Who watches the watchmen? Assessing potential regulatory capture through an examination of historical Surface Transportation Board (STB) decisions on shipper/railroad disputes

A Thesis Submitted to the
College of Graduate and Postdoctoral Studies
In Partial Fulfillment of the Requirements
For the Degree of Master of Science
In the Department of Agricultural and Resource Economics
University of Saskatchewan
Saskatoon

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Abstract

This thesis will examine a series of historical decisions made by a major U.S. regulatory body, the Surface Transportation Board (STB) in the surface freight transportation sector. As a federal regulator overseeing a major industry, the STB (and the ICC before it) were created to operate as a neutral economic regulator acting in the public interest, managing relationships and disputes between surface railroads (in this case, railroads) and their shipper customers. But understanding the incentives and consequences described by Stigler (1971) in the context of economic regulation and capture, in particular the U.S. freight rail sector continues to operate under some controversy because of the questionable regulatory objectivity of the STB as the railroad regulator (Gallamore, 2014). Much of the prior regulatory research about the STB has focused on its scope along with key issues resulting from the agency's long term regulation of the rail sector (Goldman, 2022), as well as the impact of regulation on the operation and management of the U.S. freight rail system. Other related literature tries to gain insight on decision processes as well as rationalizing the outcomes of the STB decisions over various freight disputes (Warren, 2018). But in spite of this body of research, to our knowledge there have been few if any analytic attempts to assess the fairness or objectivity of the STB regulatory decisionmaking. One interesting feature of the STB crucial to our assessment is that the agency maintains an online compendium or database of its decisions, going back well into the 1990's and overall numbering into the thousands. As a qualitative database it can be difficult to use for analytics, but it is detailed and allows us to set up both empirical and qualitative assessments of regulatory objectivity. A further underlying factor in formulating this thesis was the effort required to identify and code the sub-set of relevant STB decisions that were both thematically consistent (i.e. rate disputes between a railway and a shipper) as well as independent over time to the

present. This extensive vetting yielded individual decisions/data points that were used to conduct our initial statistical analysis and subsequent qualitative work.

After reviewing related literature on assessments of regulatory objectivity in other industries, the empirical part of the thesis estimates various statistical tests (randomness tests, tests of distributional differences) on the case decision data to identify whether or not the data were generated by a neutral decision-maker. To supplement the statistical analysis and to help facilitate understanding of the reasonability and justifiability of STB decisions, we further qualitatively analyze the same cases to add insight on regulatory behavior. Overall, we hope this study will contribute to a better understanding about the decision-making process of a major U.S. economic regulator. Further, we hope this work might help improve STB performance by improving future objectivity in regulatory decision-making within the US freight rail sector.

ACKNOWLEDGEMENTS

This thesis was carried out in the Department of Agricultural and Resource Economics, University of Saskatchewan, 2020-2022. During my academic years, I have had the privilege to work with knowledgeable, energetic and enthusiastic faculty in the department. I want to express my special thanks to all the professors in the department who cared and helped me during this process.

First of all, I would like to express my deepest and most sincere gratitude to my thesis defense chair and my academic supervisor, ***Professor James Nolan***, for taking great efforts in reviewing my manuscript, providing constructive comments, and sharing his valuable insights in his field of expertise. It has been my great pleasure to study and work with Professor James Nolan during my academic journey. His keen intelligence, deep insights, extensive knowledge and sharp expertise have been of great assets in helping me to finish my thesis. In addition, Professor James Nolan has spent a lot of his valuable time in helping me to review, comment, revise, and polish my thesis again and again with patience and dedication. Furthermore, he set up each specific goal for me to gradually work out and finish the research project. Without his valuable instruction, support, cares and helps, this research project would not have been possibly to be accomplished.

Second, I would express my sincere thanks to my committee members, ***Professor Nicholas Tyack*** and ***Dr. H. Andic***, whose efforts, support and guidance keep me moving forward. Professor Nicholas inspired me with his extensive knowledge and expertise and he also provided deep insights in helping me to elaborate and explain my quantitative methodology rationale while Dr. H. Andic's constructive comments left me with deep reflection and improvement. Dr.

H. Andic is humorous, intelligent and his inspiring comments made me think deeper and achieve higher. Besides, Dr. H. Andic is also someone whose opinions I value greatly.

Third, I also want to warmly welcome and thank the external reviewer, ***William Huneke***, the former STB Chief Economist, for taking his valuable time to instruct and provide valuable comments. He was a former STB member and we all learned unique industry experience from him during the process.

Last but not the least, I want to thank all professors and staff from the agricultural department for their support, encouragement and cooperation. There are so many people to show gratitude, so I only name a few. ***Ms. Melissa*** supported me in assisting and providing official arrangements and instructions during the process. In addition, I would like to thank all my fellow classmates and dear friends who showed support and encouragement during my academic years.

DEDICATION

This dissertation is dedicated to my incredibly beloved wife, ***V. QQ***, without whom, this thesis and the pursuit of my goals would not have been possible. My wife has accompanied me through years and provided unconditional love, unwavering belief and spiritual support during my academic period. My wife is intelligent, humorous, insightful, and she is also a life-long close friend who shares thoughts with me and stands with me to overcome difficulties and achieve what I desire in my life.

Chapter 1

Introduction

This thesis consists of two inter-related studies. To start, we analyze a total of 39 independent case disputes, eventually conducting statistical analysis of these legal decisions affecting both railroads and shippers. But next, we introduce several concepts that will help illustrate the scope of the STB and help us to assess the historical objectivity of STB decisions on freight rate disputes. Then we develop quantitative assessments to evaluate regulatory capture by employing carefully chosen statistical tests (randomness, distributional differences) on a set of STB decisions over freight rate disputes. After discussing and summarizing these findings, using qualitative software we will distill and analyze these same case decisions made by the STB. We characterize various key concepts which may have been most critical to the STB and associated litigants at the time of a given decision. In addition, this latter analysis permits us to check for consistency among the revealed qualitative issues that affect STB case decisions. It is our hope that these findings will help point the way forward for future research in identifying regulatory capture.

Significance of the study

Previous related research on STB performance does not focus on regulatory objectivity. However, a growing body of research in other industries shows that there is considerable interest in trying to quantitatively assess regulatory performance, and to this end we believe this can be accomplished by searching for statistical evidence of objectivity within a set of STB regulatory decisions. To this end, we compute a series of statistical tests to determine whether a series of

STB legal decisions on freight rate cases are subjective (i.e. not random, captured) or objective (i.e. random, not captured).

The main assumption about our empirical approach is that of an even prior likelihood for case decisions, as will be elaborated in the thesis. This approach explains why we start with a binary decision metric for some of the computed statistics in assessing data randomness or similarity. In the rate cases analyzed here, private shippers constitute most of the case plaintiffs and given they have necessarily made a decision to ask for STB intervention, we assume they did so because they believed they were commercially wronged and deserved to contest the carrier. As is well known historically about this industry (see Bailey, 1981), freight railroads are likely to possess some level of market power, raising freight rates above what would be considered competitive levels.

To be more specific, if our statistical findings on the case data reject a hypothesis of randomness, then we offer this is suggestive of the exertion of regulatory capture by the regulator. However, if the tests reveal that these STB decisions are effectively a random sequence, the latter is indicative of no regulatory capture.

The quantitative part of the study will contribute to the literature in regulatory economics by buttressing our understanding of both the justifiability and appropriateness of STB decisions over rate disputes between railroads and shippers. By making an effort to "watch the watchmen", we also hope to help improve future STB regulatory performance by identifying subjectivity in its regulatory decision-making process.

Research problem and statement of hypotheses

After explaining the function of the Surface Transportation Board along with the concept of regulatory capture, this thesis then builds and justifies the use of statistical tests on the case database so as to evaluate the objectivity of the case decisions. The research question to be assessed in the first part of this thesis is whether or not regulatory decisions made by the STB on freight rate disputes between railroads and shippers are systematic or random. We also estimate a related set of statistical tests to assess whether or not the distributions for the respective (shipper/carrier) decisions are similar. In order to answer these research questions, we use six statistical tests. These are a Binomial test, a one sample Wilcoxon signed rank test, a Wald-Wolfowitz runs test, the Kolmogorov-Smirnov Test (K-S Test), Levene's test for equality of variances, and a Mann-Whitney U test. These tests allow us to evaluate whether or not historical STB decisions appear to be even-handed or instead favor either carriers or shippers.

Taken together and drawing from the theory of regulation as well as elements of forensic data analysis (e.g. Benford's Law[1] on actual integer distributions in real data), our overall working hypothesis is that the STB did not exhibit favoritism or capture in its case decision-making, and we offer that this can be assessed through randomness tests, or alternatively tests of distributional differences among the rate case data. Drawing upon these observations, the following specific research hypotheses will be addressed in turn;

[1] According to Miller (2015) and Weisstein (2018), Benford's Law (also known as the first digit law) states that in many real-life numerical datasets, leading digits can be small. For example, when the expected probability is 11.1% (that is, out of nine digits), the majority of numbers in a group (about 30%) have a leading digit of 1 (Druică, Oancea, & Vâlsan, 2018). That is, in a regular set, the number 1 appears as the leading significant digit is about 30% of the time, and 9 appears as the leading significant digit in less than 5% of the time (Berger & Hill, 2015). If the numbers are uniformly distributed, they each occur about 11.1% of the time. Benford's Law also predicts the distribution of second, third, number combinations (Kaiser, 2019).

RQ1: Are decisions made on freight disputes between railroads and shippers statistically equivalent to a random sequence, or not? In turn, are the distributions of the respective decisions for carriers and shippers similar, or not?

Using the constructed rate case data, we check to see if the STB's rate case decision sequence exhibits certain statistical characteristics that are indicative of regulatory objectivity. While some tests are for simple decision sequence randomness, alternatively, a test of the equivalence of the two decision (railroad/shipper) distributions should also indicate if these decisions were generated by an objective decisionmaker. Expressed as statistical hypotheses, the following is a list of the tests implemented to check for regulatory capture on the case sample data;

Ho1: The STB's case decisions are randomly distributed, as identified through a Binomial test.

Ho2: The STB's case decisions are randomly distributed, as identified through a one sample Wilcoxon signed rank test.

Ho3: The STB's case decisions are randomly distributed, as identified through a Wald-Wolfowitz runs test.

Ho4: The STB's case decisions distributions across the litigants are different, as identified through a Kolmogorov-Smirnov Test (K-S Test).

Ho5: The STB's case decision distributions across the litigants are different, as identified through Levene's test for equality of variances.

Ho6: The STB's case decision are randomly distributed, as identified through a Mann-Whitney U test.

Since each of the chosen statistical tests need to be conducted individually, a priori there is no guarantee that they will produce consistent results. If our findings are inconsistent, we would offer that the data series cannot yield overly conclusive results either way regarding regulatory capture. We will discuss this notion further in the thesis, but with something as inherently dynamic as randomness, it can necessarily be very difficult to find thematic consensus among a chosen set of test statistics.

Another potential explanation that might mask such regulatory behavior is the existence of other factors that may affect the STB decision-making process, for example the type of shipment involved in a given dispute or even the quality of the legal teams involved in cases. On this theme, it has been argued (for example, see STB Ex Parte 646 (Sub No.1), 2006) that larger and better funded shippers seem to do better in rate disputes with carriers, while smaller shippers often fare poorly. Along with highlighting what interesting trends the actual case literature analysis reveals, we will explore such concepts in the subsequent qualitative analysis of the set of rate decision cases.

Chapter 2 – Railroads, shippers, and regulation

This thesis consists of cataloging and interpreting individual freight rate disputes as adjudicated by the STB. To better understand how the rate regulation process works under the U.S. system, it is important to introduce industrial as well as regulatory terminology that commonly appears in both the supporting literature as well as the STB case descriptions.

Regulatory capture

This thesis is motivated by the desire to evaluate behavioral objectivity over adjudicated decisions rendered by a major and ostensibly neutral U. S. regulator. Put alternatively, from an economics perspective this analysis is motivated by the concept of regulatory capture. The initial description and definition of regulatory capture comes from Stigler's (1971) seminal work. Stigler argued that regulatory agencies acting in the public interest may instead be vulnerable to capture by industry special interest groups, whereby the latter continually attempt to shape regulatory outcomes in ways that ultimately benefit the regulated industry itself at the expense of consumers (Shughart and Thomas, 2017). Some previous research (Khan & Vaheesan, 2017) has argued that the STB seemed to support extant railroad market power, leading to limited competition and unreasonably high freight rates. Given these suppositions, we feel it is instructive to use statistical testing to try to assess whether a sample of the STB's rate case decisions are effectively generated as a random sequence.

According to Stigler (1971) as well as Bull (2016), Carpenter and Moss (2013), and Levine and Forrence (1990), regulatory capture as a theory argues that regulators themselves may also be influenced or dominated by the industries or interests they oversee. If this is the case, the result is that an agency charged with acting in the public interest instead may act in a way

that benefits interest groups or companies in the industries it is supposed to oversee. As we shall cover later, only a limited amount of empirical work has been done to assess or validate regulatory capture. More specifically, in spite of considerable long-term anecdotal concerns by numerous U.S. rail shippers about the STB (Nolan et al. 2018), almost no research has been done previously to assess the regulatory performance of the STB from this perspective.

The Surface Transportation Board (STB)

In its current iteration, the Surface Transportation Board (STB) was established on January 1, 1996, in the form of an independent adjudication board over U.S. surface transportation (Goldman, 2022). Pittman (2020) describes the STB as an independent federal agency charged with both the economic and safety regulation of various modes of U.S. surface transportation, including the railroad sector. Dempsey (2011) further points out that the STB remains a federal bipartisan, independent adjudicatory board, that in turn assumed many of the regulatory functions administered by the former Interstate Commerce Commission (ICC) after the ICC was terminated. Summarizing the function of the STB, it is the federal agency responsible for regulating the operations of freight railroads along with other U.S. surface transportation modes.

U.S. rail transportation

Railroad transportation in the United States consists primarily of freight movement, operating on privately owned standard-gauge track. Track connects and extends East-West from New York to Los Angeles, as well as North-South from Canada to Mexico (Prozzi and Wilson, 2018). As highlighted by Notteboom and Rodrigue (2017), the United States has the largest railroad network of any country in the world, serving mostly freight. Today, while long range interstate

rail passenger service still operates, rail passenger traffic is comprised mainly of transit and commuter rail in major cities. Laurino, Ramella, and Beria (2015) point out that unlike much of the world, U.S. freight railroads are privately-owned rather than government-owned/operated, meaning that U.S. railroads are responsible for their own track maintenance and infrastructure support.

