Regulatory Capture and the Dynamics of Interventionism:
The Case of Power Utilities in Quebec and Ontario to 1944

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Abstract

To what extent are the outcomes of economic regulation intended and desired by its proponents? To address this question, we combine Stigler's theory of regulatory capture with the Austrian theory of the dynamics of interventionism. We reframe Stigler's theory of regulatory capture as an analytical starting point for a dynamic theory of interventionism, one which accounts for the unintended consequences that emerge from regulation, even if the origins of such regulation were designed to benefit a particular industry or special interest group. Therefore, we argue that regulatory capture is not necessarily inconsistent with a dynamic theory of intervention. We illustrate this theoretical point by applying it to an econometric case study of electric utility regulation and its nationalization in both Ontario and Quebec in the early 20th century, resulting in unintended and undesirable consequences that deviated from the interests of the regulation's intended beneficiaries.

Keywords: George Stigler, Regulatory Capture, Electric Utilities, Nationalization

JEL Classification: B51; H12; P52

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1 Introduction

To what extent are the outcomes of economic regulation intended and desired by its proponents? In this paper, we deal with this question by considering the process that led to the regulation and subsequent nationalization, during the 1930s and 1940s, of electric utilities in the Canadian province of Quebec.

Since its beginning in the late 19th century, Quebec's electrical industry offered some of the lowest prices for residential electricity in North America and even lower prices for industrial clients due to its geography conferring large cost advantages in the generation of hydroelectricity. Moreover, prior to 1928, the few municipal governments involved in the distribution of electricity privatized their services and few regulations applied to private firms. This made Quebec exceptional as the trend in the rest of Canada was toward greater state involvement (both in terms of regulation and state ownership). Yet, Quebec's government rapidly changed starting with the adoption of important pricing regulations in the 1930s and nationalization in the 1940s. We argue that this rapid policy change in Quebec was the unintended and unforeseeable result of the nationalization of electric utilities – and distribution of electricity at cost – in the neighboring province of Ontario which began in 1906 and was completed in the early 1920s.

Our work offers two contributions. The first is to the economic history of electric utilities and the economic history of Canada. Ontario's publicly-owned electric utility was the first in the world to provide electricity at cost. It provided the impetus for nationalization advocates in both the rest of Canada and in the United States. Yet, it has been heavily understudied. Most of the literature on the economic history of electric utilities has been on the United States in general and the Tennessee Valley Authority in particular. Canadian pioneering forays in publicly-owned electrical utilities are largely ignored. As for the Canadian economic history literature, very little of it is actually "economic". Most of the works available fall, with some exception such as Dupré and Patry (1998) and Geloso and Belzile (2018), under the rubric of political and social history (Hogue et al. 1979; Faucher 1992; Dorion 2000; Bellavance 2003; Bernier 2009; Giguère 2018). Our work fills a vacuum in terms of economic history.

The second contribution speaks to the theoretical framework we employ. Relying on the insight of Thomas and Thomas (2021) regarding residual claimancy in regulatory decision-making, we combine two distinct theories of regulation and its effects: the theory of regulatory capture developed

by George Stigler (1971a,b; see also Peltzman 1976) and the theory of the dynamics of interventionism developed by scholars from the Austrian school of economics (Mises 1976 [1929]; 1998 [1940], 2008 [1950], 1966 [1949]; Hayek 1944; Kirzner 1978; Ikeda 1997, 2005, 2015). By pointing out the unappreciated complementarities between both theories, we argue that using them jointly allows us to study the long-term ramifications of regulatory capture and its unforeseen effects.[1]

These complementarities stem from the fact that both theories consider different time horizons. When describing his work on regulatory capture, George Stigler claimed that "[a]ll legislation with important economic effects is *the calculated achievement* of economic classes" based on their self-interest (1971b, p. 268, emphasis added). In this view, not only are the regulations desired by actors, but their consequences are also fully understood and appreciated by the actors in play. This is in marked contrast with the proponents of the theory of the dynamics of interventionism, who argue that the long-term effects of a policy are unforeseeable and unpredictable. Regulations, these proponents argue, create distortions that redirect entrepreneurial efforts to less productive (or even superfluous) domains. Because this redirection can yield unclear outcomes in the long-run, these proponents argue that it may be possible for the regulators and the regulated to be aware of the immediate effects but not the long-run effects. While both theories seem to clash, we argue that they merely differ in the time horizon they each consider. They are complements to each other, as regulatory capture theory speaks to the origins of regulations (and immediate effects), while the dynamics of intervention theory focuses on the long-run evolution out of these origins.[2] It is entirely possible, we argue, for a policy to be desired and its immediate effects understood by all parties involved while also having unforeseeable long-run consequences.

We proceed as follows. In Section 2, we provide a theoretical overview that explores the potential for reconcilability between Stigler's theory of economic regulation and the Austrian account of the dynamics of interventionism. Section 3 illustrates the implications of our theoretical analysis by applying it to the history of the regulation of electricity in Ontario, and later Quebec. Section 4 builds from our qualitative analysis of electricity regulation in Ontario and Quebec by providing an overview of our quantitative analysis, in which we explain our data and methodology. Section 5 provides a discussion of our results. Section 6 concludes with some implications for future research.

[1] There is an additional side benefit in that we are adding to the small but growing empirical literature on the dynamics of interventionism (Benson 2002; Czeglédi 2014; Boettke et al. 2017; Candela and Geloso 2020; Geloso 2020a, 2020b).
[2] We thank one helpful anonymous referee for this formulation.

2 Complementarities between Dynamics of Interventionism and Regulatory Capture

The causes and consequences of economic regulation can be categorized into two theories. The "public-interest theory" of economic regulation postulates that its origins arise out of the benevolence of public officials, with the intention of correcting a particular undesirable outcome in the market process that would otherwise exist in the absence of such intervention. The goal of such regulatory policy is to create an outcome that benefits the public as a whole.

The theoretical account of the dynamics of interventionism, developed in the Austrian tradition by Ludwig von Mises (1976 [1929]; 1998 [1940]; 2008 [1950]; 1966 [1949]), F.A. Hayek (1944), Israel Kirzner (1978), and Sanford Ikeda (1997, 2005, 2015), illustrates how publicly-interested regulators, however well-meaning, unleashes an unintended dynamic process that they themselves will not be able to control and will find undesirable.

The fundamental basis for understanding the emergence of such unintended consequences is the ubiquity of entrepreneurial profit (and loss) that sets the market process in perpetual motion towards equilibrium. The competitive market process consists of an incessant discovery of profits, and the avoidance of losses, by entrepreneurs, within a context of private property and freedom of contract under the rule of law. The nature of economic regulation, therefore, can never eliminate such profit opportunities altogether. Rather, such intervention can only change the *manifestation* of such profit opportunities (Kirzner 1978, p. 12; Wagner 1989, p. 56). As a result, intervention redirects entrepreneurial efforts into activities, such as rent-seeking, regulatory avoidance, and industry exit in accordance with the changing incentive structures.

Why is it, then, that regulators cannot foresee the long-run consequences of this redirection? The answer lies in the assignment of property rights. As they are not assigned a claim to the profits or losses of their decision-making, regulators have are precluded from the knowledge to anticipate the long-run consequences of their action (Thomas and Thomas 2021). Thus, even with the best intentions, regulators cannot anticipate how entrepreneurs will react to the new circumstances created by such regulation, since they operate outside the context of knowledge that they unintendedly spawn.[3]

[3] Multiple illustrations of this process exist. One of the most potent illustration is provided by Lucas and Fuller (2018) in their study of "cobra effects" – a term coined from anecdotes of a regulatory policy implemented by British colonial authorities in India, with the well-intended motive of eliminating venomous cobras. By offering bounties for cobra tails, the unintended result of this regulation was to increase the cobra population. By commodifying cobra tails, the British regulatory officials introduced a profit opportunity to raise cobras for bounties, an unintended and undesirable consequence that they did not anticipate. Whereas entrepreneurs learned to identify profits and losses arising form this intervention, regulators operating outside that context could not, and therefore could not anticipate such unintended consequences. Other examples include the effect of U.S. drug prohibition (Redford and Powell 2016), money laundering and demonetization in India (Rajagopalan 2020), flour regulation in 19th century Canada (Geloso 2020b), land-use planning

In the face of unintended consequences, regulators are left with two choices. They can admit failure and remove the existing regulation to mitigate its unintended effects. Or, if they assume the unhampered outcome to be worse, additional regulations are introduced to mitigate the unintended effects of prior interventions. This generates a destabilizing dynamic process that calls for more interventions and may also slow down economic growth (Czeglédi 2014).

