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Electricity markets in transition: Market distortions associated with retail price controls

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ABSTRACT

In many jurisdictions, there are growing concerns over rising electricity prices and increased price volatility due in part to aging network infrastructure, retiring generation capacity, and subsidies to promote investment in renewables. In response, policymakers have advocated for or implemented retail price controls. Yet these can foster distortions that do not directly address market failures. We discuss alternative policies that can be used to mitigate these price effects.

1. Introduction

Electricity markets are in a period of transition worldwide. Growing concerns over climate change, technological advancements, and subsidies have led to an increased penetration of renewable generation and distributed energy resources such as rooftop solar and energy efficiency. Further, numerous jurisdictions have adopted policies to place a price on carbon emissions (Gulli and Chernyavska, 2013). These market changes have been coupled with the need for capacity investments to replace aging generation units and modernize the transmission and distribution network infrastructure (IEA, 2014). These market dynamics place upward pressure on electricity prices and increase policymakers' concerns over price volatility.

Recently, multiple jurisdictions have implemented retail price controls in an attempt to protect consumers from rising electricity rates and a potential increase in price volatility. While retail price caps and freezes have been implemented in the past, these price controls were largely motivated by the lack of competition as market-based (restructured) electricity markets were being implemented (Kwoka, 2008). Retail price controls that hold retail rates at inefficiently low levels can dampen price signals, distort retail market competition, damage utility finances, result in government budget deficits, and lead to contentious debates and retail price spikes as governments attempt to phase out the imposed price controls.

In this article, we discuss the market distortions and other issues that can arise in the presence of retail price controls that artificially hold rates at suboptimal levels. We begin by supposing that retail markets are competitive or regulated and the natural monopoly portions of the industry pass their costs through at regulated rates. This allows us to focus on the distortions associated with retail price controls not designed to solve a clear market failure. Because the competitiveness of retail markets is central to an understanding of the effects of retail price controls, we also consider the evidence on this question, and discuss how our conclusions regarding the effect of price controls and alternative policy approaches would be changed by a significant degree of retail market power.

We begin in Section 2 by providing an overview of retail price controls used in numerous jurisdictions. In Section 3 we provide details of the electricity market in Canada's Alberta province, highlight several recent changes to the market design, and discuss the recently proposed retail price cap. Section 4 discusses the market distortions and political challenges associated with imposing retail price caps in the presence of rising industry costs. We propose alternative policies in Section 5. Section 6 concludes.

2. Retail price controls

During electricity market restructuring in the United States, several states implemented retail rate controls in the form of an initial rate reduction of 3%–20% and a subsequent rate freeze. These price controls persisted for up to 10 years and were motivated by concerns of market power in the wholesale and retail sectors during the transition period (Kwoka, 2008). An unexpected increase in natural gas prices caused these retail rates to be substantially below the equilibrium level. This created financial problems for utilities and is cited as a contributor to the 2000–01 California electricity crisis (CBO, 2001).

Several jurisdictions have recently imposed similar retail price controls. However, the cited motivation for these price controls is not

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over concerns of market power execution, but to shield consumers from rising electricity prices and concerns over price volatility. These price controls often occur in combination with policies to promote network upgrades, grid modernization, and subsidies to renewable and distributed energy resources. As a result, these price controls are occurring during a period of rising industry costs.

As a recent example, in December 2016 the Illinois Senate passed "The Future Energy Jobs Bill" that includes numerous provisions to fund investment in renewables and distributed energy resources and provide subsidies to six large nuclear facilities (Illinois General Assembly, 2016). In addition, the bill calls for limitations on the rate of increase in retail prices and overall rate caps on residential, commercial, and industrial consumers. These price controls are in place until 2030.

Similarly, in November 2016, the Alberta government announced a ceiling on the energy portion of the retail electricity price for residential consumers, limiting retail prices to not exceed 6.8 cents per kWh (Alberta Government, 2016). The rate cap is to be in place until June 2021. The rate cap does not apply to per-site service or administrative fees. While current rates are below the proposed cap, it is markedly below the historical average retail rates in Alberta. As we discuss in detail below, this retail price control arises during a period of substantial transition in Alberta's electricity market.

