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The switching behavior of large-scale electricity consumers in The Turkish electricity retail market☆

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ABSTRACT

This paper studies the effects of various economic and psychological factors on the switching behavior of large-scale electricity consumers in Turkey. Switching frequency and switching direction are two variables used to analyze switching behavior. The former is concerned with how often retailers change their suppliers. On the other hand, switching direction measures the direction of switching preferences of consumers between two electricity suppliers since the incumbent has a brand advantage over new suppliers that creates inertia and may reduce competition in the market. The target group of this study is large-scale electricity consumers rather than residential consumers since the switching activities of large-scale consumers are more competitive. We employ a five-point Likert scale questionnaire to construct eight psychological and economic factors to explain switching activities. The estimates indicate that improving service quality and providing essential services are the main motivations for switching decisions. Satisfaction with primary services, the homogeneity of the retail electricity market, and switching costs enhance the status quo; however, clarity of contracts and assistance for electricity distribution services (maintenance, metering, billing, etc.) affect the switching activities.

1. Introduction

Starting from the late 1990s, electricity production and distribution services have been liberalized. Following the experiences of the UK, Scandinavian countries, and new neo-liberal policies, electricity services were unbundled and opened to market competition with corresponding privatization programs. Afterward, these liberalization policies quickly turned into a global trend. Retail competition is one of the crucial steps in energy market liberalization. Turkey is one of the countries to adopt these liberalization policies. Yet, like in many other countries, these policies did not lead to more competitive retail markets or gain market efficiency (Flores and Price, 2018). The purpose of this paper is to attempt to identify the barriers to competitiveness in the Turkish energy market.

Deregulation in retail electricity markets allows consumers to choose their providers among the competing retailers with unregulated prices. The competition brought about by deregulation aims to incentivize the retailers to offer lower prices and high value-added services to the consumers. Thus, if the consumers respond to price changes, then competition brings efficiency (Hunt, 2002). Active consumers search for the best offer among alternatives in the electricity market to get the benefits of deregulation. Nevertheless, the level of consumer switching across electricity suppliers has not occurred in the way it was supposed to (Defeuilley, 2009). The switching frequency of residential electricity consumers is relatively low, and the incumbent retailers have considerable market shares worldwide. This power of incumbent retailers suggests that competitiveness levels are relatively low in deregulated markets. For example, although Norway does not have an eligibility consumption threshold to enroll retail markets and all electricity consumers can choose the most advantageous electricity suppliers, the

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consumer switching rate has been relatively low (21% in 2018) (Flataker and Nielsen, 2019). Moreover, the UK's mature retail market has also experienced a low-level switching rate for residential consumers even though all consumers have the right to choose (20% in 2019) (OFGEM, 2019). Moreover, incumbent retailers have a market share of about 70% of residential customers within their network area in Norway as of 2018 (Flataker and Nielsen, 2019). The market share of incumbent retailers is 25% in the UK (OFGEM, 2019).

In the literature, the rationale behind the behavior of (non) switchers is analyzed in various studies. Keaveney (1995), Bansal and Taylor (1999) argue that the switching decisions of retail service market consumers may depend on both behavioral and financial factors. Wieringa and Verhoef (2007), Ek and Söderholm (2008), Yang (2014), He and Reiner (2017), and Flores and Price (2018) study the competitiveness of electricity markets by considering economic and behavioral factors empirically.

Although the aforementioned studies examine the switching behavior of residential consumers, this study focuses on large-scale consumers. Low switching frequency has been a fundamental problem for electricity markets since the beginning of deregulation. The problem seems more prevalent among residential consumers since incentives to encourage them to switch their electricity suppliers may be inefficient. On the other hand, large-scale consumers have more substantial incentives to switch than residential consumers for several reasons. First, large-scale consumers may be more likely than residential consumers to hire personnel to seek out the benefits of switching. Second, the magnitude of electricity bills is greater for large-scale consumers than small-scale consumers. The large-scale consumers' cost of switching is expected to be lower than for residential consumers. Third, as Ek and Söderholm (2008) state, industrial consumers being active in the market is expected to contribute to competition among retailers; correspondingly, this benefits all consumers. Thus, the benefits of switching are more significant for large-scale consumers, and behavioral barriers to switching may not be so high.

Turkey is one of the 20 largest economies in the world and is expected to grow in the coming years. With its growing electricity demand due to its population and economic growth, the Turkish electricity market was the fifth largest in Europe in 2018. Turkey had the second-highest electricity demand growth after Georgia among the OECD countries in 2019. This study uses the data from the Turkish electricity retail market on large-scale electricity consumers. Although the behavior of Turkish residential electricity consumers was studied by Sirin and Gonul (2016), the switching behavior of large-scale consumers has not been researched.

This study's primary aim and contribution to the literature are to shed light on the role that behavioral and economic factors play in the competitiveness of the retail electricity market by providing the first empirical evidence from Turkey for the switching preferences of large-scale electricity consumers. The empirical evidence provided here suggests that large consumers are affected by a set of factors apart from financial incentives, such as psychological switching cost, service quality, and the heterogeneity level of the market, which are similar to those of small-scale consumers. On the other hand, there might be other determinants of switching that we did not consider due to data limitations and the characteristics of the Turkish Market. Green tariff incentives on switching behavior (Shin et al., 2015; Danne et al., 2021), the effect of consumers' awareness and attitude toward energy issues (Sirin and Gonul, 2016; He and Reiner, 2017), the personality types of decision-makers (Ziegler, 2020; Flores and Price, 2018) and the effects of behavioral factors on searching for alternatives (Schleich, Faure & Gassmann, 2018; Hortacsu, Madanizadeh & Puller, 2017) are not considered in this study.

The rest of the article is organized as follows: The following section reviews developments in the Turkish Electricity Market. In the third section, we discuss the literature regarding switching behavior in energy markets. The fourth section describes the data and surveys the methodology and theoretical framework. Later, we present the empirical method, introduce empirical models, and discuss our estimation results. Lastly, we conclude the paper with a general discussion of retail competition and offer a set of policy recommendations.

2. Developments in the Turkish Electricity Market

Until the 1990s, the government heavily dominated the Turkish electricity market. Although the initial step was to promote public-private partnership in electricity utility investment projects, Turkey accelerated its liberalization processes by taking rapid and decisive actions to make energy market reforms with structural changes, especially after 2001. First, the Electricity Market Law (No: 4628) enabled private entities to generate, distribute and sell electricity. This development allowed the privatization of state-owned power plants and electricity distribution companies. Furthermore, the Electricity Market Regulatory Agency (EMRA) was established in 2001 to control and monitor competition in the electricity market (Atiyas et al., 2012). In 2002, to enhance competitiveness in the retail market, consumers with an annual consumption of 9000 MWh (threshold level for eligible consumers) were given the right to choose their electricity supplier (IEA, 2016). Moreover, the legal framework of the renewable energy support mechanism was introduced in 2005. The policy considers electricity production from various energy sources: hydro, wind, solar, geothermal, biomass, biogas (including landfill gas), wave, current and tidal (IEA, 2016).

Having a reliable and efficient electricity trading platform is one of the main elements of a liberalized energy market. The Turkish electricity market has taken numerous steps to achieve this goal. After 2006, the wholesale energy market was established to enable bilateral contracts and a real-time balancing mechanism between the electricity supply and demand. The Market Financial Reconciliation Centre (PMUM) operated the market. Between 2008 and 2010, electricity market participants could trade electricity one day before the settlement, thanks to the Day-Ahead-Planning, and settle hourly prices (Atiyas et al., 2012). The Renewable Energy Resources Support Mechanism (YEKDEM) was introduced (IEA, 2016). As of September 2015, the Energy Exchange Istanbul (EXIST) launched both the Day-Ahead Market and the Intraday Market with Real-Time Balancing (Bicen, 2016). Thus, the electricity market became more sophisticated and started to provide smart solutions for market needs.