The theory of regulatory capture is dramatically different from the theory of the dynamics of intervention. The difference results from the fact that George Stigler, the main proponent of the model, departed from the assumption that regulation is benevolently motivated to benefit the public as a whole. "As a rule, regulation is acquired by the industry and is designed and operated primarily for its benefit" (Stigler 1971a, p. 3). This has implications that create two important differences from the dynamics of interventionism. First, Stigler assumes "that political systems are rationally devised and rationally employed, which is to say that they are appropriate instruments for the fulfillment of desires of members of the society" (Stigler 1971a, p. 4). As such, if "every society that is purposive," Stigler states, "seeks to do efficiently whatever it seeks to do" (1975b: 286), then this implies that policy adoption and persistence reflect efficient outcomes. Second, the "announced goals of a policy are sometimes unrelated or perversely related to its actual effects, and the *truly intended effects should be deduced from the actual effects*" (emphasis in original; Stigler 1975a, p. 140), implying that not only the causes, but also the consequences of regulation were intended.[4] Thus, the consequences of economic regulation cannot be regarded as unintended, but a deliberate result of rational actors optimizing their goals. Then, economic regulation is said to be "efficient" based upon the logic of collective action. The presumption that there are benefits to the overall economy to eliminating economic regulation, such as the abolition of tariffs against imports, price controls, occupational licensing, or other measures that benefit special interest groups, according to Stigler, would imply that the economist has not properly identified all the costs of changing such a policy. Had it been cheaper for policymakers to compensate interest groups the capitalized value of the rents they derive from an existing policy, then it would have been efficient for policymakers to have done so already (see Stigler 1992; Peltzman 1976).

in Britain (Pennington 2005) and the nationalization of lighthouses in 19th century Britain (Candela and Geloso 2020). There are also examples where the series of unintended consequences forces deregulation (Benson 2002; Hirshleifer, Glazer, and Hirshleifer 2005, p. 265).

[4] As Stigler states bluntly, to "say that such policies are mistaken is to say that one cannot explain them" (1975a, p. x).

At first glance, the theory of the dynamics of interventionism, and Stigler's capture theory of economic regulation, seem mutually exclusive to one another. The first claims that regulations have unforeseeable and inefficient outcomes. The second claims that regulations have predictable and efficient outcomes. However, first glances are deceiving, as both theories simply make differing assumptions about how residual claimancy may affect the time horizon to properly analyze a regulation's outcome.

In terms of generating the policy in the first place, the theory of regulatory capture is an effective first step. After all, if regulators and industry act, it must be because they stand to gain immediately. They desire the immediate effect and thus a regulation's genesis is easy to explain. However, if regulators are not residual claimants to their decision-making, there is "structural ignorance" (Boettke et al. 2007) in the sense that regulators are precluded from the contextual knowledge necessary to respond to the long-run ramifications of regulation. As such, proponents of intervention may seek regulation for their own private interests, as Stigler would argue. However, the incentives required to anticipate the long-run consequences of such regulation are nonexistent. Thus, the unintended consequences that arise from structural ignorance "are the key to understanding discrepancies between (open or concealed) intentions and actual outcomes" (Ikeda 2005, p. 48).[5]

This formulation suggests that Stigler's theory of regulatory capture is an analytical point of departure for a set of regulatory dynamics, rather than as an end-point for explaining an equilibrium state of regulatory affairs. As it takes disequilibrium as its analytical point of departure, the Austrian theory of the dynamics of interventionism is then ideally suited to explain how regulations generate unintended consequences. By emphasizing disequilibrium, the theory predicts that the regulatory process is unstable *over time* due to the incessant pursuit of rents that are created by regulatory discretion in the first place (i.e. the redirection of entrepreneurial efforts) and the lack of residual claimancy for regulatory decision-makers. As a cumulative destabilizing process (Czeglédi 2014; Geloso 2020b), the only logical endpoints are further regulations or outright deregulation. This is well illustrated by Bruce Benson in the context of Interstate Commerce Commission's regulation of interstate trucking:

> ICC regulation of interstate trucking "survived" for over 40 years, suggesting that it must have been "efficient" in the political sense that the Chicago School stresses.

[5] A corollary of this point is that the theory of the dynamics of interventionism can relax its assumption of benevolence on the part of regulators. This assumption, used for the analytical purpose of preserving value-free economic analysis, does not alter the conclusion. Indeed, the key component of the Austrian theory of the dynamics of interventionism is the problem of structural ignorance (i.e. the lack of residual claimancy to regulatory decision-making). Adding or removing the benevolence assumption entails "little or no loss of methodological integrity" (Ikeda 2005, p. 49).

> However, it did so only through a[n] evolving process of "more regulation" as additional statutes were added and the ICC's regulatory policies became increasingly complex. The fact is that the system really never achieved an equilibrium in any meaningful sense, as entrepreneurial discoveries in the competition for rents and efforts to reduce the dissipation of wealth produced continuous organizational, technological, and political changes (2002, p. 249).

As this quote suggests, we are not the first to notice this potential complementarity between the two theories. This emphasis on the process inherently accepts the use of analysis *from* disequilibrium at some point and lends itself to the idea that the regulatory process will be inherently unstable, resulting either in a spiraling process of additional regulation or deregulation (Benson 2002, p. 238). In fact, Stigler himself, at least implicitly, provides a *potential* basis by which to insert a dynamic process of intervention that begins with a story of regulatory capture, as we describe in the next section.[6] Stigler argues that when "an industry receives a grant of power from the state, the benefit to the industry will fall short of the damage to the rest of community" (1971, p. 10). Given that the industry is still a part of the community, the "damage" to which Stigler refers must also include the cost of foregoing profit opportunities that are created as an unintended by-product of capturing regulation, which will prompt unwanted rent dissipation by other individuals competing for such rents.

Our synthesis of the two theories suggests that the origins of regulation may arise to serve the ends of particular special interest groups, the effect of which, in the short-term, will be predictable and desired. However, because regulators are not residual claimants, longer-run consequences are cannot be fully anticipated. The redirection of entrepreneurial efforts results from the fact that such regulation will introduce rents that would otherwise not exist, and more importantly, are not intended for the interest group that had captured regulation in the first place. From the standpoint of the

[6] Perhaps where the most overlap can be found between Stigler's theory of economic regulation and the Austrian tradition of political economy has been identified by H.E. Frech III, in his review article of Murray Rothbard's *Power and Market* (1970), entitled "The Public Choice Theory of Murray N. Rothbard, a Modern Anarchist" (1973). As Frech (1973, p. 148) states, Rothbard's "view of economic regulation as a method of using the power of the State to exclude competitors anticipates Stigler's theory of regulation (1971)."

intended beneficiary of regulation, such an outcome is regarded as undesirable, and therefore inefficient. However, the outcomes are conceptually predictable: more regulations are added to deal with the earlier effects of regulations.

3 Electricity Nationalization in Ontario and Spillover in Quebec

The synthesis of the theories of regulatory capture and the dynamics of interventionism can be illustrated using the case of Quebec's electrical industry during the first half of the 20th century. The claim we put forward is that the nationalization of electricity in one Canadian province (Ontario) laid the foundation for the nationalization of electrical utilities in another province (Quebec), where private provision can be deemed to have delivered consistently better service than all other private providers in all of North America. Nationalization in Ontario was clearly desired by regulators and by members of industry as per the theory of regulatory capture. However, nationalization had unforeseen consequences on the market for electricity in Quebec by causing upward pressure on residential rates. This led, at first, to the regulation an industry that had been largely unregulated in the province. Later it led to the nationalization of the industry.

To understand this process, a brief historical overview in two steps is necessary. First, we must understand the outline of Quebec's electrical industry before regulation (in 1935) and nationalization (in 1944) and what are the frequently-iterated views regarding regulatory changes. Second, we must understand how the process of nationalization in Ontario affected Quebec's electricity market in ways that made regulation and nationalization likelier.