Other recent examples of controversial retail price controls are in Spain and Australia. The Spanish electricity market has imposed retail price controls since the early 2000s, leading to subsidized electricity consumption and a considerable energy tariff deficit (Federico and Vives, 2008). In the presence of increasing industry costs due in part to the need to meet rising peak demand, regulators in Queensland Australia imposed retail price controls that limited rates to be below estimates of long-run marginal cost. This led to concerns over the feasibility of retail competition and the need for government intervention to ensure reliability in the presence of suboptimal rates (Simshauser and Laochumnanvanit, 2012).

3. Alberta's electricity market and retail price caps

While our discussion of price controls applies generally to restructured electricity markets worldwide, we focus on the implementation of price controls in Alberta to emphasize the potential market distortions of retail price controls. In Alberta, electricity market restructuring began in 1996 and retail and wholesale market competition was established in 2001. Transmission and distribution remain as regulated natural monopolies (Olmstead and Ayres, 2014). Alberta's wholesale market currently operates as an energy-only market design with a uniform price (i.e., there is no nodal pricing). While there are no formal bid mitigation measures to limit wholesale market power and the generation side of the market remains moderately concentrated (Brown and Olmstead, 2017), wholesale power prices are currently at historic lows due in part to low natural gas prices and excess generation capacity (MSA, 2016).

Alberta's generation capacity is primarily fossil-fuel-based, with 39% and 43% of installed capacity being fueled by coal and natural gas, respectively. Import capacity is limited, with interties from neighboring regions having maximum available transfer capabilities of only 1103 MW combined, compared to an average market demand of 9162 MWs in 2015 (AUC, 2016).

3.1. Alberta retail competition

In Alberta and numerous jurisdictions, electricity market restructuring opened the retail market up to competition. Under retail competition, electricity is produced by deregulated generators and flows through regulated transmission and distribution lines to the final consumer. Retailers do not at any point take physical possession of the product. A competitive retailer offers consumers a variety of contracts, varying largely by the price structure (floating or fixed) and duration. To a large extent, retailers can be viewed as offering different packages of insurance against wholesale electricity price variation. In addition, retailers offer "green" products and dual fuel electricity/natural gas combined products. Finally, retailers provide customer care and billing services.

In addition to the introduction of retail competition, Alberta chose to maintain a regulated default product (the Regulated Rate Option (RRO)), to be available to all customers with annual consumption below 250 MWh (MSA, 2015). The RRO is provided in different regions of the province by different firms, with most of the RRO contracts being served by three providers. The energy-based portion of RRO rates is set on a monthly basis and regulated by the Alberta Utility Commission. Under the RRO Regulation, these rates must be based on forward electricity prices over a short period (initially 45 days, then extended to 120 days) before the month of delivery (MSA, 2014). The RRO Regulation indicates that the regulated rate of the RRO "must not impede the development of an efficient market for electricity based on fair and open competition …" (Alberta Regulated Rate Option Regulation, 2005, Paragraph 6(1)(d)).

The regulated default rates were expected to be temporary until retail competition was sufficiently developed. However, the RRO was never phased out and remains an option for small consumers (Retail Market Review Committee, 2012). Transition of customers from the RRO to competitive products has been gradual. By June 2016, 45% of residential customers were on a competitive contract (compared to 27% of farms and 57% of small commercial and industrial customers). Almost all customers on a competitive contract are with one of the three largest competitive retailers (MSA, 2015). The majority of customers on competitive rates are on long-term fixed prices ranging from one to five years. MSA (2015) reports that as of the end of 2014, 64% of customers on competitive contracts were on dual-fuel (electricity and natural gas) contracts with long-term fixed electricity rates, with additional consumers on fixed-rate energy-only contracts.

McFetridge (2012) and MSA (2014) assessed the competitiveness of Alberta's retail market. The conclusion of the MSA (2014) was that the retail market is competitive. McFetridge (2012) notes on page 35: "the retail electricity market can be regarded at present as being competitive if not highly competitive. The RRO plays an important role in this. Competitive retailers design their offerings with a view to matching if not beating the RRO." He goes on to note that "it is reasonable to assume that there would be significant new retail entry in the event that the RRO is eliminated." The close interaction between the RRO and competitive retailers' products will play an important role in assessing the impact of retail price caps discussed below.

