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# CONSUMER BEHAVIOR IN THE INTENTIONS TO CHANGE BETWEEN ELECTRICITY SUPPLIERS IN PORTUGAL: A PUSH-PULL-MOORING FRAMEWORK

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## KEYWORDS

Retail electricity market liberalization, Consumer switching behavior, Push-Pull-Moorings framework

## ABSTRACT

The liberalization process of the Portuguese electricity market, which started in the 1990s, is integrated in the strategic action enacted by the European Union (EU). With the introduction of competition in the electricity sector, it became essential for electricity providers to identify which factors determine consumers' choice and switching between electricity suppliers. This study intends to apply the push-pull-moorings migration theory to consumers in the electricity market to understand the switching behavior between suppliers. The results showed that push and mooring dimensions have a significant impact on consumer switching intention. In general, low satisfaction and higher value-billing of the other services can push consumers away from their current electricity supplier. Furthermore, these results suggest that the moderating effects such as the switching costs, the previous experience in this market as well as the social influence play important roles in the relationship between some components of the push effects (commitment, satisfaction, and value-billing other services) and the intention to change. Therefore, this study helps both market players and public policy makers designing strategies and incentives aligned with consumer behavior, considering both economic and psychological factors and their combined effect in their switching intention.

## INTRODUCTION

With the success of liberalization of the telecommunication sector, the European Commission extended the principles of the free market to the energy sector (Newbery, 2002), whose main objective was to introduce competition to foster efficiency. Portugal followed closely the restructuring process initiated by the EU, undergoing two major legal and structural changes towards a liberalized system. In 1995, anticipating the 96/92/EC directive, the vertically integrated state-owned monopoly was legally unbundled from wholesale to the retail segment and converted into a dual system, the “regulated” and the “free market” systems operating simultaneously. The wholesale was liberalized and the retail was partially opened to competition. In contrast, transmission and distribution activities remained regulated to allow producers the access to these segments on a non-discriminatory basis. In 2006, in compliance with the 2003/54/EC directive, this dual regime was replaced by the “free market” approach and the last resort supplier was created. Portugal is currently undertaking the extinction of transitional tariffs in the regulated market which, after the initial planned date in 2015 and postponed to 2017, is now scheduled for the end of 2025 by the Law 2/2020 of March, 21. The phasing-out of the regulated retail tariffs forces consumers to switch from the last resort supplier to the liberalized market suppliers and promotes the entrance of new companies (Ghazvini et al., 2016). However, the benefits of this liberalized process are not clear. Even though electricity, *per se*, is a homogeneous product, over the years its commercialization has been conducted together with other products (e.g., dual fee contracts) and complementary services (e.g., flexible billing, green energy, technical assistance, mobility solutions and even smart equipment) to create product differentiation and avoid competition on prices. This implies that consumers may not have felt the reduction in prices due to the higher retail costs of traders and to their own little involvement in the market (Gamble et al., 2009).

The British Competition and Markets Authority (CMA) notes that consumers in the energy market lost an average of £ 1.4 billion between 2012-2015 due to the low switching rate. The liberalization process in Japan shows high resistance to change between suppliers (Shin and Managi, 2017). In Denmark, despite the smooth functioning of the market, there

is little consumer involvement (Yang, 2014). In 2018, according to Eurostat data, Portuguese households paid the fourth highest value in the EU per kilowatt-hour (kWh) of electricity, despite the fact that, in the same year, they had registered a 16% switching rate in electricity suppliers according to the Annual Report on the electricity and natural gas markets (ERSE, 2018a). This result might be explained by the fact that the Portuguese market is still highly concentrated – around 80% of the customers are supplied by the incumbent, EDP Comercial (ERSE, 2018b). The Hirschman-Herfindahl index is quite high – above 6000 – when it is common to consider a highly concentrated market above 2500. Even though the switching rate is high, many residential consumers are still being supplied by the incumbent. This is due to the fact that the switching rate considers not only the changes within the LM, but also the new consumers and those that left the regulated market to enter in the LM. Furthermore, most consumers have a long-established relationship with EDP Comercial, which might result in a great willingness to sign contracts with this company after the removal of regulated tariffs.

