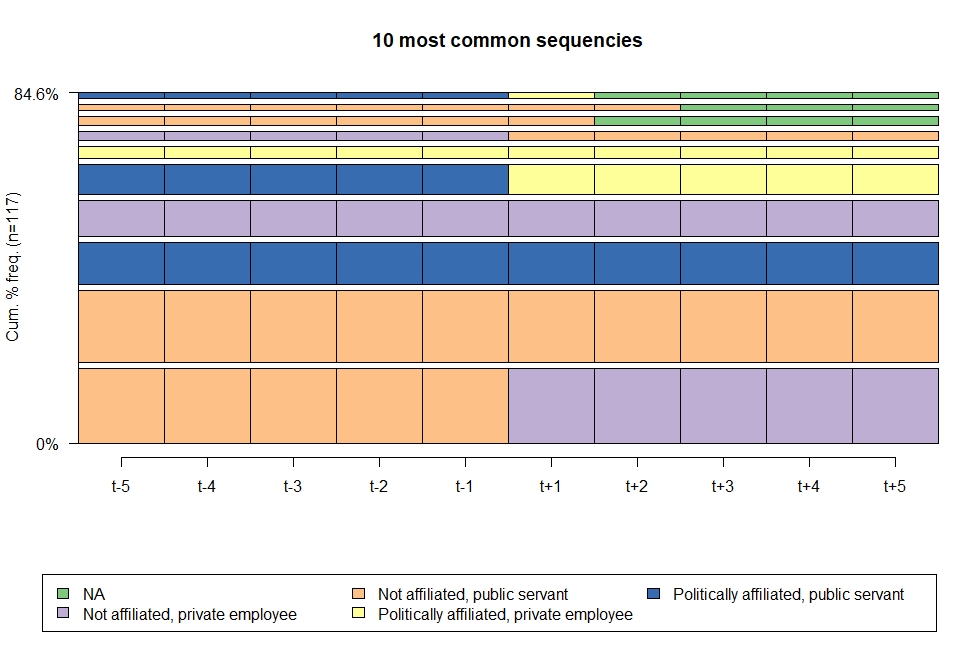
**RESULTS**

Our first analysis relied on the choice of removing the regulators that are still in office, so that we can track the professional's placement post-term.

***The most common sequences***

Figure 1 shows the ten most common sequences tracked from the pre-term period (from t-5 to t-1) to the post-term period (from t+1 to t+5), representing 84.6% of the occurrences:

Figure 1. Ten most common sequences



As we can see above, the most frequent string illustrate public servants, without political affiliation, that are captured by the private sector or become consultants in the regulated area after term. The second string shows public servants, without political affiliation, that remain in the public service after term. The third string represents public servants, with political affiliation, that remain in the public service after term. The fourth string, i.e., private employees, without political affiliation, tend to go back to the regulated private sector. The fifth sequence shows public servants, with political affiliation, that are hired by the private sector after term. Next, private employees, with political affiliation, remain in the regulated private sector. From the analysis we infer that politicians do not change replacement, i.e., being a politician is not a post-term gain. Neither it precludes of being appointed, nor it guarantees any position post-term. There is no evidence of relevant detectable gender difference (there are few women, n = 10) or academic training.

***Political vs. Not political***

When grouping the sequences into two states: political (public servant or private employee) or not political (public servant or private employee), a chi-square test of independence was performed to examine the relation between political affiliation and employment in public and private sectors. The relation between these variables was not significant, 2 (1, N = 117) = .967, p = .33. Thus, we cannot reject the null hypothesis that political affiliation does not affect the distribution between public and private sector. However, a logit model regression was used to test if public and private sectors are independent of political affiliation. Results indicated that there was a significant effect (McFadden R2= .026, p < .01), i.e., public servants are more likely to migrate to private sector than it would be expected at random. Reinforcing that public servants migrate from the public to the private sector, that is, among those in the private sector in the post-term, having been public servant counts favorably. However, conditionally, being a public servant, political affiliation does not have influence. Again, a logit model regression with this reduced sample was performed. Results indicated that there is no evidence to reject the null hypothesis that political affiliation does not influentiate career in private sector during post-term period (McFadden R2= .006, p =.388).

***Bias towards a type of agency***

To test whether political or employment condition (public or private) is biased with any type of agency, we runned a cross-tab with the IRAs and trajectories as presented in Table 2:

**Table 2** Cross-Tab IRA and trajectories

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IRA | Serv-pol-nac | Ac-npol | Serv-pol-ac | Serv-viracons |
| ANA | 3 | 3 | 1 | 0 |
| ANAC | 3 | 6 | 2 | 3 |
| ANATEL | 3 | 2 | 6 | 5 |
| ANCINE | 1 | 0 | 7 | 2 |
| ANEEL | 2 | 7 | 5 | 3 |
| ANP | 0 | 3 | 6 | 2 |
| ANS | 1 | 3 | 6 | 6 |
| ANTAQ | 1 | 1 | 1 | 4 |
| ANTT | 2 | 3 | 1 | 2 |
| ANVISA | 4 | 1 | 3 | 3 |
|  |  | | | |
| Legend: | Serv-pol-nac: public servant with political affiliation, not academic; Ac-npol: academic without political affiliation; Serv-pol-ac: public servant, with political affiliation, academic; Serv-viracons= public servant that became consultant post-term. | | | |

However, Table 3 with standardized residuals above 1.65 (critical value from standard normal to 10% of two-tailed significance) indicate that public servants with political and non-academic affiliation tend to focus relatively on ANA and Anvisa, academics without political affiliation tend to go to ANAC and ANEEL and tend to move away from ANCINE, public servants with political affiliations and academics tend to focus relatively on ANCINE and public servant that became consultants post-term tend to focus relatively on ANTAQ.