3.1 The drive for nationalization in Quebec

Quebec, the largest French-speaking Catholic province of Canada, always had a comparative advantage in producing hydroelectricity for three reasons. First, it possesses a dense array of wide

rivers with flows sufficiently fast to generate large quantities of electrical power. Second, the gigantic forests of the northern parts of Quebec (where most of these rivers are situated) act as "storage for the heavy snowfall, which is thus released gradually in the spring" which keeps the flow of rivers relatively stable and which in turn makes power generation relatively constant and cheap (Dales 1957, p. 28). Third, many of the suitable production sites are not geographically concentrated and tend to be relatively close to large urban centers. This meant that most cities had access to a cheap hydro-power source nearby.[7]

Quebec was not only exceptional in terms of "endowments". It also had a unique policy environment. While municipal ownership of utilities was trending in the United States and Ontario during the 1910s and 1920s, privatization was the norm in Quebec as close to a dozen cities that operated their own utilities opted to privatize (Dales 1957, p. 32; Bernier 2009). This trend towards privatization was matched by an exceptionally unregulated environment. Overall, observers argued and accepted the claim that Quebec's industry was lightly regulated. Neither price controls, nor quality of service or rate-return regulations existed (Murray and Flood 1922). Franchises were offered, generally, for long periods of time which limited hold-up problems from municipal authorities (Geloso and Belzile 2018). State involvement was limited to drawing up hydraulic resource inventory (Bellavance 1999). As such, state policy towards the industry has been described as a "policy of inaction" (Bellavance 1999, p.1) prior to the 1930s. On the eve of the Great Depression, the few large generating firms had each established their own dominance over regional markets.

The province's hydroelectric potential showed early on as supply costs were "considerably lower than in the northeastern United States, and have also, probably been somewhat lower than in Ontario" (Dales 1957, p.27). Figure 1 below reproduces recent and systematic evidence assembled by

[7] The city of Montreal alone represented 41% of total industrial employment during the 1950s. Adding the neighboring towns on the island of Montreal itself bring this well in excess of 50%. In contrast, Ontario's largest city (Toronto) only accounts for 21% of total industrial employment at the same moment (Raynauld 1961, p.241).

Geloso and Belzile (2018) regarding prices for residential customers between 1923 and 1925. The green, red and navy bars represent rates in cities from Quebec, the rest of Canada and the United States, respectively. As can be seen, cities in Quebec – including the populous metropolis of Montreal – had quite low prices in North American perspective.[8] Geloso and Belzile also extended this finding to rates for commercial and industrial services (2018, p. 114) which were lower, on average, by 36% than in Ontario. Moreover, prices in the United States were higher than in Ontario meaning that Quebec was clearly offering the lowest industrial rates in all North America (United States Congress, 1934, p. 456).

After leaving the industry largely unregulated for close to four decades, in 1935, the provincial government created a regulatory board in charge of reviewing residential rates. A mere nine years later, in 1944, the largest electrical producer of the province – the Montreal Light Heat and Power – was nationalized and folded into a crown corporation known as Hydro-Quebec. To explain this rapid turn, historians tend to highlight two dissonant notes regarding prices. The first is that heavy concentration of industry and population in urban areas meant that they were the object of most electrification investments.[9] Rural communities and smaller cities complained that electrification was slow in coming (Dorion 2000). When the Great Depression hit, these areas provided much of the political base for proposals that sought to regulate electrical utilities more aggressively (or even nationalize them). Secondly, private electrical utilities in Quebec engaged in very high levels of price discrimination. Industrial clients such as pulp and paper manufacturers and aluminium manufacturers had the ability to engage in self-generation of electricity for their purposes (Gelly 2003, 2010).[10] Their relatively elastic

[8] And as we will see below, by including the reported rates for cities in Ontario (shown in red), this understates the low *market* price nature of Quebec's electrical market.

[9] It should be noted that nationalization occurred during World War II. However, historians of the topic attribute little to no importance to war considerations in the decision to nationalize the industry (Bellavance 2003; Giguère 2018). These historians emphasize that impetus for nationalization had more to do with consumer discontent.

[10] For the United States, Neufeld points out that self-generation "initially dominated the demand for electrical equipment and remained important for decades (2016, p. 21). And while large industrial manufacturers would have consumed the lion's share of energy produced through self-generation, "hotels and retailers", "transit companies" and "wealthy

demand, compared to residential users, meant that they were offered quite large price discounts – especially on volume (Geloso and Belzile 2018). This price discrimination attracted hostility from residential and rural consumers.

These explanations are, however, clearly insufficient. Complaints by these two groups were present as early as 1900 just as was the case in the rest of Canada or the United States. Yet, changes in the direction desired by these groups only began three decades later and well after they had taken place in the United States and the rest of Canada (Neufeld 2016; Bernier 2009; Boutet 1999; Bellavance Levasseur, and Rousseau 1999). Why such a long delay?

Geloso and Belzile (2018) proposed a complementary explanation that provides a potential answer. Noticing that many scholars invoked higher prices in Quebec than in Ontario to explain the success in calls for regulation, Geloso and Belzile realized that Ontario played a subtle role in shaping narratives *in* Quebec. They pointed out that the comparisons were biased by the fact that Ontario was a strange benchmark because it had, at the turn of the 20th century, moved gradually in the direction of public ownership (see Section 3.2). By the early 1920s, the entire electrical generation business of Ontario was state-owned and was geared to the purpose of providing electricity at marginal cost. The effect was, Geloso and Belzile noted, that Ontarians were being subsidized for their consumption. The difference between demand and supply had to be made up by making further investments in electrical generation – which would be financed through taxes – or through purchases from private stations in other provinces – which would also be financed through taxes. As a result, electrical rates paid by consumers offer a poor depiction of the "cost" of electricity as Ontarians paid through taxes *and* rates.[11]

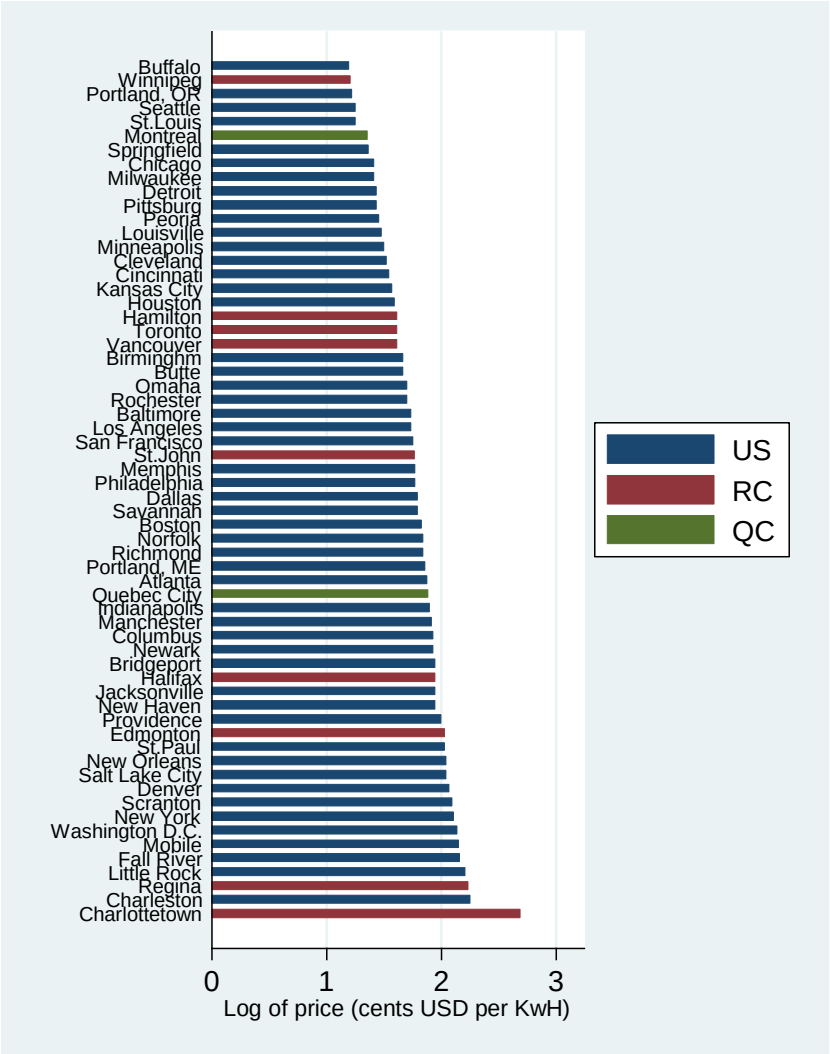
individuals" also engaged in self-generation (2016, p. 21). There is little evidence that electrical utilities charged "standby fees" for self-generating industrial clients. The only source available (Gelly 2003; 2010) does not go into details.

