ESSAYS ON SWITCHING COSTS IN THE TURKISH CREDIT CARD MARKET

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ESSAYS ON SWITCHING COSTS IN THE TURKISH CREDIT CARD MARKET

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Essays on Switching Costs in the Turkish Credit Card Market

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Thesis Abstract

Alper Alkan, "Essays on Switching Costs in the Turkish Credit Card Market"

This thesis consists of two essays. The first essay analyses the switching behaviour of the Turkish credit cardholders by using a very recent survey data. Customers that value bank level characteristics of the card are likely to be locked-in whereas customers are responsive to non-price benefits such as limits and cash backs. The price related features, on the other hand, are not significant factors in switching behaviours of cardholders. This finding justifies sticky interest rates and the existence of non-price competition. The model also controls for bank dummy variables and estimations reveal that each issuer generates switching costs at different levels.

The second essay aims to analyse the determinants of rate sensitivity in the credit card market. The survey includes specific questions that directly measure the responsiveness of cardholders to rate cuts. This chapter investigates factors affecting the probability of switching to a lower rate card. It employs both probit and ordered probit models and estimations show that revolvers, less educated customers and customers holding several cards are more rate sensitive whereas customers using more banking services do not respond rate cuts.

Tez Özeti

Alper Alkan, "Türkiye'deki Kredi Kartı Piyasasında Değiştirme Maliyetleri Üzerine Makaleler"

Bu tez iki kısımdan oluşmaktadır. İlk kısım, Türkiye'deki kredi kartı sahiplerinin kart değiştirme davranışlarını, yeni anket verileri kullanarak analiz etmektedir. Kartın banka düzeyindeki özelliklerine önem veren kart kullanıcılarının daha az kart değiştirdikleri sonucu çıkarken kullanıcıların kart limti ve para puan gibi fiyat dışı avantajlara duyarlı oldukları anlaşılmaktadır. Diğer taraftan, fiyata dair özelliklerin müşterilerin kart değiştirme davranışları üzerinde önemli etkenler olmadığı sonucu çıkmaktadır. Bu bulgular, kredi kartı faiz oranlarının yapışkan olduğu ve fiyat dışı rekabetin var olduğu gerçeğini doğrulamaktadır. Bu kısımda kullanılan ampirik modelde, bankaların tüketicilerin kart değiştirme davranışları üzerindeki etkileri de kontrol edilmekte ve her bir bankanın farklı seviyelerde değiştirme maliyeti yarattığı anlaşılmaktadır.

İkinci kısım, kredi kartı piyasasında faiz oranlarına duyarlılığı etkileyen faktörleri analiz etmeyi amaçlamaktadır. Anket, kart sahiplerinin faiz indirimlerine nasıl tepki verdiklerini doğrudan ölçen özel sorular içermektedir. Bu bölüm, daha düşük faizli bir karta geçme olasılığını etkileyen faktörleri incelemektedir. İki farklı model kullanalarak, kart borçluları, az eğitimli ve birkaç kart kullanan müşterilerin faizlere daha duyarlı oldukları, çok sayıda bankacılık hizmetinden yararlanan müşterilerin ise faizlere duyarlı olmadıkları gösterilmektedir.

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CHAPTER 1

SWITCHING BEHAVIOUR IN THE TURKISH CREDIT CARD MARKET

Introduction

There is a consensus in the literature that prices are less competitive when there are switching costs. The most popular definition of switching cost is the cost that the customer faces when she wants to buy the product that she did not previously purchase. In a broader term, it is the cost that restrains customers from switching to alternative products. These costs make products that are alike at the outset to be perceived distinct later. This pattern gives firms market power and hence encourages them to deviate from competitive equilibrium.

The deviation from the perfectly competitive equilibrium also exists in the credit card market. This field has been the matter of research in the last two decades. Ausubel (1991) stated that the US credit card market showed a perfectly competitive model but credit card interest rates were sticky for the period from 1983 to 1987 that credit card interest rates did not respond much to the changes in the cost of funds. Furthermore, he estimated that card issuing banks earned higher profits than ordinary returns.

This downward stickiness of interest rates also exists in Turkey. Akin et al. (2010) investigate the competition in the Turkish credit card market and show that the market lacks the price competition. They also claim that the other two most popular explanations, namely '*search cost*' and '*adverse selection theory*' are less important factors in explaining the variation due to the specific characteristics of Turkish credit card market. As they point out, there is more to explore in the Turkish

credit card market in terms of switching costs. The determinants and magnitude of switching costs are still unexamined for the market. Thus, this study aims to investigate which factors affect the switching behaviour of the cardholders. In this respect, it also contributes to understand the switching patterns of customers that would be valuable for regulatory authorities considering the policy debate to regulate the credit card market in Turkey.

There are few examples of empirical studies on estimating switching costs although there are plenty of theoretical works in the literature. This is because it is hard to calculate switching costs since they are intangible. Moreover, they are mostly customer specific and hence are not readily available from aggregate data. However, there is a recent survey conducted in Turkey (Akin et al., 2009) including mainly credit card specific questions designed to examine the credit card market from the demand side. Thus, another novelty of this study is that it estimates the switching costs by using a primary data set. The time length that how long the cardholder has been using her main card is used as the predictor of the switching costs due to the fact that the probability of not switching and hence maintaining a longer relationship is positively associated with switching costs.

The model reveals that there is a significant difference between risky revolvers and non-risky revolvers in terms of switching costs. This result suggests that customers who revolve on credit cards for longer terms are more captive than those counterparts that borrow for shorter period of time. The model also shows that different credit card features have different effects on generating switching costs. The bank level characteristics of the card issuer make cardholders captive while non-price benefits such as cash backs or discounts increase the likelihood of customers to switch. On the other hand, the interest rates and annual fees do not have significant

effect on the switching behaviours of the Turkish card users. Another finding of the model is that customers using or having more of banking services and products are more captive. Moreover, holding several cards at the same time increases the tenure at the main card. Lastly, the estimation suggests that each card issuing bank enjoys some kind of market power because each issuer generates switching costs at different levels. The results show that the banks with the larger market shares create larger switching costs.

The study is organized as follows: In Section 2 the previous literature on switching costs is surveyed and characteristics that are specific to the Turkish credit card market are given. The next section briefly describes the data and introduces variables used in the model. Section 4 depicts the model and includes the regression results. Section 5 concludes the study.

Prior Research on Switching Costs and the Turkish Credit Card Market

It is hard to observe switching costs since they are intangible. More concrete examples of switching costs were specified by Klemperer (1995) such as need for compatibility with existing equipment, transaction costs, costs of learning to use new products, and psychological costs. Nilssen (1992) merely focused on the two types of switching costs namely transaction costs (for example; closing of an existing bank account and apply any other bank to open a new account) and learning costs (for instance; time spent on learning to use a new software). These reasons are not quantitative and it is not simple to express those costs in numerical notations. Notwithstanding, the effect of switching costs on pricing was extensively surveyed in

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the literature and the conclusive outcome reveals that the existence of these costs makes prices less competitive.

Klemperer (1985) emphasized two distinct strategies that firms employed when there were switching costs: (1) attract new customers and (2) exploit existing customers. He suggested that the more the number of new customers the more competitive the market would be because in such a market they used the former strategy. In this regard, Sharpe (1997) hypothesized that the higher migration rate made the deposit interest rates increase because a high migration rate, as a proxy for new customers who were supposed to have little costs of switching, made the market more competitive. He analyzed the US bank deposit market for the period from October 1983 to November 1987 and showed that the estimate of the portion of movers was significantly positive implying that the migration had a positive effect on the deposit interest rates for the specified time period.

