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Consumers' Switching Behavior and Bundling: An Empirical Study of Japanese Energy Retail Markets

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Abstract

This study empirically examines whether firms' bundling strategies affect consumers' switching behavior in Japanese energy retail markets. The results show that bundling makes consumers less likely to switch their supplier. When consumers are less likely to switch and locked-in, firms could exercise market power over existing consumers. When reviewing market competition after the full liberalization, it is important to consider the probability that firms' bundling strategies affect market competition.

Keywords: bundling, switching behavior, energy retail market, discrete choice model
JEL Classification Codes: L10, L94, L95

1. Introduction

In recent years Japanese energy retail markets were fully opened to competition. Following the full liberalization of the electricity retail market in April 2016, city gas retailing was also fully liberalized in April 2017. The number of new entrants into the markets increases and firms are engaged in price competition and marketing strategies such as bundling of electricity, gas or other services. This study empirically examines whether bundling strategies affect consumers' switching behavior in Japanese energy retail markets, using micro data of consumers.

The existing theoretical literatures on bundling in oligopoly markets show that bundle-discount intensifies price competition（Matutes and Regibeau [1992]）and bundling strategies attract new customers to firm's services through saving shopping costs (Armstrong and Vickers [2010]）. On the other hand, as consumers who purchased bundled services previously must restructure service portfolio along with switching suppliers, such inconvenience increases switching costs for consumers. Bundling could create switching costs and switching costs reduce consumers' switching of suppliers. Suppliers would want their existing subscribers to stay with them for as long as possible because the suppliers would profit from the subscribers' repeated purchases. Switching costs make the individual firm's demand more inelastic and so reduce competition in the market（Farrell and Klemperer [2007]）.

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This paper contributes to the recently growing literature on empirical studies of bundling and provides some implications to competition reviews of Japanese energy retail markets.

The remainder of this paper is organized as follows. Section 2 offers literature review, followed by the overview of Japanese energy retail markets. Section 4 presents an econometric model and data. Section 5 shows results and discussion. Section 6 provides conclusions.

2. Literature Review

A firm engages in bundling when it sells two or more separate products in a package for a single price. We observe such bundling strategies targeted at households in many markets including public utility services.

There are two basic types of bundling theoretically. The first is pure bundling, where the firm selling the bundle chooses only to sell the package and not the stand-alone goods. The second type of bundling is mixed bundling, where both the package and the individual goods are available from the bundling firm.

Bundling strategies bring both of efficient effects and anticompetitive harm to the market. The bundling firms achieve economies of scope in production. Firms want to simplify the choice set and reduce search costs for consumers. Consumers save shopping costs by one stop shopping. So bundling gives economic benefit to producers and consumers. Prior literature has shown that bundling can serve as an effective tool of price discrimination (Adams and Yellen [1976]). Whinston [1990] illustrates that a dominant firm in one market can exercise market power and foreclose other firms by using bundling. Matutes and Regibeau [1992] illustrates that bundling strategies might intensify market competition in an oligopoly market. Armstrong and Vickers [2010] shows that when shopping costs are high, mixed bundling in an oligopoly market may not necessarily improve profits as compared to linear pricing.

When purchasing different products from the same supplier at the same point in time, users can enjoy price discounts or save shopping costs because of economies of scope. While bundling attracts new consumers to a firm's service, bundling could play a distinct role to prevent existing consumers from leaving the present service. Consumers who purchased a service as a part of a bundle could face different inconvenience from those who did not purchase it as a part of a bundle. For instance, if a consumer purchases electricity and gas bundled together, then in order to switch to a different gas supplier, he would not only have to change the gas supplier but would also have to consider electricity service. Considering an alternative provider or dropping a service from a bundle force a consumer to restructure its entire service portfolio when switching and also to lose the simplification that comes from having all the services on one bill or one-stop consulting services. Such inconvenience or troublesome along with switching suppliers increases switching costs for consumers. Farrell and Klemperer [2007] defines switching costs as being where consumers find it costly to switch

from one supplier to another and indicates that switching costs affect consumers' behavior and market competition. The consumer who is locked in current supplier may decide to stay with it. Switching costs make consumers less price sensitive and so reduce competition in the market. Companies would want their existing subscribers to stay with them for as long as possible because the companies would profit from the subscribers' repeated purchases. Switching costs give market power to sellers, allowing them to raise price above competitors' by an amount almost equal to the switching cost. Beyond this, potential entrants may face difficulties to acquire locked-in users from the incumbent. If bundling creates switching costs, it could harm market competition and consumer welfare via increased market power.