[11] Early criticisms of Ontario's publicly owned system (when it was municipalized) pointed to the fact that taxes were considerably higher in Ontarian cities than Quebec cities (Murray and Flood 1922) so that that when both taxes and rates

This explanation has a powerful implication that Geloso and Belzile (2018) mentioned but left largely unexplored and that speaks directly to our theoretical outline in Section 2. If the subsidization of electrical consumption could not be met by production sites in Ontario, it would have to be met by sites elsewhere – including in the low-cost and geographically close province in Quebec. As such, some of the excess demand from Ontario essentially "moved" to the Quebec market, causing price increases. In turn, price increases fueled political discontent sufficiently to later motivate regulation and nationalization in Quebec. This is the "dynamics of intervention" portion of our story – nationalization in Ontario destabilized markets in Quebec which ultimately led to regulation and nationalization in Quebec. Thus, even a private sector with important natural cost advantages as Quebec was unable to withstand the distortionary ripples of nationalization in Ontario. To see how this is the case, we must now outline the process of electricity nationalization in Ontario, how it is explained by regulatory capture and how it then initiated a dynamics of interventionism that spilled over into Quebec.

were considered jointly, Quebec enjoyed the lowest cost of electricity. This is why, in footnote 9, we argued that figure 1 was understating Quebec's low prices for electricity.

Fig. 1: Residential Rates for Electricity (USD cens per KwH), 1923-25



Source: Geloso and Belzile (2018, p. 113)

3.2 The dynamics of interventionism and regulatory capture begin in Ontario

The push for nationalization in Ontario started early. Initially, southwestern Ontario (where most of the province's population is located) relied on importing coal (at relatively high prices) from the United States. The high prices, combined with American strikes in 1897 and 1902, fueled discontent in this area of Ontario. That discontent translated itself into a push for developing hydraulic power sources. The area around Niagara Falls offered the potential for power at low cost compared to imported coal and a high-capacity hydro plant was built in 1895 (Dupré and Patry 1996). The fact

these inland towns paid higher prices for coal can explain the interest-group origins for Ontario's involvement in electricity markets. As Brady describes this point:

> At the outset the drive for collective action in providing power came from the same class which supported the National Policy of the federal government; viz., *the small manufacturers and traders in Toronto and those congregated in the Boards of Trade or represented in the Municipal Councils of Western Ontario*…But all the major municipalities soon became concerned in the collective action, and their initial activity determined in part certain salient features of the Ontario hydro[12] as an administrative system (emphasis added; Brady 1936, p. 331).

This, however, created two problems. First, the Niagara Falls constitutes the lion's share of Ontario's hydraulic power potential. As such, the distance from Niagara to any given city in Ontario constituted a key determinant in the provision of service. The first electrical companies were fast to connect the large Toronto market to the production sites but went much more slowly in connecting other towns in southwestern Ontario (London, Sarnia, Waterloo, Guelph, Windsor). Second, the Niagara Falls sites offered easy access to the American market whose reliance on coal meant higher prices for electricity. On the American market, the electricity generated at Niagara Falls meant potentially important price reductions. Private firms at Niagara Falls were thus heavily interested in exporting to the American market (Nelles 1978; Fleming 1992; Froschauer 2005). Thus, these two factors caused a "public power" movement to emerge in the towns of southwestern Ontario.

The main forces within that movement were manufacturers southwest of Toronto who felt they were being disadvantaged (Fleming 1992, p. 20). They were joined, later in the 1910s, by rural consumers who sought farm electrification (Fleming 1992, pp. 25-38). The conservative mayor of London, Adam Beck (himself a manufacturer), rapidly became a key figure in this movement and had formulated a concrete plan of public ownership of the transmission lines (Nelles 1978, p. 242). Through public ownership, Beck argued that power could be distributed "at cost" to the different

[12] As Nelles writes, "Until recently, in Canada, the word Hydro was synonymous with electricity" (2003, p. 119).

cities of Ontario – especially those further away from Toronto and Niagara Falls. By 1905, Beck had become a minister in the provincial government. A year later, legislation was adopted creating the Hydro-Electric Power Commission (HEPC) and Beck was named at its first chairman (while still sitting as a member of the provincial legislature), a position he held until his death in 1925 (Brady 1936, p. 333).

Initially, the HEPC's powers were to regulate private utilities, purchase electricity from them and take charge of the distribution at cost of electricity to municipalities (Nelles 2005, p. 242; Fleming 1983, pp.495-6).[13] This provision at cost was meant, essentially, to subsidize consumption of electricity.[14] "Hitched to wider goals of public policy, it (the HEPC) pursued rural electrification programs and sought to stimulate consumer demand" (Evenden and Peyton 2016, p. 257). By 1914, the HEPC's purview expanded as it engaged in the production of electricity, in direct competition with private producers and with a tax-free advantage[15], rather than merely distribution (Armstrong and Nelles 1983, p. 9). The First World War hastened the move to a public monopoly (Dupré and Patry 1998, p.129) as the Hydro Electric Power Commission (nicknamed Ontario Hydro by then) was authorized to purchase the largest private electricity producers that existed in the province. In 1917, it acquired the Ontario Power Company assets at Niagara Falls (Dupré and Patry 1998, p. 129). After the war, the HEPC started negotiating to do "a clean-up" deal (Dupré and Patry 1998, p. 129) to purchase the remaining big private players. By the end of the 1920s, most private providers and

[13] Nelles (1976) points out "that under its statutory authority wielded tremendous power over the private companies. It had access to their books, could examine their contracts, and could even requisition power from them for its own customer" "Beck used his regulatory power to enhance the competitive position of his company whenever possible. In effect, he used his discretionary authority and his superior legal position to limit as much as possible the growth prospects of the private companies. When he was taken to court he won all his cases, for his power rested upon the bedrock of provincial jurisdiction over property and civil rights" (p.472)

[14] The reductions were sizable (somewhere between 7% and 40% depending on the city) (Murray and Flood 1922, pp. 43-45).

[15] Crown corporations are exempt from federal taxation, but private firms were taxed.

producers were out of the business (Fleming 1992, p. 126). Electricity was provided "at cost" by the HEPC for the entire province.

The development of the HEPC fits very well with regulatory capture theory. Interest groups, among them non-Toronto manufacturers and rural consumers, banded together to lobby for nationalization in order to secure lower rates. The costs in terms of extra taxation resulting from the purchase of private assets were also perfectly understood by legislators and members of the interest group coalition. However, this is only true for the immediate effects. The HEPC had predicted a large increase in quantity demanded resulting from nationalization. However, the increase far exceeded expectations. By the 1920s, Dales (1957) points out that the HEPC feared that it would face considerable excess demand at the low rates it charged: "during the 1920s the demand for electricity in Ontario grew so rapidly that the Hydro-Electric Power Commission was forced to take steps to provide adequate power supplies for both the immediate future and the expected long-run increase in its load" (Dales 1957, p.151).

It is at this point that the dynamics of interventionism begin to appear. The problem of the unexpected magnitude of the increase in quantity demanded was that, by that point in time, the largest and cheapest power sites (such as the Niagara Falls sites) had been fully developed. This meant that the installed capacity of the province was able to meet this increase in quantity demanded up only until a point. Electrical capacity is measured in kilowatts (kW) but the consumption is measured in kilowatts-hours (kWh). As electricity must be generated at the same instant it is used, the capacity determines how consumption can be satisfied. However, if the consumption fluctuates over the day, the capacity may become insufficient to meet the quantity demanded at peak time. This entails that large increases in quantity demanded can only be satisfied by important investments in additional capacity. In other words, further state interventions were required to deal with unforeseen consequences of the first round of state intervention (i.e. nationalization).

To deal with the unexpected increase in consumption, the chairman of the HEPC, Adam Beck, argued that there were three options: a) building steam plants; b) developing new – and more expensive – power sources; c) purchase from Quebec.[16] Of the three, Beck argued that only the last one was viable (Dales 1957, p.151). Prior to that point, importing electricity from Quebec had never been considered as it was thought that production from the Niagara Falls area would be sufficient. However, the anticipated increase in quantity demanded that had been expected from nationalization was significantly smaller than the actual increase. Ontario gradually ramped up its imports of electricity from Quebec as much as the existing low-tension lines allowed. As can be seen in Figure 2, in 1919, 1.8% of Quebec's output was exported to other Canadian provinces (most of it being to Ontario).[17] By 1923, that proportion had surged to 2.8% and by 1925 this had increased to 4.2%.