Freight rate

A freight rate is the transacted price at which cargo is transported and delivered from an origin to a destination. Wang and Meng (2021) point out that this price can depend on the type of cargo, fuel prices, the mode of transport, shipment weight, as well as the distance between the origin and destination. In the U.S., rail freight rates were heavily de-regulated with the Staggers Act of 1980, and since that time, the STB has developed several tests and metrics of performance that can be used as a regulatory tool to modify or cap excessive rates. One main concern with these metrics from a shipper perspective has been with cost of implementation – one of the main regulatory tests of market power used by the STB that has evolved since the 1980's (known as the Stand Alone Cost test) for identifying unreasonable rates has over time proven to be extremely expensive to implement, both in time and money. Over the past two and half decade, this has led to the development of alternative tests of market power/excessive rates that are ostensibly less costly for shippers to use in a rate dispute. The latter are still available for shippers but have not been used much and don't show up very often in the studied database.

Shipper

Shippers of freight are also referred to as the owners of goods, products, or commodities. Shippers transact with freight railroads to carry goods to designated destinations, paying the carrier for the cost of this service (Patterson et al., 2021). The major responsibility of the freight shipper is working with a railroad to manage delivery of goods to final destination. When transporting various goods, parties are legally required to complete documentation of transportation terms, including legal and liability restrictions, etc. through what is known as a transportation waybill (Ungureanu, 2018).

Carrier/railroad

Carriers of freight are the firms that physically transport and "carry" freight to final destination on behalf of their customers, the shippers (Moulton, Christiansen, and Wang, 2018). Behrens and Picard (2011) explain that freight carriers supply transport services for shipping all manner of manufactured goods, products, and commodities. And according to Aljohani and Thompson (2020), because carriers face network logistical constraints, freight carriers make efforts to deliver goods across both ends of a given trip pairing, wanting to avoid the costs of returning from a delivery (or backhaul) empty.

Captive shipper

There are a class of shippers who are referred to as "captive shippers". In the bulk freight sector, these generally tend to be transportation customers who cannot ship their product economically by alternate means (i.e. truck) because of shipment size, and in addition lack proximate access to

a navigable waterway to potentially transport the commodity by river barge (Fritelli, 2017). The term “captive shipper” is not defined legally, however it is well established that rail shippers in a wide variety of situations are captive to a single carrier and thus subject to monopolistic behavior on the part of that railway (Vachal and Bitzan, 2005).

Price/rate discrimination

Price discrimination (sometimes referred to as PD) is a pricing strategy that charges various customers different prices for the same product or service depending on their respective demand elasticity. The latter also approximates a customer’s relative ability to switch products or services. According to Boland (2020), actual “price discrimination” by a firm exists when two “similar” products or services that have the same marginal cost of production are sold by the firm to different customers at different prices. Though the practice of PD is often controversial because of the way it distinguishes among customer classes as well as the profit motives behind its use, it is well understood that this practice is common across the U.S. freight rail industry. In essence, more captive shippers facing less competitive surface transportation options subsidize shippers operating in very competitive surface transportation markets. However, cognizant of this, railroad rate discrimination against captive shippers in the U.S. is not without limits. Performance tests have been created by the STB to assess the consequences of excessive freight rates for captive shippers, but shippers argue that the use and adjudication of several of these tests are complex and expensive, and further that the results are sometimes not able to prevent discrimination.

Freight rate disputes

When freight shippers believe the rates they are being charged for transportation by a specified railroad are excessive in situations where they may lack competitive options, ideally these shippers need access to a dispute settlement mechanism that is fair, easily understood, accessible, and affordable (Prater and Sparger, 2014). Historically, this has not always been the case as generally accepted STB procedures (like the SAC test) have proven to be both costly and time-consuming. Knowing this, the STB continues to try to move towards simpler tests of rate reasonableness or market dominance, but progress has been slow. Finck (2018) points out the on-going debate as to whether the current statutory definition of market dominance (or the ability to set monopoly rates) limits the STB from granting relief to shippers who claim to be captive. Interestingly, with U.S. freight rate disputes, dispute resolution procedures including mediation and arbitration can be conducted as alternatives to the more commonly used rate-challenge procedures within the STB, but at the time of this writing, these still require railway approval to be initiated so the latter procedures have been only very rarely used (Tong, 2022).

Economic regulation of freight railroads

When a U.S. freight shipper believes that a quoted freight rate is excessive or uncompetitive, the shipper is entitled to report their situation to the STB in order to set up a case. Whether or not the dispute will be taken further by the STB is determined by one of a set of tests or computed determinations that establish whether the rate is excessive compared to established computable benchmarks (i.e. market dominance tests). The STB maintains staff to investigate disputes in detail and is obliged to respond to a freight shipper's request either by dismissing the complaint if the contested rate does not exceed pre-established benchmarks, or if the rate does exceed these

metrics, by ultimately rendering a legally binding rate decision on the carrier and the shipper. Examining the historical case library on their website (www.stb.gov), the STB frequently renders regulatory for freight transportation, meaning that the Board and its staff is well acquainted with freight markets as well as the operation of rail networks.

Chapter 3 – Theoretical considerations and an overview of U.S. rail regulation

Regulatory capture

Regulatory capture, also known as "capture theory" was first formally brought to the attention of economists by Stigler (1971), a future Nobel laureate in economics at the University of Chicago. In this initial paper, Stigler discussed the basic prototype of this concept and also provided some limited evidence and examples in his original research article.

According to Stigler (1971), Laffont and Tirole (1991) and Boehm (2007), the concept of regulatory capture refers to the situation when a regulatory agency created to protect the public interest instead follows commercial or political interests from groups that support the industry or sector that the agency regulates. If and when regulatory capture occurs, the interests of the company or political group the regulator is responsible for takes precedence over the public interest (Carpenter and Moss, 2013).

Referring to how the concept is perceived in the political sphere, Dal Bó (2006) states that regulatory capture is seen as a form of corruption of power that occurs when a political entity, policy maker or regulator specially serves the commercial, ideological or political interests of minorities such as a particular geographic region, industry, professional or ideological group. In economics, regulatory capture implies interest groups having undue influence over industry regulators who are tasked with overseeing the interest group.

In his original article, Stigler argued that regulation is a product that, just like any other product, is produced in a market, and that it can be acquired from the governmental “marketplace” by firms in order to serve their private interests as well as to create barriers to entry for potential competitors. He challenged the idea that regulation occurs solely to serve the public interest and argued that important politically motivated advantages held by firms can contribute to industry

influence over the regulatory process. Although his argument was largely based on a theoretical framework he developed, Stigler also buttressed his insights with some limited empirical findings from (at that time) state-level regulations, including the regulation of the trucking industry (at that time) and occupational licensing.

Stigler also cautioned that regulated industries maintain a strong and immediate interest in influencing regulators, while conversely ordinary citizens are far less motivated. Therefore, although relevant regulations like pollution standards tend to affect citizens as a whole, individuals are typically far less likely to try to prescribe the degree of regulation by regulatory agencies. Further, it is understood that in many industries, regulated firms often spend significant budgets influencing regulators at all levels. By contrast, individual citizens spend only limited resources to assert their rights. This situation is necessarily an extension of the notion of concentrated benefits versus dispersed costs of regulation, public policy, and collective action as described by economist M. Olsen (Bagchi, 2015).

Key features of regulatory capture

1. Regulatory capture is an economic theory whereby regulatory agencies may come to be dominated by the interests they regulate instead of the public interest.

2. The result of capture is that the agency acts in ways that benefit the interests it is supposed to be regulating over the broader public interest.

3. Regulated industries and firms may devote large budgets to influencing regulators.

Existence of regulatory capture

Sidak and Spulber (1997) argued that regulatory capture is ubiquitous across the entire global economy as well as throughout modern industrial history. Other researchers explain that capture is an almost inexorable outcome so long as an industry is regulated, since even regulation that harms existing companies or increases costs tends to generate barriers to entry for new or smaller entrants (Carpenter and Moss, 2013).

To this end, large portions of the transportation sector in the United States historically seem to represent classic examples of regulatory capture (Thaw, 2014). In the late 19th century, as the industrial revolution created vast new wealth across the U.S., various governments and regulators openly advocated for the industries they oversaw, including the newly created railroad sector. Larger railroads themselves advocated for regulation, which was ultimately actualized through the (former) Interstate Commerce Commission (ICC). While the development of economic or public interest regulation was still in its infancy in North America, in the early days of the ICC, the commission allowed the rail industry to operate without much protection for the public interest. Thus, one might argue these early regulatory bodies were dominated or "captured" by the industrial interests they were tasked to monitor and oversee.

Identifying regulatory capture

While many modern industries may be potentially subject to regulatory capture, as one example Martin and Whitley (2010) argue that modern banks openly try to influence financial regulators to favor their interests, and they typically rely on various methods to achieve these goals. Other modern economic sectors, such as health, education, utilities or telecommunication are all subject to some degree of regulatory capture, depending in large part on the size of the sector and

the legal institutions governing the region and industry. From a behavioral perspective consisting of necessarily frequent business interactions as well as a common perspective on the particular industry, modern regulatory bodies such as the STB almost always have a tendency to co-operate with or favor interests they are supposed to regulate.

Given this discussion as well as the extensive online database of regulatory disputes that have been adjudicated by the STB, the first goal of this thesis is to employ statistical tests of randomness to help quantitatively interpret whether the STB, specifically for rate case decisions, has maintained objectivity and avoided capture. Showing the latter would be somewhat contrary to long-standing speculation that the Board has historically tended to favor railways (private interests) over shippers (public interests) in its historical rate decisions.

Alternatively, we will conduct tests comparing the distributions of the litigant (shipper/carrier) decisions in the rate case data. While nominally a stronger notion than simple data randomness, there exist relatively straightforward statistical tests that can be used with the case data to check for the similarity of litigant decision distributions. On this point, we offer that an objective or uncaptured regulatory body should generate statistically similar decision distributions among litigants, ceteris paribus. Overall, we compute six statistical tests to generate analytic evidence about regulatory capture on the part of the STB. On one hand, if our randomness null hypotheses are rejected, this is suggestive of the exertion of regulatory capture. On the other hand, if the statistical results reveal that decisions are random or alternatively that the litigant distributions are the same (null hypothesis not rejected), this suggests none or minimal regulatory capture in the case data.

The second goal of this research consists of using some of the STB case data to build a qualitative analysis of key shipper/carrier decisions, similar to the work of Nolan et al. (2018)

on railroad mergers. We seek answers to questions such as "do regulatory decisions show any significant qualitative trends?" or "is there terminology that can tell us something interesting about litigant behavior?" As an example, one prior on case phrasing would be that equally treated litigants would not use language within a filing or description of an on-going case or dispute that might antagonize the regulator. Thus we will analyze our database of shipper/carrier rate disputes in order to try to identify key words or phrases that might highlight any less than objective looking behavior on behalf of litigants towards the regulatory body.

Overall, the goal of this research is to use regulatory capture as a theoretical foundation and to inform about "watching the watchmen", a phrase that we use here in turn to refer to the act of monitoring regulatory objectivity and performance in the public interest. Combined with qualitative analysis, statistical tests of randomness to test for the presence of unobjective regulatory behavior are done using a newly constructed time series database of historical STB shipper/carrier case decisions.

History of U.S. railroad regulation

Early changes to the ICC came from the 1903 Elkins Anti-Rebating Act, which made the official transportation rate published with ICC the legal rate. The 1906 Hepburn Act gave the ICC broad powers not only to review rates on complaints but also to replace a rate with one it determined was reasonable and just. Although this allowed producers of raw materials and agricultural goods to enjoy lower freight transportation rates, bringing more rapid economic development to some areas, it also penalized manufacturers. The new rates reduced national economic efficiency because some factories were located far from the raw material sources but close to final markets to minimize total transportation costs (Hakim, 1996).These attempts did

not sit well with the U.S. Congress and led to the passage of the Mann–Elkins Act in 1910, giving the ICC new powers to suspend rate increases for up to 10 months while conducting an investigation. Additionally, the act gave ICC oversight of communications rates set by cable telephone and telegraph (later transferred to other agencies).

With the start of World War I, railroad traffic began to snarl. Eastern terminals had too many full cars, while western terminals had a dearth of available cars (Widayanti & Supriyatno, 2020). This prompted proposals for nationalization of the railroad industry, accomplished when President Woodrow Wilson bypassed the ICC. Federal control of the railroad industry ended in March 1920 with the Esch–Cummins Transportation Act, which heightened the rate-setting power of ICC, increased the number of commissioners to 11 and created the Railroad Labor Board to settle labor disputes (Gomez-Ibanez, 1992). The Emergency Railroad Transportation Act of 1933 allowed for the creation of a federal Transportation Coordinator to oversee the industry. This act changed the direction of rate-making oversight, instructing the ICC to evaluate rates in terms of their effect on shippers. Although the Transportation Coordinator was relatively ineffective in realigning the rail industry, his reports to Congress eventually led to the passage of the Motor Carrier Act of 1935, placing the highway transportation industry under ICC oversight (Martland, 1997 and 1999). After World War II, the nature of the ICC and the transport industry changed dramatically. A major change in the regulatory environment was the 1948 Reed–Bulwinkle Act, which allowed rate bureaus to set rates without the Sherman Act's antitrust oversight but still subject to ICC approval (Hoogenboom,1976).

In Interstate Commerce Commission vs. Baltimore and Ohio Railroad, and Wight vs. the United States, the court applied the provisions of §§ 3, 4 of the Interstate Commerce Act of February 4, 1887, c. 104, 24 Stat. 379, making it unlawful for common carriers to make or give

any undue or unreasonable preference or advantage to any particular person or locality or charge or receive any greater compensation in the aggregate for the transportation of passengers or of like kind of property under substantially similar circumstances and conditions, for a shorter than for a longer distance over the same line in the same direction, competition which affects rates is one of the matters to be considered, is not applicable to the second section of the act. The purpose of the second section of that act is to enforce equality between shippers over the same line and prohibit any rebate or other device by which two shippers shipping over the same line, the same distance, under the same circumstances of carriage, are compelled to pay different prices. Therefore, in Wight vs. the United States, the phrase "under substantially similar circumstances and conditions," as used in the second section, refers to the matter of carriage and did not include competition between rival routes. The court's conclusions on this part of the case are (1) that competition between rival routes is one of the matters which may lawfully be considered in making rates for interstate commerce, and (2) that substantial dissimilarity of circumstances and conditions may justify Page 168 U. S. 146. On the 27th of June, 1892, the Board of Trade of Troy, Alabama, filed a complaint before the Interstate Commerce Commission at Washington, D.C., against the Alabama Midland Railway Company and the Georgia Central Railroad Company and their connections, claiming that there is a discrimination against the Town of Troy in the rates charged for transportation of property by the railroad companies mentioned and their connecting lines, violating the terms and provisions of the Interstate Commerce Act of Congress of 1887.