Turkish electricity market consisted of 21 electricity distribution regions, each with its own distribution company serving as a retailer. In this framework, non-incumbent retailers and non-incumbent wholesaler companies had a relatively weak position in the market since incumbent retailer companies had the information advantage and were service providers for the distribution companies. Thus, one of the critical regulations regarding retail competition was to unbundle the vertical integration of incumbent distribution and retail companies. This regulation legally guarantees that distribution companies treat all retailer companies equally. Thus, it eased the engagement of new retailers (new entrants) and increased the competitiveness in the Turkish electricity retail market after 2013 (Sirin and Gonul, 2016); however, the market was not fully competitive because of regulations regarding eligible consumers.[1] Likewise, incumbent retailers are still powerful due to their requirement to be the supply of last resort for vulnerable (non-eligible) consumers and consumers preferring not to switch (eligible non-switchers).

Incumbent retailers provide electricity services as a supplier of last resort if their current retailer fails to deliver electricity (IEA, 2016). In 2018, another electricity consumption threshold level (50,000,000 kWh/year) was introduced to apply competitive market prices

[1] In order to protect consumers' interests, the EMRA puts a price cap on bilateral contracts for eligible consumers whose annual consumption is 100,000 KWh or less.

Table 1
Consumer groups in Turkish electricity retail market and corresponding policies.

			Regulated Tariff [b]	Bilateral Contracts with Regulation	Non-regulated Contract	LRST
Non-eligible Consumers			YES			
Eligible Consumers[d]	*Eligible Consumers with High Consumption[a]*	Large-scale Consumers[c]			YES	YES
		Non-large-scale Consumers	YES		YES	
	Eligible Consumers with Low Consumption		YES	YES		

Note: a: Consumes more than 100,000 kWh; b: Only the regional incumbent Retailer supplies electricity; c: Consumes more than 10,000,000 kWh (in 2019); d: Consumes more than 2400 kWh (in 2019).

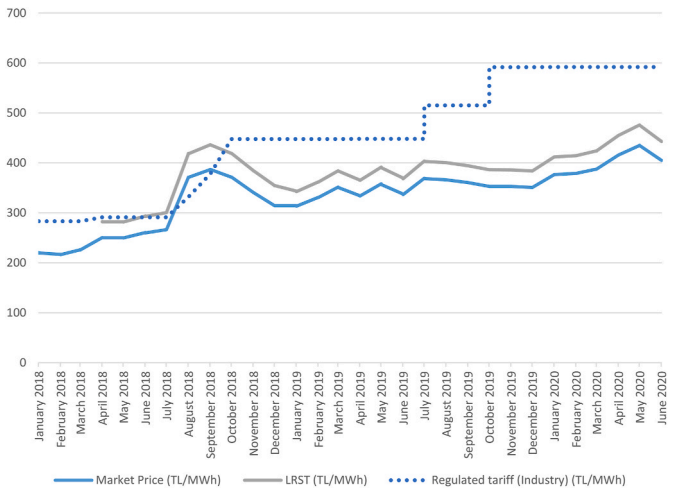

Fig. 1. Market price and regulated tariff for industrial users (TL/MWh).

determined by EXIST (see Table 1). With this new regulation, as a Supply of Last Resort, the incumbent retailer must supply electricity to consumers above the threshold, and those who do not have a contract with any other retailer. The price for these consumers is set at the Last Resort Supply Tariff[2](LRST), whose profit margin is determined by EMRA annually. Following this regulation, the eligibility threshold level[3] has gradually decreased. The LRST threshold level was reduced to 10,000, 000 kWh/year as of 2019.[4]

In the Turkish electricity retail market, the duration of the switching procedure and the search for a new retailer are the fundamental costs that make consumers less likely to change electricity service providers. To illustrate in detail: the switching procedure takes a while to implement (25–55 days); the websites for comparing retailers' offers are inadequate to attract new customers; websites do not reflect all retailers' price and service opportunities. Instead, consumers are informed about only some of the promoted retailers' offers. Thus, switching is much more demanding for residents due to higher searching costs because the websites do not provide adequate information about consumers' experiences and lack transparent information about retailers. However, large-scale consumers can hire consultants to make formal contracts or choose incumbent retailers themselves.

Fig. 1 illustrates how electricity market prices have increased over time. In 2018, input prices of electricity generation increased dramatically due to the depreciation of the local currency. Thus, between July and September 2018, market prices were above the regulated tariff for industrial users since higher natural gas prices decreased the profitability of the retail firms. Therefore, electricity market participants had difficulties, so most bilateral contracts between consumers and retailers were canceled. As a result, consumers were forced to purchase electricity from their regional incumbent retailers (Hacimale et al., 2019). Occasionally, eligible consumers who experienced various difficulties were discouraged from switching.

One might think that conducting a survey right after a financial crisis may lead to bias since incumbent retailers are more likely to be included.[5] Nevertheless, the existence of certain factors may suggest that this effect is minimal. Since 2001, EMRA has given 275 licenses for supplying electricity to consumers; 217 still hold their retailer licenses (EXIST, 2021). As Table 2 suggests, the number of active retailers decreased between 2017 and 2019. Moreover, the Herfindahl-Hirschman Index (HHI) value increased in 2018 due to the financial crisis. Afterward, the HHI fell to a level even lower than the 2017 one. These market signals might indicate that some existing non-incumbent retailers increased their market shares, and some new retailers could not survive. On the other hand, the market power of the incumbent retailers might stay the same.

As Fig. 2 suggests, the eligible consumers' electricity purchased from non-incumbent retailers increased from 2017 to 2018. Moreover, the consumption of regional incumbents and other retailers' customers increased following the crisis (see 2019 values in Fig. 2). Thus, it can be claimed that while some consumers changed to non-incumbent retailers, some consumers probably preferred to transfer to their regional incumbent retailer, as new electricity retailers canceled contracts with these consumers due to the crisis.

3. The theoretical framework and literature review

3.1. Switching behavior

Switching behavior has been an interest of research in various disciplines, including economics, marketing, and psychology (Fontana et al., 2019). Among those, the initial work on switching was concerned

[2] Thus, the LRST policy replaces the regulated tariff with a price cap formulated as [(Market Clearing Price + YEKDEM Premium) • constant].

[3] The eligibility threshold was 1600 kWh/year for 2019. This threshold was decreased to 1200 kWh/year for 2021.

[4] The LRST threshold is 7,000,000 kWh in 2021.

[5] The LRST was introduced in 2018, a few months before the 2018 crisis. Therefore, it is possible that some of the switching activities could have been caused by the 2018 crisis. To partially address this, when we collected the data, we tried to narrow down the population to consumers being subject to LRST. We listed "reasons to switch" and "reasons not to switch" within two questions in the questionnaire to account for this. Failure of the contract (7,46% of the sample) and bankruptcy of the retailer (2,99%) are given as options for switching in the questionnaire. We removed the observations for the ones where participants marked these options from the sample and re-estimated the specifications. The analyses suggest that new estimates are in line with the previous estimates. These analyses are not reported here to save space but are available from the authors upon request. However, the *t*-statistics of the estimates are slightly lower, possibly due to decreased sample size.

Table 2
HHI of Turkish electricity market and number of active retailers.

	2017	2018	2019
Number of Active Retailers*	142	116	103
HHI	437,5	494,3	413,6

Note: * whose sales are greater than zero.
Source: EMRA.