Kiser (2002) studied the switching costs and switching behaviour of deposit account holders in USA via a new survey data. She studied the factors affecting the tenure at the main bank to analyse switching behaviour. Moreover, the survey included a specific question that explicitly asked if respondents felt it problematic to change their accounts. This direct measure of switching costs enabled her to conclude that higher income and more educated customers as well as minority households were likely to face switching costs. Degryse and Ongena (2008) had prepared a more detailed study that examined the existence, magnitude and determinants of switching costs in various financial markets specifically loan, deposit and interbank markets. They adopted models that investigate the effects of factors on duration of bank-firm relationship in order to examine the determinants of switching costs in loan markets.

There are a few examples that calculate the magnitude of cost of switching because it is difficult to observe these costs. Shy (2002) developed a simple theory without using econometrics that deployed observable variables such as prices and market shares in order to estimate the degree of switching costs. He suggested that customers with different level of switching costs have different purchasing pattern such that customers with low switching costs tend to buy less expensive products while customers with high switching costs tend to buy more expensive products. He also justified this argument with the example of the Finnish demand deposit banking industry in 1997: the banks with the larger number of accounts had the customers with higher switching costs but the smallest bank served customers with no switching costs.

Kim, Kliger, and Vale (2004) proposed a model that estimated the magnitude of switching costs with the aggregated data which did not need to incorporate individual specific micro level data. They analyzed the Norwegian banking sector for the period from 1988 to 1996. Accordingly, their point estimate of the average switching cost was 4.1 percent for the loan market. The estimate was more meaningful considering that it was about one third of the market average interest rate. They also calculated that an average of 35 percent of the average banks' market share for the loan market was derived from their existing borrowers. More interestingly, they found that the larger banks in terms of branch-network and loan size induced lower switching costs to their customers as opposed to Shy's aforementioned argument. Their justification was that the larger banks had more creditworthy borrowers who had more access to alternative sources.

Switching costs also exist in the credit card market and they restrain cardholders from switching to a lower rate card. The switching costs give card

issuers market power to charge higher prices. Deviation from the competitive outcome in the US credit card market was documented by Ausubel (1991). He highlighted that the perfectly competitive market itself, as there were 4,000 card issuers in the US, failed to reduce the interest rates down to marginal costs. He also calculated that issuers earned higher profits than ordinary returns for the period from 1983 to 1987. Similarly, Stango (2002) showed that the credit card rates in the US were positively related to the bank's market share, the indebtedness of its own customers, the indebtedness of its competitors' customers and the annual fees of its competitors. Another contributory conclusion was that customers with high default risks were more captive and the indebtedness was generating higher switching costs for these customers. This was an explanation for the banks' marketing strategies in 1990s that they tried to broaden their customer base with less creditworthy ones.

The interest rates in Turkey have been decreasing since 2002. The economic as well as political stability experienced in Turkey after the 2000 and 2001 financial crises brought down the rates. At the end of 2006, home, commercial and consumer loan rates went down to almost their half levels compared to 2002. However, neither the competition nor the economic progress could bring down the credit card interest rates until 2007. Having enacted in March 2006, "Debit Cards and Credit Cards Law no. 5464"[1] authorizes the Central Bank of Republic of Turkey (CBRT) to set a ceiling rate for the credit card market. Thanks to the regulation, rates came down to reasonable levels but they are still relatively high compared to other loan rates. Moreover, the larger banks in terms of market shares set their rates close to ceiling unlike the smaller banks. However, smaller ones are not able to raise their market shares implying that there is inertia in market shares (Farrell, 1986).

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[1] The law is available on the website of the Grand National Assembly of Turkey: http://www.tbmm.gov.tr/kanunlar/k5464.html

Akin et al. (2010) empirically show that credit card interest rates do not react much to the changes in marginal costs which are the costs of short term borrowing. The two-step system GMM estimation reveals that a coefficient of 0.37 for the lag of the cost of fund is statistically significant but not economically since as Ausubel (1991) suggests that the rates should fully reflect the changes in the cost of fund and hence the coefficient must be at least close one. They also show in another study that there is a fierce competition on non-price benefits (Akin et al., 2010). They use number of bank branches, service quality and soundness of the bank as proxies for bank level characteristics. Their model investigates whether these characteristics are important factors in explaining the credit card rates. They figure out that all estimates of the coefficients relating to these variables are significantly positive.

There are three arguments explaining high and sticky credit card interest rates: *search costs*, *switching cost*s, and *adverse selection theory*. Ausubel (1991) states that while high risk cardholders are induced to search for lower rates, convenience users and irrational customers- who do not aim to borrow initially but do borrow afterwards- are not interested in searching for lower rates. Thus, since lower interest rates will attract only customers with high default risks, banks do not compete on rates. Calem and Mester (1995) also argue that lower rates attract only customers with lower balances since customers carrying higher balances face higher search costs (because they get higher disutility from searching). However, those customers with lower balances are not profitable and hence not desirable for banks' point of view.

On the other hand, there are papers stating that 'search costs' argument is less valid for explaining the deviation from competitive equilibrium. In this regard, Crook (2002) claims that there is not any significant evidence that customers carrying larger

balances search more or less than customers with lower balances. Kerr and Dunn (2002) also show that probability of rejection does not have an important effect on consumers' search behaviour and customers with high probability of rejection search even more. In addition, it has shown in an empirical work that the search costs were not significant factors in credit card pricing in the US market for the years 1981-1986 (Berlin and Mester, 2004). Akin et al. (2010) discuss the very low search costs that the Turkish customers face. They list a few reasons. In Turkey, there are institutions like Banking Regulation and Supervision Agency (BRSA) and CBRT that they provide all relevant information about credit cards. This up-to-date information is readily available for customers. Furthermore, relatively small number of card issuers also makes searching easier in Turkey than in other countries such as US and Europe. All these studies together with the low search costs in Turkey suggest that the *search cost* argument is less valid in explaining high and sticky interest rates.

Ausubel (1991) introduces the new adverse selection theory. The theory argues that under asymmetric information, unilaterally decreasing the interest rates induces an incentive for risky card users to switch because they are more rate sensitive. This is not an equilibrium strategy for card issuers because risky customers become insolvent and hence default eventually. Calem and Mester (1995) also suggest that cardholders carrying higher balances have higher switching costs because under asymmetric information banks are not able to distinguish customers who want to carry their balances to new card from customers who intend to expand their credit lines, they use outstanding balances as credit scores and hence reject applications of customers with high balances. Calem, Mester and Gordy (2006) revised the tests with a new data set, 1998 and 2001 Survey of Consumer Finances, and concluded that there were still informational asymmetries.

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In this respect, Turkey has a specific case that makes the adverse selection argument less valid. Turkish credit card market does not have serious asymmetric information problem as claimed by Akin et al. (2010) because of the well developed information sharing system in Turkey. The Credit Bureau of Turkey was established in 1995 to assist financial and credit institutions in information exchanging and Credit Reference System (CRS) was launched in 1999 for this purpose. Moreover, "Debit Cards and Credit Cards Law no. 5464" enacted in 2006 regulates the interbank information sharing that banks can exchange information to monitor, evaluate, and control the risk status of the cardholders. Therefore, Turkish banks can distinguish customers in terms of their credit risks.

Having claimed that the two arguments are less valid, this study hence focuses on switching costs in the Turkish credit card market. It investigates the determinants of switching costs by utilizing a very recent survey data and adopts the model which Kiser (2002) and Degryse et al. (2008) employed. The next section describes the data.