The last major changes to U.S. law concerning the economic regulation of railroads were the Railroad Revitalization and Regulatory Reform Act of 1976 (the so-called "4R Act," P.L. 94-210; 90 Stat. 31) and the Staggers Rail Act of 1980 (P.L. 96-448; 94 Stat. 1898). At that time,

U.S. railroads, particularly those in the Northeast, were in a prolonged period of financial distress, and strict federal regulation of railroad activities was blamed for some of the railroads' difficulties. Railroad deregulation was part of a larger movement to deregulate all modes of transportation in the late 1970s and early 1980s. Before deregulation, railroads were required to post proposed freight rates for various commodities, and the Interstate Commerce Commission (ICC) reviewed the proposed rates to determine whether they were "reasonable." Railroads were prohibited from discriminating between shippers in rates and quality of service. The Interstate Commerce Commission Termination Act of 1995 (P.L. 104-88; 109 Stat. 803) eliminated many of the functions of the ICC, abolished the ICC itself, and transferred its remaining functions to the STB.

The STB is a bipartisan and decisionally independent from but organizationally housed within the U.S. Department of Transportation (DOT). The ICC Termination Act left largely intact the regulatory framework that governs captive rail shipper issues. In addition to determining market dominance, the STB must determine that a rail rate exceeds a revenue to variable cost threshold of at least 180% before it can assert jurisdiction to judge the reasonableness of that rate. Depending on the total amount of freight costs in question, the STB has different methodologies for rate reasonableness determinations. The STB does not evaluate rates on its own initiative; it must receive a complaint from a shipper (Laurits R. Christensen Associates, 2008).

In 1995, the U.S. Congress passed the Interstate Commerce Commission Termination Act, which authorised the president to lift the moratorium on Mexican carrier movements beyond the commercial zones if removal was deemed consistent with the obligations of the United States under a trade agreement or with United States transportation policy. This allowed the president

to implement the trucking provisions under NAFTA, which entered into force on January 1, 1994. Discussions about the conditions and requirements imposed on Mexican trucks took several years. In 2000, rules for Mexican carriers that operate in the U.S. were published (Campos, 2001).

Throughout its first century as a nation, the United States allowed transportation to develop unfettered in a freely competitive manner. However, by the late 1800s, a combination of cutthroat competition (where there was competition) and abuses of market power (where there was no competition) led to the creation of the Interstate Commerce Commission (ICC). It was the first national regulatory commission. Previously, the only attempts to regulate surface transportation commerce had been at the state level—although the railroads challenged much of this legislation. In 1877, the U.S. Supreme Court affirmed the legality of state regulation and ruled that railroads were engaged in public interest activities and, therefore, could charge only reasonable sums. However, state-by-state regulation was not the best solution because railroads used the courts and differential rate bases for movements within and between states to circumvent the state commissions' orders. In addition, federal law holds that the STB "shall approve and authorize a transaction, and only parties can demonstrate that competition will be enhanced as a result. Since the revised regulations were implemented, most railroad mergers and acquisitions have involved smaller carriers, as potential mergers among Class I carriers have triggered strong enough objections that the parties never formally applied for the STB approval (Nolan et al. 2018).

The STB and its role

The Surface Transportation Board regulates and decides on disputes involving railroad rates, railroad mergers or line sales, and various other transportation related matters. According to the STB's mission statement, the body "resolves disputes in support of an efficient, competitive, and economically viable surface transportation network that meets the needs of its users." As an independent agency involved in transportation, in fact the STB operates outside of the U.S. Department of Transportation (DOT). The major function of the STB is to provide a platform for resolving ground transportation disputes and other matters within its jurisdiction (Prum, 2011). To be specific, the STB provides a forum for resolving surface transportation disputes and other associated issues within its legal authority. In addition, the Surface Transportation Board (STB) holds sole authority to rule on railroad mergers and acquisitions. Although required to consider the position of the Department of Justice regarding proposed mergers, the STB has historically approved several major railroad mergers which were opposed by the Department of Justice. The STB also reviews sales of rail lines, and its approval provides immunity for such a transaction from antitrust laws.

According to Warren (2018), the Surface Transportation Board (STB) is considered to be a small federal agency as compared to other, similar agencies. Today, the STB has a handful of technical employees who are now led by five Board members. Historically, most Board members have prior experience in either government or the transportation sector. Since Board members have rotating terms and are appointed by the federal government, there are times when the agency has to withhold decisions until enough Board members are present to render a formal vote. Otherwise, its workings are relatively transparent to the public, as evidenced by the growing formal case database that is used for this analysis.

The STB reserves the right to limit or remove regulatory requirements where appropriate. For rail, the STB has the ability to conduct extensive economic regulatory oversight of the industry, including examining rates and services, approving line abandonments, and of course, making decisions on large scale railroad mergers. STB has authority to preempt local laws when they infringe on public interest in a economically sound rail network.

Overview of the U.S. freight railroad industry

Rail transportation in the United States consists primarily of freight operations (Fu and Zhang, 2010). In the 1860s, America's first transcontinental railroad was built with the authorization of the Pacific Railway Act of 1862 and strong federal support (Yen, 1977). First of all, railroad's mission to create a nationwide mechanized transportation network had a revolutionary impact and far-reaching influence on the ever-increasing population and economy of the American West (Kolko, 2015). Second, since the construction of the national railway required large numbers of highly skilled engineers and laborers from the Union Pacific Railroad (UP) and the Central Pacific Railroad (Davis, 2018), it essentially accelerated the migration of white farmers to the west, resulting in the rapid clearing of new arable land.

Beginning in the 1900s, trunk railroads in the United States mainly focused their efforts on transporting passenger and products over long distances. But many of them also provided suburban passenger services near big cities (Saparovna, Ospanov, Antoni, & Sharapiyeva, 2018). Since the 1930s, automobile transportation cut deeply into the railway passenger market, reducing the economic scale of railway passenger transportation, but the real destructive blow to railway transportation was the interstate highway in the 1950s and 1960s (Murray and Schwartz, 2019).

The main competitors for freight were and continue to be interstate trucking companies (Grimm and Pittman, 2018). Gradually, railways hoping to profit sought ways to evade legal obligations on carriage (Witte and Poudel, 2019). And through this era, inter-city rail passenger business was about to mostly disappear in the United States, except for lines with particularly concentrated populations (Blainey and Preston, 2021).

With the evolution of the railroad industry through the 20th century, more and more small railroads closed down or were acquired by larger competitors, while inter-city passenger rail became gradually monopolized (Procter, 2021). At this transitional stage, larger railroads sought to compete with the few other larger railroads to survive but the industry was still in decline. According to Barbosa (2020), to protect the declining freight rail industry in the United States, the U.S. congress passed the Regional Rail Reorganization Act of 1973. Soon after yet another law, the Railroad Revitalization and Regulatory Reform Act of 1976, set the tone for a broad reduction in regulations on the rail industry (Southern, 2011). However, regulated freight rail output continued to decline until Congress passed the Staggers Rail Act in 1980 (McCullough and Thompson, 2013), an event that significantly reduced historical regulatory constraints on the freight rail industry. Since that time, America's freight railroads have massively restructured, gradually merging to find economies of scale as well as closing down thinly used branch lines to consolidate their networks. This allowed the surviving firms to return to prosperity and profitability (Rodrigue, 2008).

Today, freight railroads play an important role in the U.S. economy, especially for shipping containerized imports and exports, as well as bulk commodities such as coal and oil. Between 1981 and 2000, rail freight capacity increased by 172%, while revenue per ton-mile (a measure of rates) fell by 55%. Even with serious considerations of inflation around this time,

railroad share of the U.S. freight market rose to 43%, the highest of any first world nation. In 1975 U.S. rail transported 750 billion ton-miles of cargo, but by 2005, this output had doubled to 1.5 trillion ton-miles. In the 1950s, the percentage of freight transported by rail in the United States was roughly equal to that in Europe, but by 2000, rail freight in the United States accounted for 38 percent of freight moved, compared with only 8 percent in Europe. And in 2000, while U.S. trains carried 2.39 trillion ton-km of cargo, the EU-15 combined transported only 304 billion ton-km of cargo. In terms of ton-miles of freight moved, railroads transport more than 25 percent of U.S. freight annually and continue to connect businesses throughout the U.S. with overseas markets.

Deregulation and its effect on shippers

Rail rates decreased after deregulation in the early 1980's, but have varied widely since. However, a broad and consistent increase in rail freight rates over at least the last 4 years, and for some commodities over the last 7 years, indicates the railroads have raised many rates to achieve profit levels previously unseen in the industry. Moreover, the overall decrease in revenue per ton-mile for railroads does not reflect the actual effect on shippers. The logistical cost to shippers, and to the public, has increased over that time. Average rate per ton-mile has fallen because all shippers, and especially bulk commodity shippers, are assuming greater responsibility for car supply and other logistical functions that railroads have traditionally provided. In particular grain shippers, in times of short railcar supply, rely on the now commonly used hopper car ordering systems, paying auction fees in addition to tariff rates to guarantee hopper car delivery within a specified time period rather than risking a delay in receiving hopper cars on a traditional first-come-first-served basis **(**Prater, 2000)

Market issues in freight rail

Economists offer that the marginal cost of railroad service is lower than the average cost of output compared to many other businesses (Frischmann and Hogendorn, 2015). This is because the initial cost of track construction is high and expensive equipment must be purchased before production. Once trains start running, additional operating costs are greatly reduced (Barnhart, Jin, and Vance, 2000). Research done by Demir (2020) showed that industries with a "natural monopoly" or "cost reduction" characteristics such as railways are not theoretically "economical". The latter means that their activities do not lead to stable, balanced price levels and other features of efficient industrial production. Second, based on research conducted by Laurino, Ramella, and Beria (2015), in recent years railway companies have been facing fierce competition in a less profitable transport market with soaring expenses and costs. The fact is that even when they offer their services at a lower price, railroads won't always get a good market return on their investment.

Pettus, Kor, and Mahoney, etc. (2018) mention that in order to survive severe economic competition, the railroad industry needs to adapt their networks and offerings to align itself with challenging economic norms and practices. That is, under fierce competition, there is no guarantee of growth or increased market share for the railroad industry. In this situation, the railroad industry should react and try to make significant investments in infrastructure such as installing advanced equipment and new technologies to improve transportation services and providing safer, more economic and more reliable offerings to their customers (Pettus, , Kor, and Mahoney, etc., 2018).

According to Savage (2013) and the National Railway Labor Conference (NRLC), other challenges facing railroad industries also include; i) The decline of the coal industry; ii) the

threat from the advancement of the trucking business; and finally iii) threats from changing regulation over the railroad industry. With all those competitive challenges and other related challenges such as the decline of the coal industry, the rise of the trucking industry, federal regulation, and adjustment, it is becoming even harder for railroads to maintain and upgrade its networks to provide safer, efficient, reliable services for its customers with cost-friendly transportation rates.

Captive shippers

Captive shippers remain a significant policy and operations problem for both railroads and regulators. While competition for freight might come from intramodal (competition from other rail companies), or intermodal (from other modes of transport) sources, by definition a captive shipper is unable to economically access transportation alternatives. Whether a competitive alternative is "economical" is critical, even if the shipper's location can be accessed by other modes. For example, in many instances, trucking is not economical for large and bulky commodities such as crops, coal, chemicals, etc.

Captive shippers have long been under scrutiny by the STB. Whether they are adequately protected over rates and service remains an open question, while the railroads argue that they need to freely price discriminate on these shippers in order to maintain their profit levels. Rail is a capital-intensive industry that requires constant investment in maintenance and expansion to support economic growth. If adequate returns are limited in some manner, shippers will not be able to count on these investments in the long run. The direct result of reduced investment in rail infrastructure will be higher costs, congestion inefficiencies and higher transport rates, which will result in more freight being diverted from rail to trucks. Nonetheless, U.S. Class I railroads

have continued to earn more than normal returns, so it seems reasonable for the STB to limit railroad returns on captive shipper earnings.

According to existing regulations and the STB jurisprudence, the STB can only intervene over railway tariffs set for captive shippers if the following conditions are met: First, if the tariff is determined to exceed 180 percent of the variable cost of transportation; second, if an STB assessment determines that there is no viable and economical alternative (captivity) to current transport options. Given the conditions, it can be difficult for the agency and shipper to generate proof for meeting all of them, particularly on the point about the rate as related to variable costs.

Another problem is that in the decades since the 1980 Staggers Act was enacted and the industry was substantially deregulated, freight rail operations in the United States have become more concentrated among fewer firms, and surviving railroads have increased flexibility to set supra-profitable rates. In turn, these changes in industry scale have gradually created a set of regionalized or localized bulk transportation monopolies. As of this writing, only two Class I railroads serve much of the vast Western United States (UPSP and BNSF), and only two Class I's serve most of the industrially dense Eastern states and coastal regions (NS and CSX).

Contracting and rates

The STB may disapprove a shipper/carrier transportation contract i) if it finds the contract unreasonably discriminates against a port or shipper; ii) if the contract impairs the ability of the railroad to meet its common carrier obligation to a shipper, or iii) that it constitutes a destructive competitive practice. Tang and Sun (2018) discuss modified portions of the Shipping Act associated with collective rate setting and the use and confidentiality of service contracts negotiated between shipper and railroad. Historically, tariff and contract rates were publicly

available, but now service contract rates can be filed confidentially. This allows shippers to enter into contracts with carriers individually. Railroads may still discuss rates and develop rate guidelines, but it is up to individual railroads to decide on a customer-by-customer basis whether to implement guidelines wholly, in part, or not at all in their confidential service contract negotiations. These relaxed regulations over shipper/carrier interactions helped to increase the competitive nature of the industry.