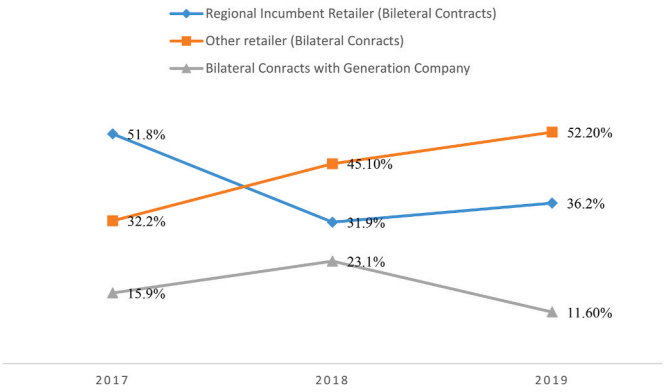

Fig. 2. Eligible consumers' electricity consumption (in percentages) across different suppliers (EMRA, 2019).

with the service industries. Keaveney (1995) studies economic factors (e.g., prices of the service required) and the quality of services involved in switching decisions. Klemperer (1995) uses theoretical models to highlight how switching costs and searching costs are important for the switching decisions, even for homogenous products. Thus, switching decisions are driven by economic factors (the price of the electricity, transaction cost, searching cost, etc.). On the other hand, Bansal and Taylor (1999) argue that, in addition to economic factors, psychological factors are important for the switching decisions of consumers. Their study extends Keaveney's study and introduces the Service Provider Switching Model (SPSM). They consider five major factors in determining switching preferences: service quality, satisfaction, switching cost, attitudes towards switching, and social influence.

In a pioneering study, Bansal et al. (2005) develop the Push-Pull-Status quo (PPS) (or Mooring) model for a service provider. Their work is based on studies of individual decision-making mechanisms employed in migration literature. In their research, push factors are the determinants that induce consumers to leave the current provider. Pull factors, however, refer to determinants that attract consumers to an alternative provider. Moreover, the mooring (Status quo) effect is based on Boyle, Halfacree, and Robinson's (1998) study. Boyle et al. (1998) consider the cases when individuals do not prefer to switch providers, although push and pull factors are strong.

3.2. Switching behavior in electricity retail market

Electricity suppliers are commercial companies that sell a nearly homogenous product (Gamble et al., 2009). There is also limited product differentiation other than price schemes varying minimally across electricity providers (Sirin and Gonul, 2016). Deller et al. (2017) claim that consumers do not regard electricity as a homogenous product and all retailers are not interchangeable due to non-price preferences. Therefore, even if fierce competition is expected, low switching rates are observed in various markets.

Government energy institutes have researched the barriers to competitive retail markets as well. In a European Commission report, factors that prevent consumers from switching are reported as: "1) the

Table 3
Descriptive statistics of questions in questionnaire.

Name	Number of observations	mean	Standard dev.	min	max
How many years have you been operating in this sector?	97	30.979	17.487	3	80
Have you ever switched your electricity supplier? (Yes:1/No:0)	104	0.846	0.363	0	1
How many times have you changed your electricity supplier?	91	3.088	2.787	0	12
The last time you switched between suppliers, which is your previous and current supplier?	103	2.068	0.82	1	4
Which sector does your business serve?	105				
Organized Industrial Zone	40				
Cement Manufacturer	17				
Plastic	14				
Steel Producer	10				
Construction	8				
Others	24				
How many employees does your firm have?	104				
0–100	38				
100–250	16				
250–1000	17				
1000–2000	19				
2000 and above	14				
What is your annual profit?	73				
0 TL - 500.000 TL	–				
1.000.000 TL - 3.000.000 TL	–				
3.000.000 TL - 10.000.000 TL	6				
10.000.000 TL - 25.000.000 TL	5				
25.000.000 TL - 125.000.000 TL	11				
125.000.000 TL and above	50				
no answer	33				
What is the share of electricity to your overall cost?	92				
4%	20				
5%–9%	12				
10%–19%	20				
20%–29%	12				
30%–39%	19				
No Answer	9				

Table 4
Descriptive statistics for survey items.

Group Name	Questions and Statistics	Number of observations	Mean	Standard Dev.	Median	Mode
Risk of Switching	*If I switch to another electricity supplier, I expect problems with solving issues*	104	2.144	1.009	2	3
	If I switch to another electricity supplier, I expect problems with payments	104	1.904	0.93	2	3
	If I switch to another electricity supplier, I expect problems with getting answers to questions	104	2.308	1.124	2	3
	If I switch to another electricity supplier, I expect problems with replies to complaints	104	2.413	1.187	2	2
Cost of Switching	*Customers have to pay a high cost for searching and evaluating information about alternative electricity suppliers before changing their supplier*	103	1.621	0.806	1	2
	Customers have to pay a high cost to learn about new services after changing their supplier	103	1.893	0.827	2	3
Commercial Service Quality	*My electricity supplier provided me with adequate consultation before proposing the best solution*	100	3.97	0.937	4	4
	My commercial responsibilities towards my supplier are clear	101	4.149	0.74	4	4
	My supplier respects his/her promises	101	4.089	0.567	4	4
	My supplier contacts me often	101	3.752	1.053	4	4
	There is adequate continuity in my relationship with my supplier	101	3.851	1.024	4	4
Administrative Service quality	*Terms and contracts signed are always clear*	101	3.99	0.781	4	4
	Invoices sent are always clear	101	4.277	0.736	4	4
	Invoices sent are always precise	101	4.158	0.771	4	4
Communicative Service Quality	*My suppliers inform me sufficiently about the potential retail services*	101	3.475	1.128	4	4
	My supplier provides clear information concerning the capability of his/her company's retail services.	100	3.46	1.068	4	4
Physical Service Quality	*My supplier advises me about ways to decrease distribution costs*	101	3.04	1.232	3	4
	My electricity supplier helps me solve electricity distribution problems (power outage, metering, billing).	101	2.535	1.323	2	2
Attractiveness of Switching	*There is not much differentiation among electricity suppliers*	104	2.75	1.113	3	2
	There is not much differentiation in service quality among the several electricity suppliers	104	2.788	1.103	3	2
	There is not much differentiation in price among the several electricity suppliers	104	2.808	1.043	3	4
Market Competition	High availability of alternative tariffs is offered (products of electricity retail market) in the market	104	3.51	0.924	4	4
	High availability of alternative services is offered in the market	104	2.846	1.003	3	2

Note: The answers are coded such that: 1 is strongly disagree; 2 is disagree; 3 is neither disagree nor agree; 4 is agree; 5 is strongly agree.

advantage of vertically integrated market players; 2) low customer awareness or interest; 3) uncertainty related to the regulatory future of digitalization; 4) uncertainty concerning the current regulatory environment or its development; and 5) strategic behavior of incumbent or other market players" (Market Observatory for Energy of European Comission, 2021). In the UK, 36% of switching is observed "to" and "within" incumbent retailers, even if these retailers offer higher prices. Furthermore, 11% of consumers perceive a risk of switching by referring to "the possibility of something going wrong with the switching process" (OFGEM, 2019).

Academic research focuses on the residential consumers' perception, even if low switching is mainly considered a structural problem in official documents. That is to say, following service provider switching theories and behavioral approaches in the literature, researchers provide empirical evidence concerning the barriers and drivers of switching in terms of economic factors such as switching cost, searching cost, and expected benefit rather than just prices. Guiletti, Waddam Price, and Waterson (2005) associate the switching behavior of customers with two types of economic barriers: expected benefits of lower price and switching-searching costs. They argue that consumers may not switch to alternative retailers that offer advantageous prices since switching and searching costs in the UK's gas retailer market are high. Moreover, later studies suggest that switching behavior does not occur when the act of changing suppliers is perceived to be higher in cost than the perceived relative higher benefits of switching (Ek and Soderholm, 2008; Gamble et al., 2009).