Survey Data and Descriptive Statistics

Survey Sampling

This study employs the data obtained from 'A Nationwide Survey on Credit Card Usage' (Akin et al. 2009). The survey which was designed with various questions to understand the credit card market from the demand side was conducted to 2576 cardholders in diverse cities of Turkey in 2009. The interviewee was selected such that she had a credit card and the preferences over card choice and payment decisions

were at her discretion. The targeted population was adult card users living in urban areas since firms accepting credit cards are rare and the number of "point of sales" (POS) machines is limited in rural areas. The registered urban voters used as proxy for the so called population.

It is worth to tell more about the sampling technique utilized in the survey. There are millions people holding more than 46 million credit cards as of June 2010. However, there is not adequate information about the geographical distribution of these cards. Therefore, the survey used proxies to determine how many surveys must be conducted in each region. The number of POS machines is a major determinant for the card usage and the number of POS machines in each region is known.[2] Thus, the share of POS machines was used as a proxy in sampling of credit card customers. Notwithstanding, some regions may have more of these machines. The touristic areas are good examples of those regions. The number of credit cards is also related to the number of bank branches.[3] However, there are branches in some regions more than the economy requires since state banks open branches despite the low economic activity. In order to circumvent these pitfalls, the number of POS machines and bank branches were both used as proxies. The sampling weight then was calculated as the average of the two ratios for each region.

The statistical system called Nomenclature of Territorial Units for Statistics (NUTS), which was developed by the European Union, was used for the regional distribution of the surveys. There are 26 regions in Turkey according to the NUTS 2 level. The calculated weights were multiplied by 2500 to decide the number of surveys to be conducted in each region. Then, four regions get less than 30 surveys

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[2] The data is available online, Interbank Card Centre (BKM): http://www.bkm.com.tr/bkm-en/istatistik/illere_gore_isyeri_sayisi.asp
[3] The Banks Association of Turkey provides the geographical distribution of bank branches.

accordingly. But since it would be inefficient, these surveys were redistributed within the same NUTS1 level. The final step was choosing the province centre where the surveys must be conducted in each region. The provinces were randomly selected for each region after removing provinces that had a weight less than 25 percent within that particular region.

Variables

In order to investigate the factors affecting the duration, the standard Ordinary Least Squares (OLS) model is employed. *Duration* is the dependent variable that captures the degree of the cost of switching. It measures how long the cardholder has been using her main card. Respondent holding more than one card was asked to choose one of them to be her main card (respondent holding one card was not asked since her primary card was the only one she possessed). The mean for the sample is 5.5 years.

The dependent variable is regressed on some socioeconomic, demographic variables and on some specific survey questions that captures the customer type, the number of cards customer using, the reasons to use the card as the primary card. The regression also includes the bank dummy variables. Socioeconomic factors are controlled by personal income, gender, marital status, age, education with four dummy variables, wealth, and employment with six dummy variables. On the other hand, demographic variables are captured by the region the respondent lives and more specifically whether she lives in a province centre or a town in the region. The definitions and the summary statistics are given in Table 1 and Table 2 respectively.

Table 1: Definition of Variables

Variable	Definition
Duration	How long the cardholder has been using her card
Income	Personal income per month in Turkish Lira (TL)
Income Squared	Personal income squared in TL
Female	1 if female respondent, 0 if male
Married	1 if married respondent, 0 otherwise
Age	Age in years
Age Squared	Age squared
Primary	1 if primary school graduate or did not get any schooling, 0 otherwise
Secondary	1 if secondary school graduate, 0 otherwise
High School	1 if high school graduate, 0 otherwise
University	Excluded category: 1 if university or higher degree graduate, 0 otherwise
WHOUSE	1 if owns a house, pavilion or a real state, 0 otherwise
WCAR	1 if owns a vehicle, 0 otherwise
Civil Servant	1 if the respondent is a civil servant
Self-employed	1 if the respondent is a manufacturer, craftsman or a freelancer
Seasonal Worker	1 if the respondent is a farmer or a seasonal worker
Private Sector Employee	1 if the respondent is working as an associate or a manager in the private sector
Unemployed	1 if the respondent is not currently working
Out of Labour Force	Excluded category: 1 if the respondent is classified as out of labour force
Coast	Includes Aegean, Mediterranean, East Marmara and West Marmara
Black Sea	Includes East and West Black Sea
Middle Anatolia	Includes West Anatolia and Middle Anatolia
East	Excluded category: Includes North East Anatolia, Middle East Anatolia and South East Anatolia
Town	1 if the respondent lives in town, 0 otherwise
Risky Revolver	1 if the respondent is a revolver and roll over her balance at least two months within the last twelve months
Non-risky Revolver	1 if the respondent is a revolver and roll over her balance at most one month within the last twelve months
Convenience User	Excluded category: Convenience user, 1 if the respondent does not borrow on card
Bank Services	The number of banking services the respondent utilizes
Multi-card	1 if the respondent has more than one card from different banks, 0 otherwise
Bank Level	Bank level features of the card
Card Level Price	Price characteristics of the card
Card Level Non-price	Non-price benefits of the card

The model also controls the effect of each card issuing bank on the cost of switching. Since the dependent variable is the duration at the main card, bank dummy variables are the ones whose credit cards are being used as a primary card. It is seen in the data that no one prefers credit cards of 'Anadolubank', 'Eurobank', 'Milennium Bank', 'Turkishbank', and 'Turkland Bank' as a main card whereas 'Garanti Bank', 'Yapi Kredi Bank', 'Is Bank', and 'Akbank' have the largest market shares and their total market share is 70.4 percent in the total number of main cards. These four largest banks issued 60.8 percent of the total credit cards. This number derived from the survey is consistent with the aggregate data.[4]

After controlling socioeconomic, demographic and bank dummy variables, the model focuses on the independent variables that are generated from survey specific questions. First of all, customer types are controlled in the regression with *Convenience User*, *Risky Revolver*, and *Non-risky Revolver*. Credit cards are devices for payment alternatives rather than cash transactions but they can also be used as a credit instrument. Convenience users are the former type customers that they only use them as payment instruments. The variable *Convenience User* of this study conforms to the literature that customers who regularly pay their credit card balance in full are defined as convenience users. Revolvers, on the other hand, make use of the credit option of the cards. There are a few questions in the survey to infer if the respondent is a revolver. The card user is classified as revolver if she did not make any payment for the latest statement, or she did not pay any or paid some but less than the minimum amount, or she did pay above the minimum amount but less than the full balance within the last twelve months.

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[4] The aggregate data indicates that the market share of the four largest banks is 62.5 percent in the number of customers (Akin et al., 2010)

The literature tells that the level of switching costs is heterogonous among customers. That is to say different customers have different levels and types of switching costs. Calem and Mester (1995) show that cardholders with higher outstanding balances face higher switching costs. Those customers are likely to be rejected for their credit card applications and are likely to have payment difficulties. Under asymmetric information, banks use outstanding balances as credit scores and hence perceive them as risky. Ausubel (1991) introduces a third type in addition to convenience users and pure revolvers; customers who display some kind of irrationality that they do not plan to borrow at first but do borrow subsequently. From a bank's point of view, they are the most desired ones since they pay interest on their borrowings and have low default risks.