There are some previous empirical studies investigating bundling's effects on consumers' switching behavior. Burnett [2014], Prince and Greenstein [2014] and Lee [2017] show that bundling of telecommunication services reduce consumers' switching behavior empirically. This paper also relates to prior literature that explores empirical investigation about consumers' switching behavior in energy market. Giulietti et al. [2005] focuses on consumers' switching behavior in British Gas retail market. Goto [2017] analyses empirically consumers' switching behavior in Japanese electricity retail market after liberalization.

This study empirically examines whether bundling strategies affect consumers' switching behavior in Japanese energy retail markets, using micro data of consumers. Although empirical evidence of switching costs arises in a variety of contexts, there is little empirical study focusing on switching costs deriving from bundling. To the best of my knowledge, this is the first paper to examine the effect of bundling in Japanese energy retail markets. This paper contributes to the recently growing literature on empirical studies of bundling and provides some implications to competition reviews of Japanese energy retail markets.

3. Overview of Japanese energy retail markets

The Japanese electricity retail market was opened to competition in April 2016. Following the full liberalization of the electricity retail market, city gas retailing is also being fully liberalized in April 2017. The number of new entrants into the markets increases and firms engage in price competition and marketing strategies such as bundling of electricity and city gas. Both of electricity and city gas used to be a monopolized market, with only one utility company offering supply to the region. In a monopoly market, without competition among suppliers, there is no sufficient price adjustment function, and the service tends to see little improvement. Retail liberalization started first among large-scale consumers and the targets of liberalization were extended step-by step to small-scale retailing. The incumbent companies of electricity and city gas enter mutual markets, and the companies in other industries, such as telecommunications or oil companies, also enter the electricity and gas market. Some companies offer the bundle including energy service or other services like safety

watch service. It is expected that services will be enriched.

Monthly reports of trading electricity and gas by the Electricity and Gas Market Surveillance Commission show the number of active new retail suppliers for homes in the whole country is 679 for electricity and 222 for city gas in Oct. 2020. Market shares of new retail suppliers for homes on contract number basis is 17.6% for electricity and 14.7% for gas in Dec. 2020. Household accumulated switching rate since liberalization on contract number basis is 21.7% for electricity and 19.2% for gas as of Dec.2020. The level of market competition is different among regions. In urban regions such as Tokyo or Kansai, the number of new entrants is large and market competition is fierce. In Kansai region on which this paper targets, market share of new retail suppliers for homes is the second highest next to Tokyo region for electricity, and the highest for gas retailing for homes on sales amount basis （Sept. 2020）. Consumers in Kansai region have a number of choices for both of electricity and city gas. Kansai Electric Power, the incumbent in electricity market and Osaka Gas, the incumbent in gas market entered mutual markets and provide both services. And some suppliers such as telecommunication or energy firms also provide both services in Kansai region.

4. Methodology and Data

Econometric model

A standard probit model for the investigation of consumers' switching behavior can be given as follows:

$$Y^* = X'\beta + \varepsilon, \quad Y = \begin{cases} 1 \ if \ Y^* > 0 \\ 0 \ if \ Y^* \leq 0 \end{cases}$$

where Y^* is a latent variable. Y is a binary variable taking the value of 1 if a household switch electricity suppliers and otherwise 0. Consumers decide to switch suppliers if the expected gains exceed the anticipated costs. The independent variables in X denote the factors which effect consumers' switching behavior including key independent variables which represent the effect of bundling. β represents the respective coefficients and ε is an error term. The model takes the form:

$\Pr(Y = 1) = \Phi(X'\beta)$

where Pr denotes probability and $\Phi(\cdot)$ is the standard normal cumulative distribution function. The parameters can be estimated using a maximum likelihood estimation.