The problem is that the low-tension lines had high losses and most of the imports from Quebec would have to go to the areas closest to Quebec (e.g. Ottawa and Cornwall). The solution would be to build high voltage transmission lines that had significantly smaller losses. These transmission lines, while exhibiting lower marginal costs, had high fixed costs. This meant economies of scale. If deals could be struck with private generators in Quebec to increase their capacity, the construction of high voltage transmission lines would become a viable solution. As a result, the HEPC began negotiating deals with private firms in Quebec in order to incite them to develop resources along the Ottawa river and in the Beauharnois region and build high-voltage transmission lines that would connect with those of the HEPC and serve markets as far as Sudbury (at the southernmost tip of Ontario). The first deal, with the Gatineau Power Co. which served the western portion of Quebec, was signed in 1926 (Biss 1936; Hogue et al. 1979, p. 177). In October 1928, high-voltage transmission

[16] Technically, there was a fourth option to deal with excess demand which is to increase rates to reflect market clearing values. However, that option was never on the table politically which meant that some form of transfer – through taxation – was necessary to meet excess demand.

[17] The numbers for exports out of Quebec include those to the province of New Brunswick but these appear to have been minimal.

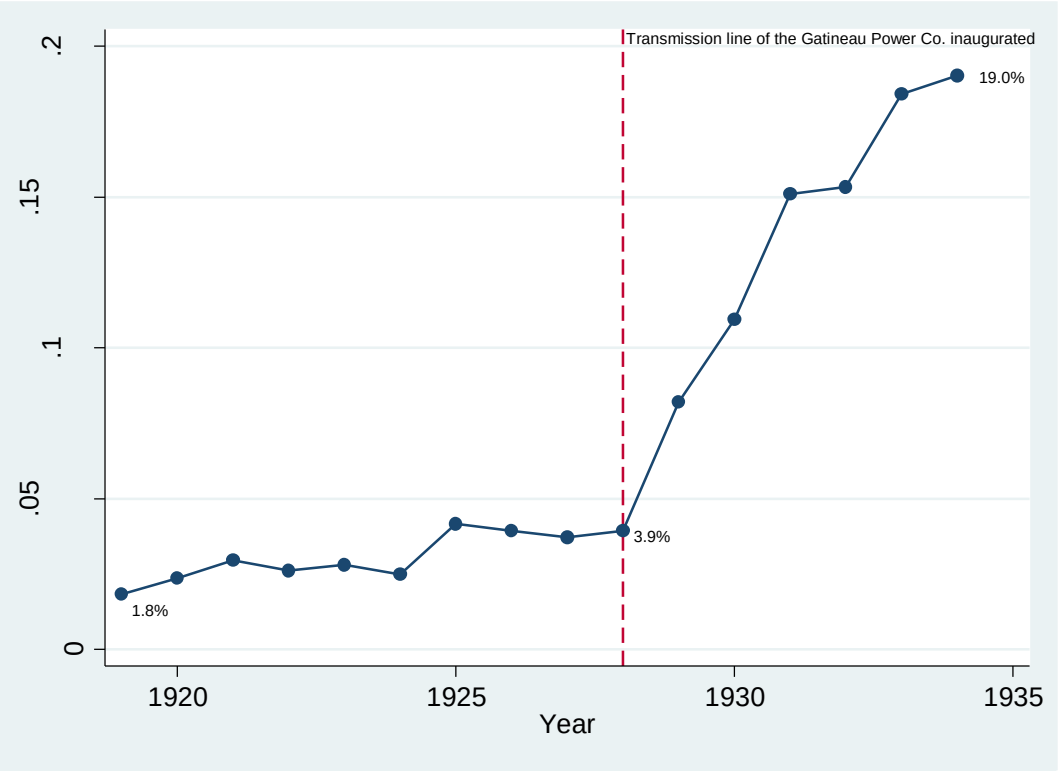
lines with the Gatineau Power Co. were inaugurated and exports surged: from 3.9% in 1928 to 8.2% in 1929 and 19% in 1934. Deals with other firms from Montreal rapidly followed (Biss 1936).

The solution of relying on Quebec producers to meet the unexpectedly large increase in consumption essentially extended the dynamics of interventionism to Quebec. Tax revenues from Ontario were used to finance imports of electricity from Quebec producers who charged market prices. In other words, Ontario's excess demand was satisfied by Quebec producers which essentially can be depicted as an increase in demand on the Quebec market. Consequently, the rates on Quebec markets that were connected to Ontario increased (in contrast to areas unconnected with Ontario). Given that industrial consumers had a more elastic demand, the increases were shouldered by the more inelastic residential and rural consumers. This upward pressure on prices in Quebec resulted from the HEPC's response to larger than expected increases in consumption from non-Toronto manufacturers and rural consumers. This unforeseen increase in electricity demand from Ontario, in turn, generated increased demands for regulation and nationalization in Quebec. The ultimate regulation and nationalization of the industry in Quebec thus fits within the framework of the dynamics of interventionism following Ontario's own nationalization of electric utilities. However, spillover effects on Quebec by itself does not in itself constitute an undesirable effect for those Ontarian interest groups desiring cheaper electricity.

As we explain in the next section, to the extent that Ontario's importation of cheap electricity from Quebec was dependent upon private provision of electricity in Quebec, the Ontarian trend toward nationalization created a public backlash among producers in Quebec, who demanded for regulation of electricity in Quebec. This political demand generated electoral losses, resulting in the 1936 electoral defeat of Liberal Party of Quebec, which had continuously been in power since 1897 and had opposed electricity nationalization in Quebec. Thus, nationalization in Ontario created unintended political consequences in Quebec that went against the interest of those groups in Ontario

dependent upon a cheaper source of privately-provided electricity from Quebec. In the next section, we also explain our empirical strategy to tie this effect to the political backlash against electrical utilities in Quebec. In the next section, we explain our empirical strategy to detail how plausible is the claim that the HEPC's response generated the predicted effects on Quebec market.

Fig. 2: Share of Quebec's Electricity Output Exported to Ontario and New Brunswick, 1919–1934



Source: Dominion Bureau of Statistics (1935, pp. 2-3).

4 Data and methodology

To assess the effect of the HEPC's decision on Quebec markets, we adopt two different econometric strategies. Both methods exploit the timing of the deals between Quebec firms and the HEPC. The first contract was signed in 1926 (Biss 1936, p.551) with the Gatineau Power Co. In October 1928 (two years after signing the deal with the HEPC), the Gatineau Power Co. inaugurated its 230 miles

transmission (at a pressure of 220,000 volts) connecting Quebec with the main Niagara network of Ontario (Stanton 1929, p.1120). Thus, whereas there had been exports into small portions of eastern Ontario pre-1928, the entire province was from that moment able to receive electricity from Quebec. In November 1929, a deal with the Ottawa Valley Power Company was reached. In 1930, deals with the Montreal Light, Heat and Power and the MacLaren-Quebec Power Company (Biss 1936, pp. 551-2). All the contracts provided for gradual increases in capacity until 1937. By that time, exports were expected to represent more than 20% of the province's consumption.[18]

Only a few regions of Quebec were connected to Ontario's electrical market. The markets in central and eastern Quebec (representing close to 60% of the province's population) were never before connected with Ontario. Prior to the contracts being signed, only the small population of the Outaouais region was connected to Ontario's markets. After the contracts were signed, all of western Quebec (including the south and north shores of Montreal and Montreal itself) was connected to Ontario. If the HEPC's decision to import from Quebec had an impact on Quebec, it would be observable in areas connected with Ontario. The excess demand from Ontario would have affected itself on those regional markets. This yields a simple empirical prediction: because of the excess demand from Ontario, prices in cities connected to Ontario should have started to diverge from prices in unconnected cities after the HEPC's decision.[19] If price movements differ by region according to connection with the HEPC, this is evidence for the mechanism proposed in section 3.2 whereby Ontario's nationalization causes unforeseen consequences on Quebec's markets.

[18] The Great Depression caused the Ontario government to try to renege its purchase promises in 1935. However, after numerous court proceedings, new agreements were signed that continued the supply from these private firms (Hogue et al. 1979, p. 179-180). However, when adjusting for the deflation of the Great Depression, the renegotiated price was roughly equal in real terms to the prices agreed to in the initial contracts.

[19] Whereas, prior to the HEPC's response, they would have shared the same price trends. It should also be noted all the major networks in Quebec were connected together, and they could purchase from each other. However, there were energy losses along transmission lines (Piché 1937) which would have isolated the markets that did not share a direct connection with Ontario's HEPC.