This study is inspired from the two researches and hence divides revolvers into two according to their risk levels. Revolvers who made a payment less than the minimum required amount (which is at least 20% of the term debt in Turkey) at least two months within the last twelve months are perceived as risky. This two-month criterion is set since the delinquency procedure in Turkey starts if customer does not pay the minimum amount in two consecutive months. The survey cannot deduce if the respondent rolls over for two consecutive months. But still using *two-month in the last twelve months* criterion is a good proxy for the risk classification of revolvers. Robustness test seen in the appendix, in fact, reveals that using a *three-month in the last twelve months* criterion does not alter the results.[5]

The survey also includes yes or no questions in order to capture which bank products and services the interviewee has or uses. Answers to these questions are yes if for example she has a time deposit, liquid, investment, pension fund account, or

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[5] Table 16 shows that the results do not change with using the three-month within the last twelve months criterion.

has a loan. There are also Likert scale questions with 1 to 5 that captures how often the respondent uses the bank services such as ATM, money transferring operations or online banking. Answers to these questions are 'never, seldom, sometimes, often, very often' such that 'never' corresponds to 1 and 'very often' corresponds to 5 on Likert scale.[6] These responses are transformed into binary to make them consistent with the former type of answers. Then, *Bank Services* is calculated as the sum of the 16 banking service questions. The mean of the variable is 4.27. A higher value of this variable implies that the cardholder is utilizing several banking services, and hence it is much more costly for the customer to change her card. Then, it is expected that the more the number of bank services and products employed by the cardholder the higher the cost of switching she faces.

Banks have several different credit cards. They issued them to capture different customers that demand credit cards for distinct purposes. Then, the number of cards should also be controlled in the model. However, this study differentiates holding several credit cards of different banks from having some credit cards -not necessarily of different banks. Customers holding several credit cards issued by different banks have already established relationships with different banks. They have already undertaken some costs. They now have more annual fees to be paid. On the other hand, they have the opportunity to exploit each card when it is beneficial to do. *Multi-card* is a dummy variable that is 1 if the cardholder has more than one card issued by different banks, 0 otherwise. Almost half of the sample is of this type.

The last three variables are important to understand which card features cardholders take into account when switching. The specific survey question asks the reasons why the cardholder prefers her main card. There are several reasons about

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[6] The survey questions are given in Table 14 in the Appendix.

the features of the card given in Likert scale with 1 to 5. This study uses eight of them and categorizes them as 'bank level' characteristics, 'price' related features and 'non-price' benefits of the card. *Bank Level* includes two reasons: (1) the card is issued by the respondent's primary bank and (2) the card issuing bank has a widespread ATM and branch network. The variable is calculated as the average of the two and has a mean of 3.154. The higher values of the variable imply that the cardholder values bank level characteristics more.

There are two factors related to price features namely 'interest rate' and 'annual fee' of the card. The respondent values price related attributes more if she is attracted by the low interest rate and low annual fee. *Card Level Price* is computed as the average of them and has a mean of 2.343.

The last category is composed of four factors. It gets higher values if the cardholder prefers the card because (1) card has a high 'limit'; (2) it offers more cashbacks, (3) more instalments, and (4) discounts in more stores. Similarly for the previous variables, *Card Level Non-price* is calculated as the average of the four factors and has a mean of 2.75. The mean comparison of these variables suggests that cardholders consider bank level characteristics the most in choosing the main card while they value price related features the least.

Pair-wise correlations among variables that are generated by the specific questions and the dependent variable are given in Table 3. *Bank Services, Multi-card,* and *Bank Level* are positively related with *Duration*. These significant positive relationships imply that customers who engage in more of banking services, who possess several cards from different banks and who value bank level features more have longer durations at the main card.

Table 2: Summary Statistics

Variable	Mean	Standard Deviation	No. of observations*
Duration	5.549	4.208	2561
Income	1,418	1,352	2498
Income Squared	3,839,751	26,700,000	2498
Female	0.285	0.452	2576
Married	0.710	0.454	2576
Age	38.010	12.022	2571
Age Squared	1589.242	1024.501	2571
Primary	0.219	0.414	2576
Secondary	0.110	0.313	2576
High School	0.358	0.480	2576
University	0.312	0.463	2576
WHOUSE	0.403	0.491	2467
WCAR	0.343	0.475	2500
Civil Servant	0.190	0.392	2573
Self-employed	0.161	0.368	2573
Seasonal Worker	0.034	0.181	2573
Private Sector Employee	0.388	0.487	2573
Unemployed	0.035	0.183	2573
Out of Labour Force	0.193	0.395	2573
Coast	0.684	0.465	2576
Black Sea	0.085	0.280	2576
Middle Anatolia	0.156	0.363	2576
East	0.075	0.263	2576
Town	0.105	0.307	2576
Risky Revolver	0.171	0.376	2576
Non-risky Revolver	0.137	0.344	2576
Convenience User	0.692	0.462	2576
Bank Services	4.267	2.564	2557
Multi-card	0.470	0.499	2572
Bank Level	3.154	1.118	2572
Card Level Price	2.343	1.276	2574
Card Level Non-price	2.750	1.135	2570

*Differing numbers are due to missing values or because the questions were not answered.

Table 3: Pair-wise Correlations of Survey Specific Variables

	Duration	Risky Revolver	Non-risky Revolver	Bank Services	Multi-card	Bank Level	Card Level Price	Card Level Non-price
Duration	1							
Risky Revolver	-0.0627***	1						
	(0.0015)							
Non-risky Revolver	-0.0222	-0.1812***	1					
	(0.2613)	(0.0000)						
Bank Services	0.1770***	0.0037	0.0131	1				
	(0.0000)	(0.8521)	(0.5079)					
Multi-card	0.1455***	0.0872***	0.0851***	0.2638***	1			
	(0.0000)	(0.0000)	(0.0000)	(0.0000)				
Bank Level	0.1285***	-0.0225	-0.0368*	0.1492***	0.0193	1		
	(0.0000)	(0.2533)	(0.0622)	(0.0000)	(0.3283)			
Card Level Price	0.0030	-0.0283	-0.0150	0.0301	-0.0566***	0.3633***	1	
	(0.8788)	(0.1507)	(0.4457)	(0.1278)	(0.0041)	(0.0000)		
Card Level Non-price	0.0039	-0.0022	-0.0390**	0.0910***	0.0503	0.5295***	0.5369***	1
	(0.8451)	(0.9094)	(0.0480)	(0.0000)	(0.0108)	(0.0000)	(0.0000)	

The P-values are given in parentheses. *, **, and *** highlight the significance at 10 percent, 5 percent, and 1 percent respectively.

The Model and Results

In order to investigate the factors affecting the duration, the standard Ordinary Least

Squares (OLS) is employed.

$$Y = X\beta_1 + Z\beta_2 + S\beta_3 + \varepsilon$$

where Y is the years that the cardholder has been using her current card so far, X is

the vector of socioeconomic and demographic variables, Z is the vector of

independent variables discussed above, S is the vector of dummy variables that

controls the effect of each card issuing bank, and ε is the OLS error term.

Kiser (2002) discusses the customer decision making process as such when a

customer comes to an edge to switch between alternatives, she will compare the

expected utilities she gets from different products. Then, if switching costs exist and

are positive, the utility gain from switching must be high enough to compensate the

costs of switching. Therefore, all else equal, the probability of switching is inversely

related to switching costs. That is to say, the higher the switching costs the less likely

the customer will switch. Then, higher switching costs imply a longer duration,

ceteris paribus. In other words, a positive coefficient means that an increase in the

value of the variable leads to increase in the duration implying that the variable

restrains customer to switch.

The results of the estimation are given in the Table 4 (robustness tests are

given in Appendix A). Estimations show that personal income has not any significant

effect on duration nor does income squared. The monthly personal income is used in

the regression since the survey was conducted to individuals who made the decisions

about card choice and payment.[7]

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[7] There are outliers in terms of personal and household income. Therefore, cardholders having
personal or household income of more than TL 20,000 per month are excluded from the data.

