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Identifying variables that predict clients' propensity to end their checking accounts

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Abstract

Purpose – This study aims to investigate which variables can predict clients closing their checking accounts in a commercial bank and to validate the model used in this research.

Design/methodology/approach – The theoretical basis of the study has contemplated satisfaction, loyalty, change mediators, switching costs and client retention. A total of 2,000 account holders plus 2,000 clients who closed their checking accounts were selected by simple probabilistic sample. The samples were probabilistic, without repetition, with an error margin of approximately 2.2 percent and trust interval of 95 percent with random drafting of the account holders' database from a large institution based in all Brazil. The variables were tested using the Binary Logistic Regression and the variables between the account holder and former account holder groups with indication of checking account closing request were compared.

Findings – Account holder's age, time of the account, investor/taker profile, internal relationship, long term assets contracts, risks in other banks, quantity of products, product canceling, average amount of entries and the existence of a joint client are the variables which better identify clients' propensity to end their relationship.

Practical implications – The obtained results make it possible to identify the clients' propensity to abandonment and contribute to directing future marketing actions.

Originality/value – The model is relevant on the theoretical point of view because it can measure the importance of each independent variable and provides elements to compare all of them in the same base (meta-analysis). It deals with 14 independent variables and had a good adjustment once was capable to classify correctly 89.8 percent of the account holders and 87.2 percent of the former account holders. The K-S value was 79 percent with $p < 0.005$ and value of ROC curve was 0.947. Models like this are unknown.

Keywords Banking, Customer loyalty, Relationship programs, Client retention, Checking account, Change mediators

Paper type Research paper

1. Introduction

The changing of a company or brand by the client may be considered as a common event in the current market. It may be motivated by dissatisfaction towards one or various services' aspects, however dissatisfaction is not a necessary condition nor a sufficient one to generate it (Stewart, 1998). According to Roos (1999), not all the clients who change are dissatisfied. For Ferreira (2004), a very satisfied client may change simply because he wishes to test or experiment a new company or because he is

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searching for a better business. In case the client opts for changing, whatever the reasons, this decision will necessarily pass by considering points such as the availability of alternatives, the involved switching costs and the eventual loss of benefits.

Losing a client may represent a bigger risk for the companies than simply the reducing of a single client in their portfolio. According to Bateson and Hoffman (2003) those companies which are not able to retain their clients have the tendency of committing in recurrent manner the same mistakes. Because of that, the causes which have led to the abandonment must be identified and one must seek to avoid them in a retention plan. So that effective strategies may be formulated and implemented in client retention in the banking sector it is needed to know the reasons or behaviors which most influenced the clients' propensity to close their checking accounts.

In the banking sector, the dispute over the client has been intense. The regulations established by the authorities show that the objective is to stimulate even more the competition, in such a manner that the client may compare the prices given among institutions. So, a few rules have appeared for portability of applications and loans aiming to ease the changing of institution. In this sense, the present study aimed to point the prevailing variables in identifying clients' propensity to close their checking accounts, being taken the following research question: which are the variables which predict clients closing a checking account in a commercial bank?

2. Theoretical reference

Berry (1983) has defined relationship marketing as the action of attracting, maintaining and improving relationships with clients, while Gummesson (1999) highlighted the application of this concept in the services area showing the importance of client retention and maintenance and not only acquiring new ones. In the vision of Berry and Parasuraman (1995, pp. 161-8) the relationship marketing has three different levels. In level one it is used the frequency or retention marketing, being offered monetary incentives for stimulating clients to have more dealings with the organization. In this level the organization passes in the relevance to the client test, but loses in market differentiation. In level two, the social links are given more priority over the financial links, through the emphasis on providing personalized services and transforming customers into clients, considered by the authors as being the "[...] product of the soul and of the science [...]". In this level appears the one-on-one relationship. In level three, the relationships are consolidated with structural links, beyond the financial and social links. The structural links are the ones created to make the services valuable to the clients, but which are not always readily available in other sources. This makes the switching cost high and uninteresting and has as basis the information technology.

2.1. Loyalty and satisfaction

Loyalty is characterized by Dick and Basu (1994) as a strong relationship among individual attitudes and the repetition of a purchase which represents proportion, sequence and the probability of purchases done from a same provider. Lejeune (2001) highlights the existing difference between "customer retention" and the "conquest of its loyalty". The loyal clients remain with the company despite more attractive offers, while those clients who were only retained are susceptible to the competition's actions. Day (2001, p. 149) exposes that variables such as inertia or lack of more adequate

alternatives presented by the competition also exercise influence over the client's inclination to maintain itself faithful to the company.

The definitions on client satisfaction are presented in two approaches: the transaction-specific and accrued satisfaction. The transaction-specific is defined by Oliver (1993) as an emotional answer by the customer to its most recent transactional experience. In this manner, the affectionate answer varies in intensity, depending on the situational variables which are made present (Yang and Peterson, 2004). The accrued satisfaction or general satisfaction, on the other hand, reflects the accrued impressions on the clients' part as to the service performance of a company, in other words, the customers require experiences with the product or service to determinate the satisfaction degree, because it is based in present and past experiences (Anderson *et al.*, 1994).