To test whether this is the case, we employ two econometric methods. Both methods are imperfect and are imposed upon us by the way that the Dominion Bureau of Statistics (henceforth DBS) collected data about electricity generation. From 1926 to 1951, the DBS published the *Index Numbers of Rates for Electricity for Residence Lighting and Table of Monthly Bills.* This series of publication provide rates for different residential consumption bundles per month for 24 cities continually from 1926.[20] The quality of the price data is ideal for our purposes. As such, we collected the rates for the different consumption bundles (20, 40, 80, 100, 180, 300, 500 kWh) for the 24 cities that appear continually from 1926 to 1941 and estimated the average price per kWh for residential service. We then expressed these rates in real terms using the regional price indexes provided by Emery and Levitt (2002).[21] These data allow us to ask whether being connected to the HEPC after it starts increasing imports from Quebec causes price increases. We use the following estimation approach that applies to pricing decisions by firms on different markets (*i*):

$$\textbf{1)}\ logprice_{it} = \beta_1 connection_{it} + \beta X_{it} + \tau V_i + \varphi V_t + \theta V_j + \epsilon_{i,t}$$

Which is essentially a difference-in-difference approach where the variable *connection* is our variable of interest – i.e. whether a city is connected to Ontarian markets by contracts. There are two downsides, however, to this approach. The first is that there are no covariates available at the city-level that are annual. We are thus restricted to use census years to create covariates captured under the term *X*. Censuses were taken in 1921, 1931 and 1941 which explains our choice of endpoint as the census of 1941 is the last one before Quebec begins its nationalization process in 1944. Population and manufacturing output are the covariates that we can rely on.[22] Thus, the prices for the earliest year

[20] Some cities were added in the later editions so that by 1941, there were 33 cities in Quebec that provided price quotations for residential electrical services.
[21] Our results hold whether we deflate prices or not.
[22] The manufacturing productivity data is constructed using value added in manufacturing and the number of employees reported in Part II of the different annual censuses of manufacturing output in Canada (Dominion Bureau of Statistics, 1921 to 1941). The inclusion of this variable is motivated by the fact that it approximates the type of industry in the cities. High productivity industries were also capital intensive and high-energy consumption industries (Raynauld 1961). Thus,

(1926) in the *Index Numbers* publication are matched with the 1921 census covariates. The second problem is that these city-data do not provide any firm-specific information for the years 1931 and 1941. Thus, we have no information about the generating power, capital and costs of firms servicing cities. This is because, as we will see below, the directories of electrical firms that the DBS published regularly was discontinued after 1929. Thus, to capture features specific to the firms servicing the different cities of Quebec (some such as the Montreal Light, Heat and Power and the Southern Canada Power serviced more than two cities in our assembled sample), we have to rely on firm-fixed effects denoted by V_j where *j* refers to the different firms which are reported in certain of the *Index Numbers* publications. We also add city-fixed effects and year-fixed effects captured denoted by V_i and V_t. Table 1 shows the descriptive statistics for this estimation approach.

Table 1: Descriptive Statistics for Panel Regression Using the Dominion Bureau of Statistics' *Index Numbers of Rates for Electricity for Residence Lighting and Table of Monthly Bills,* 1926, 1931 and 1941

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Municipalized	72	0.278	0.451	0	1
HEPC Connection	72	0.167	0.375	0	1
Log Real Price (1913$, cents per kWh)	72	1.286	0.400	0.544	2.234
Log of Manufacturing Productivity (1913$, output per worker)	70	8.043	0.398	6.981	9.013
Log of City Population	72	9.475	1.392	6.777	13.71

It should also be noted that because we are using a fixed effects approach to estimate the effect of being connected to the Ontario market by the HEPC contracts, we cannot directly control

this would speak to the industrial sector that firms would service in a market *i*. Because industrial demand was more elastic and that electric utilities engaged in price discrimination, we expect higher productivity to be associated with higher prices for residential consumers. In other words, productivity is included as a proxy variable (for lack of a better variable) for market structure. As for population, we motivate its use by pointing that it approximates the presence of economies of scale in servicing a city.

for whether a city operates its own electrical utilities. This is because, with the exception of one city, the dummy variable representing publicly-owned utilities is time-invariant.[23] This is of importance because municipally-owned utilities can be expected to be less inclined to increase rates in the face of increasing demand from Ontario and would rather increase taxes. They are also expected to have lower rates (especially for small consumers) than cities serviced by private operators all else being equal (Boutet 1999; Bernier 2009). As such, in order to indirectly control for these factors, we run the specification above with and without a restriction to units that are municipally owned utilities.

The second approach we use is based on the *Central Electrical Stations in Canada Part II* publications of the DBS. These publications are directories of all the cities in Canada with details about their population and the utilities that service them.[24] Included in the directories are details about distribution networks, transmission mileage, generating power, the type of station, the capital invested by firms, and the rates charged for residential lighting. As such, we can produce a series of variable that would determine the pricing decisions of firms in different municipalities. However, we now have a much larger sample (249 municipalities with complete sets of covariates at the city and firm levels) to estimate the effect of being connected to Ontario. Moreover, we have more knowledge about the features of the firms that service the different cities so that the covariates do not have to rely on the assumption that firm-specific features are constant over as we did in specification 1) above.

There are four downsides and one major upside to this approach. The first is that the directories end in 1928 just as the contracts ramp up. Thus, we are constrained to the period when

[23] We pointed out above that multiple cities had privatized their services. But most of these cities were relatively small ones that did not make it in the DBS' *Index Numbers of Rates* publications. The exception was the city of Verdun (a suburb of Montreal) which started as publicly owned but which had been privatized after 1928 (the exact year could not be identified but it was between 1928 and 1933).

[24] We had to use Magnan (1925) to match city names between the directories because there are several iterations of the names of places in Quebec. This is a result of the fact that religious parishes, which were the names most frequently referred to by the French-Canadian, did not always bear the exact same name. For example, census officials gave the more accurate name while the survey of electrical stations was slightly different or used one of the diminutive (e.g. Hemmingford vs. Saint-Romain d'Hemmingford).

exports to Ontario were limited to the low-voltage lines that existed by that point. As we showed in figure 2, exports increased in this period – from 1.8% of Quebec's total output in 1919 to 3.9% in 1928. But this increase pales in comparison to the one that started when the high-voltage lines were inaugurated in October 1928. As such, this constrains us to study the period when the increase in demand from Ontario was present but was relatively small and thus, we expect weaker results because we are not capturing the substantial increase post-1928. Secondly, unlike in the panel estimation specified above in equation 1) where the *connection* variable spoke to being a city affected by a contract with the HEPC, our *connection* variable here will be whether a city had a transmission line that connected with Ontario. This variable could only be created using the 1928 edition of the directory which contains a map highlighting the HEPC transmission lines with Quebec (Dominion Bureau of Statistics 1929, plate 17). Because the rapid expansion of the network in order to service the demands of the HEPC had yet to happen by the time of the directory, only 8 municipalities appear to have been directly connected with Ontario through the HEPC.[25] However, and this is our major upside, the few connected cities would have borne the brunt of the pre-1928 tripling of the HEPC's demand for Quebec electricity.[26] As such, the effect of what seems to be a small increase in exports due to Ontario's excess demand is going to be concentrated and strong in this small number of cities.

The third downside is that while the DBS produced data that speak to covariates in many of the large cities, there is little that exist regarding smaller cities that are included in the directories. This is problematic as there were wide economic differences *within* Quebec with western Quebec (the areas around Montreal and the Gatineau River). For example, most of the industrial clients with high-energy use were in western Quebec (which was also richer than the rest of province – see Egnal 1996). This

[25] Some very small municipalities shared connections with Ontarian cities but not through the HEPC. This is the case for cities like Hawkesbury and Vankleek Hill which were served by the Quebec-based Gatineau Electric Light Company and were thus unaffected by the HEPC's subsidization of consumption (Dominion Bureau of Statistics 1929, pp.255, 374).
[26] The rising share of total production that is exported which is depicted in figure 2 is when total production is rising. The total quantity exported actually tripled and it would have been concentrated on those eight municipalities.

would have affected pricing decisions on these markets. To indirectly control for this issue, we attempt a sample restriction to Western Quebec areas. The fourth downside is that there are only two directories that provide rates: one for 1922 and one for 1928.[27] This is a severe handicap because it prohibits the serious use of a panel approach. Consequently, we are reduced to using specification 2) below which is an Ordinary Least Square approach:

$$\mathbf{2)}\ pricediff_i = \beta_1 connection_i + \beta X_i + \epsilon_i$$

Where *pricediff* refers to the price difference that emerged between 1922 and 1928 (we will be using two different ways to measure the change in prices in those years). Our variable of interest is still *connection* with the assumption that cities that were connected between 1922 and 1928 experienced price increases relative to cities that were not connected. The vectors of covariates include a direct control for whether a city owns its power utility, the generating power, transmission line mileage, city population and capital invested by firms.[28] All of these variables speak to elements of the costs of firms. Table 2 shows the descriptive statistics for this approach.