3.2. Recent changes to policy and market structure

In the past two years, Alberta's electricity market has undergone substantial changes with the intent to transition the power market away from coal generation towards more renewable integration. The government adopted a carbon pricing program that substantially increases the cost of production from coal generation, imposed a mandatory coal unit phase-out by 2030, and announced the implementation of a program to procure utility-scale renewable projects (Alberta Government, 2015; AESO, 2016a; Brown et al., 2017). Further, the government announced its intent to transition the market from an energy-only market design to one that includes a capacity payment mechanism (AESO, 2016b).

The government implemented changes to the retail market as well. In addition to a ban on door-to-door sales, on Nov. 22, 2016, the government announced the introduction of a retail price ceiling of 6.8 cents per kWh that will apply to the RRO rate until 2021. The motivation for the retail rate cap is the anticipation of higher electricity prices and to protect consumers from "volatile" electricity prices (Alberta Government, 2016). This ceiling is 15% below the average RRO price

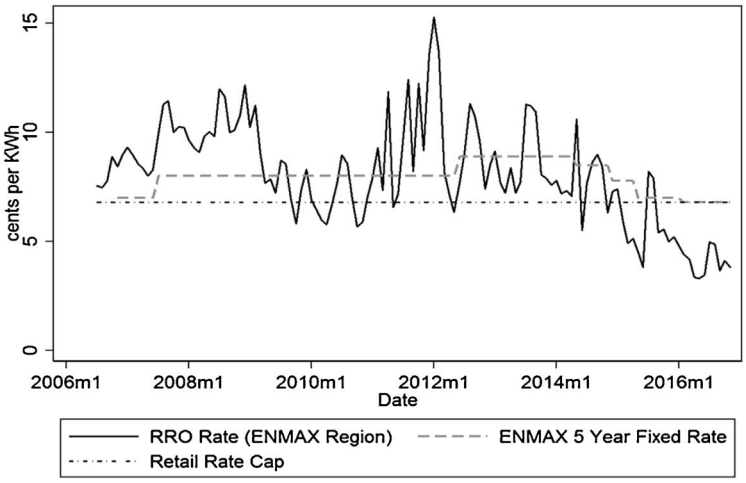

Fig. 1. Regulated and five year fixed retail rates, 2006–2016.

since July 2006. When the price cap is binding, the RRO providers will pay the true wholesale costs of the energy consumed, and will be compensated by the government for the difference between the wholesale cost and the price ceiling. It is important to note that the retail cap and government's make-whole payments will not apply to the non-RRO competitive rates. As we will discuss in detail below, this creates an asymmetry between the RRO and competitive retail products.

Fig. 1 provides historical RRO energy rates, along with a representative five-year competitive fixed retail rate. Over the period from July 2006 to November 2016, the average monthly RRO energy price was approximately 8.0 cents per kWh. The proposed retail rate cap was set equal to the prices being charged by competitive retailers for a five-year fixed contract. The RRO rate was exceptionally low in 2016, due in large part to historically low natural gas prices (MSA, 2016). However, the EIA (2017) forecasts that Henry Hub natural gas prices will increase to levels observed in January 2014 by early 2018. Consequently, in light of policies that put upward pressure on prices (e.g., Alberta's carbon pricing policy), the retail price cap could be binding as early as 2018. It is worth noting that a price ceiling on the RRO rate may impact retail competition even if it is not binding, since the majority of consumers not on the RRO are on long-term fixed rates, which presumably contain a premium related to risk.

4. Implications of retail price controls

In this section, we summarize the key market distortions that can arise from artificially lowering and controlling retail prices.

4.1. Distorting market signals

Efficient regulation of network industries should strive to mimic the forces of competition. In this setting, the price signal serves a fundamental role in reflecting the underlying costs of resources. It has been well established by economists that time-varying retail electricity prices can yield large efficiency gains (e.g., Faruqui et al., 2012; Borenstein, 2013). However, due to numerous technical and social barriers, retail prices often do not vary from day to day or from hour to hour (see Borenstein (2013) for a related discussion). Rather, retail rates are often set at a single rate for an extended period of time (e.g., a month or a year).