Despite all the importance given to the concept of satisfaction, only satisfaction is not enough to retain a client (Reichheld, 1996; Jones and Sasser, 1995). For Ferreira (2004), a very satisfied client may change simply because he wishes to test a new company or because he is in search of a better business in terms of price. As demonstrated by Davids (2007) between 65 percent and 85 percent of the clients who have chosen a new provider said that they were satisfied or very satisfied with their current provider. The loss of these clients may be as damaging to the company as the loss of the dissatisfied clients. However, the author highlights that the client who changes seeking variety may be won over again by the company's actions, while the dissatisfied client may not.

Specifically in the bank market, Rajaobelina and Bergeron (2009) investigated financial advisors and clients in Canada and the results notably show that customer orientation has an impact on buyer-seller relationship quality, whereas buyer-seller similarity does not. The link between relationship quality and both consequences (purchase intention and word-of-mouth) was significant. Licata and Chakraborty (2009) examined the differential influence of three drivers of loyalty (stake, satisfaction and value of switching service providers) on the dimensions of loyalty (behavioral response, commitment to the people providing the service and commitment to the institution.). Overall, all three drivers exhibited differential influence on the three dimensions of loyalty. The behavioral response dimension was influenced by all three drivers. The commitment to people dimension was influenced by stake and satisfaction. The commitment to the institution dimension was influenced by value of switching and satisfaction. Age of the service relationship and depth of the service relationship affected the pattern of influence. Lam *et al.* (2009) investigated small to medium-sized enterprise (SME) decision makers in Hong Kong and found that affective components, such as relational bonds, and cognitive components, such as perceived service quality, are shown to influence customers' switching behavior.

2.2 The change mediators

For Strouse (1999), Michalski (2004) and Asaari and Karia (2000) the factors which contribute to the company abandonment are:

- the decline in the quality of the products and/or services provided by the company;
- the greater attractiveness of alternatives offered by the competition as concurring offers of lower risk, better, cheaper and with superior services;
- the perception by the customer of low provider switching costs;

- the low perceived value of the products and/or services currently offered by the company;
- the way in which the company reacts to the abandonment attempts and answers to client's complaints;
- the high costs involved in the attractiveness of doing shopping, such as the transport costs generated by low distribution coverage;
- changes in the client's expectations and a low effort by the company to fulfill new demands and preferences; and
- lack of market regulation which stimulates competition among the companies and makes it easier for the customers to test a new provider giving in to the promotional appeals of concurring companies.

The existence of these mediators comprises what Colgate and Lang (2001) name the change dilemma. The mediators are also called barriers to change and according to Jones *et al.* (2000, p. 261), the barriers to change "are any factor which makes harder or costlier for the customer to change service providers". Whatever are the motives which led the client to opt for the change, this decision will necessarily pass by the consideration of points such as the alternatives' availability and the eventual loss of benefits.

Varela-Neira *et al.* (2010) studied subjects in the service sector that had experienced service failures and had afterwards complained. The results highlight the importance of the emotions experienced as a result of the complaint handling. Their investigation shows that these emotions not only have an independent effect on customer satisfaction, after accounting for the effects of the cognitive evaluations of complaint handling, but also play a mediating role in the relationship between these cognitive variables and satisfaction.

2.3 Switching costs

Switching costs are conceptualized as the perception which the client has as to the magnitude of the additional necessary costs in order to end the current relationship and guarantee an alternative relationship. High perceived costs prevent the clients from migrating to the competition (Yanamandram and White, 2006). Switching costs include not only those which may be monetarily measured, but also the psychological effect of becoming a client to a new company, as well as the time and effort involved in the acquisition of a new product (Dick and Basu, 1994). Due to the specific nature of the services, the clients may face considerable risks in changing to an alternative provider because a service could not be evaluated before the purchase itself (Caruana, 2004).

Some aspects of the customer's behavior favor the perception that he has as to the change's risk and costs. For Yanamandram and White (2006) the factors which determine the risks perception in provider changing are:

- the difficulty of post-purchase evaluation of the quality of the service or product;
- previous purchasing experiences;
- level of involvement with the service of product;
- customer's aversion to risk;
- brand strength; and
- mouth-to-mouth communication from friends and family.

For the authors, the stronger these factors are, the less prone the clients will be to changing providers.

Burnham *et al.* (2003, p. 110) speak of the "passive loyalty" generated by the switching costs as "costs which the clients associate with the process of changing from one provider to another". They confirm that satisfaction leads to an intention by the customer in remaining with a service provider, however the strongest effect in client retention is observed by the existence of switching costs. Satisfaction by itself only explains 16 percent of the variance in the changing intentions of the customer, a value well inside the limits reported in the meta-analysis of Szymanski and Henard (2001). On the other hand, 30 percent of the variance in the customer's intentions in remaining with the current provider is explained by the switching costs. Beyond that, the bigger the switching costs are, whatever type they may be, the greater the client's intention of remaining with the current provider.