While individually flawed, taken together these two approaches allow us to credibly assess whether connection to the nationalized Ontario market caused significant price increases once the HEPC decided that it had to meet excess demand by importing from Quebec. If both show a conceptually similar result despite the econometric flaws inherent to each strategy, then we can assess that while imprecise, our estimations yield economically significant findings that speak to the dynamics of interventionism.

However, this is not sufficient to explain why Quebec eventually regulated or nationalized its own electric utilities. Specifications 1) and 2) only point to the unforeseen effects of nationalization in

[27] There is another directory, for 1919, but the information contained within about rates charged is sparse.
[28] The Montreal Light, Heat and Power Company and the Gatineau Power Company refused to provide the value of their capital investments to the DBS in 1929. However, the directories from other years and other sources allow us to impute approximate values for their capital investments through the stocks issues they made (Hogue et al. 1979).

Ontario and say little about Quebec's eventual interventions in electricity markets. Thus, there is an additional step that needs to be taken: explaining the policy changes in Quebec.

Table 2: Descriptive Statistics for OLS Regression Using the Dominion Bureau of Statistics' *Central Electrical Stations in Canada Part II,* 1922 and 1928

	(1)	(2)	(3)	(4)	(5)
VARIABLES	N	mean	sd	min	max
		Full Sample			
Log(Price 1928) – Log(Price 1922)	283	-0.0570	0.369	-1.309	1.825
Price 1928)/(Price 1922)	283	1.026	0.612	0.270	6.200
HEPC Connection, 1928	333	0.0240	0.153	0	1
Log of Capital, 1928	319	14.23	2.655	7.601	17.98
Log of Pole Mileage, 1928	330	4.465	1.732	-1.386	6.087
Log of Population, 1921	302	7.132	1.088	3.970	13.34
Municipal Utilities, 1928	331	0.127	0.333	0	1
Non-Generating Station, 1928	330	0.276	0.448	0	1
		Western Quebec Sample			
Log(Price 1928) – Log(Price 1922)	85	-0.102	0.480	-1.050	1.825
Price 1928)/(Price 1922)	85	1.070	1.024	0.350	6.200
HEPC Connection, 1928	106	0.075	0.265	0	1
Log of Capital, 1928	103	14.353	3.246	9.532	17.982
Log of Pole Mileage, 1928	106	4.116	1.667	0.405	5.888
Log of Population, 1921	95	7.102	1.333	3.970	13.335
Municipal Utilities, 1928	106	0.198	0.400	0.000	1.000
Non-Generating Station, 1928	106	0.623	0.487	0.000	1.000

In 1935, after being in office continuously since 1897, the Liberal Party of Quebec was subjected to an important schism as a fraction of younger party members bolted from the party to form the Action Libérale Nationale (ALN) which had as one of its main planks the nationalization of hydro-electric firms. This was in response to a perception of increasingly higher prices and slow rural electrification.[29] The ALN rapidly secured an electoral alliance with the Quebec Conservative Party

[29] In reality, nominal prices had remained the same throughout the period in most cities. The perception of rising prices was the result of the deflation observed for other goods and services during the Depression. Thus, *real* prices were increasing (Geloso and Belzile 2018).

whereby each party would not field candidates against each other. In that election, the Liberals were reduced to a thin majority and, by the election of 1936, the ALN and conservatives had merged under the banner of the Union Nationale (UN), which campaigned under the promise to break the electricity trust and nationalize the industry.[30] Promising rural electrification and lower urban prices for residential consumers (in opposition to large industrial clients), the UN won the 1936 election with 76 seats in the legislature out of 90. The liberals, campaigning lukewarmly against electricity nationalization, were thrown out of government for the first time since 1897.

The election of 1936 offers a way to operationalize how the HEPC's decision may have pushed Quebec towards regulation and nationalization. If the decision to import from Quebec helped push prices up *only* in regions connected to the HEPC, we should expect a larger swing against the liberal party in those regions relative to regions unconnected to the HEPC. To test whether this is the case, we set up specification 3) below which relies on an ordinary least squares approach:

$$\textbf{3)}\ swing_i = \beta_1 connection_i + \beta_2 rate_i + \beta_3 (connection_i * rate_i) + \beta X_i + \epsilon_i$$

Where *swing* is the change in vote share of the Quebec Liberal Party in each of Quebec's 90 electoral districts between the election of 1931 and the election of 1936 (when it faced the unified opposition under the banner of the UN).[31] That data is based on the historical database of Quebec elections assembled by Pierre Drouilly (1985).[32] The *connection* variable speaks to whether or not an electoral district was serviced by at least one firm that exported to Ontario by 1936. The *rate* variable is the rate reported in the 1928 directory used above for the largest private provider in that electoral district.[33] While our main variable of interest is the *connection* variable, it is necessary to point out that an

[30] While the UN reneged its promise to nationalize the industry, it did create the Régie de l'Énergie to regulate energy prices. It was the Liberal Party, upon returning to power in 1939, that initiated the nationalization of the industry.
[31] However, in two electoral districts, liberal members were elected by acclamation in 1936.
[32] The data are available online at https://www.donneesquebec.ca/recherche/dataset/atlas-des-elections-au-quebec
[33] We were unable to find rates for two additional subdistricts in the 1928 directory (Magdalen Islands and Roberval).

interaction term is necessary. While it is true that areas connected with the HEPC would have enjoyed higher prices, the greater level of production needed to meet the terms of the contracts between private firms and the HEPC would have meant more employment in those electoral districts. That would have benefitted the incumbent liberals to some degree. This means that we must remove the mitigating effect of greater employment to arrive at the net effect of connection on the liberal party's electoral performance. This is what the interaction term between the price level and the connection to the HEPC allows us to achieve. Unfortunately, we can only add one additional control variable – the percentage of the population that is French-Canadians. The French-Canadian population share is important as French-Canadians tended be very nationalist voters and the Liberal party tended to be less nationalistic than the Conservative Party and than the splinter elements that formed the ALN (Black 1977).[34] No other covariates could be matched to the electoral districts. Table 3 depicts the descriptive statistics.

Table 3: Descriptive Statistics for OLS Regression Using the 1936 Provincial Election Results

	(1)	(2)	(3)	(4)	(5)
VARIABLES	N	mean	sd	min	max
Swing 1931 to 1936	88	-13.95	8.702	-39.89	4.930
Log Rate, 1928	88	1.952	0.381	0.993	2.708
HEPC Connection	90	0.311	0.466	0	1
Share of Francophones	86	82.87	20.07	21.01	99.64
Log Rate X HEPC Connection	88	0.524	0.806	0	2.485

[34] However, Drouilly was unable to compute the francophone share for four electoral districts.

5 Results

The results from the panel strategy specified in equation 1) that relies on the *Index Numbers* publications for 24 cities in 1926, 1931 and 1941 are show in Table 4 below.[35] The log of manufacturing productivity appears has no statistically significant effect while the log of population, which speaks to market size and potential economies of scale in servicing the city, is negative and significant. Most importantly, our variable for the connection with Ontario is positive. The cities that were connected to Ontario and which were thus affected by the series of deal of the late 1920s between the HEPC and private firms in Quebec experienced price increases of 13% relative to cities that were not connected (and were thus unaffected by the deals).

That upward effect on prices appears to be dampened by municipally owned utilities. These municipal utilities purchased large quantities of electricity from private generators (to complement their own production) and then distributed it at below-market rates thanks to subsidization from city governments. As such, while the HEPC deals with private Quebec firms would have increased the operating costs of municipal utilities, it is likely that municipal politicians were reluctant to raise rates in order to avoid political discontent. As such, when the cities that had a municipally owned station (generating or non-generating) are excluded, we find that the effect of connection with Ontario is greater (21%) and statistically significant at a higher level.