Before switching suppliers, in general, a consumer decides to consider switching and search around suppliers. Once considering switching, a consumer decides whether to switch a current supplier or not. Giulietti et al. [2005] and Hortaçsu et al. [2017] employ such a two-stage decision-making modelling framework. In order to investigate such a decision-making of consumers, the bivariate probit model is appropriate to address the possible relationship between the consumers' searching and switching decisions. Bivariate probit model consists of two equations:

$$Y_1^* = X_1'\beta + \varepsilon_{1,} \quad Y_1 = \begin{cases} 1 \ if \ Y_1^* > 0 \\ 0 \ if \ Y_1^* \leq 0 \end{cases}$$

$$Y_2^* = X_2'\beta + \varepsilon_{2,} \quad Y_2 = \begin{cases} 1 \ if \ Y_2^* > 0 \\ 0 \ if \ Y_2^* \leq 0 \end{cases}$$

Where Y_1^* and Y_2^* are latent variables. Y_1 takes the value of 1 if a household consider switching electricity suppliers and otherwise 0. Y_2 takes the value of 1 if a household switch electricity suppliers and otherwise 0. X_1 and X_2 are vectors of independent variables which effect consumers' searching or switching behavior. β represents respective coefficients. ε_1 and ε_2 are error terms assumed to follow a bivariate normal distribution, with E (ε_1) = E (ε_2) = 0, Var (ε_1) = Var (ε_2) = 1 and Cov (ε_1 , ε_2) = ρ. The two-equation system, then, can be estimated using a bivariate probit maximum likelihood model. The correlation between the errors, ρ, can be interpreted as the interdependence of the unobserved components in two equations. These two equations could be estimated separately by standard probit model. But the joint estimation of two equations is more efficient when ρ is not equal to zero.

In order to consider switching, a consumer need to be aware that they have opportunities to consider and switch suppliers after retail market liberalization. According to web questionnaire survey conducted for this study, 96.4% of respondents were aware that they could choose suppliers after retail market liberalization. Therefor the decision-making step of whether to be aware is not considered in this study.

Data

The data for this study came from internet questionnaire survey of households' purchases or contracts of electricity and gas conducted by entrusted research company, INTAGE Inc., in Feb. 2021. Survey respondents were chosen as the key decision makers in a household budget including energy spending. They were selected as households who lived in the supply regions of Kansai Electric Power and Osaka Gas and whose residence was a house not an apartment, excluding an all-electric house, because respondents should have choices of electricity and city gas suppliers without restriction. They were requested to prepare for the recent monthly bill before making answers. Survey respondents were asked questions concerning their current supplier, tariff menu, charges, consumption of electricity and gas at the time that they were surveyed, their experiences of switching suppliers and reliability of each suppliers. Respondents were also asked the current and past bundle status of electricity, gas and other services. Information on income and respondents' characteristics was obtained.

Data summary

The data gathered by the questionnaire survey are summarized as follows: Table 1 and 2 show the proportion of subscribers for electricity and gas respectively. They show that the incumbent

firms have dominant positions in each market, but their proportions decrease from 2019 to 2020. The largest new electricity supplier is Osaka gas, the incumbent in gas market and the largest new gas supplier is Kansai Electric Power, the incumbent in electricity market. Osaka Gas which has market power in gas market seems to leverage it to acquire electricity customers from Kansai Electric Power through a bundle and vice versa. As a result, while incumbents increase the market share in the market they entered, they lose market share of originally dominated market. Two incumbents seem to compete head to head each other.

The survey shows that 60% of respondents have ever considered switching electricity supplier, with 39.1% stating that they have ever considered switching gas supplier. And 46.2% of respondents have ever switched electricity supplier, with 20.5% stating that they have ever switched gas supplier since full liberalization. Table3 indicates that 9.5% of electricity consumers and 4.0% of gas consumers changed suppliers in 2020.