Due to the direct relation between satisfaction and loyalty and between switching costs and loyalty, a possible negative relation between the existence of switching costs and satisfaction would be expected, that is, it would be expected that the greater the switching cost, the more the clients would feel stuck with that provider, which would lead to less satisfaction. Burnham *et al.* (2003) tested this effect by dividing the sample in different levels of switching costs perception and did not obtain interaction between the two constructs. Lam *et al.* (2004) also tested the possible switching costs' moderation in the satisfaction's impact over loyalty, but the data did not support this hypothesis. According to Lee *et al.* (2001, p. 38) the switching costs only have relevance to the changing decision when and as the customer has attractive alternatives at his disposal, that is, the existence of alternatives precedes the consideration of the change's costs and benefits.

Bendapudi and Berry (1997) affirm that the problems of the relationships built basing in restrictions to exit are that they are highly susceptible to dissolution the moment the barriers cease to exist. Furthermore, they defend that the customers who feel stuck in a relationship with a company tend to be more receptive to the competition's offers and actions. The clients that are in a relationship by choice, on the other hand, even being exposed to the competition's actions, are less prone to look for alternatives.

Considering now the studies in market studies, de Matos *et al.* (2009) did a survey with 7,461 customers of a large Brazilian bank and their analysis revealed that:

- switching cost is a significant antecedent of both attitudinal and behavioral loyalty;
- the mediating effect of switching cost is stronger in the relationship between satisfaction and attitudinal loyalty; and
- the moderating effect of switching cost is stronger in the relationship between satisfaction and behavioral loyalty.

In other recent research with bank customers in Jiaozuo City, China, Clemes *et al.* (2010) reveal that price, reputation, service quality, effective advertising, involuntary switching, distance, and switching costs impact on customers' bank switching behavior. The findings also reveal that the young and high-income groups are more likely to switch banks.

2.4 Client retention

Client retention was approached by Vavra (1993). In his concept of post-marketing, it was proposed the construction of long term relationships aiming at the client's continuous

satisfaction. For Pepper and Rogers (2005), client retention occurs through a learning relation. It motivates the clients to teach the organization to personalize the services being provided to them, according to each one's preferences. Once this teaching is learned, it becomes convenient to the client to maintain himself faithful to the company. So that a learning relation may be developed, there are necessary active and continuous changes, as well as the intensive utilization of information technology resources.

The client base's growth is a challenge to all organizations. Because of this, each client has been attracted by different manners. There are always those who offer a lower price, innovation, superior quality, commodity and so many other benefits. On the other hand, all organizations have conscience of what the loss of clients represents, so the existence of so many efforts to retain the conquered client.

Investigating bank clients in Greece, Dimitriadis (2010) tested the relationships between relational benefits, satisfaction with the bank and behavioral outcomes. Five types of perceived relational benefits were identified: two trust-related (competence and benevolence), special treatment, social and convenience. Only competence and convenience significantly affect satisfaction with the bank. No direct link between relational benefits and behavioral outcomes was found, as satisfaction plays a mediating role between them.

In this meaning, the presented theoretical reference joined elements which allow the construction of the research's hypothetical model as it may be seen in the sub-item 3.1 below.

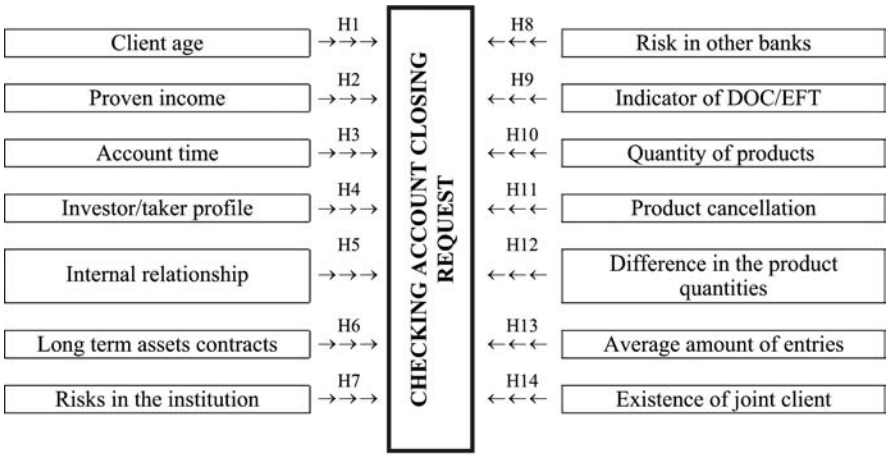
3. Methodology

The present work may be classified as a descriptive quantitative case study. Due to its sample and procedures, which will be explained further, this research is not attitudinal, but behavioral. The logistic regression statistical technique was utilized with the objective of discriminating individuals, because the desired known answer was one of binary nature (yes or no). In order to do so, it was necessary to determine the groups to be compared and make a sampling schedule for application of the methodology which will be explained in the following.