While there are inefficiencies associated with time-invariant retail rates, these rates are typically set based on the underlying wholesale and network costs, so that retail price controls that suppress prices to inefficiently low levels distort the already dampened price signals of the underlying costs of consumption. Demand for electricity is price-inelastic, but it is not unresponsive to prices. There is a broad range of estimates for short-run price-elasticity, ranging from -0.05 to -0.35 for residential consumers (Faruqui et al., 2012; Ros, 2015; Lessem et al., 2017). Further, in the presence of retail competition, the majority of residential consumers who switch providers state that they do so in response to lower prices (Morey and Kirsch, 2016). Although Ito (2014) suggests that consumers may respond to average price changes rather than marginal price changes, a retail price cap would suppress average prices signals as well. Commercial and industrial consumers tend to be more price-responsive than residential consumers (e.g., see Ros, 2015). Hence, retail price controls placed on rates charged to commercial and industrial consumers are particularly troubling. This is the case in the recently implemented retail price controls in Illinois (Illinois General Assembly, 2016).

Both regulated default providers and competitive retailers already provide risk-hedging services that protect consumers from retail price volatility. As discussed above, in Alberta the Regulated Rate Option is based on forward electricity prices 45–120 days in advance of the month. There is some degree of volatility in the RRO retail rates. For example, over the period from July 2006 to November 2016, the average monthly change (in absolute value) of the energy portion of RRO rate in the Calgary region was 1.2 cents/kWh, or 15.6%. However, in the absence of market power in the forward and retail markets, this volatility is expected to reflect changes in the underlying costs of electricity that will remain in the presence of retail price controls. Further, competitive retailers offer fixed rate options that range from monthly contracts to one- to five-year contracts (MSA, 2014, 2015). Therefore, it is unclear that there are excessive and "extremely volatile" retail electricity rates in Alberta and in other jurisdictions with regulated retail rates and/or (workably) competitive retail markets.

Retail price controls also contradict environmental policy agendas. A number of governments, including Alberta are placing a price on carbon emissions (Gulli and Chernyavska, 2013; Alberta Government, 2015). While the wholesale market effects of carbon pricing will persist, retail price controls dampen the price signal to consumers associated with pricing carbon emissions. Absent controls, these costs would be at least partially passed down to consumers' retail rates (Cullen and Mansur, 2017). Suboptimal retail prices can result in inefficiently high levels of electricity consumption (Federico and Vives, 2008). The reduction in electricity consumption from carbon pricing is non-negligible. O'Gorman and Jotzo (2014) measure the reduction in retail consumption (residential and commercial) attributable to the Australian carbon price to be 1.3%–2.3% of total electricity consumption in the National Electricity Market, generating an emissions reduction of between 11 and 17 million tonnes over two years. In fact, jurisdictions have begun partnering carbon pricing on production with carbon pricing on consumption in order to increase downstream abatement (Munnings et al., 2016).

Finally, governments worldwide are implementing policies to promote the adoption of distributed energy resources (DERs) such as rooftop solar, storage, energy efficiency, and demand response (e.g., see NYPSC, 2014, 2016). Consumers' decisions to adopt DERs are driven largely by the level of electricity prices (IEA, 2015). Inefficiently low prices reduce consumers' incentives to adopt DERs. This is particularly true in jurisdictions with net metering policies (such as Alberta) where rooftop solar is compensated at the prevailing retail rate. Despite the controversy over the efficiency of net metering policies (Brown and Sappington, 2017), net metering policies are a main driver for the adoption of rooftop solar (Darghouth et al., 2011). Even as rate design for DERs evolves beyond controversial policies such as net metering (e.g., NYPSC, 2016), the retail rate will play an important role in consumers' decisions to adopt DERs. It is important that these rates reflect the prevailing industry costs of providing power services.