The coefficient of *Female* is not statistically significant but *Married* has a positive and significant coefficient. While gender does not have any significant effect on the tenure at the main card, married respondents have significantly longer durations than respondents who are single, widowed, divorced or separated. The results show that *Duration* is positively related to respondent's age but inversely related to age squared. The older people are more likely to have switched because they have more time and hence more opportunity to do that.

The model controls the education level of the cardholders with four dummy variables. The university graduates or respondents holding higher degrees are used as reference group. Among the other three variables, only *Primary* is significant and the coefficient is negative. This implies that respondents with little or no schooling have shorter durations than university graduates or graduates of higher degrees. The possible justification may be suggested by Stango (2002) such that with the increasing competition in 2000s, banks started to launch aggressive marketing strategies to obtain less creditworthy people. Therefore, primary school graduates are recently granted credit cards and hence have shorter durations.

Table 4: Estimation Results for First Chapter

	Coefficient	Std. Err.		Coefficient	Std. Err.
Income	0.000	0.000	Akbank	-1.425***	0.279
Income Squared	0.000	0.000	Albaraka	-1.538***	0.311
Female	0.177	0.171	Anadolubank	(dropped)	
Married	0.406**	0.192	Bankasya	-2.999***	0.450
Age	0.281***	0.050	Citibank	-1.354	1.125
Age Squared	-0.002***	0.001	Denizbank	-2.220***	0.786
Primary	-1.208***	0.264	Eurobank	(dropped)	
Secondary	-0.419	0.290	Finansbank	-2.184***	0.344
High School	0.019	0.203	Fortis	-2.280***	0.531
WHOUSE	0.188	0.172	Garanti	-1.437***	0.253
WCAR	0.451**	0.187	Halkbank	-2.288***	0.695
Civil Servant	-0.928***	0.353	Hsbc	-1.283***	0.313
Self-employed	-1.406***	0.363	ING	-2.164***	0.695
Seasonal Worker	-1.312***	0.458	Isbank	-0.835***	0.288
Private Sector Emp.	-0.658**	0.319	Kuveytturk	-2.470*	1.358
Unemployed	-0.490	0.440	Millennium	(dropped)	
Coast	0.301	0.242	Sekerbank	1.167	1.012
Black Sea	0.519	0.340	Tekstilbank	-5.096***	0.389
Middle Anatolia	0.426	0.291	Turkishbank	(dropped)	
Town	-0.316	0.257	Turkland	(dropped)	
Risky Revolver	-0.236	0.196	TEB	-3.013***	0.591
Non-risky Revolver	-0.428**	0.211	Turkiyefinans	-3.454***	0.861
Bank Services	0.187***	0.037	Vakifbank	-0.474	0.530
Multi-card	0.362**	0.163	Ziraat	-1.619***	0.505
Bank Level	0.374***	0.076	Cons	-2.727***	0.982
Card Level Price	0.036	0.073			
Card Level Non-price	-0.215**	0.090			
Number of observations = 2250					
R-squared = 0.2976					

No one prefers credit cards of 'Anadolubank', 'Eurobank', 'Milennium Bank', 'Turkishbank', and 'Turkland Bnak' as a main card. Yapi Kredi Bank is excluded from the regression.
*, **, and *** highlight the significance at 10 percent, 5 percent, and 1 percent respectively.

In addition to personal income, wealth indicators *WHOUSE* and *WCAR* are also

included in the regression to control the financial condition of the cardholder. Unlike

owning a real state, car ownership has a positive and significant effect on the

dependent variable. This is because the credit card is mostly used for daily

transactions, especially for fuel oil consumption. The sectoral breakdown of the

credit card transaction volumes is available on the website of the Interbank Card

Centre (BKM). The below table shows the top three sectors that have the largest

shares in total transaction volumes in June of each year. It is seen that Turkish credit

cardholders use their cards mostly for fuel oil consumption. Therefore, it is expected

that car owners hold credit cards for a longer period.

Table 5: Sectoral Breakdown of Credit Card Transactions

	2006	2007	2008	2009	2010
Petrol Stations	16.1%	15.3%	16.0%	13.4%	13.2%
Clothing & Accessory	9.7%	9.2%	8.6%	8.5%	8.5%
Markets & Shopping Centres	15.5%	15.3%	14.7%	15.1%	14.6%

Source: Sectoral Development for Selected Month; Interbank Card Centre (BKM). The shares of each
sector are given in percent for June of each year.

The employment type is controlled with six dummy variables. People out of labour

force are excluded as a base category. All coefficients of these variables except

Unemployed are significantly negative meaning that working households have

shorter durations than households that are classified as out of labour force. There are

497 respondents who are neither working nor seeking for a job. Those people

obtained their cards somehow (maybe because of the aggressive marketing strategies

of banks' discussed above) a short time ago. However, unlike respondents that are

currently working, they are not eligible to switch due to their poor financial

conditions.

Demographic variables do not have significant effects on the regressand.

Region where the cardholder lives is controlled with four dummy variables. The

coefficients of *Coast*, *Black Sea*, and *Middle Anatolia* are not significantly different

from *East,* the excluded category. Living in a town or a province centre is not a

significant factor either.

The results show that there is significant difference among customer types.

As discussed before, there are three types of customers in the model. Convenience

users are excluded from the regression as the reference group. The estimation reveals that the coefficient of *Risky Revolver* is not significant whereas *Non-risky Revolver* has a significantly negative effect on duration. This result suggests that revolvers with low default risks are more willing than convenience users and more able than revolvers with high risks to switch. Revolvers with low default risks are the most desired customer type from a banks' point of view because they pay interest on their card borrowings but have little default risks. Therefore, banks allow only those customers to switch conditional on that there is no asymmetric information about customers' types. Therefore, the estimation result relies on the premise that Turkish banks have no serious adverse selection problem (discussed in section 2).

Bank Services captures the customer's interest of using bank services and products. A positive coefficient implies that the duration increases as the number of bank services employed by the cardholder increases. This result is in line with the bundling effect theory of Akin et al. (2010). Banks promote their cards with other types of bank services and products so that switching brings extra costs. Therefore, cardholders become more captive as they utilize more of bank services.

Holding more than one card issued by different banks is a significant factor in estimating the tenure at the main card. It is better to interpret this conclusion with the help of another survey specific question. It asks cardholders who have several cards the reasons why they hold numerous cards. The responses indicate that cardholders enjoy different instalment opportunities, different grace periods, and different non-price benefits. Holding several cards is costly due to annual fees paid for each card. However, it gives the opportunity to benefit different card features without cancelling the main card. Therefore, the duration of the main card is longer if the respondent has more than one card issued by different banks.

The last three variables capture how specific card features affect the duration. The coefficient of *Bank Level* is significant and positive implying that cardholders valuing bank level features more are locked–in. The significance of bank level characteristics such as the number of branches, service quality and the bank's financial soundness in explaining high credit card interest rates has been proven by Akin et al. (2010). These two results together conform to the literature that banks make their customers captive by offering bank level features and charge them higher prices.

The estimation also reveals that the coefficient of *Card Level Price* is not significant whereas the coefficient of *Card Level Non-price* is significantly negative. Price related features such as interest rates and annual fees are not significant factors in explaining tenure at the primary card. On the other hand, customers are attracted by non-price benefits such as cash backs, instalments and discounts. This finding may be a justification for the inexistence of price competition and the existence of fierce non-price competition in the market (Akin et al., 2010).