3.1 Hypothetical model

The definition of the variables included in the hypothetical model was done supported on the literature and the current institution experience, as possible predictors of the checking account closing request. So, the variables were chosen: client age, proven income, account time, investor/taker profile, internal relationship, long term assets contracts, risks in the institution, risk in other banks, indicator of document of order of credit (DOC)/electronic funds transfer (EFT), amount of hired products, product cancellation, difference in the product quantities, average amount of entries in the checking account and the existence of joint client in the account. Each one of these variables will be explained in the following sub-item. It is also worthwhile to highlight that those variables not available in the institutional databases were not included, and neither those which, when available, are less reliable by lack of updating. As examples of these less reliable variables there are: goods owned/acquired, number of dependents and address changes.

The established hypotheses in the model were formulated by the relation of each one of the variables with the account closing request, as Figure 1 shows.



Source: Elaborated by the authors by utilizing the theoretical basis and the 2008 database

Figure 1.
Structural model of the analyzed variables

The importance of this model is that the logistic regression statistical technique can evaluate each variable (hypothesis). In other words, the model is important on the theoretical point of view because it can measure the importance of each independent variable and provide elements to compare all of them in the same base (meta-analysis). In the case studied, the 14 hypotheses represent the situations found at everyday banking. Together, these variables are important so that managers can focus on what is effective to retain clients. In summary, this research deals with many independent variables aimed at a single issue. It is a relevant contribution to checking account closing theory.

Following are characterized the research variables and presented the formulated hypotheses which are in the hypothetical model:

H1. The newer the clients, the greater the chances of closing of checking accounts. For the account holders it was adopted the age at the moment the research was performed and for the former account holders it was adopted the age at the moment of the account closing request.

H2. The income value of the account holder does not discriminate the account holders by the fact of they requesting or not to close the checking account.

H3. The longer the relationship time of the client with the institution, that is, the longer the account time, the smaller the chance to close it.

When the account holder owned more than one checking account it was adopted the time of the oldest one. For former account holders it was adopted the total time of months passed between the account opening and the date of the closing request:

H4. Non investor and non resource taker clients have propensities to close their checking account.

One who applies resources in the bank is an investor, while one who acquires loans is a taker:

H5. The greater the internal relationship, the smaller the chance of the client closing the account.

Internal relationship is a combination between the client potential and the points which he receives, for the adhesion of each product of the bank and its profitability. The clients are classified as R1, R2, R3, R4, R5 and without classification. The R1 client is the one of most relationship and so on:

H6. Clients with long term assets in force have less propensities to closing their accounts.

It is considered as long term the assets (loans) with 24 installments or more. Only the due clients were considered because an overdue, depending on its gravity, may force the cancellation of a checking account, both by the client or the institution:

H7. Clients which own short-term risk in the bank have less propensities to closing their accounts.

Risks are all the assets the client has in the bank, such as loans and hired limits:

H8. Clients which own risks in other banks have more propensities to closing the account.

H9. Clients that make DOC and/or EFT to themselves in other institutions have more propensities to closing their accounts.

DOC and EFT are resource transfers for other institutions which differ only in the clearing time:

H10. The smaller the quantity of products, the greater the chance of the client closing his account.

At the moment the research was done it was used the quantity of products which each account holder had and the quantity had by the former account holder at the moment of the account closing request:

H11. Asking the cancellation of products is a great indication for a client to request the closing of the account.

There were only analyzed the canceling of the special check, automatic debt, private pension fund and credit card as of greater significance with the account closing. The analyzed term was formed by the last four months from the last movement for account holders, or from the account closing request for former account holders:

H12. If the product difference is negative, which implies in a fall in quantity, the chance of account closing is greater.

The product difference consists in the comparison between the total quantity of products in the first and last months of analysis. All the products were considered, including the ones said in the previous hypothesis. The analyzed term was formed by

the last four months from the last movement for account holders, or from the account closing request for former account holders:

H13. The smaller the average amount of entries in checking account, the greater the chance of a client to close his account.

For the account holders, the average amount of entries in checking account is referred to the average of the last four months from the last movement, while for the former account holders this calculation was done from the account closing request. All the client's accounts are considered:

H14. The existence of a joint client minimizes the chances of account closing, because the account may have a more intense and significant movement.

3.2. Population, sample and proceedings

The studied organization is a financial institution of approximately 65 years of operation in the national and international market. Its clients are divided in terms of profitability and potential to making financial transactions and movements, which help to segmenting the portfolio. Thus, the clients which are a priority for the study form a sub-population. As part of the target population are the account holders with individual income from five minimal wages ($5 \times$ R$415.00 = R$2075.00 in 2008). From this sub-population, two groups were formed:

(1) Current account holders: checking account holders which move their account normally, without restrictions. Accounts coming from payroll were not considered.

(2) Former account holders: checking account holders which request the closing of their last account from May to December 2007 and that did not have restrictions on the period. The account holders which had more than one account had to have closed all of them to be a part of this group. By option of the investigation the variables over the four months prior to the request were analyzed.

The size of the sample was of 4,000 clients, being 2,000 account holders and 2,000 former account holders. The elements selection was done by simple probabilistic sample without repetition based in infinite populations, since the institution has a large client base in all Brazil. Each sample was defined by an error margin of approximately 2.2 percent and trust intervals of 95 percent. Simple random sampling is the most simple and important probabilistic method for the elements selection in the sample. It may be characterized through the operational definition in which one has a list with N elementary units and drafts with equal probabilities n units (Bussab and Bolfarine, 2005). Having the clients list and knowing beforehand the probability of each individual being drafted is a basic premise for establishing a probabilistic sampling.