**Table 3** Cross-Tab IRA and trajectories - standardized residuals

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IRA | Serv-pol-nac | Ac-npol | Serv-pol-ac | Serv-viracons |
| ANA | 1,86736476 | 1,14200748 | -1,06005523 | -1,60231024 |
| ANAC | 0,45916395 | 1,66902052 | -1,54924899 | -0,38471502 |
| ANATEL | 0,18937955 | -1,22506675 | 0,46163078 | 0,55302059 |
| ANCINE | -0,62312944 | -1,89827315 | 2,64947739 | -0,42719359 |
| ANEEL | -0,63135478 | 1,69295625 | -0,29207404 | -0,8164796 |
| ANP | -1,58221491 | 0,20065653 | 1,64193761 | -0,59524346 |
| ANS | -1,24013061 | -0,60188062 | 0,46163078 | 1,16924352 |
| ANTAQ | -0,20355161 | -0,66359894 | -1,06005523 | 1,96855259 |
| ANTT | 0,61541141 | 0,86286194 | -1,25017541 | -0,04301953 |
| ANVISA | 1,78358771 | -1,26664435 | -0,38735852 | 0,13020951 |
|  |  | | | |
| Legend: | Serv-pol-nac: public servant with political affiliation, not academic; Ac-npol: academic without political affiliation; Serv-pol-ac: public servant, with political affiliation, academic; Serv-viracons= public servant that became consultant post-term. | | | |

***Infrastructure vs. Competitive Markets***

From the analysis above, we focused on the agencies that regulate infrastructure sector, i.e., ANTT, ANTAQ, ANP, ANEEL, ANATEL, ANAC, having the following results in Table 4:

**Table 4** Cross-Tab Infrastructure IRAs and trajectories - standardized residuals

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Infrastructure | Serv-pol-nac | Ac-npol | Serv-pol-ac | Serv-viracons |
| Yes | 0,172 | 2,381 | 1,691 | 0,689 |
| No | 0,172 | 2,381 | 1,691 | - 0,689 |
|  |  | | | |
| Legend: | Serv-pol-nac: public servant with political affiliation, not academic; Ac-npol: academic without political affiliation; Serv-pol-ac: public servant, with political affiliation, academic; Serv-viracons= public servant that became consultant post-term. | | | |

Results show that academics without affiliation tend to be appointed to the infrastructure agencies, and public servants, with political affiliation, academic, tend to go to non-infrastructure agencies (p<.01).

Focusing on non-infrastructure agencies, i.e., agencies that regulate competitive markets, ANATEL and ANS, no relevant pattern was found as shown in Table 5 (p=.3):

**Table 5** Cross-Tab Competitive Markets IRAs and trajectories - standardized residuals

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Competitive  Markets | Serv-pol-nac | Ac-npol | Serv-pol-ac | Serv-viracons |
| Yes | 0,810 | 1,408 | 0,712 | 1,328 |
| No | 0,810 | 1,408 | 0,712 | 1,328 |
|  |  | | | |
| Legend: | Serv-pol-nac: public servant with political affiliation, not academic; Ac-npol: academic without political affiliation; Serv-pol-ac: public servant, with political affiliation, academic; Serv-viracons= public servant that became consultant post-term. | | | |

***Sectorial vs. Bissectorial vs. Multisectorial***

If we divide the agencies among those that regulate one sector (ANATEL, ANEEL, ANCINE, ANS, and ANA), two sectors (ANAC and ANTAQ) or more than two sectors (ANVISA, ANTT, and ANP), the following results are presented in Table 6:

**Table 6** Cross-Tab Competitive Markets IRAs and trajectories - standardized residuals

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type of Agency | Serv-pol-nac | Ac-npol | Serv-pol-ac | Serv-viracons |
| Sectorial | -0,6349306 | -0,5868035 | 1,4189483 | -0,3941299 |
| Bissectorial | 0,2625355 | 1,0014439 | -1,965395 | 0,8912288 |
| Multisectorial | 0,4903114 | -0,2137482 | 0,1159281 | -0,3356893 |
|  |  | | | |
| Legend: | Serv-pol-nac: public servant with political affiliation, not academic; Ac-npol: academic without political affiliation; Serv-pol-ac: public servant, with political affiliation, academic; Serv-viracons= public servant that became consultant post-term. | | | |

The only notable trend is that public servants with political affiliation and academic background do not tend not to go to the bissectorial agencies.

**DISCUSSION**

**CONCLUSION**

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