In various studies, behavioral factors including consumer expectations, consumer satisfaction, perceived service qualities, social influences, inertia, consumer loyalty, anticipated risk of switching, and perceived market conditions are also suggested as determinants of switching in the electricity market. Yang (2014) investigates the effects of suppliers' managerial skills as a non-price determinant, such as the proper relationship with consumers and service quality. Loi and Le Ng (2018) suggest that the information (disseminated in the market) regarding the quantity and quality of the service and contracts are important determinants for the active switching decisions of consumers. Among recent studies, Fontana, Iori, and Nava's (2019) findings emphasize the importance of market structure. Lower market concentration and switching experience in a similar (gas) market positively affect the Italian electricity market. Moreover, Flores and Price's (2018) results suggest that advice from family/friends positively influences switching activity more than advertisements. Harold, Cullinan, and Lyons (2020), examining 27 countries with 14 retail markets, state that the probability of switching in the retail electricity market is higher for those who have switched at least once in another retail market.

As an experimental study for EU countries, Schleich et al. (2019) show that behavioral factors such as risk aversion and discount factors also affect consumers' "not switching," "tariff switching," and "supplier switching" preferences diversely. Likewise, Flores and Price (2018) classify their sample on consumers' attitudes to markets (i.e., status quo, big bargain hunter, regret, gain/time, and life is too short). They argue that the attitudes of consumers are important in searching for new alternatives and switching behavior. In addition to those, if a consumer faces a choice among two options rather than a combination of these options, they are expected not to engage in retail markets or switch but to continue with the status quo (Watson et al., 2020; Waddams et al., 2014). Guiletti et al. (2005) determine the existence of the "home bias," where customers have a higher dependence on the current supplier (incumbent retailer) and prefer not to switch even though the opportunity cost of staying with the existing supplier is high.

He and Reiner (2017) depart from the mainstream determinants of switching as mentioned above; they consider the lack of attention to energy issues, consumers' political attitudes, and preferred payment method important in switching behavior. Moreover, Shin et al. (2015) and Danne, Sauthoff, and Musshoff (2020) focus on the green energy preferences in explaining the switching decisions of electricity consumers and explore the view that retailers' environmentally friendly behavior (for example, the green energy tariff) may affect intentions and tendency towards switching. Furthermore, Ziegler (2020) finds that trustworthiness and transparency are important.

Brand loyalty is a status quo factor defined as a positively biased emotive and/or behavioral response tendency toward a branded, labeled, or graded alternative/choice by an individual in his/her capacity as the user, the choice maker, and/or the purchasing agent (Sheth and Park, 1974). Hortacsu et al. (2017) suggest the existence of a significant brand advantage for the incumbent retailers, especially in the early years of deregulation. Moreover, consumers attribute an additional cost for switching, particularly for switching from an incumbent retailer (Dressler and Weiergraber, 2019). Gamble et al. (2009) also suggest that loyalty to their incumbent retailer ("former monopolist") inhibits consumers' switching activities in the Swedish electricity market. Loyalty is a more effective factor in electricity than in other markets (Gärling et al., 2008). Likewise, Shin and Managi (2017), analyzing the deregulation of the retail electricity market in Japan, argue that consumers' ambiguity concerning the management and supply stability for new entrants decreases the probability of switching electricity providers. Recently, Ndebela, Marsch, and Scarpa's (2019) findings reveal that the status quo effect and the dislike for non-traditional suppliers are influential on consumer switching.

Sirin and Gonul (2016) study the residential consumers' switching behavior in the Turkish electricity market. Their study reveals that classical economic theories assume that eligible consumers search for cheaper alternatives, while the behavioral economic theories claim that they stick to their current supplier. Furthermore, due to status bias and loss aversion, consumers fail to switch to cheaper options even though they have access to pertinent information. Moreover, the recommendations of social networks such as family members and friends seem to be important determinants in searching for possible electricity suppliers. A similar behavioral pattern is found for non-eligible consumers. Those consumers stick to their current provider (the status-quo) as they think that their gain in switching is too low and believe that switching is closely associated with perceived risk.

4. Data and the theoretical framework

4.1. Data

Questionnaires were sent out to the electricity purchasing managers of large-scale eligible electricity consumers through the Ministry of Industry and Technology, the Turkish Cement Manufacturers Association, the Turkish Steel Producers Association, and the Chambers of Industry in Ankara, Denizli, Izmir, and Kocaeli between June and September 2019. The questionnaire consists of three parts. The first part comprises the descriptive factors that capture firms' and their markets' characteristics. The second part reports the summary statistics of the firms' switching experience in the past; the previous switching experiences are assessed by the questions including the frequency of their switching behavior over the last five years, as well as the status of previous and current (incumbent or new entrant) electricity retailers. The third part includes the self-assessment type of questions intended to measure the opinions and attitudes of firms regarding their switching decisions in the electricity market using five-point Likert scale questions. While Table 3 reports the descriptive statistics for the first and second parts of the questionnaires, Table 4 reports the descriptive statistics for the study variables of the five-point Likert scale questions.

Surveys were gathered from 105 large-scale electricity consumers, representing 6% of all the electricity meters being employed to measure the consumption amount of large-scale electricity consumers. Anyone who consumes more than 10,000,000 kWh annually and is subject to the Last Resort Supply Tariff as of 2019 is considered a large-scale eligible electricity consumer. Since some of the supervisors can be decision-makers for more than one electricity meter, 105 might actually

Table 5
Confirmatory Factor Analysis' Loadings and Reliability (Two models).

Factors Items	Standardized Factor Loadings
Model 1 (χ^2[40]=137.03,0.001<p; CFI = 0.90; TLI = 0.85; GFI = 0.957; RMSEA = 0.07)	
Risk of Switching (Cronbach alpha = 0.81; AVE = 0.72)	
If I switch to another electricity supplier, I expect problems with solving issues	0.896
If I switch to another electricity supplier, I expect problems with payments	0.814
If I switch to another electricity supplier, I expect problems with getting answers to questions	0.949
If I switch to another electricity supplier, I expect problems with replies to complaints	0.940
Cost of Switching (Cronbach alpha = 0.84; AVE = 0.93)	
Customers have to pay a high cost for searching and evaluating information about alternative electricity suppliers	0.615
Customers have to pay a high cost to learn about new services after changing their supplier	0.615
Attractiveness of Switching (Cronbach alpha = 0.82; AVE = 0.74)	
There is not much differentiation among electricity suppliers	1.000
There is not much differentiation in service quality among the several electricity suppliers	0.673
There is not much differentiation in price among the several electricity suppliers	0.413
Market Competition (Cronbach alpha = 0.66; AVE = 0.50)	
High availability of alternative tariffs is offered (products of electricity retail market) in the market	0.524
High availability of alternative services is offered in the market	0.524
Model 2 (χ^2[48] = 170.86, 0.001<p; CFI = 0.93; TLI = 0.88; GFI = 0.98; RMSEA = 0.08)	
Commercial Service Quality (Cronbach alpha = 0.83; AVE = 0.57)	
My electricity supplier provided me with adequate consultation before proposing the best solution	0.583
My commercial responsibilities towards my supplier are clear	0.522
My supplier respects his promises	0.500
My supplier contacts me often	0.722
There is adequate continuity in my relationship with my supplier	0.606
Administrative Service Quality (Cronbach alpha = 0.75; AVE = 0.51)	
Terms and contracts signed are always clear	0.685
Invoices sent are always clear	0.716
Invoices sent are always precise	0.776
Communicational Service Quality (Cronbach alpha = 0.95; AVE = 0.90)	
My suppliers inform me sufficiently for potential retail services	0.977
My supplier provides clear information concerning the capability of his/her company concerning retail services.	0.929
Physical service Quality (Electricity Distribution Services) (Cronbach alpha = 0.74; AVE = 0.56)	
My supplier advises me about ways to decrease distribution costs	0.719
My electricity supplier helps me solve electricity distribution problems (power outage, metering, billing).	0.719

Table 6
Estimates on switching frequency: Factor analysis.