By considering that the two groups are coming from large populations it was not necessary to make the correction for finite populations. The rest of the databases were separated for model validation. This step is important to avoid the over adjustment, that is, an adjustment with good classification only for those elements utilized in estimating the parameters (Draper and Smith, 1998). It is inferred that no matter the size of the sampling database, the time and costs employed for the performance of the technique did not suffer any impact.

3.3 Methods and techniques

The comparison of the variables between the account holder and former account holder groups with indication of checking account closing request was utilized. The statistic technique which was utilized to test the variables was the Binary Logistic Regression, with utilization of SPSS version 16.

Variables which had three or more categories were transformed into dummy variables, in other words, indicating variables which could be represented by values 0 or 1, such as: gender, having or not a given product. When the variables had three of more categories it is necessary to create a dummy for each one of them (age group, ethnic group, income group). Generally dummies are utilized when one has nominal variables or when it is necessary to transform a numerical variable in groups or categories. Logistic regression is a variables association method where a characteristic's presence or absence is predicted, (in this case the cancellation of a checking account) through a set of predictive of explanatory variables (Hosmer and Lemeshow, 1989; Soares and Siqueira, 2002). Logistic regression was formulated to predict and explain a categorical variable and not a metric dependent measurement (Hair *et al.*, 2005).

In order to validate the statistical model it was utilized the analysis of the classification that was done, the Kolmogorov-Smirnov (K-S) test and the receiver operation characteristic (ROC) curve.

4. Results presentation and analysis

4.1 Logistic regression model results

The logistic regression was adjusted by utilizing the Backward Stepwise (Wald) method with 5 percent trust as variable input criteria and 10 percent trust as output criteria. The categorical variables were transformed into dummy variables. The dichotomous variables, which assume values of 1 or 0 (yes or no), were tested without transformation by being dummy variables in nature. The other variables were treated as being continuous. The chosen model was Step 7 being that the variables pertaining to it is presented in Table I.

The hypothesis correspond only to the tested variables which are very significant, because the variables which have little contribution to the analysis are not considered in the final model, that is, in the best adjusted model possible. It is important to highlight that Table I presents the coefficients of the most significant variables that were part of the logistic model's equation presented in the sequence, pertaining to the event "canceling or not the checking account in the bank". In this case, the "client closing the account" assumes the probability 1 for success and 0 for failure.

Considering that P = F(x) Success probability of the i-th client in the presence of k-explaining variables (x1, x2, x3, x4, x5, ..., xk) and that the parameter vectors to be estimated are:

$$(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \ldots + \beta_n x_n)$$

The accrued function of the logistic distribution is given by:

$$f(x) = \frac{e^{\beta_0+\beta_1 x_1+\beta_2 x_2+\beta_3 x_3+\beta_4 x_4+\beta_5 x_5+\ldots+\beta_n x_n}}{1 + e^{\beta_0+\beta_1 x_1+\beta_2 x_2+\beta_3 x_3+\beta_4 x_4+\beta_5 x_5+\ldots+\beta_n x_n}}$$

VARIABLES	B[a]	S.E.[b]	Wald[c]	Df [d]	Sig. [e]	Exp(B)[f]
AGE	−0.007	0.004	3.010	1	0.083	0.993
EXCLUSIVE TAKER			136.993	3	0.000	
TAKER	1.162	0.128	82.041	1	0.000	3.196
NEITHER TAKER NOR INVESTOR	1.599	0.170	88.968	1	0.000	4.950
INVESTOR	1.410	0.169	69.972	1	0.000	4.094
RELATION_LEVEL			13.408	5	0.020	
RELATION_LEVEL (R2)	0.916	0.333	7.580	1	0.006	2.499
RELATION_LEVEL (R3)	1.078	0.304	12.575	1	0.000	2.940
RELATION_LEVEL (R4)	0.975	0.307	10.105	1	0.001	2.652
RELATION_LEVEL (R5)	1.160	0.388	8.924	1	0.003	3.190
RELATION_LEVEL (Not Classified)	1.080	0.388	7.756	1	0.005	2.945
ACC_TIME_MONTHS	−0.004	0.001	32.116	1	0.000	0.996
OPER_ASSETS_LONG_24M	−0.473	0.181	6.866	1	0.009	0.623
ENTRY_AVERAGE	−0.023	0.005	18.842	1	0.000	0.977
LAST_QUANT_PDT_LAST_4MONTHS	−1.102	0.056	389.864	1	0.000	0.332
CANC_DATE	0.842	0.220	14.683	1	0.000	2.322
JOINT_HOLDER	−0.297	0.127	5.437	1	0.020	0.743
RISK_IND_BACEN	1.580	0.359	19.390	1	0.000	4.853
DIF_PDT	−1.394	0.083	281.632	1	0.000	0.248
Constant	1.833	0.438	17.489	1	0.000	6.252