Railroad rate disputes – current issues

When producers and marketers of various shipped products believe the rates they are paying for transportation by a specified railroad are too high, uncompetitive, or beyond their expectation, ideally they seek access to a dispute-settlement mechanism that is fair, easily understood, accessible, and affordable (Prater and Sparger, 2014). The STB attempts to fulfill this function for shippers using a variety of formal methods that will be discussed later in this section. However, to expedite a freight rate dispute settlement, mediation and arbitration can offer alternatives to the set of standard rate challenge procedures used by the STB (Tong, 2022). As of this writing, the STB has only recently modified these procedures and mandated changes to the process to try to render them more effective (now referred to as final offer rate review, or FORR). But to date, these interactive legal case settlement alternatives have been rarely used by U.S. carriers/shippers, and this fact is cited as further evidence that the STB favors railroads over shippers in its adjudication processes.

Costing for rail regulation

Using their long-standing Uniform Rail Costing System (URCS) software as the means to evaluate railroad costs for rate cases, the computed ratio of rail revenue to variable cost (R/VC) becomes an important regulatory metric for the STB. When this ratio is exactly 100 percent, it means the railway is only just recovering its variable costs. But when the revenue from a particular freight movement is found to exceed 180 percent of operating costs, and as well the operating railroad is judged to have a dominant market position, shippers can challenge rates through the STB. When R/VC is computed to be 180 percent or above, this effectively becomes a regulatory trigger, meaning that the STB has the legal right to evaluate the validity of the rate. What this means is that under many circumstances, if a disputed rate is higher than 180 percent of the computed variable cost for the railway, the STB eventually sets the rate to the 180 percent level as a cap.

While there has been some historical debate over the theoretical justification for the 180 percent standard, and that this level is in fact quite arbitrary (Tye, 1991), another potentially more significant concern is over the continued use of URCS by the STB to evaluate rail costs in these disputes (Wilson and Wolak, 2016). While highly controversial for shippers, it is worth noting that the URCS methodology has not been updated for many years to better reflect the current cost situation in the rail industry. Linked to these issues, shippers complain that the appeal process for rate disputes has been too slow and time-consuming, resulting in poor or non-existent returns for shippers in the end even when they win a case. Ultimately, under the current set of regulations, a shipper needs very deep financial resources to push forward a freight rate dispute with a railroad. Due to this, in the data we more often see wealthier mining or chemical companies following through the rate review process.

STB rate regulation

The principal cost based regulatory tool used by the STB is known as the Stand-Alone Cost (SAC) method (Tye, 1991). A shipper challenging a freight rate (typically by referring to the R/VC metric) must essentially design a hypothetical, new railroad capable of handling its traffic and subsequently calculate the rates that the railroad would charge given the costs associated with operating the route for that shipper. In order to replicate the existing rail infrastructure used to serve shippers, complainants must demonstrate that the hypothetical railroad has sufficient capacity to handle anticipated demand. This requires the complainant to first select an appropriate subset of rail traffic for the hypothetical independent cost railway, referred to as the stand alone railroad (SARR), then design an operational plan showing how an efficient railroad will serve this traffic group and determine the optimal network configuration. The various parties to this process now use computers to simulate hypothetical SARR and test operational plans and configurations based on predicted traffic groups. The parties must then provide detailed evidence to calculate direct operating costs (such as the cost of locomotives, crew and rail cars) and indirect operating costs (such as general, administrative and road maintenance costs).

If the STB were to find that the real railroad is charging a shipper more than the SARR would, it rules the rate as unreasonable, and in many cases the hypothetically generated rate becomes the new maximum allowable rate. While the SAC test is a conceptually sound approach based on contestability theory (Baumol et al, 1982), the actual process building detailed rate cases can be daunting, lengthy and costly to a shipper. The complexity and cost of litigating SAC cases has increased over time; for example, in the most recent full-SAC case in the database, shipper litigation costs approached $5 million and took 2-4 years to complete. Due to this, over

time the STB has tried to revise and refine SAC to reduce the burden associated with its traditional SAC framework.

Current issues at the STB

President Biden's executive order of July 9, 2021 meant that the current chair of the STB was directed to consider commencing or continuing a rulemaking to strengthen regulations pertaining to the pro-competitive policy known as reciprocal switching[2] (Nolan et al., 2015; E.O, 2021). There are other relevant matters that need to be settled related to reciprocal switching including bottleneck rates, interchange commitments, or other situations involving other railways using another railroad's tracks for their own traffic.

In response to the executive order, current Board Chair Martin J. Oberman (Michael, 2021) welcomed the nationwide policy contained in this new Executive Order while underscoring that the STB is an independent agency and that maintaining its independence is vital. In his words: "*In harmony with the White House's policy that the federal government should seek to boost competition nationwide, as I have previously indicated since being named as Chairman, I intend to urge my fellow Board members to prioritize and strongly consider the concepts embodied in several measures which are already pending or have been recommended by Board staff or stakeholders, including but not limited to reforming the Board's competitive access policies; enhancing shipper visibility into first mile/last mile service; and increasing the practical accessibility of rate relief measures to shippers in market dominant situations*".

[2] Pretto and Schulman (2015) pointed out that in rail operations, the act of reciprocal switching (also known as interswitching in Canada) occurs when a shipper served exclusively by one railroad is permitted to arrange for a second (proximate) railroad to transport their freight, with the second railroad gaining access to this shipper using the tracks of the first railroad. In practice, reciprocal switching would be used to support captive shippers. However, if government regulators enable reciprocal switching in an effort to increase railroad competition, depending on the proximity of the second railroad, the practice could increase the time it takes for trains to reach their destination (Brannon and Gorman, 2022).

STB behavior towards shippers

A recent decision by the STB in the Western Fuels Association, Inc. and Basin Electric Cooperative, Inc. case (February 2009) was made in favor of utilities and consumers (Kocoloski, Griffin, & Matthews, 2011). The utility had challenged the rates charged by BNSF from mines in the Powder River Basin (PRB) to their electric plant in Moba Junction, WY. The plant is captive to BNSF and provides electricity for grids serving consumers in nine U.S. states. Ultimately, the STB found that the railroad was charging an excessive rate (roughly six times variable cost). BSNF was ordered to lower its rates by about 60 percent. The order awarded $100 million in past overcharges to utilities and an additional $245 million through reduced coal transportation rates through 2024. Electricity consumers in nine states benefit directly from this ruling. This case has been referred to by some shippers as an important rate case that might catch a turning point in efforts to protect captive shippers from monopoly pricing.

Shippers have pointed out this was the single largest award for a captive shipper by the STB and represents the first meaningful relief awarded to a captive rail customer through a full, contested rate case since 2001. However, shipping groups also highlight this decision came more than four years after filing and after the plaintiffs spent approximately $9 million prosecuting their case. Concern still remains that most captive rail customers will be denied access to meaningful rate relief because of the cost in both time and money, stemming from the inherent complexity of the STB freight rate challenge process.

Assessing the role of (de)regulation

Since deregulation, railroads in the United States have pursued various profit-maximizing and efficiency-enhancing strategies, including going through numerous mergers and conducting extensive line abandonment, often in rural remote areas or urban areas where there are competing railroads. In particular, captive shippers' transportation options have become more restricted as railroads consolidate their once vast operating networks. Other operational restrictions in the rail sector include contractual transfer agreements that limit the ability of smaller railroads to transfer traffic with larger railroads, limiting competition and options for many shippers. Other restrictions on competition include closing switches and terminating transfer agreements with other railroads.

In the U.S., captive shippers typically transport bulky commodities such as chemicals, coal or grain. Since there are no other cost-effective modes of transportation for these goods, these shippers have been reliant on rail to transport their products to destination. On top of access and service issues, historically, 20 to 30 percent of rail movement in the U.S. has been limited by paper barriers (contracts), with many such transactions occurring within rural America. To this end, shippers continue to express concerns about the state of the current rail service to the regulator, the Surface Transportation Board (STB). Since 1996, the STB has been tasked with managing a regulatory balance and market fairness between carriers and shippers using the national rail system.

As a regulatory body ensuring rate and service fairness, the STB's internal adjudication process for an individual complaint can be onerous and costly for shippers to implement. Anecdotally, both shippers and carriers have complained that both the ICC (STB predecessor)

and the STB regulatory decisions seem to favor the other party. Ideally, over time, the STB's decisions should resemble a random process. By way of example, when looking at major cases (the infamous stand-alone cost (SAC) cases for rate disputes), records show that since 1996, seven SAC cases have ruled in favor of shippers and eight SAC cases ruled against shippers. While the market value and plaintiff costs of these cases vary, it seems that as a regulator in an often contentious industry, it is necessarily difficult for the STB to please all participants.

Chapter 4 – Evaluating regulatory objectivity - research design and methods

Data collection and management

The data used in this part of the thesis comes from the Decisions category in the procedures-actions menu of the STB decision database maintained through their website (www.stb.gov/proceedings-actions/decisions/). There are literally thousands of individual decisions listed on the site, dating from 1996 to the present. Prior cases are archived on paper, so these were not included in the development of the cases sample. Given that individual rate disputes do not occur at regular intervals across time, we decided to include rate decisions from 1997 to 2018. We stopped at 2018 because in rare cases, an additional STB addendum to a published decision could still change it in the future. This still leaves us with a reasonable number of decisions to comprise our case database.

Since we want to make sure that the cases identified in the STB data are strictly related to disputes between a freight shipper and carrier, using a keyword search case, we used both economic and dispute terms like “versus, case, rate, price, tariff, competition, dismiss...", and this produced 1017 separate decisions. After removing many duplicate transportation cases, we were left with a total of 39 unique STB decisions as my database, many lasting several years and comprising several interim decisions. As mentioned earlier, this may seem a low number for a regulatory agency tasked with addressing important economic issues like rate disputes, but it is enough of a sample to do acceptable statistical analysis.

Our original sample included cases from chemical companies, coal mining companies, 1cement company, fuel companies, grain companies, timber company, metal companies, and trucking companies. However, we deleted a few of these cases as inapplicable or just unreliable, which further refined the types of companies in our sample that have appealed freight rates into

three major categories: chemicals, coal, and grain. As a result, the main complainant parties who comprise the data for this research fall within these goods categories, as coded and used for our statistical analysis. Also, since the transportation of these goods are associated with large quantities and low unit prices they are often very sensitive to cost changes, it is not surprising that this particular situation generates a higher likelihood for disputes over rates with rail carriers.

Testing methods

As statistical evidence of regulatory objectivity, we formally test whether the chosen STB decisions are either statistically random or distributionally distinct across shippers and carriers. To do this, we will employ several statistical tests to identify that the constructed case data represents essentially random decision-making behavior by the STB over the duration of the sample. We note here that according to Letherby et al. (2013), the concept of objectivity opposes the concept of subjectivity. If we can identify that a set of the STB regulatory decisions over freight rate disputes are statistically random, the latter supports our hope that regulatory decisions were not formulated by subjective willingness (i.e. capture), but instead these decisions were formulated objectively by the regulator. Our chosen empirical approach is based on a 50-50 base case decision rationale, and six statistical tests are used to examine whether the STB's rate case decisions are random or purposeful. For this specific analysis, our statistical assessment of randomness/distributional differences consist of the following six established tests: binomial test, a one sample Wilcoxon signed rank test, a non-parametric runs test (Wald-Wolfowitz), the Kolmogorov-Smirnov test (K-S Test), the Mann-Whitney U test, and Levene's test for equality of variances.

Binomial test

The binomial test is an exact test of the statistical significance of deviations from an observed value from a theoretical expected distribution using sample data. A common use of binomial testing is the null hypothesis that two classes are equally likely to occur (such as tossing a coin). Figures, graphs and tables are commonly used to give the non-random number of significant observations observed in the category in the case in point. In this research, by using binominal test, we hypothesized that the STB decisions towards the two different parties are random and neutral.

One sample Wilcoxon signed rank test

The one-sample Wilcoxon signed rank test is a non-parametric alternative to one-sample t-test when the data cannot be assumed to be normally distributed. It's used to determine whether the median of the sample is equal to a known standard value (i.e. theoretical value).

The Wald-Wolfowitz (runs) test

Named after statisticians Abraham Wald and Jacob Wolfowitz, it is a nonparametric statistical test used to test the randomness of the distribution of binary data series, and can also be used to test the hypothesis that the elements of the series are independent of each other.

Kolmogorov-Smirnov test (K-S test)

Kolmogorov-Smirnov Test (K-S Test): Named after statisticians Andrey Kolmogorov and Nikolai Smirnov, this is a nonparametric test of equality of continuity or discontinuity. The one-sample K-S test is used to compare a sample to a reference probability distribution. This test can

be used to know what the probability of drawing this set of samples is from a probability distribution. The K-S statistic quantifies the distance between the empirical distribution function of the sample and the cumulative distribution function of the reference distribution. The null distribution of this statistic is computed under the null hypothesis that the sample comes from the reference distribution. The distributions considered under the null hypothesis may be continuous, purely discrete, or mixed.

Levene's test for equality of variances

In statistics, Levene's test is an inferential statistic used to assess the equality of variances for a variable, calculated for two or more groups (Levene, 1961). In theory, standard statistical procedures assume that variances of the populations from which different samples are drawn are equal. Levene's test assesses this assumption by testing the null hypothesis that the population variances are equal (Chang, Pal, & Lin, 2017).

The Mann–Whitney U test

As Bergmann, Ludbrook, & Spooren (2000) point out, the Mann-Whitney U test compares the distributions of ranks in two groups. According to Corder (2014), the Mann–Whitney U test is considered to be one of the major nonparametric tests of randomness. The standard null hypothesis is as follows: for randomly selected values X and Y from two populations, the probability of X being greater than Y is equal to the probability of Y being greater than X.

Validity and reliability

Validity and reliability are the key issues to be considered in conducting analytic research. As Pandey & Pandey (2021) state, a reliable and valid research design can allow the researcher to

draw convincing research inferences about variables (observations), allowing insightful conclusions. In order to achieve balance between validity and reliability, the researcher should not only pay attention to the reliability of the research procedures, but also the internal validity and external validity of the research process. In this research, we carefully controlled the process of obtaining sampling cases, double-checked our coding procedures and examined both quantitative data and qualitative elements of the chosen sample. We offer that a reasonable balance between validity and reliability is achieved with this particular research through careful research design procedures.