	Model 1	Model 2
Risk of Switching-Factor	−0.091***	−0.101***
	(-3.021)	(-4.133)
Cost of Switching-Factor	0.002	
	(0.080)	
Commercial Service Quality-Factor	−0.042	
	(-0.896)	
Administrative Service Quality-Factor	0.028	
	(0.672)	
Communicative Service Quality-Factor	−0.044*	
	(−1.696)	
Physical Service Quality-Factor	−0.073**	−0.041**
	(-2.360)	(-2.123)
Attractiveness of Switching-Factor	−0.044	−0.051**
	(-1.647)	(-2.167)
Market Competition-Factor	−0.022	
	(-0.983)	
Constant	0.223***	0.223***
	(9.507)	(9.549)
Observations	77	77
R^2	0.322	0.278
$\overline{R}^2$	0.242	0.249
Residual Std. Error	0.206	0.205
AIC	−14.441	−19.300

Note: *t*-statistics are reported under the corresponding estimated coefficient. ***is for the 1% significance level, ** is for 5%, and * is for 10%.

constitute more than 6% of the total population of decision-makers.

Table 3 suggests that 38% of the respondents are from organized industrial zones, which are distributed more-or-less evenly over almost every city of Turkey; this enables us to conduct the survey in various electricity distribution zones. Furthermore, 34% of the respondents are among the leading cities in electricity consumption: Istanbul, Izmir, Kocaeli, and Ankara. Lastly, the cement and steel sectors are electricity-intensive industries, constituting 25% of the respondents. As reported in Table 3, the large-scale consumers switched their electricity retailers about three times on average between 2003 and 2019. However, 67% of the switching activities were realized after introducing the Last Resort Supply Tariff.

The last part of the survey includes the five-point Likert scale questions designed to capture the differences in the switching activities of large-scale electricity consumers as a response to behavioral and psychological factors (see Table 4 for the survey questionnaire). The questions are scaled from strongly disagree (1) to strongly agree (5).

4.2. Theoretical framework regarding construction of factors

Table 4 reports 23 questions from eight categories. Following Wieringa and Verhoef (2007), the 'Risk of Switching' questions aim to capture the expected loss and/or danger that firms perceive after a possible switching. A higher risk of switching is associated with a higher likelihood of maintaining the status quo. The questions about 'Cost of Switching' are adapted from Yee et al. (2010). These questions capture

the perception of the additional cost that a customer is required to pay when terminating the current electricity provider (Porter, 1997). The items for the factor 'Attractiveness of the Switching' are borrowed from Wieringa and Verhoef (2007). As the items in this factor are coded in reverse order, the higher values denote the unattractiveness of switching. Thus, a rise in Attractiveness of Switching is expected to decrease switching activities. The two items from Yee et al. (2010) are used to measure 'Market Competition,' which refers to the availability of alternative electricity suppliers and consumers' awareness of this availability (Yee et al., 2010).

Service Quality as a pull factor is an assessment of what consumers expect from the service providers and the consumers' perception of the actual performance of the service providers. Chang, Wang, and Li (2017) show that the service quality perceptions of current suppliers affect consumers' decision to switch to alternative suppliers. We gathered four service quality aspects with twelve questions from Caceres and Paparoidamis (2007). These aspects are Commercial Service Quality, Communicative Service Quality, Physical Service Quality, and Administrative Service Quality.

To ensure the factorial structure and construct precise scales (factors) from the survey items, we conducted a series of Confirmatory Factor Analyses (CFA). Several statistics such as Chi-Square, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA) are provided to assess whether our specifications of factors fit the data well. Table 5 reports the factor loadings and goodness-of-fit statistics of the CFA estimates. In the first CFA, we tested the factorial structure of the cost of switching, risk of switching, the attractiveness of switching, and market competition factors with a total of 13 items. After the elimination of one item from the risk of switching due to low-factor loading, the CFA provides an acceptable fit to data ($\chi^2[40]$=137.03,0.001<p; CFI = 0.90; TLI = 0.85; GFI = 0.957; RMSEA = 0.07). Therefore, we conclude that the items are loaded to their latent factors, and loadings are statistically significant. In the second specification of CFA, we perform the four-factor dimensional structure of perceived service quality. The findings provide a satisfactory fit to data ($\chi^2[40]$=137.03,0.001<p; CFI = 0.90; TLI = 0.85; GFI = 0.957; RMSEA = 0.07) with statistically significant factor loadings.

5. Empirical evidence

This section reports the estimates of the two specifications that capture the competitiveness of the retail market for large-scale electricity consumers. For the first specification, we model the switching frequency with switching factors to understand the determinants of inertia for large-scale electricity consumers. For the second specification, we model switching direction on switching factors to capture factors behind consumers' switching from the incumbent retailer or staying with the incumbent retailer. For the explanatory variables, we consider eight switching factors: Cost of Switching, Risk of Switching, Commercial Service Quality, Administrative Service Quality, Communicative Service Quality, Physical Service Quality, Attractiveness of Switching, and Market Competition. Each factor consists of several questions that vary from two to five, a total of 23 questions. Including all 23 questions as explanatory variables would cause a multicollinearity problem and *Type-II* errors (not rejecting the null when it is false). To eliminate this problem, we employ confirmatory factor analysis for each of the factors. The loadings of these factors are reported in Table 3. For calculating the relevant statistics, we used the R statistical program (version 3.6.2; R Core Team, 2019) and R packages[6] to compute estimations of econometric models.

Table 7
Estimates on Switching Frequency: Individual Questions-Item based Analysis.

	Model 1
If I switch to another electricity supplier, I expect problems with getting answers to questions	−0.080*** (-3.879)
Terms and contracts signed are always clear	0.061* (1.950)
My supplier advises me about ways to decrease distribution costs	−0.050** (-2.589)
There is not much differentiation among electricity suppliers	−0.038* (-1.799)
Constant	0.427*** (2.687)
Observations	80
R^2	0.303
$\overline{R}^2$	0.265
Residual Std. Error	0.210 (df = 75)
AIC	−15.80

Note: *t*-statistics are reported in parentheses under the corresponding estimated coefficient in parentheses. ***is for the 1% level of significance, ** is for 5%, and * is for 10%.

5.1. Switching frequency

The cost of electricity constitutes a considerable portion of total costs to large-scale consumers; thus, large-scale eligible consumers have a high financial incentive to switch to retailers that offer better prices and services. A binary variable measuring whether or not the consumers switched their providers in the last five years fails to reflect consumers' activity levels properly because switching may have occurred multiple times over the previous five years for some consumers. However, these changes in the dependent variable can indicate different characteristics of the consumers. To this extent, the switching frequency can be taken as an indicator of market competitiveness and can capture the behavior of consumers better than a model that uses binary variables. For the frequency, we use the number of times a large-scale consumer changed its provider as the nominator and the firm's age as the denominator of the dependent variable. However, switching was not possible before 2003; thus, for the firms founded before 2003, we take their age as 16.