Therefore, it is important to identify the factors that determine consumers' switching between electricity suppliers. For that purpose we apply the push-pull-mooring migration theory. This framework describes the negative factors driving users away from their current supplier (push effect) and the positive factors attracting users towards the competitors (pull effect), as well as the personal characteristics (mooring effect) that either hamper or facilitate the switching intention. To the best of our knowledge, no empirical research, in the electricity sector, has dealt with this model and relatively few studies have been conducted to explore the switching behavior of electricity consumers. Therefore, this study seeks to answer the following question: What are the push-pull-mooring effects in the switching behavior of the Portuguese electricity consumers?.

## LITERATURE REVIEW

Switching behavior is generally defined as the intention to change from a current service supplier to another. With the increased competition brought about by the liberalization, consumers can more easily find alternatives and switch between suppliers. Switching between the retail companies is promoted by increasing customer awareness about price, different contracts and available suppliers. Informative websites ensure the easy access of customers to these data, simulating costs or suggesting contracts that best suit their consumption patterns. Therefore, it is crucial to study the determining factors that lead the electricity customers to switch from the incumbent service to alternatives.

In the literature it can be found several studies analysing the reasons behind the consumers intentions to change. Studying the behavior of consumers regarding switching service suppliers, in three different markets (electricity, insurance and telecommunications), Gamble et al. (2009) conclude that attitude (negative) changes are related to three reasons: (a) the loyalty to the incumbent, (b) the costs of searching for information, and (c) the low expected economic benefits from the switching. Their results showed that the greater the preponderance of these variables, the more resistant the consumer would be to switching suppliers. The authors note that this relationship is more pronounced in the electric market, concluding that the relationship between consumers and suppliers have a major impact on switching intention. Yang (2014) concludes that the loyalty created by managing the relationship between the consumer and the retailer is important in two ways: to “attract” consumers to the market and to challenge policy makers in removing barriers to change, with evidence that strong loyalty, low economic benefits and low attractiveness of other companies contribute to greater consumer inertia. Another aspect to consider in this relationship is the brand itself. Hartmann and Ibáñez (2007) state, in the case of the electric market, that consumers make associations with brands, including quality, commitment and trust, which have an impact on satisfaction. In their research of the Spanish electric market they identify that the association of trust and quality with the brand, increases satisfaction. Consumers face several offers for energy supply. They have to choose electricity only or, electricity and natural gas, billing options and/or additional services. Although there are online simulators, which are quick to access and use, the amount and diversity of information does not seem to influence the switching rate (Yang, 2014). Moreover, the existence of too many offers can be detrimental to companies due to the phenomenon of choice overload, where the decision over several available choices can leave individuals dissatisfied and regretful (Iyengar and Lepper, 2000). In behavioral economics, individuals tend to act according to the *status quo* due to the uncertainty and the existence of transaction costs in the decision-making process (Samuelson and Zeckhauser, 1988). In this line of thought, other effects may inhibit individuals from changing their current situation, such as the loss aversion, where the inability to give up something is greater than the utility associated with its acquisition, and the endowment effect, in which individuals demand a greater compensation to give up something than the amount they would be willing to pay to purchase it (Kahneman et al., 1991). In other words, consumers can resist to change due to risk effect, “requiring” a significantly greater benefit compared to the cost of switching suppliers. Indeed, low expected economic benefits from bill reduction do not encourage consumers to switch (Ek and Söderholm, 2008; McDaniel and Groothuis, 2012; Sirin and Gonul, 2016). It is common for consumers to switch suppliers in other services, such as banking, telecommunications, insurance, among others. For the best of our knowledge, one research that displays some similarity in the switching intention across services is that of Shin and Managi (2017) that found evidence that the experience of switching from suppliers of telecommunications increases the likelihood of change in the electricity sector.