Lastly, the model also includes dummy variables controlling the bank specific effects. The regression excludes 'Yapi Kredi Bank' which has the largest market share. Then, almost all coefficients are significantly negative suggesting that banks with the larger market shares create larger switching costs.[8]

Conclusion

The credit card business is regarded as high and sticky interest rates with higher than ordinary returns. The most prominent justifications for this phenomenon are search

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[8] Similarly, the estimation that excludes 'Tekstilbank', one of the smallest issuers in terms of market share, is given in the appendix. It is seen in Table 17 that all bank coefficients are significant and positive. This implies that each issuer enjoys some kind of market power.

costs, switching costs and adverse selection problem. Turkish specific features make 'switching costs' argument more legitimate than other justifications in explaining high and sticky interest rates in the Turkish credit card market. This chapter hence focuses on the switching costs and is the first to study factors affecting the switching behaviour in the credit card market of an emerging economy. It is also an exclusive study that it uses a very recent survey designed to examine the credit card market from the consumers' perspective. The conclusions are valuable for regulatory purposes as well as banks' marketing strategies. It helps the law maker to set regulations in order to bring down the credit card interest rates without harming the market. In this regard, regulations need to focus on reducing switching costs in the credit card market instead of just focusing on prices. It also suggests banks to adopt strategies to make their customers captive.

After controlling socioeconomic and demographic variables, the empirical evidence suggests that banks will allow only customers -who pay interest on their card borrowings but have low risks- to switch when they are able to distinguish customer types. It also reveals that the engagement with the banking services and products makes customers more locked-in. Moreover, customers that value bank level characteristics of the card are likely to be captive. The results show that cardholders respond to non-price benefits while they are unresponsive to price related features such as interest rates and annual fees. This may confirm with the claim that there is a fierce non-price competition in the Turkish credit card market (Akin et al., 2010). Lastly, the model also discloses that each bank has some kind of market power that each issuer produces switching costs but at different levels. It is estimated that the larger banks in terms of market share create larger switching costs.

CHAPTER 2

RATE SENSITIVITY: SURVEY EVIDENCE

Introduction

The credit card market is associated with high and sticky interest rates. Considerable amount of research was conducted to clarify the reasoning behind the high credit card rates. The possible justifications are mostly focused on the supply side of the market. That is to say, banks charge higher rates to compensate for the risks and high operating costs they face. To begin with, banks have to bear high credit and liquidity risks. It has been claimed that customers' default risks induce issuers to set high rates because credit card debts are mostly unsecured. Banks also have liquidity risks because they do not know ex ante when customers will use their cards. This uncertainty then entails banks to invest in short-term securities with low yields or compel them to borrow expensively. In addition, the credit card business necessitates having superior technologies which increases the operating costs of issuers. Furthermore, the fierce non-price competition in the market brings further costs.

The competition literature in the credit card market, on the other hand, tells us a different story. Even though the competition is fierce among many card issuers with little entry barriers, issuing banks earn higher than ordinary profits.[1] This phenomenon suggests that the justification for high rates needs to be sought on the demand side as well. In other words, the credit card rates are sticky because demand for credit cards is inelastic in terms of interest rates. Then, another set of demand side

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[1] For example, Ausubel in 1991 highlighted that interest rates in the US credit card market remained high in spite of the decreasing trend in the cost of funds in 1980s. Moreover, although there were 4000 card issuers in 1980s with no entry barriers, he showed that major issuers earned three to five times the ordinary returns contrary to the competitive outcome. Also see Akin et al. (2010)

explanations is argued to depict the deviation from the competitive equilibrium. These arguments are search costs, switching costs and irrationality. The bottom line of these explanations is that cardholders are unresponsive to rate cuts as opposed to the behavioural assumptions of perfect competition. The first argument claims that customers have difficulties in determining card terms i.e. search costs discourage customers to search for lower rates. In addition, there are switching costs in the credit card market like all other markets.[2] These costs restrain customers from switching to lower rate cards. Search and switching costs give issuers market power and induce them to charge higher rates.

These two arguments are the basis for the debate that the credit card market should be regulated to get more competitive rates in favour of the card users. There are two main approaches in the discussion of designing regulations to bring down the credit card interest rates. The first approach argues that since customers face search costs, then the competitive outcome can be reached by making all relevant information available. Informed cardholders then rationally select the cards with the lowest rates. The regulations that require banks to disclose the card terms were set for this purpose.[3] The survey employed in this study includes questions that measure the search costs customers face. However, the empirical models of the study do not use explanatory variables related to search costs because Calem (1992) states that the rates and profits stay high despite the disclosure requirements suggesting that the search cost argument is less valid for explaining high and sticky rates in the credit card market.[4]

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[2] See Klemperer (1985, 1987)
[3] The Fair Credit and Charge Card Disclosure Act of 1988 amended the Truth in Lending Act.
[4] See also Crook (2002), Kerr and Dunn (2002), Berlin and Mester (2004). See also Akin et al. (2010) for the low search costs in the Turkish credit card market.

The other approach argues that the market needs to be regulated even more because there are factors that restrain customers from switching. It claims that customers may not be able to switch their cards even though they know which card has the lowest interest rate. The regulations about the ceiling rates that set an upper bound for the card interest rates were designed in this respect.[5] This study controls switching costs by the number of banking services the customer employs since Akin et al. (2010) state that card issuing banks bundle their credit cards with other banking products to discourage switching. The estimation results reveal that customers with high switching costs are insensitive to rate reductions.

The last argument stating that customers display a kind of irrationality is first argued by Ausubel in 1991. He claims that cardholders underestimate their probabilities of borrowing from credit cards and consequently do not care interest rates at the outset. But they find themselves borrowing eventually. These irrational customers who pay their debts are desirable from a bank' perspective because banks earn interest revenues and they face little default risks. He also argues that there are credit constrained customers who intend to borrow from their cards -the only credit sources they get. Moreover, these customers with high default risks are more motivated to search for lower rates in order to decrease their interest charges. Ausubel (1991) then introduces a new adverse selection theory which states that banks have problems in differentiating customer types. This argument claims that lowering interest rates would attract only high risk customers who are not desirable from banks' perspective. Thus, banks do not compete on prices when there is asymmetric information. This study also supports the adverse selection theory: lowering credit card interest rates would disproportionately attract customers who

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[5] In Turkey, 'Debit Cards and Credit Cards Law no. 5464' regulates the ceiling rate application for the credit card market.

intend to borrow from their cards. It finds evidence that customers who borrow from their cards are more sensitive to changes in card interest rates than customers who do not borrow their cards.

Chakrovarti (2003) also claims that the customer structure of the market accounts for the high interest rates. He categorizes cardholders as convenience users and revolvers according to their motives to use credit cards such that the former group use cards as payment instruments whereas customers in the latter group are motivated to use credit cards as credit instruments. Convenience users pay their debts regularly and hence they are not profitable for banks. On the other hand, revolvers are profitable that banks earn interest revenues from them. Then, he argues that the more the number of convenience users relatively to revolvers the higher the card interest rates.[6] This is because the interest revenues finance the costs of convenience users.

Akin et al. (2010) show that although there exists a fierce non-price competition, the credit card market lacks price competition. This is also observable in the market such that banks with smaller market shares lower their card interest rates. Notwithstanding, they cannot raise their market shares since customers do not prefer to use these cards.[7] This highlights a puzzling case that even though the rates of cards issued by larger banks (in terms of market share) are relatively high, people still prefer these cards to lower rate cards of other smaller banks. Thus, the object of this study is to analyse the demand side determinants of rate sensitivity in the credit card market. The novelty of this thesis relies on the demand related data set it utilizes. The prior studies used aggregate data but the survey at hand is unique such

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[6] According to a survey of Interbank Card Centre (BKM) in 2009, 80 percent of the cardholders in Turkey are convenience users implying that there are four convenience users for each revolver. This structure of the Turkish cardholders might be an explanation for high credit card rates.
[7] The six largest banks have 80.2 percent market share in the number customers (Akin et al., 2010)

that it has specific questions that directly measure the rate sensitiveness of cardholders and allows us to empirically determine who are rate sensitive and who are not. The wording of questions depict if the customer wishes to switch to a card with lower interest rate. Therefore, this study investigates customers' willingness to change their cards which is induced only by a rate cut. The survey also enables to differentiate convenience users from revolvers explicitly and hence the customer type is controlled in the regressions. The study first employs a binomial probit model to analyse the determinants of being a "switcher" or a "non-switcher".[8] Then, the degree of rate sensitivity is examined by an ordered probit model.