The estimates for the switching frequency specification are reported in Table 6. The first column, Model 1, includes all eight variables (factors) that we consider. The Risk of Switching, Communicative Service Quality, and Physical Service Quality variables have statistically significant[7] and negative coefficients. The estimates of the first column suggest that large-scale eligible consumers perceive a higher Risk of Switching have 9.1% less frequently changed their retailer. The estimate indicates that if a customer expects any failure to acquire fundamental services from a provider, the consumer prefers to stay with the current provider, which supports the status quo. Likewise, if large-scale eligible consumers are more satisfied with the Physical Service Quality or a one-unit increase in the measure, these consumers are likely to have switched electricity retailers 7.3% less frequently; thus, customers will

[6] The R packages that we used: data.table (version 1.12.8; Dowle & Srinivasan,2019), mass (Venables and Ripley, 2002), Hmisc (version4.3–1; Harrel and Dupont, 2020), oglmx (version 3.0.0; Carroll, 2018), effects (Fox &Weisberg,2019), effects ext. (Fox and Hong, 2009), mfx (version 1.2-2; Alan, 2019), readlx (version 1.3.1; Headley and Bryan, 2019), lavaan (version0.6-8; Rossel, 2012), psych (version 2.1.3; Revelle, n.d.), sandwich (version 2.5–1; Zeileis, 2006).

[7] The level of significance is 10%, unless otherwise stated.

Table 8
Categories of dependent variables in ordered logistic regression.

Previous Retailer	Post Retailer	Categories	Rank
Newly Entered Retailer	Newly Entered Retailer	Competitive	1
Another Regional Incumbent Retailer	Newly Entered Retailer		1
Another Regional Incumbent Retailer	Another Regional Incumbent Retailer		1
Newly Entered Retailer	Another Regional Incumbent Retailer		1
Incumbent Retailer for the corresponding region	Newly Entered Retailer	Somewhat Competitive	2
Incumbent Retailer for the corresponding region	Another Regional Incumbent Retailer		2
Newly Entered Retailer	Incumbent Retailer for the corresponding region	Uncompetitive	3
Another Regional Incumbent Retailer	Incumbent Retailer for the corresponding region		3
Incumbent Retailer for the corresponding region	Incumbent Retailer for the corresponding region		3

be more hesitant about switching not to lose the Physical Service Quality regarding electricity distribution. The Communicative Service Quality variable also has a negative and statistically significant coefficient for switching frequency. Note that the last two factors support the pull factors of Bansal et al. (2005).

For Model 2, to get a more parsimonious estimate, we iteratively eliminate explanatory variables following the Backward Elimination Method based on AIC (Akaike Information Criterion). The estimates reveal that the Risk of Switching, Physical Service Quality, and Attractiveness of Switching factors have negative and statistically significant coefficients. The model suggests that when the ranking of Physical Service Quality increases, then the switching frequency of the consumer is expected to decrease by 4.1%. Likewise, if the Risk of Switching measure increases by one unit, then the switching frequency of eligible consumers decreases by 10.1%. In addition to the factors in the first model, the Attractiveness of Switching, which captures the service differentials, has a statistically significant and negative coefficient. A rise in the ranking of this factor leads to a decrease in switching frequency by 5.1%. Due to consumers' perceptions of the low variability of value-added services and the low level of opportunities to save by switching, consumers expect a lower level of benefit from switching electricity suppliers. In other words, the homogenous prices and services of the retail market are barriers to competition.

The statistical evidence presented above mainly suggests that switching frequency depends on the Risk of Switching. If the consumers believe that any risk of losing current benefits exists, then the status quo is more likely. On the other hand, the statistical evidence from Model 2 suggests that the Attractiveness of Switching plays an important role as another determinant of switching frequency, which captures the similarity among retailers to decrease switching frequency. In other words, a homogenous market condition decreases opportunities to save by switching and decreases the switching benefits of differentiation; thus, it induces consumers to change their supplier less frequently. Furthermore, according to the PPS model, the Risk of Switching and Attractiveness of Switching is defined as mooring factors; thus, increasing these variables enhances the likelihood of the status quo. The third determinant of switching frequency, the Physical Service Quality, suggests that large-scale consumers perceive the support of electricity suppliers during blackouts and metering and billing as benefits. Thus, consumers may prefer to stay with their existing suppliers who offer better Physical Service Quality, which is attributed to the pull factor of the PPS model. Therefore, consumer satisfaction with the actual Physical Service Quality may increase the loyalty of consumers to their current electricity retailer. Thus, it can be concluded that the lack of economic benefits and the high cost of switching may increase inertia, thereby decreasing competitiveness in the retail market.

In addition to the estimates for the switching frequency model in Table 6, it is crucial to identify which items (or questions) in these eight factors have more explanatory power. First, we estimate the coefficients of all the individual things of the eight factors. However, due to multicollinearity and *Type-II* errors, we report the estimation after the Backward Elimination in Table 7.

Table 7 suggests that the "not receive an answer to [their] questions" risk is the most influential statement among the Risk of Switching factor components. Suppose large-scale consumers acknowledge that they expect they will "not get an answer to their questions" when they change their electricity supplier. In that case, the switching frequency of consumers decreases. It may also suggest that large-scale electricity customers will be reluctant to switch their retailers frequently because establishing a relationship with a new retailer is difficult. It is more difficult when consumers change their suppliers frequently. The second variable reflects that if consumers agree to the statement "Terms and contracts signed are always clear," they may be more active in the retail electricity market to change their provider. The estimates also suggest that the electricity provider's "advice about decreasing distribution system cost" of a company is the most dominant item of the Physical Service Quality. That is, such a statement leads to a decrease in switching frequency by 4.9%. Lastly, the estimates from Model 1 suggest that "there is not much differentiation among electricity suppliers" is the most compelling statement from the Attractiveness of Switching factor. A one-unit increase in the homogeneity of the retailer's measure decreases switching frequency by 5.1%. This might be because a low level of differentiation reduces the benefits of switching and thus enhances inertia. Since the Risk of Switching and the Attractiveness of Switching are both theoretically framed as Status Quo effects, the status quo effects of the PPS model can be interpreted as being dominantly effective on differences in switching frequency.

5.2. Switching direction

"Switching direction" is defined as a categorical variable for being uncompetitive, somewhat competitive, or competitive. Table 8 provides the categories of switching directions in detail. The switching direction is based on three types of suppliers, and thus nine categories of switching make up all of the former and current supplier possibilities.

Uncompetitive Switching is defined based on two main types of switching direction: not switching from regional incumbent retailers and returning (switching) to regional incumbent retailers.[8] The loss aversion theory of Tversky and Kahneman (1991) claims that "consumers in the electricity market may fail to switch their suppliers because they anticipate that switching may be equally likely to incur a loss as a gain, and they dislike a loss more than they like a gain" (Gärling et al., 2008). Moreover, not switching (loyalty to the incumbent) can be explained by the endowment effect (Samuelson and Zeckhausen, 1988).

[8] Guiletti et al. (2005), Gärling et al. (2008), Shin and Managi (2017), Hortacsu et al. (2017), and Sirin and Gonul (2016) consider switching and its behavioral determinants and claim that incumbent retailers' dominance becomes a barrier to competitiveness in the electricity retail market following deregulation. Moreover, a set of governmental institutions also report that switching direction and market concentration are a proxy of markets for competitiveness (see, for examples, OFGEM (2019); EMRA (2019)). Thus, we consider choosing an incumbent retailer as a measure of (un)competitiveness.

Table 9
Switching direction ordered logit estimates: Factor analysis.