Notes: [a] Variable coefficients; [b] Standard error; [c] Wald test statistic which indicates which variables are statistically significant; [d] Degrees of liberty for the test; [e] Value P is the probability of obtaining a statistic as critic or more critic than the observed statistic; [f] Chance ratio, that is, it is the parameter's exponential or anti-logarithm. It is the probability of an event's occurrence divided by the probability of non-occurrence of this same event. If the coefficient is positive, the variation in one unit implies in an increase in this value in an event's chance of occurrence. For *dummy* variables, when comparing one category with the reference category, the event's chance of occurrence increases or diminishes with reference to this value

Source: SPSS 16 output with 2008 database

Table I.
Logistic regression: coefficients and tests

$$p = \frac{e^{\beta_0+\beta_1 x_1+\beta_2 x_2+\beta_3 x_3+\beta_4 x_4+\beta_5 x_5+\ldots+\beta_n x_n}}{1+e^{\beta_0+\beta_1 x_1+\beta_2 x_2+\beta_3 x_3+\beta_4 x_4+\beta_5 x_5+\ldots+\beta_n x_n}}$$

Algebraically manipulated and in the presence of several variables the logistic model is given by:

$$\text{logito} = \log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \ldots + \beta_k x_k = \sum_{j=0}^{k} \beta_j x_j$$

By taking the presented results in Table I, the logistic model (equation) for the investigated case is the following:

$$\begin{aligned}\text{Logit} = {} & \text{Constant} + \text{age}\ (-0.007) + \text{Taker}\ (1162) \\ & + \text{Neither Taker Nor Investor}\ (1.599) + \text{Investor}\ (1.140) \\ & + \text{Relation\_Level. R2}\ (0.916) + \text{Relation\_Level. R3}\ (1.078) \\ & + \text{Relation\_Level. R4}\ (0.975) + \text{Relation\_Level. R5}\ (1.160) \\ & + \text{Relation\_Level. Not Classified}\ (1.080) + \text{Account Time}\ (-0.0004) \\ & + \text{Asset Term with Term Longer than 24 months}\ (-0.473) \\ & + \text{Average Account Entries}\ (-0.023) + \text{Product Quantity}\ (-1.102) \\ & + \text{Cancellation of Automatic Debt}\ (0.842) + \text{Joint Client}\ (-0.297) \\ & + \text{Risk in Other Institutions}\ (1.580) \\ & + \text{Difference in Product Quantity}\ (-1.394).\end{aligned}$$

Considering, for instance, a hypothetical client 35 years old, which does not take neither invest resources, classified as R3 in what refers to relationship, with 24 months of account, without long term asses, with an average of eight entries on the account per month, which did not cancel automatic debt, which has two products currently hired, which has no joint account with joint holder, which presents risks in other institutions, and which has products difference equal to -2. By substituting his values in the previous *logit* equation and calculating the inequality $P = \text{elogito}/(1 + \text{elogito})$, it is estimated the checking account closing probability of 0.742, that is, 74.2 percent.

4.2 Analysis over the logistic regression model

It is considered that the model had a good adjustment, once that it was capable of correctly classifying 89.8 percent of the account holders and 87.2 percent of the former account holders as Table II shows. In a general analysis, the model tends to be correct in 88.5 percent of the cases, that is, for each 100 clients the model correctly classified approximately 98. These statistics are valid for the utilized samples in the model adjustment.

According to SPSS (2003), over predictive methods utilizing advanced statistics, it is advisable to work with balanced groups, which in this study, would be equal to assuming that the client proportion which ask for account closing is equal to the client proportion which are in normal situation. Actually, this is not true and the models so defined tend to classify more individuals in the group which originally has a lower percentage to "balance" the classification, which in this study would imply in predicting more clients as a loss. Strategically this may be positive, for the chance of

	Predicted groups					
Observed groups	Group 0		Group 1		Total	
Group 1	1,796	89.8%	204	10.2%	2,000	100.0%
Group 0	256	12.8%	1,744	87.2%	2,000	100.0%

Table II.
Classification of the logistic regression model

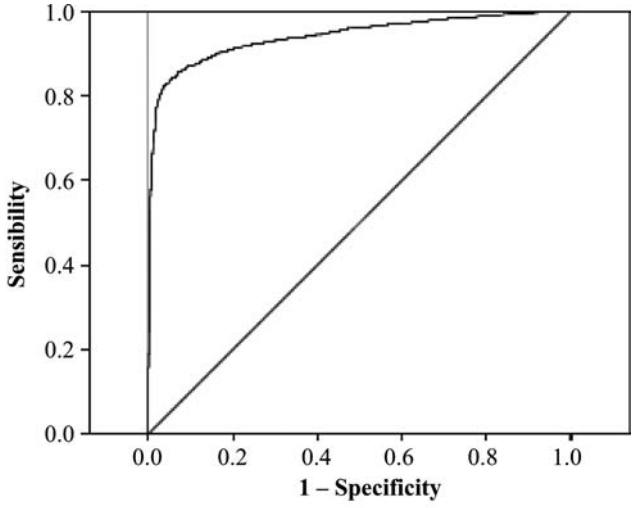
Notes: Group 1: Account holders which asked for account closing; Group 0: Account holders with normal account situation
Source: SPSS 16 output with 2008 database

committing error type 1 (not classifying an account holder as propense to leave the institution, given that he is very propense to leave the institution) is well lower.