The rate of consumers who purchase electricity and gas from the same supplier is 33.5% in 2020, with 29.3% in 2019 (Table4). It implies that bundling could attract consumers who purchase both services. The rate of consumers who purchase both services from Osaka Gas is 22.0%, and 9.7% from Kansai Electric Power in 2020.

Data limitations

The data used in this study has some limitations as follows: The data of past status about subscription of energy services or switching experiences is relied on the respondents' recalling ability, so they would have the potential recall bias problem.

Respondents of this questionnaire survey are limited to house residents who can choose suppliers of both electricity and city gas in Kansai region. Respondents who live in Osaka account for 47.7%, with 25.7% in Hyogo and 14.6% in Kyoto. The sample used in this study does not represent Japan as a whole.

The questionnaire survey for this paper was conducted through an internet survey. Almost all households consume energy services because they are necessary. There might be aged households which are not used to using internet or households which hesitate internet survey. Therefore the selected sample is not supposed to represent the entire households in Japan.

Variables

Table5 shows the definitions of variables used in the analysis. SWITCH and CONSIDER are dependent variables and others are independent variables which affect consumers' switching and searching behavior.

SWITCH equals 1 if a household switched electricity supplier in 2020, and 0 otherwise. CONSIDER for bivariate probit model equals 1 if a household considered switching electricity

supplier in 2020, and 0 otherwise.

To examine the effect of bundling in which this study is interested primarily, two kinds of key dependent variables, B_GAS and B_SERVICE, are employed. B_GAS is a dummy variable which equals 1 if a household purchased electricity with gas from the same provider as of 2019. B_SERVICE is a variable which denotes the number of services which a household purchased or used for free with electricity from the electricity supplier as of 2019. Some electricity suppliers provide various services beside electricity such as gas, broadband internet, TV, IP phone, mobile phone, service for house trouble, housekeeping service and safety watch service. The coefficients of these two variables are expected to be negative.

Consumers are expected to benefit from monetary savings by switching suppliers. The bill savings variable, SAVING, is constructed from a difference in charge between the supplier to which a household subscribed and the cheapest new entrant at the time of 2019. Its coefficient is expected to be positive. And the interaction term of savings available and income, SAVING*INCOME, allows for a potential differential effect across income levels.

Electricity and Gas Market Surveillance Commission [2017] indicates that the supplier's ability to supply services stably is very important factor for consumers to choose suppliers. In the questionnaire survey, respondents were asked perceived reliabilities of each supplier. A variable RELIABILITY is a perceived reliability of the supplier to which a household subscribed as of 2019. Its coefficient is expected to be negative.

The operations to switch electricity suppliers are rather similar to those of other services such as mobile phone, broadband internet and so on. So the experience of switching services which switching operations are similar to electricity may be expected to lower consumers' switching costs on switching electricity suppliers. The variable SERVICE_SW denotes the number of services of which a household has previously switched suppliers of the following: mobile phone, broadband internet, pay-TV or video streaming, life or medical insurance, car or fire insurance and home loan. The coefficient is expected to be positive.

Some variables which represent search costs are employed for bivariate probit model. Face to face sales by sales persons or suppliers' advertisement placed in TV or Web could decrease consumers' search costs. SALES takes 1 if a household has been promoted face to face by electricity supplier's sales person, otherwise 0. AD take 1 if a household has taken a look at advertisements of electricity suppliers, otherwise 0. Some online services which compare price or tariff menu between electricity suppliers are helpful for consumers to search suppliers. The variable COMPARISON equals 1 if household know online comparison services, otherwise 0. It is possible that SERVICE_SW which is already mentioned is interpreted as a variable representing experience of searching suppliers.

And variables of GENDER and AGE are included as demographic variables.

5. **Results and discussions**

Table7 shows the results of probit model investigating consumers' switching behavior. In Table8, the results of bivariate probit model which consider the correlation between consumers' switching and considering switching behavior is showed. ρ value is different from zero significantly, so this indicates that bivariate probit model is efficient.