The study is organized as follows: developments in the Turkish credit card market are briefly given in section 2. Next section includes the prior research on rate sensitivity. Section 4 gives details of the survey and descriptive statistics. Section 5 describes the model and shows the estimation results. Then, Section 6 concludes the study.

Developments in the Turkish Credit Card Market

The high interest rates for credit cards are applicable in all around the world and in this regard, Turkey is not an exception. The lack of price competition in the Turkish credit card market is shown by Akin et al. (2010). They show that card rates do not strongly follow the cost of funds. On the other hand, other loan rates chase the descending movement of the cost of funds realized in Turkey with the economic stability it has experienced after 2000 and 2001 financial crisis.[9] This stickiness of card rates obviously makes credit cards expensive instruments to borrow compared

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[8] 'Switcher' is the one who is willing to change her card with another card having lower interest rate but 'non-switcher' is not willing to switch. The definitions of variables are given in Section 3.
[9] Home, consumer, and automobile loan rates went down to half levels from 2002 to 2006 in Turkey.

with the alternative credits. However, the increasing outstanding balances points out that the Turkish cardholders are getting familiar to borrow from their cards despite their high interest burdens.

The growth of the Turkish credit card market is worthwhile to talk about.[10] The increasing number of point of sale (POS) terminals and automatic teller machines (ATM) also reflects the general acceptance and usage of credit cards. The number of credit cards also increased by 123 percent between 2003 and 2009 and reached to 44.4 million in 2009.

Table 6: Number of ATM and POS Terminals in Thousands

	2003	2004	2005	2006	2007	2008	2009
ATM	12.9	13.5	14.8	16.5	18.8	22.0	23.8
POS Terminals	662.4	912.1	1141.0	1282.7	1453.9	1632.6	1738.7

Source: Interbank Card Centre (BKM)

Table 7: Number of Credit Cards and Transaction Volume

Years	Number of Credit Cards (in millions)	Transaction Volume (in million TL)
2003	19.9	40,334
2004	26.7	65,688
2005	30.0	86,494
2006	32.4	109,159
2007	37.3	142,787
2008	43.4	186,549
2009	44.4	204,742

Source: Interbank Card Centre (BKM)

The total credit card transaction volume is accompanied by the increasing number of POS terminals and credit cards. It skyrocketed from TL 40.3 billion in 2003 to TL 204.7 billion in 2009 by growing 408 percent. This amount accounts for 21.5 percent of GDP. The widely usage of credit cards confirms that they are convenience substitutes for cash payments. However, they can also be used as credit instruments. The Table 8 provides the revolving card debt in Turkey for the last seven years and the outstanding debt balances reached TL 19.1 billion in 2009, eleven times the level

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[10] Akin et al. (2010) claim that the Turkish credit card market is ranked third among the European credit card markets in terms of card numbers and tenth in terms of transaction volumes.

in 2003. It is observable that people do borrow from their credit cards even it is an expensive way of financing.

Table 8: Outstanding Debt Balances in TL Billion

	2003	2004	2005	2006	2007	2008	2009
Outstanding Balances	1.7	4.4	7.5	10.7	12.6	14.7	19.1

Source: Banking Regulation and Supervision Agency (BRSA). Outstanding debt balances include balances from instalments and delinquent loans.

The delinquency rate in the credit card market is also larger among other types of loans. The delinquency rate was 10.3 percent in 2009. This is inevitable considering the relatively high interest rates of credit cards. In addition, the aggressive marketing strategies of banks might be an explanation for the high delinquency rate such that banks provide cards to customers who do not have access to alternative loans. It is likely that these customers with high default risks may have to utilize the only credit source they get. Then, once a customer become delinquent, it is not so easy to pay off the accumulated debt.

Table 9: Delinquency Rates in 2009

Type of Loan	Delinquency Rate (%)
Corporate loans	4.8
Consumer loans	6.0
Credit cards	10.3
Mortgage	2.1
Automobile	10.3
Other	5.5
Total	5.2

Source: BRSA

BRSA Financial Markets Report (September 2009) indicates that the number of customers with delinquent credit cards approached to 2.5 million. This huge number of people and the high delinquency rate in the Turkish credit card market indicates that the ease of using credit cards encourages unsophisticated customers, who are not accustomed to borrow and do not have alternative credit sources, utilize the credit

option of cards despite the high interest rates. In this respect, Turkish households are getting familiar to live with debts as Table 8 shows the rapid growth in the outstanding debt balances. However, this transformation is not unproblematic that there are many victims of credit cards and there are even distressed card users killing themselves.[11]

Literature Review

Ausubel (1991) states that revolvers are rate sensitive because they borrow from their cards and hence they will search for lower rates in order to reduce their interest burdens. On the other hand, convenience users are not interested in searching for lower rates because they do not borrow on cards. Irrational customers, defined by Ausubel, are also insensitive to rate cuts because they believe that their indebtedness will be short-lived. These irrational customers are the most desired customer type since they pay interest on their card borrowings and have low default risks. Ausubel then introduces the new adverse selection theory. The theory argues that under asymmetric information, unilaterally decreasing the interest rates induces an incentive for revolvers to switch -because they are more rate sensitive- but not for the most desired group of customers. Thus, banks maintain high interest rates to lower their risks.

Calem and Mester (1995) associate adverse selection theory with search and switching costs. They first test the search attitude of customers and show that there is an inverse relationship between searching for the best card terms and the card debt. That is to say, customers who search more for lower rates have lower outstanding

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[11] This also draws attention of foreign press. See for example, "The Debt Trap - Outside U.S., Credit Cards Tighten Grip – Series", *New York Times*, August 9, 2008.

balances. Then, decreasing card rates only attract shoppers who carry low balances. These customers but are not profitable and thus they are not the desirable type of customer. Calem and Mester (1995) also suggest that cardholders carrying higher balances have higher switching costs because under asymmetric information banks use level of balances as credit scores and reject applications of customers with higher balances (or that more creditworthy customers with higher balances are granted with less favourable limits). They also show empirically that higher balances are more likely to have payment difficulties. Then, under asymmetric information banks can not attract profitable customers by offering lower rates because they do not apply if they know their probability of rejection is high.

Kerr and Dunn (2002), however, show that rejection probabilities of customers do not significantly affect their search behaviour and cardholders with high balances search more even though their probability of rejection is high. This finding suggests that balance carrying customers are rate sensitive and hence search more to minimize their interest expenses.

Kim, Dunn and Mumy (2005) then suggest that not only their risk class but the reason why customers use their cards should also be considered to understand the search behaviour for lower rates. They categorize customers according to their motives to use cards and also their risk levels. There are two motives that credit cards are being used for; borrowing and convenience use. They also claim that with the developments in credit monitoring and risk management techniques as well as the improved information sharing systems, banks are now able to classify customers according to their risks levels. There are low and high risks customers in terms of probability of default. The survey employed in this study also allows us to make a

clear distinction between convenience users and revolvers as well as between high and low risk revolvers.