However, as we indicated above, this regression has an important flaw in that we cannot control very well for the features of the firms servicing these different municipalities. All we could do was utilize a company-fixed effect estimator. This is why we now turn to Table 5 which shows the

[35] We have additional sets of results such as the staggered inclusion the fixed effects. Without year-fixed effects but with city-fixed effects, the connection with Ontario is significant and positive in both types of specification. However, when year-fixed effects are added, the connection still has a positive effect on prices but it is slightly above the 10% threshold for significance. When the firm-fixed effects (to control for the features of the firms servicing the different cities) are introduced, one obtains the results depicted in table 4. At the request of a referee, we also attempted our results without manufacturing productivity – the result was unchanged.

estimates for equation 2). Those results allow us to control for firm-specific features such as the value of capital stock, the type of station (nongenerating or generating), the mileage of transmission poles, the type of ownership (municipal or private), and the log of population. The trade-off is that, with this design, we must use an OLS approach where the dependent variable is either the difference between the logarithm of the 1928 price and the logarithm of the 1922 price or the ratio of the 1928 price over the 1922 price.[36] We use both measures of prices because the latter standardizes the initial price levels (those in 1922) and the other simply takes the percentage changes.

In columns 1 and 3 of Table 5, we see that sharing a connection with the HEPC meant that prices were significantly increased relative to non-connected cities. With the log-price difference, connected cities had 1928 prices 92.6% greater than in 1922 relative to non-connected cities. The proportion with the standardized measure of the price ratio is even larger.

However, as we pointed out above, there is a need to restrict the sample geographically to western Quebec in order to indirectly control for the fact that areas of central and eastern Quebec were economically different (in terms of industrial structures) than western Quebec. While this cuts the sample size from 249 observations to 76 observations, the results hold as can be seen in columns 2 and 4 of Table 5. The connection with the HEPC meant larger price increases between 1922 and 1928. Moreover, the coefficients are larger once we restrict the sample to the rich areas of western Quebec (thus confirming the presence of an omitted variable bias because of lack of income data for small cities).

In Table 6, we show the estimates for equation 3). This closes the loop by showing that the price increases results from Tables 4 and 5 caused political backlash against the ruling liberals who opposed electricity nationalization. In the 1936 election, the liberals saw their vote share collapse

[36] The mean price in 1928 (8.53 cents per kWh) was lower than in 1922 (9.17 cents per kWh).

relative to the 1931 election in all but three of the 88 contested districts.[37] The liberals apparently suffered a swing against them that was 23 percentage points larger in districts that were connected to the HEPC than in districts that were unconnected. Given that the average swing in the province was 13.9 percentage points against the liberals, this is a sizable effect. However, we must remove the effect of the interaction term which suggests that the higher prices mitigated some of that effect through greater economic activity in the region. As speculated above, when private firms had to increase production to satisfy the demand from the HEPC, they likely increased employment in those electoral districts which mitigated some of the effect against the liberals. In the districts connected to the HEPC, the total effect of the connection is equal to the direct effect of connection minus the indirect effect (i.e., the interaction term). The result is a net swing of 4.3 percentage points against the liberal party in the connected districts. In these districts, the average swing against the liberal was 14.4 percentage points which means that roughly a third of the swing can be considered a backlash resulting from the price-increasing effect of being connected to the HEPC.

[37] It is relevant to note that eight of the ten largest swings against the liberal party took place in districts that were connected to the HEPC.

Table 4: Regression Results Using the Using the Dominion Bureau of Statistics' *Index Numbers of Rates for Electricity for Residence Lighting and Table of Monthly Bills,* 1926, 1931 and 1941

VARIABLES	(1) With Municipal Utilities	(2) Without Municipal Utilities
Log of Manufacturing Productivity	0.0778	0.0814
	(0.0680)	(0.0576)
Log of Population	-0.388**	-0.200*
	(0.148)	(0.100)
HEPC Connection	0.129*	0.208***
	(0.0652)	(0.0454)
Constant	4.384***	2.714**
	(1.518)	(1.168)
Observations	70	51
R-squared	0.872	0.932
Number of cities	24	18
City FE	YES	YES
Year FE	YES	YES
Company FE	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: OLS Regression Results Using the Dominion Bureau of Statistics' *Central Electrical Stations in Canada Part II,* 1922 and 1928

	(1)	(2)	(3)	(4)
	Log(Price 1928) – Log(Price 1922)		(Price 1928)/(Price 1922)	
VARIABLES	All Quebec	Western Quebec Sample	All Quebec	Western Quebec Sample
HEPC Connection	0.926*	1.011*	2.933**	3.016**
	(0.544)	(0.549)	(1.260)	(1.292)
Log of Capital	-0.0362**	-0.0590**	-0.0218	-0.0408
	(0.0183)	(0.0287)	(0.0153)	(0.0293)
Log of Pole Mileage	0.0836***	0.0115	0.0668***	-0.0139
	(0.0301)	(0.0614)	(0.0243)	(0.0665)
Log of Population	-0.0468**	0.0250	-0.0310	0.0526
	(0.0211)	(0.0344)	(0.0329)	(0.0685)
Municipal Utilities	0.0961	-0.237***	0.0777	-0.278**
	(0.0701)	(0.0894)	(0.0603)	(0.124)
Non-Generating Station	0.0737	0.286***	0.0659	0.273***
	(0.0447)	(0.0706)	(0.0418)	(0.0765)
Constant	0.355*	0.332	1.167***	1.047***
	(0.206)	(0.231)	(0.250)	(0.358)
Observations	249	76	249	76
R-squared	0.173	0.452	0.436	0.536

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: OLS Regression Results Using the Using the 1936 Provincial Election Results

VARIABLES	(1) OLS
Log of Price	-3.790
	(3.468)
HEPC Connection	-23.00**
	(9.563)
Francophone Share	-0.093
	(6.550)
Log of Price X HEPC Connection	11.36**
	(5.183)
Constant	2.182
	(9.998)
Observations	82
R-squared	0.057

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

6 Conclusion and Implications

We began by asking to what extent are the outcomes of economic regulation intended and desired by its proponents. Using a mixture of the Austrian theory of the dynamics of interventionism and the theory of regulatory capture, we argued that there exists a *direct* relationship between the intentions of regulation and its *immediate* outcomes but that – as a result of not being residual claimants – regulators cannot foresee many of the long-run consequences of their actions. To the extent that a capture theory of regulation provides an analytic anchor for understanding economic regulation, it pertains fundamentally to the origins of economic regulation, though not necessarily its consequences.

We have illustrated this to be the case with the economic regulation of electricity in Ontario. The nationalization of electricity (and the subsidization of its consumption) in Ontario, though originating from regulatory capture, had long-run unforeseen effects in the form of unexpectedly large increases in consumption. To deal with this unforeseen consequence of nationalization, Ontario's government was forced to use tax revenues to purchase electricity at market price from private Quebec

producers. This unleashed unexpected consequences into the largely unregulated Quebec electricity markets. Ontario's excess demand meant an increase in demand for electricity on Quebec markets that were connected to Ontario's electrical network. As a result, these regions saw large price increases compared to unconnected regions. This effect on price levels in Quebec fueled political demands for regulation and nationalization in Quebec (which eventually occurred in steps between 1935 and 1944). This unintended political outcome went against Ontarian interest groups that had demanded nationalization in Ontario, since the subsidization of electricity in Ontario had become dependent upon a cheaper source of privately provided electricity, imported from Quebec.

As such, the theory of regulatory capture explains well the initial decision to regulate, but the dynamics of interventionism explains why subsequent decisions to regulate materialized. By incorporating the element of time into the regulatory process, we illustrate that the relationship between the actual outcomes of economic regulation and its intended effects is based on an *indirect* link between the optimization of an individual (or special-interest group acting collectively) and an equilibrium that emerges from competition that is unleashed as a result of regulatory discretion.[38]

Indeed, optimizing behavior implies that individuals will do the best they can, given their circumstances of time and place. If the marginal costs of seeking regulatory privileges fall relative to the marginal benefits, economic theory can predict that an individual decision-maker will optimize in accordance with the law of demand by engaging in regulatory capture. However, this is distinct from (though not mutually exclusive of) the pattern of interactions that will emerge from competitive behavior among individuals within a context *after* regulation has been introduced. The equilibrium outcome of such *social* interaction is never directly reducible to the summation of the optimizing behavior of individuals, and therefore can never be perfectly anticipated by inferring the intentions of

[38] On this distinction between optimization and equilibrium, see Hirshleifer, Glazer, and Hirshleifer (2005, p. 94, fn. 1).

individuals from such an outcome. This is illustrated by the fact that higher electricity prices in Quebec emerged because of nationalization of electricity in Ontario, even though the purpose of nationalization in Ontario was to benefit a concentrated interest group of manufacturers in Ontario with lower electricity prices.

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