The coefficient of a key independent variable B_GAS for this analysis concerning a bundle is negative and significant as expected in both of probit and bivariate probit model. It shows that consumers who previously bundled electricity with gas are less likely to switch electricity supplier in the following year than those who did not bundle. B_SERVICE is also negative and significant as expected. It shows that the larger the number of bundled services with electricity is, the lower the probability of consumers' switching electricity supplier is. These results imply that bundling increases switching costs and locks-in existing consumers. In the questionnaire survey, 61.2% of respondents recognize that to confirm or manage the usage of electricity and gas together by one bill is convenient. It means that consumers would lose the simplification coming from one stop shopping and feel inconvenient when they attempt to switch an electricity supplier. The results that consumers who bundle electricity with gas are less likely to switch suppliers are consistent with those of Burnett [2014], Prince and Greenstein [2014] and Lee [2017] in the case of telecommunication. The results that the suppliers which expand own service line could lower the probability of consumers' switching are close to Chen and Hitt [2002] which shows that the product line breadth of firms reduces customers' switching in online brokerage industry. It implies that consumers are more likely to be locked-in, if suppliers broaden their service line strategically.

The results of estimation show the marginal effects of each variable. According to the results of bivariate probit model (Table 8), consumers are 11.3% less likely to switch electricity supplier in 2020 when they purchase electricity with gas from the same supplier in 2019. Consumers are 4.3% less likely to switch electricity supplier when they purchase electricity with one other service from the same supplier. This means that consumers are 8.6% less likely to switch electricity supplier if they purchase electricity with two other services from a same supplier. These marginal effects are not so small. As mentioned below, RELIABILITY is significant factor for consumers to switch suppliers. Table8 shows that consumers are 2.6% more likely to switch an electricity supplier, when the reliability of the present supplier decreases by one grade. If new entrants improve their reliabilities by 4 grades relative to incumbents, it might be possible for new entrants to confront the effect of bundling by incumbents. However, it is not realistic. Once an incumbent locks-in existing consumers by the bundle, new entrants may face difficulties to make consumers to switch.

In urban area of Japan, a number of firms compete each other supplying bundled services with bundle-discount. Bundle to bundle competition to attract new consumers could be more intensive than that without bundling. This kind of competition was also observed in the early stage of energy

retail liberalization in Great Britain. However, once consumers purchase bundled services, bundling could increase switching costs and lock-in existing consumers. When consumers are less likely to switch and locked-in, firms could exercise market power over existing consumers. So far in Japan, raising price for locked-in consumers is not observed. But recently in Great Britain, price increase for locked-in users was recognized and regulated. The proportion of consumers who purchase bundled energy services in Great Britain is very high, so bundling is possibly one of factors which lock-in consumers（Murakami [2020]）. Even if consumers gain benefit through bundle discount in the early stage of competition, it is possible that competitive harm caused by switching cost exceeds such benefit in the long run.

In the case of switching, the coefficient of SAVING is negative and significant. The coefficient of SAVING*INCOME is insignificant. SAVING is expected to be positive, but exhibits a wrong sign. Even in prior literature, the effect of savings available is not clear. Giulietti et al. [2005] examines retail gas markets in Great Britain and finds that while the coefficient of monetary savings is negative and significant, it could be positive and significant especially where there is little expectation that the individual's incumbent supplier will match the lower price. Goto [2016] examines consumers' switching behavior in Japanese electricity markets and shows that the variables representing savings available are insignificant in most of cases. Consumers do not always recognize savings available. If a consumer uses an online comparison service, he easily recognizes savings available. But only 38.2% of respondents in this survey know the existence of such an online comparison service. Suppliers often conduct big discount campaigns such as free tariff for first one month or a gift voucher. It is possible that such campaigns affect consumers' decision making of switching. However, the data about such campaigns is not available in this study.

The coefficient of RELIABILITY is negative and significant as expected. It implies that consumers are less likely to switch electricity suppliers when the reliability of the supplier to which consumers have subscribed is high. The coefficient of SERVICE_SW is positive and significant as expected. It implies that the experience of switching services of which switching operations are similar to electricity raises the probability of consumers' switching electricity suppliers. The coefficients of demographic variables GENDER and AGE are insignificant.