4.2. Effect on retail competition

In Alberta and other markets with retail competition, there is a default regulated rate option in addition to competitive retailers. The level at which this rate should be set depends on one's view of its effect on retail competition. On the one hand, it has been suggested by some that the default rate should be set high to encourage switching. However, if the market is not deemed sufficiently competitive, lower rates might act as a ceiling that reduces the ability of unregulated competitive retailers to exercise market power. As well, high default rates might serve as a focal point for coordination among deregulated retailers.

The evidence on the impacts of retail competition is limited, due in part to a lack of useful data, and what evidence that exists is mixed (see Morey and Kirsch (2016) for a detailed review of the prevailing literature). The authors note that while several studies find that retail competition reduced retail prices, others question the price reducing impacts of retail competition. In a recent analysis, Su (2015) finds that retail competition in the U.S. benefited residential consumers, but had limited impacts on other consumer groups. Likewise, McFetridge (2012) and MSA (2014) conclude that Alberta's retail market is sufficiently competitive. In contrast, Salies and Waddams Price (2004) and Von der Fehr and Hansen (2010), in studies of the UK and Norway, find that firms exploit market power over the segment of consumers who are less informed or less likely to switch suppliers.

A key issue in evaluating the effect of retail price controls is its impact on retail competition; see Littlechild (2002) for further discussion of this issue. Further, the interaction between the default RRO provider and competitive retailers plays an important role. Blumsack and Perekhodtsev (2009) provide a set of guidelines for the design and pricing of the regulated default rate option in the presence of retail competition. These guidelines include:

- "Default service prices must not be set at artificially low levels or in such a way as to erect an ad hoc barrier to entry by competitive suppliers" (page 680);
- "Price caps on the incumbent supplier should last as little time as possible, and should be indexed or otherwise linked to market prices or fuel costs" (page 681);
- "The types of service that default utilities can offer their default customers must be chosen carefully. One option… is to place all default customers on a market-based rate. Risk-averse customers can then choose a fixed price contract option from a different supplier if desired" (page 681).

The retail price controls being implemented in numerous jurisdictions have the potential to violate each of these conditions. Further, the retail price cap proposed in Alberta may create an asymmetry between the competitive retailers and the RRO providers, although it should be noted that the major RRO providers are also the largest providers of competitive contracts. When the cap is binding, the RRO providers are required to price at or below the rate cap and are compensated for the difference. To our knowledge, competitive retailers will not receive any financial assistance when the underlying costs drive retail rates above the retail price ceiling. While some consumers will remain with competitive retailers due to switching costs and inertia, the price cap might increase the incentives of consumers to switch to the RRO providers. This has the potential to undermine retail competition.

The competition policy issues are not isolated to Alberta. Retail price controls have the potential to distort the ability of retailers to compete over both the price structure and duration dimensions. For example, Littlechild (2002) highlights the issues that arose in the United Kingdom when temporary retail price controls were implemented on incumbent suppliers as retail competition was phased in. The author notes that retail price controls limit consumers' incentives to switch to competitive suppliers, reducing the incentive for new retail suppliers to enter the market.

4.3. Removing price controls

Retail price controls are set with an intended expiry date. Recent experience has demonstrated that the expiration of retail price controls can result in large and controversial increases in retail rates. This has motivated governments to extend the duration of the retail price controls, prolonging the distortions associated with suboptimal retail rates and damaging government finances.

During the period of electricity market restructuring in the United States, the expiry of retail price controls was often met with large retail price increases. An unanticipated increase in natural gas prices caused the frozen and artificially reduced retail rates to be inefficiently low. Utilities were unable to pass these higher wholesale power costs down to their retail consumers, damaging utility finances. In the extreme case of California in 2001, wholesale power prices exceeded the capped retail prices by up to 500% (Brennan et al., 2001). To avoid utility bankruptcies, regulators allowed several utilities to defer these losses and pass them onto ratepayers when the rate freeze eventually expired (Kwoka, 2008). Consequently, when the rate freezes were lifted several utilities filed for rate increases in excess of 50% and up to 100% in extreme cases (MPSC, 2008). These price spikes created substantial political controversy, the firing of numerous members of the public utility commissions, and led several states to call for a return to a regulated regime (Lien, 2008).