Chapter 5 – Quantitative analysis of the STB database

Using the basic analytic framework developed earlier in the thesis, this chapter will implement a series of commonly used tests of data randomness/distributional difference in order to quantitatively assess the likelihood of regulatory capture as evidenced through the sample of the STB decisions.

Justification in using a binary decision metric for randomness

Among the sampled 39 rate cases, in fact a large percentage of these cases were eventually settled by shippers. This was also true for many case decisions on the STB website. Not surprisingly, we found that it was usually shippers who filed cases because railroads were charging rates deemed comparatively excessive. Therefore shippers constitute a large proportion of plaintiffs in these chosen rate cases. Typically, if plaintiffs do not have sufficient evidence or lack the certainty to win a legal case, they will not rashly pursue such a case because of the need to pay legal fees, among other case costs. Following this reasoning and knowing the general ambiguity or randomness associated with all arbitrated legal disputes, the final outcome of regulated cases that are actually pursued by shippers (as plaintiffs) ought to be favorable more than 50% of the time, while the defendant railroads should obtain favorable outcomes less than 50% of the time. But in our randomly generated case sample and trying to follow a conservative research design to do statistics, we chose a base of even odds (50-50) on case decision outcomes as a neutral or non-captured outcome. Statistical tests aside, it is not difficult to see that the regulated outcomes of these mostly shipper pursued rate cases are not even 50-50, but instead the regulated outcomes fall in the opposite direction (about 68% of the randomly chosen cases had carriers receiving favorable outcomes), a basic fact that appears to defy all logic about the

function of a regulatory body as a means to protect public interests. Statistically, most of our testing rejected the characteristic of randomness in the case data, and thus we reached our research conclusion that there seems to be evidence of regulatory capture in the actions of the STB.

Second, we must consider the following, according to Kamien & Schwartz (1975) that a monopoly is a type of market structure where a single firm or organization controls the largest portion or even the entire market share of goods/services. In addition, monopolists (railroads) control the price of goods/services in their market. As highlighted by Bailey (1981), railroads are likely to possess some level of monopoly power and thus they have the privilege to raise their market rates to a substantial level, a level well above what would be considered competitive.

If railways behave as monopolists over some of these freight markets and shippers, a "fair" regulatory case split is that they should generally "lose" cases (although the ratio is hard to control, and we don't know exact numbers). In this situation, a conservative measure of evidence of "regulatory capture" might be that once again we expect shippers to generally win cases they bring about the monopolist to the regulator, which should lead to shippers having more than a 50% chance of winning any given case. But even though we implemented a very conservative case decision metric for this study, test results showed that even with a 50-50 decision prior, we saw that 4 out of 6 chosen statistical tests showed that this conservative metric did not align with the data. In conclusion, for future work we believe it is reasonable to stick with the conservative 50-50 case outcome metric in order to assess whether regulatory capture seems to have affected the regulator’s decisions on economic (freight rate) disputes.

Binomial randomness test

Broadly speaking, the binomial test is used to compute the probability of obtaining expected results. Based on Ritter (2022), binomial test is an exact test of the statistical significance of deviations from an observed value from a theoretical expected distribution using sample data. In quantitative research, the most frequent use of binomial testing is the null hypothesis that two classes are equally likely to occur (e.g. assessing the probability of coin tosses with two sides). After obtaining the statistical figures, the transcribed tables can be used to give the number of significant observations observed in the category in this case. The null hypothesis for this kind of test is that the research results do not differ significantly from what is expected:

RQ1: Are the legal decisions made on freight disputes between carriers and shippers statistically equivalent to a random sequence, or not?

Ho2: The STB's decisions on rate disputes between carriers and shippers are randomly distributed as represented by the binomial test.

Using the collected data, a binomial test was performed to evaluate whether the STB decisions on funding rates disputes between carriers and shippers are randomly distributed as represented.

Table 1

Binomial Test Results

Winner Type	N	Observed Proportion	Test Proportion	Sig.
Carrier	24	.62	.50	.20
Shipper	15	.38		
Total	39	1.00		

As Table 1 shows, the null hypothesis that the STB is neutral in decision-making could not be rejected. My sample consists of a total of 39 STB rate decisions, where a sample proportion of 0.62 were won by a shipper and 0.38 won by carriers. These sample proportions were not significantly different from the test proportion, $N = 39$, $p = .200$ ($p > .05$), hence the null hypothesis cannot be rejected. By comparison to a 50-50 decision metric, we find here that the STB's decisions on funding rate disputes between carriers and shippers are in fact random. The result of this first test lend support that the STB performed as a neutral regulator and protector of the public interest for the freight rail sector.

One sample Wilcoxon signed rank test

According to Cleophas and Zwinderman (2016), the one-sample Wilcoxon signed rank test is a non-parametric test used when the data cannot be assumed to be normally distributed. It is used to determine whether the median of the sample is equal to a known standard value. For this particular research, one sample Wilcoxon signed rank test was performed to evaluate whether the legal decisions made on freight rates between carriers and shippers were statistically random or not. Following two hypotheses were developed for the study;

$H_0$3: The STB decisions made on freight rates between carriers and shippers are statistically random

H_1: The STB decisions made on freight rates between carriers and shippers are not statistically random.

For this test, the data were analyzed using the SPSS V26 software package and interpretations were done at confidence level of 0.01. Once again, 39 decisions were used in the analysis. Table 2 below contains the results of this analysis.

Table 2

Results of the one sample Wilcoxon signed rank test on winners of legal decisions

Parameter	Test Statistics	Standard Error	Standardized Test Statistic	Sig.(2-tailed)
Value	780.00	69.12	5.64	.001

As shown in Table 2, a one sample Wilcoxon signed rank test is significant, T=780.00, z=5.64, p=.001, p< .01, therefore, we cannot accept the null hypothesis. The test shows there is evidence in this data to suggest that historical STB decisions made on freight rate disputes between carriers and shippers are not statistically random. This outcome indicates that the STB over this time period may have acted as if it was possibly captured in the regulatory sense. Overall, the test indicates that the STB sided significantly with carriers over shippers.

Kolmogorov-Smirnov test

The Kolmogorov-Smirnov test (K-S test) is named after A. Kolmogorov and N. Smirnov. It is a nonparametric test of equality of continuity or discontinuity. In addition, the one-sample K-S test is used to compare a sample to a reference probability distribution. This test can be used to understand the probability of drawing this set of samples from a given probability distribution. The K-S statistic quantifies the distance between the empirical distribution function of the sample and the cumulative distribution function of the reference distribution. The the null hypothesis assumes that the sample comes from the reference distribution. The distributions considered under the null hypothesis may be continuous, purely discrete, or mixed.

A one sample Kolmogorov-Smirnov test was conducted on the STB decisions assuming these are normally distributed. The results of the test are shown in the Table 3 below;

Table 3

Kolmogorov-Smirnov Test

Parameter	N	Normal Parameters		Most Extreme Differences			Test Statistics	Sig.
		Mean	Std. Dev.	Absolute	Positive	Negative		
Value	39	1.62	.49	.40	.28	-.40	.40	.001

The outcomes of the STB decisions are inconsistent with the null hypothesis and thus we reject the null. Here, the sample included 39 STB decision, whereby the test statistic was computed to be .40, with a significance value of $p < .001$. The results of the Kolmogorov-Smirnov test indicate that the winner decision does not follow a normal distribution. We conclude that the STB's decisions on rate disputes between carriers and shippers do not simply appear to be neutral. This comprises more quantitative evidence supporting long-standing anecdotal evidence that the STB has acted as if it has been captured in its regulatory conduct.

Wald Wolfowitz runs test

Named after statisticians Abraham Wald and Jacob Wolfowitz, this test is a nonparametric statistical test used to test the randomness of the distribution of binary data series, and can also be used to test the hypothesis that the elements of the series are independent of each other.

This runs test was performed to evaluate the random distribution of the binary variable, the STB decisions on rate disputes between carriers and shippers. Table 4 below shows the results of the analysis;

Table 4

Results of the runs test for winner type

Parameter	N	Test Statistics	Z	Sig.
Value	39	22.00	.70	.484

Using Table 4, the results of the WW test indicates that the STB's decisions on rate disputes between carriers and shippers are randomly distributed ($Z(39) = .70$, $p = .48$; $p > .05$). Interestingly, this test outcome runs counter to our previous randomness test results. Since $p > .05$, we conclude that the data on rate decisions is in fact random. This evidence does not support our supposition about the Surface Transportation Board (STB) capture behavior over the duration of the data.

While we note that the majority of the statistical randomness tests we use in this thesis are indicative of regulatory capture behavior by the STB, we include the latter WW test both for completeness as well as the fact that it is a commonly used test of data randomness in the forensic economics literature. Further, we acknowledge that due to the nature of testing for something as inherently dynamic as statistical randomness or comparing distributions, that one or more of a chosen set of tests were likely to yield the opposite results on the same data. Once again, we include our contradictory statistical findings to illustrate how difficult it can be to absolutely "prove" an inductive supposition or hypothesis using basic statistical approaches.

Levene's test for equality of variances

Levene's Test for Equality of Variances is used to test the assumption that distributional variances are equal (i.e., homogeneous) across groups. The test is easy to implement, assuming data points within groups are randomly sampled from a non-normal distribution. Like many other techniques for testing hypotheses, Levene's test for homogeneity involves computing a test-statistic and finding the P-value for the test statistic, given degrees of freedom as well as significance level.

For this research, Levene's Test for Equality of Variances was performed to evaluate following null and alternative hypotheses;

H_0:The variance of the STB's decisions made on freight rates among carriers and shippers is equal.

H_1: The variance of the STB's decisions made on freight rates among carriers and shippers is not equal.

Table 5

Results of Levene's Test for Equality of Variances of winning and losing decision of carriers and shippers

Parameter	F	Sig.	t	df	Sig. (2-tailed)
Value	.00	1.00	-2.07	76	0.042

According to the table, Levene's Test for Equality of Variances for the decisions made on freight rates between carriers and shippers was significant (F = .00, t (76)=-2.07, p = .042; p< .05), hence the null hypothesis is rejected. For this specific test, the finding indicates that the

variance of decisions made on freight rates between carriers and shippers are not equal. This again is indicative that the STB seems to have favored carriers in their decision processes.

Mann Whitney U test

The Mann Whitney U Test is another non-parametric test used to assess differences between two independent groups when the dependent variable is either ordinal or continuous, but not normally distributed. The Mann-Whitney U test allows researchers to draw different conclusions about their data depending on the assumptions they make (Bergmann et al. 2000).

The Mann-Whitney U test was performed to evaluate whether the decisions made on rate disputes between carriers and shippers are statistically random or not. Accordingly, the appropriate null hypothesis is that the distribution of the STB's rate decisions is the same across carriers and shippers.

Table 6

Results of the Mann-Whitney U test of Winning and Losing decision of carriers and shippers

Parameter	N	Mann-Whitney U	Test Statistic	Standard Error	Standardized Test Statistic	Sig. (2-tailed)
Value	78	936	936	86.67	2.02	0.043

Examining Table 6, the test reveals that decisions made on freight rates between carriers and shippers were statistically significant ($U = 936$, $p = .043$; $p < .05$), hence the null hypothesis is rejected. In this instance, we can say that the STB decisions between carriers and shippers are statistically distinct.

While not a finding supporting case decision randomness, this statistical test seems to confirm that there were significant differences across the STB’s decisions made for carriers and

shippers. Once again, we seem to have validated that the STB behaved as if it was captured in a regulatory sense through the data sample.

Further discussion of the statistical tests

For completeness and research objectivity, in this chapter we conducted six well established statistical tests. These tests were chosen to either assess the randomness of the STB decision data (a weaker notion of objectivity or capture) or to check whether the distributions of the decisions for carriers versus shippers were measurably different (a stronger notion of objectivity or capture). We acknowledge that it is very difficult to prove anything definitive conceptually using basic statistical testing, especially when testing for an inherently dynamic (and potentially ergodic) concept like pure randomness (or differences in distribution). That 4 of the 6 tests we conducted indicate the STB case decision data were either random or that the distributions were inherently different across shippers and carriers is indicative that the STB behaved in a manner consistent with regulatory capture.

Within the base data, we know that about 68% of the chosen rate cases were characterized by favorable outcomes to a railroad, whereby this simple metric provides a supporting indication of regulatory capture based on the researcher's justification for using a binary decision metric to determine decision randomness. Overall, the additional computed statistical tests allow us to build evidence about whether historical STB rate case decisions appear to be even-handed or instead seem to favor railroads (or shippers).

Ultimately, we offer that across our rate case data, the Surface Transportation Board appears to have more often than not favored one party (carriers) over the other (shippers), based on a base prior assumption on the decision distribution that the outcomes for each litigant, ceteris

paribus, should generate something close to a random distribution over time or alternatively should generate a similar distribution for both parties, depending on the statistical test used. Given the nature of the data and its collection, the logic behind our choice of these statistics to test for randomness in assessing the STB case behavior appears to be justified.

While not definitive, we conclude from the weight our statistical evidence that the STB seems to behave in a manner consistent with regulatory capture in a Stiglerian sense. It is our hope that other related industries and regulatory bodies can eventually be examined in a similar manner in order to get a better quantitative understanding of the scope of regulatory capture in the broader industrial economy.

Chapter 6 - Qualitative analysis of the STB database

NVivo - Qualitative Data Analysis Software

NVivo is a qualitative data analysis (QDA) computer software package. It is mainly used to help qualitative researchers to organize, plan, analyze, interpret and find patterns and insights in unstructured data like words, phrases in interviews, open-ended survey or reports, where deep levels of meaning analysis on disordered data are required. The most popular use of NVivo is for qualitative and mixed methods research. Specifically, it is used to analyze unstructured text, audio, video, and image data, including (but not limited to) interviews, focus groups, surveys, social media, and journal articles.

As outlined by Nolan et al. (2018), NVivo is an increasingly deployed and powerful software package used in many research fields (especially in the legal profession) to facilitate the process of collecting, collating and categorization of large amounts of written information to trace the common trends and thus identify links, connections, and relations among documentation.

NVivo analysis design regarding the STB legal decisions

The STB maintains an updated website (https://www.stb.gov/proceedings-actions/search-stb-records/) that posts the STB management and legal decisions. The current NVivo analysis is based on the 39 indepen***dent freight rate dispute decisions*** from the above website. In view of the number of entries, we decided to utilize the power of qualitative software (NVivo) to mine the documents for key points and critical phrases in relation to the main idea of legal decisions. After running the NVivo analysis randomly ***with the 39 cases***, the researcher found and focused on around 100 key words which are more related to addressing the research questions.