In the case of considering switching, the coefficient of SAVING is negative and significant, and the coefficient of SAVING*INCOME is insignificant as with switching case. The coefficient of RELIABILITY is insignificant. The coefficients of SALES, AD and COMPARISON are all positive and significant, and their marginal effects are quite large. The coefficient of SERVICE_SW is positive and significant. The coefficient of demographic variables GENDER is insignificant. The coefficient of AGE is negative and significant. To activate market competition, it is desirable that consumers consider switching and switch suppliers. SALES, AD and COMPARISON are effective drivers of consumers' considering switching.

The investigation of consumers' switching behavior of gas suppliers is conducted for a robust check. Bivariate probit model of which dependent variable is a binary variable taking one if consumers switch a gas supplier is estimated. Independent variables for this case of gas supplier switching are constructed in the same way as electricity supplier switching case. Table 9 shows the results. The results that gas consumers who bundle gas with electricity or other services are less likely to switch gas suppliers are consistent with those of electricity supplier switching case.

6. Conclusion

This study examines whether bundling of energy services makes consumers less likely to switch their electricity supplier because of increased switching costs using unique survey dataset. The results find that electricity consumers who previously bundled with gas are less likely to switch their electricity supplier than are those who did not bundle. The effect of bundling is not so small. Bundle to bundle competition to attract new consumers could be more intensive than that without bundling. However, once consumers purchase bundled services, bundling could increase switching costs and lock-in existing consumers. When consumers are less likely to switch and locked-in, firms could exercise market power over existing consumers. Increased switching costs may also help deter entry of potential competitors, because competitors would find acquiring new customers from their current service provider more difficult. Bundling strategies could result in reduction of market competition. The finding that bundling reduces the probability of switching service providers and locks-in existing users can have important implications for market competition and consumer welfare.

Though this study focuses on Kansai region where market competition is rather intensified in both electricity and gas, the status of competition is different among regions. If there are no strong new entrants in gas market, a gas incumbent easily acquires one-stop shoppers and locks in them without losing market share of gas, providing electricity bundled with gas. Such regions need to be investigated more carefully.

Though data used in this study have some limitations, the proportion of consumers who purchase bundled services is over 30% at the time of survey as already mentioned and will possibly continue to further increase. When reviewing market competition after the full liberalization, it is important to take notice of the effect that bundling strategies give to market competition.

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Table1 Proportion of electricity subscribers by supplier (%)

Supplier	2020	2019
Kansai Electric	59.3	63.9
Osaka Gas	22.8	20.4
eo	4.1	3.4
J:COM	1.9	1.9
KDDI	1.9	2.1
Rakuten	1.0	0.6
ENEOS	0.7	0.3
LOOP	0.8	0.8
Softbank	0.8	0.7
Others	6.6	6.1
T0tal	100	100

Table2 Proportion of gas subscribers by supplier (%)

Supplier	2020	2019
Osaka Gas	83.4	85.2
Kansai Electric	11.4	9.6
eo	0.9	0.9
J:COM	0.9	0.8
Others	3.3	3.5
Total	100	100

Table3 Rate of switching by service (%)

	2020	2019
electricity	9.5	11.6
gas	4.0	5.6

Table4 Proportion of combination of electricity and gas subscriber by supplier in 2020 and 2019 (%)

2020			gas		
		Kansai E. Gas	Osaka Gas	Others	Total
	Kansai Electric	9.7	48.2	1.4	59.3
electricity	Osaka Gas E	0.3	22.0	0.5	22.8
	Others	1.3	13.2	3.3*	17.8
	Total	11.3	83.4	5.2	100.0
	Note: Meshed cells indicate proportion of subscribers who purchase electricity and gas from the same supplier.				
	*1.8 of 3.3 is rate of respondents purchasing from the same supplier.				