In the Spanish electricity market, retail price controls have been in place since the market restructured in 1998. Despite early concerns over the growing retail tariff deficit due to suboptimal rates, the government imposed price controls that limited annual rate increases to 1.4%. Since 2000, the retail tariff revenues have been too low to cover the costs to operate the power network. These prolonged retail price controls have created large government deficits estimated to be 26.9 billion € (CNMC, 2015). Spanish electricity prices are among the highest in Europe. As a result, completely removing retail price controls has proven to be challenging.

5. Alternative policies

The recent implementation of retail price controls has been motivated by two primary concerns: rising retail prices and retail price volatility. In general, capping retail prices is a blunt and indirect instrument by which to address these concerns. In order to determine if additional policy instruments are needed and the form they should take, it is important to understand why retail prices and their volatility might be increasing.

Price volatility is a common concern in deregulated electricity markets. Studies have found that pricing behavior and volatility is related to a number of underlying factors including variation in demand, the cost structure of generators, and market design (Werner, 2014). To

the extent that price volatility reflects demand and cost fundamentals, there is limited justification for retail price controls. In addition, in competitive retail markets, consumers can typically choose between stable, higher fixed-price long-term contracts and more volatile, lower price short-term fixed or variable price electricity packages. As such, households that are averse to price volatility can access stable prices and retailers can earn a premium in order to face the price risk.

As renewable generation comprises a larger share of capacity, the wholesale price is expected to be more volatile because wind and solar are intermittent and do not necessarily align with demand. While imposing retail price controls may reduce volatility, it does not address the underlying intermittency and may prevent retailers from increasing the risk premium charged in fixed-price contracts in order to be compensated for their increased risk. A preferable approach may be to focus government action on addressing the intermittency problem and to consider the differential effects that policies to support renewables have on the level and volatility of the wholesale price. For example, Winkler et al. (2016) show that fixed feed-in-tariffs generate more volatility than capacity-based support, minimizing volatility. Alternatively, regulators can promote policies such as demand response or improved regional interconnection to reduce wholesale market price volatility that feeds into more volatile retail prices (NREL, 2013).

To the extent that retail price volatility is the outcome of market power execution in an imperfectly competitive wholesale market, regulatory intervention may be warranted. Wholesale market power could be a source of price volatility if the potential for market power varies from hour to hour with changes in demand and available capacity. For example, in 2008 in Alberta, there was a change in the Market Surveillance Administrator's policy that permitted unilateral market power via economic withholding. It has been suggested that this change resulted in increased wholesale price volatility, and changes in forward prices and RRO retail prices (Retail Market Review Committee, 2012). The idea that spot market power can result in increased market power in the forward market and higher forward prices is supported theoretically and empirically by de Braganca and Daglish (2016). However, if higher and more volatile retail prices are believed to be the result of spot market power, a more fruitful avenue for intervention would likely involve addressing the market power directly by fostering competition in the wholesale market.

Some form of intervention might also be justified by market power at the retail level. As noted earlier, price ceilings or regulated default rates have been employed by different jurisdictions as temporary measures to ease the transition of the market towards a competitive structure (Kwoka, 2008). Littlechild (2002, pg. 5) notes that "price controls tend to mask the underlying problem rather than cure it. Insofar as there are legitimate concerns about monopoly power, it is generally more appropriate to look at the conditions of new entry." For example, McFetridge (2012) suggests that in Alberta, while entry barriers are low, the expansion of the competitive side of the retail market has been negatively affected by regulations and cost advantages of RRO providers (including a base of default customers, so that advertising is unnecessary).

In addition, it is notable that studies that have identified market power concerns in retail electricity markets have found that the execution of market power is focused on particular consumer groups that are less likely to switch providers (Salies and Waddams Price, 2004; von der Fehr and Hansen, 2010). This suggests that policy may be focused on these groups. In its 2016 energy market investigation report, the United Kingdom's Competition and Markets Authority concluded that customers with prepayment meters, who tend to live in rental accommodations or have poor payment history, faced fewer and higher-priced choices regarding rates and plans, were less informed about alternatives in part because of limited internet access, and faced barriers to switching (Competition and Markets Authority, 2016). The Office of Gas and Electricity Markets responded in January 2017 by imposing temporary price ceilings specifically on retail rates for prepayment energy meters. While temporary retail price controls may be justified in this setting, it is important that regulators work towards eliminating the underlying market power issue facing this subset of consumers.