Consumer inertia is observed by Hortaçsu et al. (2017) in the state of Texas where, although they could achieve significant savings (\$100/year) by switching suppliers, they remain with the same by not evaluating competitors' offers and attributing a greater value to the incumbent's brand. Another situation, which may occur among inactive consumers, is the preference for not to choose - a situation exposed by Brennan (2007) revealing that when faced with several options from different suppliers, consumers decide not to choose, given the costs of research and comparison between offers.

Bansal et al. (2005) were the first to apply the push-pull-mooring model to understand consumer's switching behavior for the case of hairstyling and car repair services. According to them the decision to change supplier depends on three factors:

- Push effect – characteristics of the current firm that motivate the consumer to change to other firms, namely: (1) quality; (2) satisfaction; (3) value; (4) trust; (5) commitment and (6) price perception;
- Pull effect – characteristics of the other market traders that attract the consumer to them. It represents the attractiveness of the alternatives;
- Mooring effect – intrinsic characteristics of each consumer that allows revealing themselves, acting as a moderating effect, inhibiting or enhancing the Push and Pull effects, which are: (1) attitudes toward switching; (2) social norms; (3) switching costs; (4) past experience in switching, and (5) variety-seeking tendencies.

Since the work of Bansal et al. (2005), the push-pull-mooring model has been extended to other services. For instance, Zhang et al. (2008) studied consumers' switching intention for blog service providers and Hou et al. (2011) applied the model to the online role-playing game services. More recently, Jung et al. (2017) explored the key determinants of travellers' switching intention in terms of airline selection and Sun et al. (2017) examined the main factors influencing users' switching intention in the mobile instant messaging.

## METHODS AND DATA

Following Bansal et al. (2005), a similar model could be applied to study the propensity or intention to change of the portuguese electricity consumers. For this analysis three dimensions could be stressed: (1) satisfaction, value, trust and commitment to the supplier, as well as the perception of prices charged by the latter; (2) attitudes toward switching, the costs of switching, the variety-seeking dependency, the subjective norms (social influence) and previous purchase behavior, and (3) the attractiveness of competitors.

Therefore, this paper intends to investigate whether the factors considered as mooring effects moderate the relationship between the independent variables - perceptions of the push and pull factors -, and the dependent variable - the intention to change - to contribute to the validation of the following hypotheses:

- **H<sub>1</sub>**: Mooring factors moderate the relationship between the perception of the characteristics of the current supplier (push effects) and the intention to change;
- **H<sub>2</sub>**: Mooring factors moderate the relationship between the perceived attractiveness of competitors (pull effects) and the intention to change.

To collect the data, an online survey from a non-probability convenience sampling technique was used. The questionnaire was prepared to assess the validity of the theoretical model and it was disclosed through the Google Forms platform since it allows easier construction, treatment and export of data. The survey was available between 11 February 2021 and 15 May 2021, resulting in a total of 125 valid questionnaires.

An exploratory factor analysis in principal components with varimax rotation (orthogonal rotation) was carried out to reduce the dimensionality of the observed variables that are related to a same subject. This procedure allows the extraction of the components that are independent from each other, for the same set of items within the same subject / theme. After extracting the components, the binary logistic regression procedure was performed to analyse whether the components of the mooring factors moderate the relationship between the components of the push effects and the pull effects, on the one hand, and the intention to change, on the other.

For the validation of the two hypotheses raised from the literature review, a binary logistic regression model was performed. The purpose of this model is to determine the probability of an individual, with certain personal and social characteristics, to choose one of two possible options, when the independent variables are quantitative and / or qualitative:

$$\text{logit}(p_i) = \left( \ln \frac{p_i}{1-p_i} \right) = \beta_0 + \beta_1 X_i + \dots + \beta_k X_{ki} \quad (1)$$

where  $\frac{p_i}{1-p_i}$  is the ratio of possibilities or the ratio between the probability of having an intention to change versus the possibility of having not, and  $X_i$  are the Push-Mooring and Pull-Mooring independent variables.

The chosen method of estimation was the conditional forward approach that eliminates the variables that are significantly correlated. The dependent variable is the switching intention to another electricity supplier.