2019			gas		
		Kansai E. Gas	Osaka Gas	Others	Total
	Kansai Electric	7.8	54.1	1.9	63.8
electricity	Osaka Gas E	0.3	20.1	0.2	20.5
	Others	1.6	10.9	3.1*	15.6
	Total	9.6	85.1	5.2	100.0
	Note: Meshed cells indicate proportion of subscribers who purchase electricity and gas from the same supplier.				
	*1.4 of 3.1 is rate of respondents purchasing from the same suppliers.				

Table5 Data Definitions

Variables	Definitions	Code or Measures
SWITCH	switch electricity supplier	1=switch electricity supplier in 2020 0=not
CONSIDER	consider switching electricity suppliers	1=consider switching 0=not
B_GAS	bundled status with gas	1=electricity is purchased with gas from same supprier 0=not
B_SERVICE	services bundled with electricity	the number of services which are bundled with electricity
SAVING	savings available per year	difference in charge between the supplier which a household subscribed to and the cheapest new entrant at the time of 2019 (measured in 10 thousand yen)
INCOME	annual income of household	measured in million yen
SAVING * INCOME	interact term of SAVING and INCOME	
RELIABILITY	evaluation of reliability of supplier in 2019	1= not reliable 2= rather not reliable 3=neither reliable nor not reliable 4=rather reliable 5 = reliable
SERVICE_SW	experience of switching suppliers of other services	the number of services of which consumer has ever switched suppliers
SALES	experience of face to face sales of electricity	1= yes 0=no
AD	experience seeing or hearing advertisement of electricity sales	1=yes 0=no
COMPARISON	knowledge of online comparison service	1=know online comparison service 0=not
GENDER	Gender	Male= 1 Female= 0
AGE	Age of the consumer	Age in years

Table6 Descriptive Statistics

variables	mean	sd	max	min	n
Switch	0.096	0.295	1	0	1934
Consider	0.621	0.485	1	0	1934
B_GAS	0.343	0.475	1	0	1934
B_SERVICE	0.851	1.147	7	0	1934
SAVING	1.622	1.824	16	0	1934
SAVING * INCOME	6.677	4.331	30	1	1934
RELIABILITY	3.933	0.882	5	1	1934
SERVICE_SW	1.463	1.474	6	0	1934
SALES	0.521	0.500	1	0	1934
AD	0.908	0.288	1	0	1934
COMPARISON	0.412	0.492	1	0	1934
GENDER	0.542	0.498	1	0	1934
AGE	59.044	14.652	88	20	1934

Table7 Results for probit model of switching electricity suppliers

	Coef.	MarginalEffect		Coef.	MarginalEffect
B_GAS	-0.503***(0.101)	-0.077			
B_SERVICE				-0.162***(0.041)	-0.025
SAVING	-0.091**(0.045)	-0.014		-0.089**(0.045)	-0.014
SAVING * INCOME	-0.002(0.005)	0.000		-0.002(0.005)	0.000
RELIABILITY	-0.195***(0.045)	-0.030		-0.214***(0.044)	-0.033
SERVICE_SW	0.08***(0.028)	0.012		0.089***(0.028)	0.014
GENDER	-0.008(0.086)	-0.001		-0.014(0.086)	-0.002
AGE	-0.004(0.003)	-0.001		-0.004(0.003)	-0.001
constant	-0.196(0.252)			-0.147(0.25)	
n	1934			1934	
LR chi2(7)	78.81			69.00	
Prob > chi2	0.0000			0.0000	
Pseudo R2	0.0671			0.0587	
Log likelihood	-547.87334			-552.77907	
Note: Standard errors in parenthesis; *:p<0.10, **: p<0.05, ***:p<0.01.					