Based on the online STB data from the decisions category in the procedures-actions menu of the STB database maintained through their website, we extracted what we believe is the comparatively complete set of documents (1997-2018) with the STB decision-making information entries (Nolan, Micheels, & Pollard, 2018). After careful examination of the extracted data, we deleted invalid entries and were left with a total of 39 unique STB decisions to be used as data. In the qualitative analysis, we employ qualitative analysis software (NVivo) to organize, analyze and find insights in regard to the STB decisions and help us assess the fairness of the STB legal decisions on freight rate disputes. In this specific research, frequent and heavily used words or phrases regarding the STB legal decisions were distilled out and carefully examined. Upon completion, we use the generated qualitative research results to explain the fairness and reasonability of the STB legal decisions on fright rate disputes between carriers and shippers.

Adding key terms for clues about STB decisions

From Table 7, we see the categories we have defined include price, competition, agreement, decision, dispute, and market. The key terms under price are high rate, high cost, overcharged and overpriced; the key terms under competition include words like monopoly, compete, rivalry, and contest. The key terms under agreement are (respectively) contract, agree, consensus, and opinion. And under decision categories, the key terms are dismiss, deny, withdraw and fail. In addition, under the category of dispute, the key terms are complaint, damage, late delivery, and unfulfilled. Furthermore, the key terms under market are exchange, advertise, wholesale, and

sale. These key terms will help us identify the nature of the STB internal opinions on freight rate dispute decisions.

Table 7

Keywords, by category

Price	Competition	Agreement	Decision	Dispute	***Market***
High Rate	Monopoly	Contract	Dismiss	Complaint	Exchange
High Cost	Compete	Agree	Deny	Damage	Advertise
Overcharged	Rivalry	Consensus	Withdraw	Late Delivery	Retail
Overpriced	Contest	Option	Fail	Unfulfilled	Sale

Sub-panel window NVivo analysis design

We decided to perform a type of "window panel" analysis with around 4-6 year windows to see if the case decision proportions change over time. In detail, the researcher broke down more than 20 years of data (1997 to 2018) into four sub-panel windows, each around a 4-6 year window panel as a unit.

First panel window NVivo results (1997-2004)

Since NVivo can be used to mine digital documents for special words and phrases, the researcher checked a few key terms and tried finding the patterns during these 8 year session. The researcher divided research terms into six major categories, including price, competition, agreement, decision, dispute, and market, which cover the key elements in the STB legal decisions on freight rate disputes. Once given the search terms and phrases, NVivo will facilitate the search and manipulation of key phrases or terms.

The first panel window NVivo analysis includes documents from 1997 to 2004, with around 10 decision entry documents. The results of the first panel window NVivo are shown in Table 8 below.

Table 8 shows not only the key phrase frequencies but also the number of sources where the phrase appeared. According to Nolan et al. (2018), we need to show this because there is a possibility that a single document could have multiple occurrences of a single phrase, which can lead to a biased impression of the importance of that particular phrase in the overall analysis. As a result, listing the source count will provide a better understanding of the overall breadth of an issue related to the selected key phrases (Nolan et al., 2018).

Table 8

Key phrase frequencies (phrase occurrences/phrase source count):

Price	Competition	Agreement	Decision	Dispute	Market
High Rate	Monopoly	Contract	Dismiss	Complaint	Exchange
4/2	5/2	7/5	19/8	4/3	5/4
High Cost	Compete	Agree	Deny	Damage	Advertise
3/1	9/7	9/5	15/7	3/2	5/3
Overcharged	Rivalry	Consensus	Withdraw	Late Delivery	Wholesale
5/3	5/3	5/2	8/5	6/5	6/5
Overpriced	Contest	Option	Fail	Unfulfilled	Sale
3/2	4/3	5/2	5/3	8/7	3/2

Interpretation of the first panel window NVivo analysis

As mentioned, we ran NVivo by using all the 39 cases and recorded the 1st 100 keywords with most frequency. And we also ran 4 sub panel window of each 4-6 year to demonstrated the details across the 21 years of the STB legal decisions. From the 1st sub window panel of Nvivo analysis within the 8 years periods, Table 8 showed that the most common phrase among those

we entered in this qualitative analysis was “Dismiss” (with 18 occurrences in 8 documents), while the next most common phrase was “Deny” (with 15 occurrences in 7 documents). These phrases are clearly linked with the idea of “shipper complain loss” during the STB internal opinions on freight rate dispute decisions. All those terms such as “dismiss”, or “deny” consistently showed that the carriers are very aggressively urging the STB to dismiss the case and deny the case, which was also proved by historically presented data confirming the idea that carriers have always been favored by the STB in legal decisions. Following the logic, the STB would possibly get involved in the process of “regulatory capture” by giving preferences for carriers against the shipper’s interest in the freight rate dispute.

Second panel window NVivo results (2005-2008)

The second panel window NVivo analysis includes documents from 2005 to 2008 with around 10 decision entry documents. The results of the second panel window NVivo are shown in Table 9 below. Table 9 showed that the researcher still listed both key phrase frequencies and the number of sources where the phrase appeared. The validity of the design was fully explained by Nolan et al. (2018).

Table 9

Key phrase frequencies (phrase occurrences/phrase source count):

Price	Competition	Agreement	Decision	Dispute	Market
High Rate	Monopoly	Contract	Dismiss	Complaint	Exchange
5/5	3/3	6/5	9/7	4/3	5/3
High Cost	Compete	Agree	Deny	Damage	Advertise
5/3	8/5	7/6	8/8	2/2	3/2
Overcharged	Rivalry	Consensus	Withdraw	Late Delivery	Wholesale
7/3	3/3	2/2	19/9	4/3	1/1

Overpriced	Contest	Opinion	Fail	Unfulfilled	Sale
4/2	3/2	5/3	13/8	4/2	5/3

Interpretation of the second panel window NVivo analysis

Table 9 shows that the most common phrase among those we entered in this qualitative analysis was “withdraw” (with 19 occurrences in 9 documents), while the next most common phrase was changed to “Fail” (with 13 occurrences in 8 documents). These phrases are clearly linked with the idea of “shipper complaint was withdrawn, denied or failed” during the STB internal opinions on freight rate dispute decisions. As discussed, terms such as “withdraw”, or “fail” consistently show that the shipper was often forced to withdraw its case due to high cost of time, energy and money. It also seems carriers were aggressively urging the STB to dismiss cases or to induce shippers to withdraw from cases. Following the qualitative analysis, the STB was potentially caught up in the process of “regulatory capture” by showing preferences to carriers against shipper interests in freight rate disputes.

Third and fourth window NVivo design (2009-2012)

The third panel window NVivo analysis includes documents from 2009 to 2012, with around 11 decision entry documents. The results of the third panel window NVivo are shown in Table 10 below. Similarly, the fourth panel window NVivo analysis includes documents from 2013 to 2018 with around 8 decision entry documents. The results of the fourth panel window NVivo are shown in Table 11 below.

Table 10

Key phrase frequencies (phrase occurrences/phrase source count)

Price	Competition	Agreement	Decision	Dispute	Market
High Rate	Monopoly	Contract	Dismiss	Complaint	Exchange
5/4	3/2	5/3	17/9	11/8	3/2
High Cost	Compete	Agree	Deny	Damage	Advertise
5/3	5/5	5/4	13/8	9/7	4/3
Overcharged	Rivalry	Consensus	Withdraw	Late Delivery	Wholesale
6/5	4/3	2/2	19/9	9/5	3/2
Overpriced	Contest	Opinion	Fail	Unfulfilled	Sale
3/2	2/1	4/2	15/8	10/7	2/1

Table 11

Key phrase frequencies (phrase occurrences/phrase source count)

Price	Competition	Agreement	Decision	Dispute	Market
High Rate	Monopoly	Contract	Dismiss	Complaint	Exchange
4/2	5/4	3/2	15/6	12/7	3/2
High Cost	Compete	Agree	Deny	Damage	Advertise
4/3	4/4	5/4	11/7	9/5	4/3
Overcharged	Rivalry	Consensus	Withdraw	Late Delivery	Wholesale
7/5	3/2	2/2	13/6	6/3	3/2
Overpriced	Contest	Opinion	Fail	Unfulfilled	Sale
3/2	4/3	1/1	11/5	7/5	2/1

Interpretation of the third and fourth window NVivo analysis

As shown in Table 10 and Table 11, the NVivo results demonstrate a similar pattern with most frequencies of the keywords under the category of “Decision” and “Dispute. The key terms with the largest frequency are still “dismiss”, “withdraw”, “deny” or “fail” or “complaint”. As a result, we can conclude that these decision proportions did not change over a time range of 21 years, as

shown in the four window panels. These qualitative findings seem to confirm that over time, shipper's complaints were ignored, and carriers were still aggressively confident in their efforts to persuade the STB to deny rate cases, or force the shipper to withdraw the cases, or even ask the STB to directly dismiss rate cases, in their efforts to make shippers fail in their attempts to seek rate relief. The research findings in this window also confirm that the STB consistently showed preferences for carriers over shipper interests in rate disputes.

In summary, the NVivo qualitative findings align with our prior quantitative results about the presence and consequences of regulatory capture in the STB data. Our conclusion is that as the industry regulator, sometime after 1997 the STB seems to have been influenced and under regulatory capture, while we find additional evidence that carriers seemed to aware of their superior position in these disputes as evidenced by the use of certain phrases and words identified in our subsequent qualitative analysis. By more frequently favoring railroad interests in this sample of freight rate cases, the STB seems to have given more consideration for industry interests rather than impartially protecting the public interest.

Chapter 7 - Research implications and conclusions

This thesis examines the evolving decision-making structure of a major U.S. regulatory body, the Surface Transportation Board (STB), over the freight railroad sector. Ideally the STB, as a federal regulatory body overseeing an important and broad economic sector, should perform in a neutral manner in managing relationships and disputes between freight carriers and shippers. Though two of the computed six statistical tests were not consistent with the other findings, we offer that the weight of our evidence provides support for the potential presence of regulatory capture as exerted by the STB. Generally speaking, our findings (both qualitative and quantitative portions) indicate that in the context of economic regulation, the STB, as the ostensible neutral "regulator" of freight rail transportation, has been found to have acted at times in a manner consistent with regulatory capture. Instead of maintaining neutrality and thus best supporting the interests of the general public, we show evidence that the STB behaved in a manner consistent with capture over the historical sample of freight rate disputes.

Overall, the thesis findings buttress certain prior apprehensions about the performance of the STB as a public interest decision-maker. In addition, our qualitative research results have further elucidated interpretation and understanding about the position of the STB over freight disputes between carriers and shippers. Words and phrases most frequently seen in the case decisions seem to indicate that railroads were confident about the eventual outcomes of their respective rate cases.

In this light, our findings contribute to understanding regulatory objectivity and service of the public interest by a major U.S. industrial regulatory body. By making an effort to evaluate the historical decision-making performance of a key regulatory agency both quantitatively and qualitatively, we hope this research will also ultimately improve industry performance by

enhancing future STB objectivity over regulatory decision-making within the important U.S. freight railroad sector.

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Appendix – Rationale for the Selection of Additional Case Decisions

What follows is a set of more detailed and individual justifications for rate case data selection, helping to explain the coding process and final dataset. Since my final data set is slightly different from that contained within available STB documentation listing historical freight rate cases, my assessment is that some cases listed as "settlement" (meaning a formal case decision was ultimately not made by the STB) by the STB can in fact be assessed as almost surely having been in favor of one of the litigants, either carrier or shipper. These cases are listed in order by STB ID number.

1. Case ID: 41987
Docket Title: WESTERN FUELS SERVICE CORPORATION VS. THE BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY

My assessment is that for this case, the STB would have judged in favor of the shipper.

Explanation: In this case, the STB provided adequate time for the shippers to provide more proof to counter the carriers dismiss motive. Thus it seems the STB was comparatively fair in this case. An initial decision (21336) denied the carrier's motion to dismiss the complaint and established a procedural timetable in which the carrier was allowed to present evidence in response to these and the shipper's claims, after also providing the shipper with limited time to supplement its primary case. A subsequent decision (28304) made more than a month later, indicated that the parties had requested an extension of the process in order to begin a settlement. Therefore, it is reasonable to assess that the STB reached the final settlement (decision No. 31000) under favorable conditions for the shipper.

2. Case ID: 42077
Docket Title: ARIZONA PUBLIC SERVICE CO. AND PACIFICORP VS. THE BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY

My judgement upon assessing a series of related decision documents is that in this case, the STB would have judged in favor of the carrier.

General description: In this case, BNSF was judged to possess market dominance over the traffic and the Arizona public service requested a refund. However, in decision No. 33564, the STB denied the shippers motion to merge this program with Docket No. 42077.

Explanation: In decision No. 33564, the STB decided to approve the carrier's motion to restart but also refused to file a motion for retroactive relief to the shipper, canceling the validity of the previous rate regulations and also rejecting the shipper's application for merging the litigation procedures with its own procedures. In decision No. 34102, the STB denied the shipper's request

for an injunction and dismissed their request for the STB to intervene in this proceeding. Under various conditions unfavorable to the shipper, in decision No. 34261 they decided to withdraw their complaint on the reasonableness of the carrier's rate (and the STB also rejected the shipper's request to refund its application fee). Here, it seems that the shipper withdrew from what appeared to be a legitimate rate case.

3. Case ID: 42091
Docket Title: ARIZONA PUBLIC SERVICE COMPANY & PACIFICORP VS. BNSF RAILWAY COMPANY

My judgement in this case is that the STB was in favor of the carrier.

General description: On December 17, 2004, the Arizona Public Service Company and PacifiCorp (jointly, "Arizona") filed a complaint in this proceeding challenging the reasonableness of rates charged by The Burlington Northern and Santa Fe Railway Company (BNSF) for transportation of coal from the McKinley and Lee Ranch mines in New Mexico to Arizona's Cholla Electric Steam Generation Station near Joseph City, Arizona (Cholla). In this case, the STB assisted the shipper's withdrawal procedure and eventually due to time limitations and costs, the shipper withdrew the complaint.