Due to a large number of missing cases, it was performed a Missing Value Analysis to verify whether the missing cases are *Missing Completely At Random* (MCAR), that is, when the missing values of  $Y$  do not depend on  $X$ , but are part of

the random sample of  $Y$ . For this assessment, the chi-square test was performed, in which  $H_0$  stipulates that the missing data are completely random (MCAR). Since the  $H_0$  was not rejected, it was selected the imputation method from the expectation-maximum likelihood (EM) algorithm that assumes that the missing data pattern is only conditioned to the observed data. It is an iterative method in which in the first step the expected value of the estimates of the missing data is calculated conditioned to the observed values and in the second step the maximum likelihood estimates (means, standard deviations or correlations) are calculated until the change in these estimated values is negligible. The results showed that the missing data are completely random and the missing values were replaced (*Little's test: MCAR test:  $\chi^2_{(31)} = 35.559; p\text{-value} = 0.262$* ).

Then, the logistic regression model was estimated and the results are expressed in Table 1.

Table 1: Classification table

Observed		Predicted		
		Evaluate your likelihood to switch supplier within one year		Percentage Correct
		No	Yes	
Block 1	Step 23 Evaluate your likelihood to switch supplier within one year	No 97	Yes 4	96.0
		Yes 16	82	33.3
Overall Percentage				84.0

Source: Own elaboration.

Table 1 shows that from the 125 cases analysed, the model classifies well 84.0% of the consumers' intentions in this sample. Sixteen respondents are classified as intending to change when, in fact, they do not intend to change, whereas four respondents are classified as having the intention to change when, in fact, they do not intend to change.

To evaluate the performance of this model, the Hosmer and Lemeshow test of goodness-of-fit was conducted. With  $\chi^2_{(8)} = 8.024; p\text{-value} = 0.431$ , the null hypothesis is not rejected suggesting that the model fits the data well.

The results allow concluding that seven interaction effects were found with an impact on the intention to change (or not to change) the supplier, as can be observed in Table 2.

Table 2: Significant variables in the equation

	B	SE	Wald	df	p-value	Exp(B)
Step 1 ...	...	...	...	...	...	...
...	...	...	...	...	...	...
Step 23						
Push3*M2	1,014	,364	7,745	1	,005	2,755
Push3_M3	-1,060	,355	8,894	1	,003	,346
Push3_M5	,701	,416	2,836	1	,092	2,016
Push4_M2	-,660	,396	2,773	1	,096	,517
Push4_M3	,532	,311	2,929	1	,087	1,703
Push4_M5	-,856	,448	3,644	1	,056	,425
Push5_M5	-,808	,409	3,900	1	,048	,446
Constant	-2,207	,360	37,629	1	,000	,110

Notes. (1) SE – standard error; (2) df – degrees of freedom

The exponential of the  $\beta$  coefficients show the odds ratios of Success versus Failure when the independent variable  $X_i$  increases one unit relative to the odds of Success versus Failure when  $X_i$  remains constant. For example, for the interaction product Push4\*M3, the estimated ratio is  $0.532 = e^{1.703}$ . This means that the chances of switching the supplier within one year decrease 46.8% ( $100 \times [0.532 - 1]$ ) for each unit variation.

Table 3 shows a summary of the significant interactions. The results allows concluding that there are seven significant effects: three positive and four negative.

Table 3: Summary of significant interactions

Positive effects		Negative effects	
Push3*M2	Prices' perceptions * Switching costs	Push3*M3	Prices' perceptions * Experience in this market
Push4*M3	Satisfaction * Experience in this market	Push4_M2	Satisfaction * Switching costs
Push3*M5	Prices' perceptions * Social influence	Push4*M5	Satisfaction * Social influence
		Push5*M5	Value-billing and value-other services * Social influence

Source: Own elaboration.