Table8 Results for bivariate probit model of considering and switching electricity suppliers

	Coef.	MarginalEffect		Coef.	MarginalEffect	
Considering switching						
SAVING	-0.082***(0.024)	-0.029		-0.081***(0.024)	-0.029	
SAVING * INCOME	0.003(0.002)	0.001		0.003(0.002)	0.001	
RELIABILITY	-0.031(0.034)	-0.011		-0.033(0.034)	-0.012	
SALES	0.270***(0.059)	0.096		0.262***(0.059)	0.093	
AD	0.352***(0.099)	0.125		0.362***(0.100)	0.129	
COMPARISON	0.361***(0.060)	0.128		0.365***(0.060)	0.130	
SERVICE_SW	0.109***(0.022)	0.039		0.109***(0.022)	0.039	
GENDER	0.068(0.061)	0.024		0.068(0.061)	0.024	
AGE	-0.005**(0.002)	-0.002		-0.005**(0.002)	-0.002	
constant	0.033(0.196)			0.034(0.196)		
Switching						
B_GAS	-0.703***(0.097)	-0.113				
B_SERVICE				-0.267***(0.041)	-0.043	
SAVING	-0.090**(0.043)	-0.014		-0.093**(0.043)	-0.015	
SAVING * INCOME	-0.003(0.005)	-0.001		-0.003(0.005)	0.000	
RELIABILITY	-0.160***(0.044)	-0.026		-0.189***(0.044)	-0.031	
SERVICE_SW	0.074***(0.028)	0.012		0.090***(0.028)	0.015	
GENDER	0.018(0.086)	0.003		0.000(0.086)	0.000	
AGE	-0.003(0.003)	-0.001		-0.003(0.003)	-0.001	
constant	-0.271(0.247)			-0.181(0.244)		
n	1934			1934		
Wald chi2(16)	242.19			234.2		
Prob > chi2	0.0000			0.0000		
Log likelihood	-1653.950			-1659.2027		
ρ	0.97163***			0.9631***		
LR test of rho=0:	chi2(1)=206.482	Prob > chi2 = 0.0000		chi2(1)=205.789	Prob > chi2 = 0.0000	
Note: Standard errors in parenthesis; *:p<0.10, **: p<0.05, ***:p<0.01.						

Table9 Results for bivariate probit model of considering and switching gas suppliers

	Coef.	MarginalEffect		Coef.	MarginalEffect	
Considering Switching						
SAVING	-0.029***(0.008)	-0.010		-0.029***(0.008)	-0.010	
SAVING * INCOME	0.002(0.006)	0.001		0.002(0.006)	0.001	
RELIABILITY	-0.052(0.037)	-0.018		-0.052(0.037)	-0.018	
SALES	0.286***(0.055)	0.101		0.284***(0.055)	0.100	
AD	0.191***(0.073)	0.067		0.19***(0.073)	0.067	
COMPARISON	0.434***(0.056)	0.153		0.434***(0.056)	0.153	
SERVICE_SW	0.096***(0.02)	0.034		0.097***(0.02)	0.034	
GENDER	0.171***(0.058)	0.060		0.172***(0.058)	0.060	
AGE	-0.011***(0.002)	-0.004		-0.011***(0.002)	-0.004	
constant	0.116(0.2)			0.116(0.200)		
Switching						
B_ELECTRICITY	-0.217**(0.106)	-0.016				
B_SERVICE				-0.101*(0.056)	-0.008	
SAVING	-0.049(0.082)	-0.004		-0.036(0.082)	-0.001	
SAVING * INCOME	-0.009(0.011)	-0.001		-0.009(0.011)	-0.001	
RELIABILITY	-0.056(0.066)	-0.004		-0.059(0.066)	-0.004	
SERVICE_SW	0.055(0.035)	0.004		0.06*(0.035)	0.005	
GENDER	0.261**(0.109)	0.020		0.257**(0.11)	0.019	
AGE	-0.005(0.004)	0.000		-0.005(0.004)	0.000	
constant	-1.405(0.349)			-1.419(0.349)		
n	2207			2207		
Wald chi2(16)	221.66			220.790		
Prob > chi2	0.0000			0.000		
Log likelihood	-1626.9758			-1627.349		
ρ	0.7289***			0.7298***		
LR test of rho=0:	chi2(1)=114.532	Prob > chi2 = 0.0000		chi2(1)=114.089	Prob > chi2 = 0.0000	
Note: Standard errors in parenthesis; *:p<0.10, **: p<0.05, ***:p<0.01.						