Explanation: This case consists of just two decisions. The first (35442) decision was to hold for a judicial review to be completed and to suspend the procedure, while the subsequent (35441) and final decision indicated that the carrier and shipper reached a settlement. Due to the speed of the settlement process in this case and the lack of active involvement by the carrier, I offer that the shipper was in a disadvantaged negotiation state compared to the carrier when the two parties settled outside of the STB.

4. Case ID: 42093
Docket Title: BP AMOCO CHEMICAL COMPANY V. NORFOLK SOUTHERN RAILWAY COMPANY

My judgement in this case is that the STB was in favor of the carrier.

General description: BP AMOCO CHEMICAL COMPANY (BP) filed a rate complaint against Norfolk Southern Railway Company (NS), alleging that NS's rates for the transportation of Paraxylene from Decatur, AL, to Kingsport, TN, were unreasonable. In decision 35917, the STB denied BP Amoco Chemical Company's request for an injunction governing the rates that NS could charge for the relevant traffic. After providing a 30-day non-binding mediation period, BP abandoned the complaint. It appears as if the STB mediation was unhelpful to the shipper and ultimately assisted the carrier in skirting the complaint.

Explanation:
The 35917 decision was that the STB oversee a 30-day mediation period while rejecting the shipper's request for a ban on the carrier's rate in question, but the decision also contained an admission by the Board that that the assessment of the asset status of the railway industry is outdated. Then in less than 30 days Decision 35982 indicates that the carrier and shipper had settled. It appears that this case reached a settlement relatively quickly with the active assistance of the STB and that the carrier did not participate much in the process. While intended to find a middle ground between parties in case settlements, arbitration did not work in this case. The STB's intermediary role in this case seems to have helped the carrier far more than the shipper.

5. Case ID: 42099
Docket Title: E.I. DUPONT DE NEMOURS AND COMPANY V. CSX TRANSPORTATION, INC.

My judgement here is that the STB was in favor of the carrier.

General description:
On August 21, 2007, E.I. du Pont de Nemours and Company (DuPont) filed three separate complaints challenging the reasonableness of rates charged by CSX Transportation, Inc. (CSXT). However, on September 5, 2007, the STB published new guidelines in their simplified railway standards rate case, thus the complainant's case did not seem to warrant a complete independent fee statement. In this case, the STB seems to have (inadvertently) set up a new obstacle to help the shipper withdraw their complaint.

Explanation: Decision No. 39072 found that the defendant (CSX) had a dominant market position, and also found that the challenged rate was unreasonably high. The STB ordered the railway to formulate a new rate that did not exceed the prescribed maximum reasonable rate and required CSX to pay the shipper compensation with interest. These assessments seem to indicate that the shipper should have won a final judgment. However, through decision No. 39536, the STB admitted that the RSAM formula did contain material errors (because it blended pre-tax and after-tax income) and restarted the process with a commitment to update the RSAM data. Decision 39648 also established a timetable for both shipper and carrier to submit revised income shortfall allocation methods for use in subsequent proceedings. But since then, the parties took no further actions, and the procedure was repeatedly suspended until a settlement between the two parties as determined by 40223 was completed. The shipper eventually dismissed the complaint. The final settlement (shipper dismissing the complaint) in Decision No. 39072 shows that the STB (deliberately or not) helped the carrier become exempt from compensation by publishing the new rate standard.

6. Case ID: 42110
Docket Title: SEMINOLE ELECTRIC COOPERATIVE, INC. V. CSX TRANSPORTATION, INC.

My judgement here is that the STB was in favor of the carrier.

General description:
On October 3, 2008, Seminole Electric Cooperative, Inc. (SECI) filed a complaint challenging the reasonableness of rates established by CSX Transportation, Inc. (CSXT) for transportation of coal from various origins to their Seminole Generating Station. The shipper filed with the STB 5 times in a two year period, and the request was put on hold for two years, and ultimately this led to the shipper dismissing their complaint due to time and cost.

Explanation:
In decision No. 39498, the STB denied the shipper's request for injunctive relief while waiving the carrier's response to injunctive relief. After the shipper asked five times over approximately two years and the case was kept on hold, the final decision (41095) indicated that the shipper had reached an agreement with the carrier and signed a new contract. Although it is impossible to know the content of that final contract, judging from the shipper's repeated applications to the STB, it is reasonable to assume that the carrier was given an advantage over the shipper through the STB's procedural delays, all culminating in a new “negotiated” contract with the shipper.

7. Case ID: 42112
Docket Title: E.I. DU PONT DE NEMOURS & COMPANY V. CSX TRANSPORTATION, INC..

My judgement is that the STB sided in favor of the carrier.

General description: On November 10, 2008, E.I. du Pont de Nemours & Company (DuPont) filed a complaint challenging the reasonableness of rates established by CSX Transportation, Inc. (CSXT) for transportation of 38 commodities between 99 origin and destination pairs. It was argued that CSXT possessed market dominance over the traffic and DuPont requested that the maximum reasonable rates be prescribed along with other relief pursuant to the Board’s Stand-Alone Cost test method. After some time elapsed, the final outcome was that the shipper dismissed the complaint.

Explanation: Decision No. 39583 suspended this complaint pending submission of a highly confidential order of protection for the contract of carriage by both parties. Decision No. 39649 of January 6, 2009 offered a pre-determined a schedule for the procedure. In decision No. 39905 on April 17, 2009, shortly after the end of the STB discovery investigation, the two parties

jointly initiated a request for a stay of the procedure three times. The final decision (39969) describes that the shipper voluntarily settled with the carrier and withdrew their rate complaints. The scope and duration of this case indicates that even large shippers can be ill-equipped to stage a legal/regulatory battle with the railways, and many appear to remain mostly passive throughout the formal STB complaint process.

8. Case ID: 42116
Docket Title: US MAGNESIUM, L.L.C. V. UNION PACIFIC RAILROAD COMPANY

My judgement is that the STB sided with the carrier.

General description:
Via a complaint filed on October 9, 2009, US Magnesium, L.L.C. (USM) challenged the reasonableness of rates charged by Union Pacific Railroad Company (UP) for the movement of chlorine by tank car from Rowley, UT, various destinations, including Salt Lake City, UT, Sparks, NV, Elk Grove, CA, Stockton, CA, and Pittsburg, CA. USM elected to utilize simplified stand-alone cost methods, whereby the total available case relief is limited to $5 million over a 5-year period. UP answered the complaint on October 29, 2009, leading to Decision No. 40407, where the STB granted US MAGNESIUM, L.L.C.'s request to dismiss its complaint and terminate the proceeding.

Explanation:
Scanning through the decision, the case details seemed reasonable from the shipper perspective, but they took a chance and used the (relatively new) simplified SAC as the basis for its case. But after one year, the shipper eventually dismissed the complaint, due to the duration of the case, mounting legal costs as well as reporting requirements by the STB. Without necessarily always being stated in the decisions, the latter reasons are all too common in describing the evolution and shipper situation for a number of what appear to be reasonable contested rate cases.

9. Case ID: 42115
Docket Title: U.S. MAGNESIUM, L.L.C. V. UNION PACIFIC RAILROAD COMPANY

My judgement in this case is that STB acted in favor of the carrier.

General description:
Under a complaint filed on June 25, 2009, US Magnesium, L.L.C. (USM) once again challenged the reasonableness of rates charged by Union Pacific Railroad Company (UP) for the movement of chlorine by tank car from Rowley, UT, to destinations Los Angeles, CA, Mojave, CA, Ontario, CA, Santa Fe Springs, CA, Saugus, CA, Torrance, CA, and Henderson, NV. USM once again elected to utilize the simplified stand-alone cost (Simplified-SAC) method. In Decision No.

40706, the STB once again granted the request of US Magnesium, L.L.C. (USM) to dismiss its complaint. While this case is very similar to 42116, the outcome was the same in that the shipper decided not to pursue the case with the STB.

Explanation:
In Decision No. 40219, the STB suspended the decision process pending the filing of a highly confidential protective order for the contract of carriage by both parties. Next, Decision No. 40330 stated that the STB would find a later date for this procedure. In Decision No. 40527, the shipper claimed that the carrier provided outdated information on November 12, 2009, which made its preparation of evidence too complicated, finally asking the STB to extend the deadline by 2 weeks. Later in Decision No. 40587, the shipper stated that it had requested the carrier to provide supplementary information, necessary to verify and replicate the calculations contained in the carrier's (second) disclosure. This exchange of information and subsequent analysis by the shipper required another extension for 6 weeks. While the shipper eventually voluntarily reached a settlement with the carrier in the (Decision No. 40706), the asymmetric information processing between the shipper and the carrier (similar to the previous decision), hindered the shipper in its negotiations until the final voluntary settlement.

10. Case ID: 42123
Docket Title: M&G POLYMERS USA, LLC V. CSX TRANSPORTATION, INC.

My judgement is that the STB ruled in favor of the **s**hipper.

General description
By a complaint filed on June 18, 2010, M&G challenged the reasonableness of rates established by CSXT for the transportation of polyethylene terephthalate between 69 origin and destination pairs. Since M&G voluntarily request to dismiss the complaint, in Decision No. 42862, the STB granted shipper's request to dismiss the complaint under the challenged rates. The STB respected the shipper's choice to dismiss the complaint without further cause.

Explanation:
In Decision No. 41926, the STB found the carrier to have market dominance in 36 of the 42 tariffs challenged by the shipper. and in Decision No. 42722, the STB partly denied the carrier's motion to modify the procedural timing for cost litigation. In Decision No. 42808, the STB decided to explain that the information provided by both parties contains competitively sensitive information, and thus after each party has an opportunity to make editorial suggestions for any confidential and highly confidential information, a new public version should be released. Then later in Decision No. 42862, the STB granted both parties' agreement of dismissal over past disputed interest rate complaints and terminated the proceeding. As the shipper realized its

disadvantageous status on a final decision whereby the shipper was willing to reach a settlement, I judge this case as providing advantage to the shipper.

11. CASE ID: 42127

Docket Title: INTERMOUNTAIN POWER AGENCY v. UNION PACIFIC RAILROAD COMPANY

My judgement based on the decision documents is that in this case, the STB favored the carrier**.**

General description:

Intermountain Power Agency (IPA) challenged the reasonableness of rates established by Union Pacific Railroad Company (UP) for unit train coal transportation service to IPA's electric generating facilities at Lynndyl, Utah. IPA alleged that UP possessed market dominance over the traffic and requested that maximum reasonable rates be prescribed pursuant to the Board's standard Stand Alone Cost test. In Decision 42519, the STB offered that the shipper did not show new evidence, changed circumstances or material error that justified further investigation under standards. Given this all the while the railroad did not object to the shipper filing a new complaint challenging the same rates with respect to future movements, yet the STB dismissed with prejudice that portion of the shipper's original complaint as applied to past movements.

Explanation:

In Decision No. 42183, the STB denied the Shipper application for supplementary records and modified the procedural timetable. In Decision No. 42519 of Dec 8, 2011, the shipper filed a petition seeking permission to narrow its scope by eliminating more than one-third of its SARR computed cost, affecting the calculation of movement average total cost. Subsequently the carrier submitted an application against the shipper on December 28 to stop this. The STB also denied the shipper's request for additional records on April 4, 2012, as previously disputed. Finally, on May 2, the shipper voluntarily withdrew its appeal with an intent to file a new complaint to challenge the carrier's rate. Here the STB seemed to have blocked several attempts by the shipper to refine its rate case.

12. Case ID: 42132

Docket Title: CANEXUS CHEMICALS CANADA, L.P. V. BNSF RAILWAY COMPANY

My judgement after reading these decision documents is that in this case, the STB sided in favor of the shipper.

General description:
In this case, ***Canexus Chemicals Canada, L.P. (Canexus)*** challenged the reasonableness of rates charged by BNSF Railway Company (BNSF) for the transportation of chlorine from: (1) North Vancouver, B.C. to Glendale, Ariz.; and (2) North Vancouver to Albuquerque, N.M. In Decision No. 42116, the STB denied a motion from BNSF Railway Company (BNSF) to compel the revelation of rate, fuel surcharge, specific carload, and other information relating to transport arrangements between Canexus Chemicals Canada, L.P. (Canexus) and railroads other than BNSF. In the Decision No. 42537, the two parties reached an agreement in principle to settle the rate reasonableness claims raised by Canexus in this proceeding. Accordingly, Canexus requested that the Board dismiss its complaint, with prejudice. and discontinue the proceeding. Given the ease with which the shipper was allowed out of the case, we judge the STB was on the side of the shipper.

Explanation:
In Decision No. 42116, the STB decided to suspend the process pending the filing of a highly confidential order of protection for the contract of carriage by both parties. In Decision No. 42191, the STB denied the carrier's attempt to compel the provision of information on tariffs, fuel surcharges, specific loads, and transportation arrangements with shippers and other railroads. Decision No. 42162 of January 3, 2012 denied the carrier's request for accelerated consideration in this case. In the final Decision No. 42537, the parties successfully concluded the settlement discussions and resolved all matters covered by the shipper complaint, while the STB was hereby requested to terminate this process in supporting shipper efforts to keep proprietary information confidential.

13. Case ID: 42136
Docket Title: INTERMOUNTAIN POWER AGENCY V. UNION PACIFIC RAILROAD COMPANY

My judgement after evaluating a series of decision documents is that in this case, the STB was in favor of the carrier.

General description:
On May 30, 2012, ***Intermountain Power Agency (IPA)*** filed a complaint in the instant proceeding challenging the reasonableness of rates established by Union Pacific Railroad Company (UP) for unit train coal transportation service from a point of interchange with the Utah Railway Company at Provo, Utah to IPA's electric generating facilities at Lynndyl, Utah. In Decision No. 42677, the STB decided to deny the carrier's request to suspend this procedure, and the STB considered modifying some rules in the rate case.

Explanation:
In Decision No. 43336, in a final briefing, the STB held oral arguments on November 14, 2013 in Washington, D.C., as the two sides disagreed on a number of issues. Though the two parties did not reach any agreement at that time, in Decision No. 44061, it seems IPA and UP reached a final negotiable resolution of their rate dispute. Although IPA requested the board to dismiss its complaint and the STB approved the IPA request, the shipper did not get a refund or compensation from the carrier. In this instance the shippers' perspective seems to have changed sharply and further the STB did not provide any details about what the shipper requested or why the shipper's attitude flipped completely from Decision No. 42513 to decision No. 44061. While difficult to ascertain, it seems the shipper's interactions with the regulatory process affected its change of position, and thus we judge this suspended case to be in favor of the carrier.