The statistic non parametric Kolmogorov-Smirnov (K-S) test determines if two distributions are identical. Any differences in the two distributions are taken into consideration, including median, dispersion and asymmetry (Malhotra, 2004). This test was utilized in the logistic regression in order to evaluate if the two groups had the same probability distribution. Thus, K-S determines the model's power in separating the two groups ("clients which closed their checking accounts" and "clients which did not close their checking accounts"). As higher the K-S value, the more efficient the model, in what regards to client prediction and classification. In this case, the K-S value for this adjusted model was 79 percent and the p value well below 0.005. This rejects the hypothesis that the groups are evenly distributed and also confirms that the model is adequate for that which it proposes to do.

The ROC curve is largely utilized in order to evaluate predictive model's performance. The larger the curve's area is, that is, the closer to 1, the better the discrimination capacity. The closer to zero the more random and imprecise the model. Figure 2 presents the built ROC curve for the case under study and demonstrates that the curve's area was calculated in 0.947. Again it may be stated that the model is very useful for predicting if a client will or will not close his checking account.

One other manner of verifying a predictive model's adherence is through validation samples. There were separated two validation samples, one for each group, also utilizing the technique for simple random samples. The same standard utilized in relation to the selected samples for the use of logistic regression was followed in what regards to methodology. As the assertiveness of these samples was 98.5 percent for account holders and 80.5 percent for former account holders, it may be said also by this analysis that the model is adequate to identify new clients which may come to closing their checking account.



Source: SPSS 16 output with 2008 database

Figure 2.
Analysis performed through ROC curve

4.3 Hypothesis' analysis

The analysis of the formulated hypothesis was elaborated from the results in Table I which took the model equation presented in previous sub-item 4.1. The statistical model classified the entire bank's active client portfolio with closing probabilities between 0 and 1, that is, from 0 to 100 percent. The clients with probability above 50 percent will be classified as propense to ending the relationship, while those below this value will be classified as clients in normal conditions. The clients which are around 50 percent are those who presented most uncertainty about their behavior, so some follow-up is necessary in order to know to which group they have greater chances to migrate.

H1. The newer the clients, the higher the chances of closing checking accounts. This hypothesis was confirmed. The variation of one year in the clients' age diminishes the account closing chances 0.993 times. The newer the client, the higher the chances he has to seek new experiences in other institutions. This statement may be in tune with the findings of Ferreira (2004), once those younger are always in search for new experiences, even being satisfied with those they dispose of.

H2. The value of the account holder's income does not discriminate the account holders by the fact of requesting or not cancellation of the checking account. This hypothesis was not confirmed. The pertaining variable did not appear in the model's step 7, so it is indication that it does not affect the decision of ending the relationship so much. The analyzed account holders have a higher acquiring power and seem to be very homogenous as to this characteristic. On the other hand, there is no parallel in the researched literature in which the income level is a variable which affects changes in product and service providers.

H3. The longer the client's time of relationship in the institution (longer account time), the smaller the chance to close it. This hypothesis was confirmed. Older clients have smaller chances o ending the relationship in the institution. The increase of one unit in the account time diminishes the chances of closing 0.996 times. It is an interesting conclusion which was not specifically mentioned in the studied literature. This may be understood as an absence of perception of change mediators (Strouse, 1999; Michalski, 2004; Asaari and Karia, 2000), therefore there would be no reason to change.

H4. Clients which are non-investors and non-resource takers have propensities to closing the checking account. This hypothesis was confirmed. The "neither taker, nor investor" has a bigger chance of closing the account, when compared to the reference categories. This chance is 4.95 times higher than that of the "takers". The consulted theory explains this behavior as a smaller switching cost (Yanamandram and White, 2006), when compared to the ones who have resources invested or loans in the institution.

H5. The greater the internal relationship, the smaller the chance of the client closing the account. Confirmed hypothesis: the R5 clients are those of smaller relationship and when compared to R1 are the most propense to closing the checking account. The coefficients for low relationship levels are generally higher, which shows a greater influence for the "requesting cancellation of checking account" factor. Just as analyzed in the previous *H4*, increasing the relationship means increasing the switching costs for the client.

H6. Clients with long term assets in force have less propensities to closing their account. Confirmed hypothesis: the chances of canceling the account are smaller when one has a long term assets (loan with the bank), that is, just as proposed in *H4*, the additional products to the checking account increase the switching costs for the client.

On the other hand, it may also be believed that this product itself generates satisfaction for the client which possesses it and contributes to his loyalty.

H7. Clients which have short term risk in the bank have less propensities to closing their accounts. Non-confirmed hypothesis. Inside the regression criteria, this variable could not be situated in step 7 which presents the best model. At each step the model takes it selects more significant variables and for when an ideal model is found. The model's interactions act on the stop criteria.