	Model 1				Model 2		
	Coefficient	Odds Ratios	Coefficient	Odds Ratios	Marginal Effects on Pr (Comp.)	Marginal Effects on Pr (SomeW.-Comp.)	Marginal Effects on Pr (Uncomp.)
Risk of Switching	−0.074	0.930					
	(-0.249)						
Cost of switching	0.638***	1.893	0.652***	1.920	−0.0818***	0.023	0.059***
	(2.622)		(3.080)		(-3.016)	(0.943)	(2.814)
Commercial Service Quality	1.518***	4.561	1.218***	3.380	−0.153***	0.043	0.110***
	(3.223)		(3.493)		(-3.329)	(0.954)	(3.031)
Administrative Service Quality	−1.148***	0.317	−1.104***	0.332	0.138**	−0.039	−0.100**
	(-2.821)		(-2.825)		(2.764)	(-0.937)	(-2.583)
Communicative Service Quality	0.164	1.178					
	(0.616)						
Physical Service Quality	−0.177	0.837					
	(-0.874)						
Attractiveness of Switching	0.128	1.136					
	(0.499)						
Market Competition	−0.187	0.829					
	(-0.867)						
1|2	−1.8225		−1.7596				
	(-5.710)		(−5.740)				
2|3	2.246		2.194				
	(6.480)		(6.461)				
Observations	96		96				
Pseudo-R^2	0.140		0.121				
% Correctly Predicted	71.88%		70.83%				
AIC	160.109		153.1797				
Loglikelihood	−70.054		−71.589				

Note: *t*-statistics are reported in parentheses under the corresponding estimated coefficient. ***is for the 1% level of significance, ** is for 5%, and * is for 10%.

The availability of information and the willingness to obtain information are important determinants for switching decisions (Johnson et al., 2003). Moreover, if retailers' offerings are not well documented, then the perceived costs of seeking information associated with comparisons of offers can be overestimated by consumers (Waterson, 2003).[9] Thus, if consumers do not particularly benefit from switching due to low diversity or have had a bad experience, they may not want to acquire new information due to the cost of searching and obtaining reliable information. Thus, they are prone to return to their initial retailer, which is under uncompetitive switching.

Following neoclassical economics' rationality, Competitive Switching includes switching directions between new entrant retailers and/or other regional incumbents. It assumes that individuals choose whatever is best for them, given their preferences and perceived options (Giocoli, 2005). Switching to retailers other than their regional incumbents (Competitive Switching) can be attributed to searching for a better offer and choosing the best option.

Lastly, we consider two possible scenarios for the Somewhat Competitive Action after covering seven of the nine possible types of actions. The first entails consumers' regret due to lack of service by the new retailer and another incumbent retailer; then, they might return to the regional incumbent retailer. The second is higher satisfaction with the new retailer's service than the regional incumbent; they might continue to choose the best offer.

We estimate an ordered logit model to show the different characteristics of the switching direction variables as reported in Table 8. Note that binary dependent variable models, such as logit and probit, allow a dependent variable to take two values to account for qualitative differences as good/bad or true/false. However, the dependent variable may take more than two qualitative differences using the proportional odds assumption in the ordered logit model. The proportional odds assumption allows the intercept terms to be different for each category; however, the estimated coefficients of the independent variables are fixed across categories. In ordered logit regression models, explanatory variables map into a latent response variable with the transformation of the logistic function. The threshold values of ordered logit models give the boundaries of this latent variable for the ordered categories of the dependent variable. The threshold value estimates are reported in Tables 9 and 10 as 1|2 and 2|3, stating the cut-off point of fitted values from competitive to somewhat competitive and from somewhat competitive to uncompetitive actions, respectively.

In Table 9, we report a set of estimates for the ordered logistic regression analyses. Model 1 reports the estimates of switching direction using all eight switching factors that we considered to be regressors. Note that the odd ratios report a percentage increase/decrease in the probability of "Competitive Switching versus Somewhat Competitive or Uncompetitive" action that is associated with variations in the cost and benefit of switching behavior. Model 1 suggests that changes in Cost of Switching, Commercial Service Quality, and Administrative Service Quality have statistically significant coefficients for the estimated switching direction variables. For every one-unit increase in the Switching Cost measure, which is given as a psychological transaction cost, the odds of Uncompetitive Switching (versus Somewhat Competitive or Competitive) increase. As a pull factor of switching, an increase in Commercial Service Quality causes an increase in the odds of Uncompetitive Switching (versus Somewhat Competitive or Competitive), and the odds ratio is 4.56. For every one-unit increase in the ranking of the Administrative Service Quality variable, the odds of Uncompetitive Switching (versus Somewhat Competitive or Competitive) decrease (the odds ratio is 0.31).

Model 2 reports the estimated coefficients of switching factors on the switching direction after the Backward Elimination. We report the

[9] In line with this, Giulietti et al. (2014) and Schleich et al. (2019) provide empirical evidence that consumers perceive switching cost differently for incumbent and new entry retailers.

Table 10
Switching direction ordered logit estimates: Item based.

	Model 1			
		Marginal Effects on Pr (Comp.)	Marginal Effects on Pr (SomeW.-Comp.)	Marginal Effects on Pr (Uncomp.)
Customers have to pay a high cost to build a new relationship after changing electricity suppliers.	0.924*** (3.130)	−0.113*** (-3.045)	0.035 (1.039)	0.078*** (2.709)
There is adequate continuity in my relationship with my supplier	0.811*** (3.151)	−0.099*** (-2.966)	0.031 (1.025)	0.068*** (2.744)
Terms and contracts signed are always clear.	−0.755** (-2.265)	0.092** (2.169)	−0.029 (-0.965)	−0.063** (-2.123)
1|2	0.057 (0.046)			
2|3	4.133** (2.840)			
Observations	98			
McFadden's R2	0.139			
Percent Correctly Predicted	68.37%			
Log-Likelihood	−70.82			
AIC	151.64			

Note: *t*-statistics are reported in parentheses under the corresponding estimated coefficient. ***is for the 1% level of significance, ** is for 5%, and * is for 10%.

estimates for the marginal effects of explanatory variables in addition to the coefficients of the corresponding odds ratios. Note that the estimates in Model 2 have a pattern similar to Model 1. The estimates for Model 2 of Table 9 suggest that when consumers are more concerned about the Cost of Switching factor, the likelihood of competitive action decreases; however, the probability of uncompetitive action increases. The cost of searching for the proper retailer and the cost of learning a new business sense with the future retailer increase the likelihood of staying with the incumbent retailer or switching to an incumbent retailer. Moreover, the incumbent retailer's brand and their business sense have been known for years by customers in the region. Therefore, this supports the proposition that incumbent retailers have a brand advantage in the market that induces consumers to prefer the incumbent's services to those of a new retailer; correspondingly, their market share will be higher than that of the new retailer.

The Commercial Service Quality factor also has a statistically significant coefficient in the switching direction specification. Consumers who believe that the current retailer gives good quality service are less likely to switch from the incumbent retailer to a new retailer. It seems that the more satisfied with the current provider, then less likely the consumers are to switch to another retailer. Administrative Service Quality affects competitive action conversely, which means that consumers cannot be confident that they will receive good service quality from a new retailer**.** Large-scale electricity consumers who think that another supplier is clear about contracts, terms, and invoices are more likely to switch. In other words, clarity in terms of contracts and accuracy of invoices make consumers trust retailers, so they are more willing to switch since they may feel more secure about the adequacy of services of new suppliers and enhance the market competition. Here, since Commercial Service Quality behaves as a Pull factor in switching from the incumbent retailer, Administrative Service Quality acts as a Push factor. Overall, the estimates support the presence of all Push, Pull, and Status Quo factors as the behavioral factors of switching. Thus, this could suggest that if certain regulations are put into effect by the authorities, then there will be a decrease in the status quo effect. Large-scale consumers would look for and switch to a new retailer with a better offer in the retail electricity market. The dominance of the incumbent retailer would be decreased with a corresponding increase in the service quality of the new retailer. [10]

Following the analyses reported in Table 7, we perform another set of analyses to determine which particular questions related to the eight factors have statistically significant explanatory power for the switching direction. The corresponding estimated coefficients and their marginal effects are reported in Table 10.