## RESULTS

From the previous results, it can be concluded that hypothesis  $H_1$  is validated, whereas hypothesis  $H_2$  is not. The results showed that push and mooring dimensions have a significant impact on consumer switching intention. In general, low satisfaction and higher value-billing of the other services can push consumers away from their current electricity supplier; also, higher prices' perceptions and low commitment can pull consumers towards a new supplier. These results suggest that the moderating effects such as the switching costs, the previous experience in this market as well as the social influence play important roles in the relationship between some components of the push effects (commitment, satisfaction, and value-billing other services) and the intention to change. Therefore, the hypothesis that the mooring effects are moderators between the push and pull factors and the intention to change is only validated for the push effects.

The estimated empirical model is depicted in Figure 1.

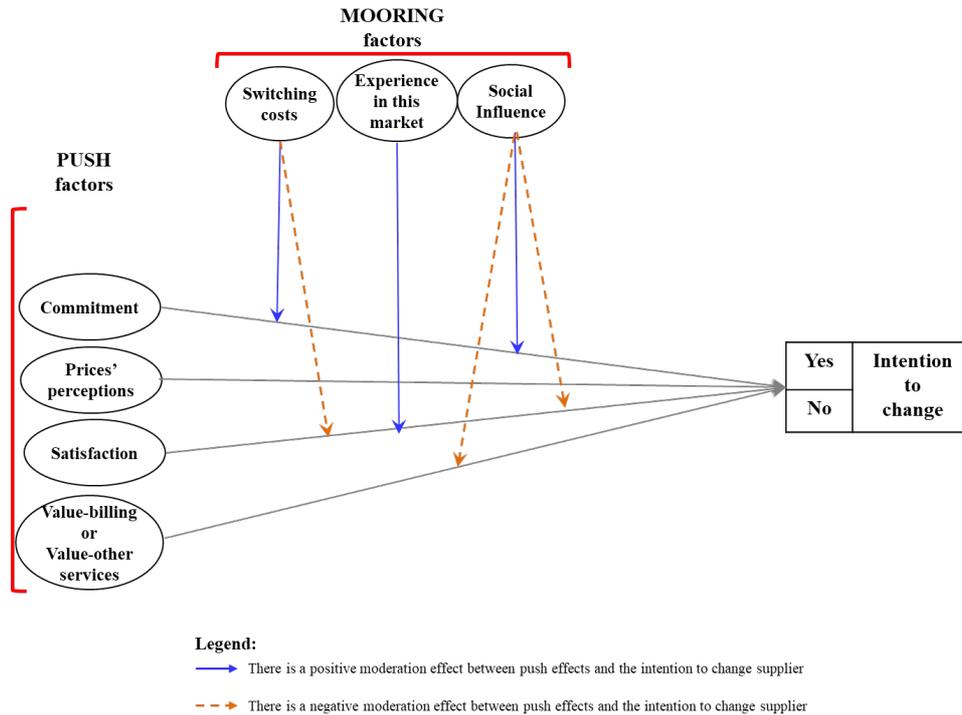


Figure 1: Estimated empirical model

Source: Own elaboration.

## CONCLUSIONS AND FURTHER RESEARCH

The objective of this study is to explore the involvement of the Portuguese consumers in the electricity market using, for this purpose, data collected through a questionnaire, to assess the determining factors behind the switching intention between electricity suppliers. The results suggest statistical evidence that push and mooring factors have a significant

impact on consumer's switching intention, while the pull and mooring dimensions did not reveal to have. Therefore, the hypothesis that the mooring effects are moderators between the push and pull factors and the intention to change is only validated for the push effects.

This research provides insights for two main economic agents such as the market players and the public policy makers. For the market players the results help them understanding what are the main triggers that affect consumers' switching intention process. For the policy makers it helps designing incentives aligned with consumer behavior, considering both economic and psychological factors and their combined effect in the switching intention, instead of considering the individual impacts of each variable only, as commonly addressed in the literature.

For future research, additional variables related with the attractiveness of the alternatives should be included in the model to better analyse the pull effect and thus to study whether the mooring factors moderate the relationship between pull effects and the consumers' intention to change. A literature review and a deeper research on the characteristics of the other market traders that attract the consumer to them should then be developed.

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