H8. Clients which possess risks in other bank have more propensities to closing the account. Confirmed hypothesis. The client which has risk indication in the Brazil Central Bank (BACEN) has loans in other institutions. Because he is shared, this client may cease to move his account with a 4.853 times bigger chance. The question approached in *H6* previously is recurring and shows the long term loan as an satisfaction and loyalty generating element, even if this is "passive loyalty" (Burnham *et al.*, 2003, p. 110) due to the high switching cost. It is worthwhile to remember here that switching costs moderation in satisfaction and loyalty was not confirmed by Lam *et al.* (2004).

H9. Clients which make DOC/EFT for themselves in other institutions have more propensities to closing their account.

Non confirmed hypothesis: As the logistic regression criteria did not situate this variable among those more important in the final model, it is possible to assume that it is an intrinsic attribute to the checking account, however not indicating an intention of closing the checking account.

H10. The smaller the products quantity, the bigger the chance of the client closing his account. Confirmed hypothesis. The more hired products the smaller the chance of the client abandoning the institution. Therefore, it is very important to increase the relationship through the sale of additional products, because they help retaining the clients by means of increasing the switching costs and/or satisfaction.

H11. Requesting cancellation of products is a great indication that a client will request the closing of the account. Confirmed hypothesis for the "automatic debt" product. An account holder which cancels an automatic debt has his chances of closing increased 2.322 times. In these cases, it is up to the institution to investigate if the cancellation is fruit of a dissatisfaction coming from a current transaction (Oliver, 2003) or due to a question pertaining to the client with third parties.

H12. If the product difference is negative, which implies a fall in quantity, the chances of account closing are greater. Confirmed hypothesis. The more canceled products, that is, the higher the difference between these quantities in the period of analysis, the higher the probability of account closing. The more negative the difference is will imply in more canceled products and the institution will be closer to losing this client. There is coherence between *H11* and *H12*, since they represent concrete actions of the client. Here it is worthwhile to investigate the existence of accrued or general dissatisfaction (Oliver, 1993). One must be observant to know if the cancellations are coming from the change mediators pointed out by Strouse (1999), Michalski (2004) and Asaari and Karia (2000).

H13. The smaller the average amount of entries in the checking account, the bigger the chances of account closing. Confirmed hypothesis. Making few entries in a checking account implies in little movement and little relationship with the bank. The client may be moving his finances in another financial institution, so the considerations done in *H12* fit in here.

H14. The existence of a joint client minimizes the chances of account closing, because the account may have a more intense and significant movement. Confirmed hypothesis. A client which has a joint client has the closing chances diminished 0.743 times when compared to a client which has no joint client in the account. The existence of a joint client minimizes the chances of account closing, because the account may have a more intense and significant movement and the closing decision may not be entitled to a single person only.

The hypotheses' analyses were done one by one evaluating the influence of each of them in the model's overall results. It is perceived that not all the 14 variables were part of the final model. Only the variables which helped to explain in a significant manner the data variability were part of the final model. Each variable will contribute with its weight (the "B" Betas presented in Table I) in the probability calculations. Though it may seem obvious one or another variable to have entered in the model, what is measured is its actual influence, that is, how much it has influence over the canceling or not the checking account factor (Hair *et al.*, 2005).

5. Conclusions

Going from the elements presented in the hypothetical model, it was possible to identify that the client's age, account time, investor/taker profile, internal relationship, long term assets contracts, risk in other banks, amount of products, product cancellation, average amount of entries and the existence of joint client are the variables which best identify the clients with propensity to ending the relationship in the banking market. In its most relevant aspects, the research has shown that people with higher ages, with more account time, without risks in other banks, with more products and with more than one joint holder have a smaller probability of closing the checking account. Under the theoretical point of view, it was noted that there is a parallel with the studied literature and that the strategy of increasing the relationship with the client tends to generate satisfaction and/or increasing the switching costs. It may be assumed that client retention will come to be a consequence of an increase in the products utilized by the client. In this meaning, the present work has achieved the objectives which it has proposed to itself.

By analyzing the obtained results in light of the studied theoretical basis it was possible to ascertain that they are both in tune. The contributions here presented can help the conception of relationship programs consolidated with structural links, beyond financial and social, as Berry and Parasuraman (1995) classified as level 3. The utilized methodology offers good estimates regarding consumer behavior as to the process of closing a checking account. The presented elements are, therefore, relevant because they point to where should be focused the marketing actions which stimulate satisfaction, loyalty and which amplify the switching costs as a form of client retention. As managerial contribution, this information is of fundamental importance for the effectiveness of the actions close to the target public, resulting in smaller expenditures for the organization.

The limitation pertaining to a case study done in one institution may be attenuated by the fact that a sample with 4,000 people was used for the model construction and then the client database in all Brazil was utilized to test the obtained model. Though the effectiveness of this study is evident, it is worthwhile to recommend its application in other institutions, products and economical segments. Such questions may fit in:

which are the motives of ending a relationship in other institutions and/or segments? It is also interesting to test other variables and tools so that the adjustment may be verified and compare them to the CHAID Neural Networks and Association Models methods. In the field of conceptual investigations, it is recommended to deepen the studies on young adults, in the beginning of the professional life and their reasons for changing a banking institution. It is one question which surfaced in the investigation, but was not deeply explored in the present research.

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