Lastly, a market transition towards renewables and large investments in network infrastructure will put upward pressure on electricity prices. Lower-income households spend a larger fraction of their disposable income on electricity and are therefore disproportionately affected by increases in the price of electricity. As such, capping the retail electricity price has been justified on the grounds of protecting low-income households from increasing prices. However, governments can address this distributional concern without changing the marginal price of electricity by providing income support or lump-sum subsidies to low-income households. Some jurisdictions have incorporated or plan to incorporate such subsidies into their clean energy and carbon pricing policies. For example, the province of Ontario provides a credit on a household's electricity bill based on household income and number of household members while the province of British Columbia uses some of the revenues from its carbon tax to provide assistance in the form of reduced income tax rates and tax credits to low-income households (Beck et al., 2015). Importantly, these subsidies do not change the marginal price of electricity for consumers and retailers.

6. Conclusions

In this article, we discuss the market distortions that can arise when regulators impose retail price controls. The imposition of price controls has been a growing trend in response to concerns over an anticipated increase in the level and variability of retail rates as electricity markets undergo a period of substantial transition. We highlight several jurisdictions that have recently adopted such retail prices controls.

Artificial price controls dampen important market signals. This can lead to inefficient consumption decisions. This is particularly acute when retail price controls are imposed on commercial and industrial consumers who tend to be more price-responsive, as is the case in that The Future Energy Jobs Bill adopted by the Illinois Senate in 2016 (Illinois General Assembly, 2016). In addition, retail price controls can reduce the effectiveness of environmental policies targeted at pricing emissions and motivating consumers to adopt distributed energy resources and energy efficiency upgrades. This is in contradiction to the growing number of policies targeted at reducing emissions and electricity generation from fossil fuels.

Retail price controls can distort the nature of retail market competition. This may induce exit or reduce the entry of competitive retailers. This can escalate the concerns associated with market power in regions with already concentrated retail markets. In addition, historical evidence demonstrates that retail price controls can be politically difficult to remove, result in retail price spikes upon removal, and can create large government budget deficits.

Possibly for these reasons, until recently the main cited motivation for retail price controls was as a method of limiting market power during the transition to a competitive market. When these policies were introduced the understanding was that they would be removed once a sufficient level of retail competition was achieved, since in the absence of a market failure such as market power, price controls that hold retail rates at inefficiently low levels can create numerous distortions in market-driven restructured electricity markets. Our discussion suggests that from an economics perspective, it is difficult to justify re-introducing retail price ceilings in the absence of strong evidence of market power execution. We are unaware of such evidence being presented in Alberta, or in other jurisdictions that have re-introduced controls.

If policies targeting retail price volatility are unavoidable, we advocate for alternatives that target the underlying issues and concerns that drive regulators and policymakers to adopt suboptimal retail price controls. First, concerns over retail price volatility can be met with policies that support a robust competitive retail market that offers consumers a menu of retail rate options with different levels of revenue

stability. Second, as renewable generation capacity expands, price volatility is expected to increase. Policies should be enacted that promote increased participation of demand response, storage, increased regional interconnection, and motivate investment in more geographically diverse renewable capacity. Third, market power execution in the wholesale or retail markets can prompt regulatory intervention. Ideally, regulators should target reducing barriers to entry to foster competition in the wholesale and retail markets; this may in part be achieved through the phasing out of default retail options. Imposing retail price caps can create additional barriers to entry in the retail market. Lastly, as electricity markets undergo a period of substantial market transition, retail rates are expected to increase. This can raise equity concerns over raising rates on lower-income consumers. Regulators can address these distributional concerns by providing income support or lump-sum transfers to low-income consumers, without imposing suboptimal retail price caps.

In many jurisdictions, there are growing concerns over rising electricity prices and increased price volatility due in part to aging network infrastructure, retiring generation capacity and subsidies to promote investment in renewables. In response, policymakers have advocated for or implemented retail price controls. Yet these can foster distortions that do not directly address market failures. We discuss alternative policies that can be used to mitigate these price effects.

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