The high cost of "learning about new services after changing their supplier" decreases the likelihood of switching to a non-incumbent retailer by 11.3%. The marginal effects on the likelihood of switching to the regional incumbent retailer or being locked in the regional incumbent retailer increase with the psychological transaction cost of switching. This suggests that the psychological transaction cost of switching to a new service provider rather than staying with the regional incumbent retailer has statistically significant explanatory power. Large-scale consumers' knowing the business sense of the regional incumbent retailer brings about consumer loyalty to them. Secondly, among the Commercial Service Quality statements, "adequate continuity in the relationship with the [current] supplier" has a more potent effect on switching direction. If consumer claims to have adequate continuity in the relationship with an electricity supplier, then the probability of switching to a non-incumbent retailer decreases by 10%. This suggests that regional incumbent retailers are more advantageous as the supplier of last resort. Lastly, the estimates suggest that clarity of contracts and their terms increase the likelihood of switching to the retailers rather than staying with the regional incumbent retailer. Thus, it eventually enhances competitiveness. When large-scale electrical consumers believe that the law will protect their commercial rights, the risk of switching to suppliers offering lower prices and better services disappears. Correspondingly, it can be concluded that the trustworthiness of retailers and the obedience to rules in contracts can increase competitiveness in the retail electricity market.

6. Conclusion and policy implications

This paper investigates the determinants of large-scale electricity consumers' switching behavior across different electricity service providers in the deregulated Turkish electricity market. We employ two measures for consumers' switching behavior: Switching Frequency and Switching Direction. Switching Frequency is related to how often large-scale consumers change their providers. Switching Direction is the variable for the status of previous and current retailers of the large scale consumer in deciding to switch between retailers. Retailers might be the regional incumbent retailer, another region's incumbent retailer, or a newly entered retailer. We find that both economic and behavioral factors help to explain the variations in these two switching measures.

We identify eight behavioral and economic switching determinants with the factor analyses gathered from the twenty-three questions. The estimates reveal that the Risk of Switching, the Attractiveness of Switching, and the Physical Service Quality explain the variations in Switching Frequency in a statistically significant fashion. When the particular questions concerning the switching factors are considered, the estimates suggest that distribution-related costs, the homogeneity of the retail market, and "the risk of not getting answers to questions from retailers" have statistically significant explanatory powers for the switching frequency variable. Cost of Switching, Commercial Service Quality, and Administrative Service Quality are important drivers of the Switching Direction. Our study reveals that being familiar with the business sense of a new retailer, continuity of relationship with the

[10] The sample we gathered includes firms that also produce their own electricity (seven firms) and six firms from two conglomerates that purchase electricity from their subsidiaries. We repeat the exercises by excluding both types of sample points. The results were robust.

current retailer, and the clarity in terms of contracts can explain the variability of switching direction in a statistically significant fashion.

Estimates also suggest that consumers who get potentially higher benefits through the heterogeneity of electricity retailers (with different pricing schemes and services) change their suppliers more frequently. However, coexisting regulated tariffs prevent heterogeneity of the market by limiting prices. Furthermore, limited price differentiations inhibit an incentive for creating new services that satisfy the consumers. In parallel with the present study, Yang (2014) investigates the effects of service quality and market variability on consumer classification (switching, uncertain, and not switching) with a multinomial logistic model. In line with the present study, it is suggested that "higher relationship management quality [*better communication skills of suppliers*] and lower economic benefits contribute to higher inertia, which prevents consumers from switching."

Furthermore, large-scale consumers associate switching with a higher risk of not receiving fundamental services. Higher perceived risks encourage consumers to prefer the status quo. The estimates also suggest that consumers satisfied with the services of their current providers regarding distribution system problems generally prefer not to switch to alternative retailers. Consumers expect retailers to provide electricity distribution services even if problems (i.e., blackouts, metering, and billing) are the responsibility of the distribution firm rather than the retailers. The assessments of Turkish institutions regarding the retail electricity market support the results of the present study. First, the Competition Authority of Turkey investigated the retail electricity market concerning the dominance of regional incumbent retailers in 2015 (RK, 2015). The investigation report noted that antitrust issues could lead to a rise in consumers' switching costs and the perceived risks of switching (Sirin and Gonul, 2016). In line with our estimates, their study argues that consumers' activity level may depend on the perceived risk of switching from regional incumbent retailers in terms of "unanswered complaints" and "unsolved problems."

Our study also suggests that satisfaction with commercial services ensures loyalty to the electricity retailers. This implies that consumers believe that the incumbent retailers are more qualified to provide various services than actually what they are. Switching cost is another factor that affects the switching direction; consumers familiar with their retailer's business sense are also less likely to switch to a new retailer. These results support the incumbent brand advantage over a new retailer. We gather estimates parallel to the existing literature on switching behaviors in electricity retail markets. Ndebele et al. (2019) survey residential consumers in New Zealand and analyze the behavioral determinants of consumers based on their switching decisions. The authors show that being a regional supplier and having a brand advantage make an incumbent retailer more preferable. Additionally, Hortacsu et al. (2017) use three specifications for switching: first, "switching from the incumbent retailer," second, "searching for switching," and lastly, "switching." They assess the residential switching behaviors in the Texas retail electricity market and note that the source of consumer inertia is a brand advantage for incumbent retailers.

When large-scale consumers don't hesitate about the clearness of contracts and their legal bindingness, they are more likely to benefit from new alternatives and enjoy new entry retailers' services. Thus, an enforceable and more understandable contract is a significant determinant for enhancing competitiveness in the electricity market. Similarly, the Energy Traders Association conducted a survey highlighting determinants of switching activity. They showed that 73% of consumers switched to an alternative electricity supplier due to low service quality. Moreover, some of the switchers did not sign a new contract because they were concerned about the ability of new providers to fulfill the contract's legal obligations; some of them returned to their regional incumbent retailers (ETD, 2016).

To the best of our knowledge, this study is the first to analyze the switching behaviors of large-scale consumers in the Turkish electricity market. On the other hand, Gurbuz (2014) and Sirin and Gonul (2016) study the switching behaviors of Turkish residential consumers. They conclude that consumers do not switch electricity providers due to a lack of information. Nevertheless, large-scale consumers who consume more than 10,000,000 KWh are more informed about their right to choose their electric supplier since they are subject to LRST. Moreover, Sirin and Gonul (2016) state that perceived risks and low expected gains prevent residential consumers from switching, as also suggested by our estimates.

Our study offers a set of recommendations to policymakers. Firstly, large-scale electricity consumers are concerned with securing the quality of service with a new retailer. If large-scale consumers believe that the contracts are guaranteed under the law, and any dispute/problem will be solved when one side fails to discharge their responsibilities, they will be more willing to switch to a new retailer. Secondly, getting a lower electricity bill is an obvious incentive but coexisting regulated tariffs decrease its effect. Although regulated electricity tariffs and a price cap might be necessary to protect vulnerable electricity consumers, the Turkish electricity market's price cap (the Last Resort Supply Tariff) prevents electricity suppliers from offering alternative prices and differentiated services. Consequently, a price cap for large-scale consumers is an obstacle to competitiveness in the market because gains from deregulation, such as creative solutions for market problems or new value-added services, decrease with price restrictions.

This study also suggests a set of recommendations to liberalize the Turkish electricity markets. New retailers should demonstrate that they have the necessary primary service quality and business-to-business relationships to create incentives so that consumers will be willing to try a new retailer. Moreover, proposing new services and opportunities to consumers will encourage them to consider switching to a different electricity provider.

CRediT authorship contribution statement

Murside Rabia Erdogan: Methodology, Writing – review & editing, Investigation, Data curation, Software, Validation, Formal analysis, Investigation, Funding acquisition. **Selin Metin Camgoz:** Conceptualization, Methodology, Investigation, Formal analysis, Investigation, Funding acquisition, Writing – review & editing. **Mehmet Baha Karan:** Conceptualization, Investigation, Data curation, Investigation, Funding acquisition, Writing – review & editing. **M. Hakan Berument:** Methodology, Writing – review & editing, Supervision, Formal analysis, Funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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