14. Case ID: 42142
Docket Title: CONSUMERS ENERGY COMPANY V. CSX TRANSPORTATION, INC.

My judgement after assessing a series of decision documents is that the STB sided in favor of the shipper.

General description:
On January 13, 2015, Consumers Energy Company (Consumers) filed a complaint challenging the reasonableness of rates established by CSX Transportation, Inc. (CSXT) for unit train coal transportation service in shipper-supplied rail cars to Consumers generating station near West Olive, Mich., from CSXT's established railroad interchange with BNSF Railway Company in the vicinity of Chicago, Ill. Consumers alleged that CSXT possessed market dominance over the traffic and that CSXT's rates were unreasonable under both a Stand-Alone Cost and Revenue Adequacy criterion. On March 24, 2015, CSXT filed a motion to dismiss the revenue adequacy portion of the claim in Consumers' complaint. CSXT argued that the claim should be dismissed because: (1) Consumers provided no reasonable grounds to investigate their claim; (2) dismissal would simplify the dispute; and (3) the Board was already considering more general revenue adequacy issues in Railroad Revenue Adequacy, Docket No. EP 722. Consumers objected to CSXT's motion, arguing that CSXT did not meet the threshold necessary for the Board to dismiss a claim. The Board seems to have agreed with most of the claims and valuations made by the shipper. Thus on January 28, 2019, both complainant and defendant submitted a joint petition to vacate the rate prescription in this proceeding, dismissing Consumers' complaint with prejudice, and discontinuing the proceeding. The STB respected the joint decision to dismiss the complaint.

Explanation:
In Decision No. 46230, the STB agreed that no viable shipping alternative to rail transportation existed for defendants in this action, and that carrier rates had proven to be unreasonably high under independent shipping conditions. Decision No. 46521 confirmed that the carrier's rate was unreasonably high under the existing SAC criterion, which led to a revision of the maximum reasonable rate. To this point, things were not going very well for the carrier. Subsequently in Decision No. 44833, the carrier and shipper jointly filed a petition, stating they reached a complete and final commercial resolution of all matters in dispute in this action. It is judged here that the set of STB evaluations worked as designed and assisted the shipper in finding a reconciliation position with the carrier as per the final Decision No. 44833.

15. Case ID: 38302
Docket Title: UNITED STATES DEPARTMENT OF ENERGY AND UNITED STATES DEPARTMENT OF DEFENSE V. BALTIMORE & OHIO RAILROAD COMPANY, ET AL.

My judgement based on decision documents is that in this case, the STB fell in favor of the carrier.

General description:
The dispute was between the United States Department of Energy and the United States Department of Defense ***v***. Baltimore & Ohio Railroad, et al. and the case lasted almost 14 years. Given the circumstances, it is in a carrier's interest to make the procedure as long as possible since few shippers can afford to wait for 14 years for a decision. These cases are a set of rate reasonableness complaints by the U.S. Departments of Energy and Defense (Government) against various railroads with respect to movements of certain radioactive materials. Eventually, by late 2018 the Government was directed to file annual reports on the progress of settlement negotiations with the (remaining) railroad defendants. During the decision procedures, the shipper filed claimed wrongdoing on behalf of various carriers, but the shipper never succeeded in convincing the STB, and finally the case was settled without further consideration. Here, the long-lasting and drawn out nature of the case put the shipper in a gradually weakening position.

Explanation:
The decision process on this case lasted for 14 years. In Decision No. 35950, on August 2, 2005, the STB approved a settlement agreement reached by the shipper and carrier to resolve the problem of rate reasonableness. The rate updates in the agreement are stipulated as between the signatories as the highest reasonable rate. However, by October 15, 2012, the two parties submitted a motion in Decision No. 42682 to resolve disagreements over the rationality of the rate. Then in Decision No. 42754 on August 6, 2013, the two parties negotiated an agreement to end the procedure. Subsequently, on February 1, 2017, Decision No. 45610 specified that both

the shipper and carrier requested (for the third time) to publish the restart process, the program timetable and related requirements in the Federal Register. The final Decision No. 45836 approved the agreement as a result of the negotiations between the parties, while the STB again stipulated the rate, rate update method and the ratio of maximum revenue to variable cost. After 14 years, the shipper finally decided to give up due to various pressures while the STB promoted reconciliation between the two parties a total of three times. Given its duration and the set of widely spaced decisions that mostly supported the carrier, it is judged that the STB remained in favor of the carrier.

16. Case ID: 38376

Docket Title: UNITED STATES DEPARTMENT OF ENERGY AND UNITED STATES DEPARTMENT OF DEFENSE V. ABERDEEN & ROCKFISH RAILROAD COMPANY, ET AL.

My judgement after reading decision documents is that in this case, the STB was in favor of the carrier.

General description:

On September 15, 2004, the United States Department of Energy and the United States Department of Defense (the Government) joined by Union Pacific Railroad Company (UP) filed a motion requesting approval of an Agreement that would settle rate reasonableness disputes as between the moving parties. This decision approved a prior agreement negotiated between the United States Departments of Energy and Defense and the BNSF Railway to settle a series of longstanding rate reasonableness complaints for BNSF only. At their request, the Board prescribed the rate and update methodology as well as the maximum revenue-to-variable cost ratios contained in the agreement. The decision also continued to hold these proceedings in abeyance with regard to the remaining railroad defendants in order to permit continued settlement negotiation. As described above, these cases involve rate reasonableness complaints by the U.S. Departments of Energy and Defense (Government) against various rail carriers with respect to rail movements of certain radioactive materials. This decision (and one favoring NS) comprised the latest in a series of settlement agreements between the Government and individual railroad defendants. As the case lasted over a decade, this is too long to be of benefit to shippers or to conduct timely commerce, while the carriers appears to have been only very weakly punished. Though there is no detailed information about why shippers finally settled the cases, we can surmise that hope to win the lingering rate case was given up a long time ago, whereas shippers (and likely the STB) wanted to reach some kind of settlement.

Explanation:

As of November 5, 2004, in Decision No. 35203 the shipper and the carrier in question submitted a notice of the proposed settlement agreement, and a procedural schedule for

submitting comments to support or oppose the settlement agreement. Decision No. 42754 on August 26, 2013 approved an agreement negotiated by both parties to resolve long-standing rate fairness complaints. However, on February 1, 2017, the two parties submitted an STB motion in the 45610 decision to resolve the dispute over the reasonableness of the rate between the two parties. Finally, Decision No. 42754 on June 28, 2017 approved the results of the second round of negotiations between the shipper and the carrier. Here, the STB again stipulated the rate as well as the rate update method and the ratio of maximum revenue to variable cost. The long-standing nature of this case meant that the STB opted to try to promote the reconciliation of the two parties. Again, the carrier appears to have ben minimally punished throughout this entire process.

17. Case ID: 42097

Docket Title: ALBEMARLE CORPORATION V. THE LOUISIANA AND NORTH WEST RAILROAD COMPANY

My judgement after assessing a series of decision documents for this case is that the STB was in favor of the carrier.

General description:
Regarding a complaint filed on April 17, 2006, the Albemarle Corporation (Albemarle) alleged that the line-haul rates of The Louisiana and North West Railroad Company (LNW) for the movement of chemicals and petroleum products between Albemarle's South Plant at Ethyl, AR, and LNW's interchange points with the Kansas City Southern Railroad at Gibsland, LA, and with Union Pacific Railroad at McNeil, AR, as modified by LNW's fuel surcharge tariff, were unreasonably high, and also that the added fuel surcharge, which incorporates a surcharge for a connecting carrier, is an unreasonable practice.

Explanation:
In Decision No. 37046, the STB ordered the associated rate reasonableness proceeding held in abeyance until the completion of the rulemaking Major Issues in Rail Rate Cases, STB Ex Parte No. 657 (Sub-No. 1) (served Feb. 27, 2006), except that the STB ordered the carrier(s) to file an answer to the complaint filed by Albemarle as well as a response to Albemarle's request to consolidate this proceeding with the proceeding in the STB Docket No. 42096, Albemarle Corporation—Petition for Declaratory Order—Certain Rates and Practices of The Louisiana and North West Railroad Company. Contrast this with the fact that the plaintiff's initial complaint was not accepted and not agreed to by the STB. Subsequently, on October 31, 2006, Decision No. 37046, Albemarle filed a motion to dismiss, requesting that the Board dismiss with prejudice its complaint because the parties reached a settlement of the issues. Accordingly, the motion to dismiss was granted, and the proceeding discontinued. This seems to be another example of the STB losing focus on a specific yet timely case in favor of focusing on much larger and broader

regulatory issues related to the initial case. If the shipper's appeal was taken seriously, then dealt with in a timely manner, we believe the shipper would not have had to withdraw their complaint.

18. Case ID: 42122
Docket Title: NRG POWER MARKETING LLC V. CSX TRANSPORTATION, INC.

My judgement after reading decision documents is that in this case, the STB was in favor of the carrier.

General description:
NRG Power Marketing LLC (NRG) challenged the reasonableness of rates established by CSX Transportation, Inc. (CSXT), for the transportation of coal from Chicago, Ill., to two NRG coal-fired generating plants: the Huntley Power LLC, located in Tonawanda, N.Y.; and the Dunkirk Power LLC, located at Dunkirk, N.Y. NRG alleged that CSXT possessed market dominance over the traffic and requests that maximum reasonable rates be prescribed pursuant to the Board's extant Stand-Alone Cost test methodology.

Explanation:
On May 25, 2010, NRG filed a petition for injunctive relief with the Board requesting that the Board stop CSXT from charging the disputed rates and instead impose an interim rate during the proceeding. CSXT filed a reply on June 14, 2010. Subsequently, the parties participated in mandatory non-binding mediation, which was facilitated by Board staff. On June 21, 2010, NRG and CSXT jointly filed a request that the Board refrain from ruling on NRG's petition for relief, as the parties were in the process of negotiating a formal settlement. On June 30, 2010, NRG filed a motion to dismiss its complaint with prejudice and to discontinue the proceeding. In its motion, NRG states that it reached a settlement with CSXT. NRG also stated that it would withdraw its petition for injunctive relief. NRG's motion to dismiss was granted. While a rare use of mediation, we feel that in this case, the STB ignored the initial shipper request for relief and instead arranged for the parties to negotiate and thus absolved the carrier from bearing any responsibility on the initial rates.

Additional notes on the dataset

A. The following is for reference on data coding decisions

A. The author judged the cases by connecting my core research topic: whether the STB seems to rule with favoritism for either shippers or carriers. I don't judge the case by whether there is a direct decision by the STB, which if I use as criteria, others will never find any problems because the STB is the decision maker. And ignoring the withdrawn cases takes the STB's decision for granted without judgement and consideration.

B. Even if the legal case is settled or withdrawn, it does not guarantee no bias. Actually, a few cases should be a shipper-win or carrier-win case, but the final decision might be settled, or no decision on win or lose. So researchers have tended to ignore these cases. However, the simple "settlement" of an original controversial case (where it seems clear that shipper be rewarded) is itself a bias. In many cases, it indicates the STB acted in favor of carriers and thus settled the case without giving shippers a reasonable decision.

C. After some discussions with experts and carefully analyzing dozens of STB rate related cases, I decided upon the 39 strongest for statistical analysis. On that note, among the 39 cases, 25 are cases where I judge that the carrier won the case and 14 cases I judge that the shipper won. The base percentage of carriers winning accounts for 62% versus 38% for shippers. This translates to the data being about a 2.7 percent chance of being made from a random 50/50 draw.

B. Potential problems in settled cases or withdrawn cases

1. I often found that the STB did not clearly state a decision in some cases because in many instances, we cannot know for example, whether shippers may want to appeal, or what specific proof the shipper provided, or even carriers' responses. This type of information is not contained in the case decision documents. What is available on the STB website is a series of STB decisions and procedures lacking many useful descriptive details. Thus future researchers might have difficulty refuting the STB's decisions or deciding if the STB tends to rule cases in favor of carriers or shippers. As a result, for most of the decisions, readers will only discern who won the case or that it was settled by the parties outside of STB jurisdiction, but it is not always clear how and why one party acted on their cases and key interpretative details are often missing. A more honest and informative case reporting process by the STB would be helpful in understanding their performance as a regulatory body. The railroad industry is notoriously secretive of its commercial operations, and I suspect this reflects back into the manner in which the STB reports these cases.

2. The STB sometimes prolonged the decision-making process and delayed cases for some years. As is now well understood, this action itself favors carriers because not all rail shippers are financially strong enough to wait for such a long period of time on a commercial decision.

3. Shippers constitute a large proportion of the plaintiffs in this data. As we know about the industry (Bailey, 1981), freight railroads often possess some level of monopoly power and in many instances they can raise their freight rates above competitive levels. These cases also indicate that due to this monopoly power, many carriers raise rates to excessive levels and thus captive shippers suffer with a regulatory they may not always trust.

4. In about 10 of these cases, the STB asked shippers to provide extremely difficult or unknowable evidence of rail behavior, leading to shipper withdrawal from the case. Many smaller shippers often compromise to get a settlement because even if they wait, there may not be a likelihood of winning the case.

5. Currently, the STB mostly relies on the Stand-Alone Cost (SAC) criteria to evaluate rate reasonableness. However, for a shipper, conducing one of these cases is very difficult, and thus comprises one of the primary reasons leading to shippers compromising or opting to dismiss cases. While more recently the STB has introduced rate reasonableness alternatives to full SAC, including simplified SAC and pre-established rate or revenue benchmarks, but these are rarely used in the cases analyzed here. Instead, in most of the disputed rate cases, shippers were asked to provide proof of rate unreasonableness by conducting an SAC test. In more than a few cases, shippers finally gave up after 2 to 3 years of frustrating procedures.

6. Since the STB is the regulator, most of the shippers are not empowered to keep defending their situation to the STB. In addition, the ultimate cost of challenging the decision-making agency is large.

The above points are my general concerns in reading those cases classified in the STB rate case database as "settled or settlement". If I let go of these cases, I risk falling into the trap of using someone else's case evaluation without my own consideration. So I believe this data set is more complete and appropriate for this original quantitative and qualitative analysis of regulatory decision-making.

Ironically, as my thesis title is "who watches the watchmen ", as I believe one should always keep a scrutinized eye on research and policy, here including those STB classified "settled (rate) cases".