Kim, Dunn and Mumy first theoretically claim that customers carrying balances have lower rates controlling for the risk levels. This is because they engage more in searching for lower rates. They also claim that a bad credit history i.e., having experienced a payment difficulty previously leads a higher card rates controlling for card use motive. Then, they empirically show that holding risk levels constant, revolvers have lower rates than convenience users since they are more motivated to search for lower rates. The estimation also indicates an inverse relationship between the probability of default and the credit card interest rate implying that a high probability of default would yield in a higher card rate.

Stavins (1996) uses bank data to investigate the cardholders' sensitivity to card interest rates.[12] The estimation results show that customers are sensitive to changes in interest rates. She also supports the adverse selection theory such that banks have incentives to charge high rates since lowering interest rates increases delinquent loans.

To sum up, all these studies imply that the customer type is a significant factor in explaining the rate sensitivity such that different types have different responses to rate cuts. Therefore, this study differentiates revolvers from convenience users explicitly thanks to the survey employed. The next section describes the data used in the study.

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[12] She also investigates the customers' sensitivity for other credit card plans such as annual fees, grace periods.

Data and Variables

Survey Sampling

The data employed in this study is obtained from 'A Nationwide Survey on Credit Card Usage' (Akin et. al. 2009). The survey was conducted on adult card users living in urban areas of Turkey in 2009.[13] The number of surveys was assigned to a region proportional to the number of credit cards used in that particular region. However, the geographical distribution of credit cards is not available; yet it can be estimated by existing data. There is a strong correlation between the number of credit cards and the number of POS terminals and bank branches. This fact makes them good presumptions to estimate the number of cards in each region. Moreover, the number of POS terminals and bank branches in each city is readily available.[14] The share of POS terminals and the share of bank branches are averaged for each region to calculate a sampling weight. These weights were multiplied by 2500 to calculate the number of surveys to be conducted in each region.[15] Next, one province was randomly selected for each region and surveys were conducted in that specific province. Then, the interviewee was selected if she had a credit card, had sole discretion of preferences over card choice and made decisions about the payment on her own. The survey was conducted to 2576 cardholders who satisfied these selection criteria.

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[13] Urban areas were selected because the number of firms accepting cards and the number of POS terminals are very low in rural areas. The statistical system called Nomenclature of Territorial Units for Statistics (NUTS) divides Turkey into 26 regions at the NUTS2 level. The regions may include several cities.

[14] Information by geographical distributions of POS terminals and bank branches are provided by Interbank Card Centre and the Banks Association of Turkey respectively.

[15] Four regions get less than 30 surveys. These surveys were redistributed within the same NUTS1 level. In addition, provinces that had a weight less than 25 percent in a region were removed from the sample.

Data

The survey includes specific questions that directly measure the rate sensitiveness of customers. More explicitly, the survey asks each cardholder the following yes/no question: "The monthly credit card interest rates are currently around 4 percent. If you learn that there is a card with lower rate than your credit card, would you switch to that card?" Then, 'switcher' is the one who answers yes while 'non-switcher' answers no. The specific part of the survey is over for non-switchers and they go with another set of questions. On the other hand, cardholders responded yes to previous question are continued in order to examine the degree of their rate sensitivity further. They are asked "Would you switch to a card with an interest rate of 3 percent?" This rate is 1 percentage point lower than the presumed card rate. Cardholders answered yes are pure switchers such that they are ready to switch by even a relatively low rate cut. The respondents are asked "Would you switch to a card with an interest rate of 2 percent?" if they answered no to the previous question. The cardholders that say yes are composed the second group in terms of willingness to change such that they switch to a card having 2 percentage points lower rate. The answer no implies that the rate cut should be more than 2 percentage points to make the respondent switch. The Figure 1 illustrates these questions and responses.

The wording of questions do not infer if the respondent is credit worth to change her card nor if she searches more for lower rates but it depicts that if she wishes to switch to a card with lower interest rate. Therefore, this study investigates customers' willingness to change their cards which is induced only by a rate cut, not for example by a lower annual fee or offering more non-price benefits.

The monthly credit card interest rates are currently around 4 percent. If you learn that there is a card with lower rate than your credit card, would you switch to that card?

NO

Non-switcher
bswitch = 0

mswitch = 0

Switcher
bswitch = 1

YES

Would you switch to a card with an interest rate of 3 percent?

YES

mswitch = 3

NO

Would you switch to a card with an interest rate of 2 percent?

YES

mswitch = 2

NO

mswitch = 1

Figure 1. Rate Sensitivity

There are two regressions in this study focusing on two dependent variables: the

customers' responses to rate cuts and the degree of their rate sensitivity. The

dependent variable BSWITCH used in the probit regression takes value of 1

indicating a switcher and 0 represent a non-switcher. 'Switcher' means that the

cardholder is willing to change her card with another one having lower rate than her

card. 'Non-switcher', on the contrary, is not eager to switch her card due to a rate

cut. The summary statistics shows that 28 percent of the sample is switcher while the

rest is non-switcher.

The value of the dependent variable MSWITCH takes value from 0 to 3

where 0 corresponds to rate insensitivity and 3 rate sensitivity to reductions in the

credit card interest rates. Customers who are ready to change their cards for even 1

percentage point lower rate are the most rate sensitive cardholders. They are denoted

by 3 and 24.5 percent of the sample is of this type. Similarly, customers who are willing to change their cards for 2 percentage points lower rate are the second group in terms of rate sensitivity and represented by 2. There are 68 respondents in this group representing 2.6 percent of the sample. The third group is composed of customers who are less willing to change their cards and the rate cut should be more than 2 percentage points in order to induce them to switch. These customers are denoted by 1 and they represent only 0.9 percent of the sample. The last group is represented by 0 and composed of customers who are not willing to change their cards due to a rate cut i.e. they are insensitive to rate reductions. This group composes the majority of the sample with 71.9 percent.

The same set of explanatory variables is used in both regressions. These variables can be categorized into three: (i) socioeconomic (income, sex, marital status, schooling, employment, and wealth), (ii) demographic variables (region the customer lives and whether she resides in a town or province centre), and (iii) variables that are generated from survey specific questions (customer type, number of banking services employed, number of credit cards, and factors that are effective in choosing the main card). The definitions of these explanatory variables are summarized and descriptive statistics are given in Table 10 and Table 11 respectively.

The personal income is controlled with *Income* and *Income Squared* that the latter is the square of the personal income. It is seen that cardholders has TL 1,418 monthly income on average. The gender is also controlled in the regressions and females represent 28.5 percent of the sample. The marital status of the customer is captured by a dummy variable M*arried* which takes value 1 if the respondent is

married and 0 otherwise. 71 percent of the sample is married while the rest is composed of single, widowed, divorced and separated cardholders.

The education level of the cardholders is controlled with four dummy variables. Customers who got little schooling or were graduated from primary school are represented by the dummy variable *Primary* and 22 percent of the sample is at this level of education. Secondary school graduates are captured with *Secondary* and 11 percent of the sample is graduated from secondary school. Likewise, high school graduates are represented by *High School* and there are 923 cardholders with 36 percent of the sample. The highest level of education is composed of university graduates or respondents having higher degrees. This group represents 31 percent of the sample and excluded from the regressions since it is used as reference group for education.

The employment type is controlled with six dummy variables. Employees working in the public sector are captured by *Civil Servants*. Similarly, cardholders working in the private sector are controlled by *Private Sector Employee*. These two types of customers have regular incomes and it is seen that civil servant and private sector employees represent 19 percent and 39 percent of the sample respectively. Cardholders who are manufacturer, craftsman and freelancer are composed *Self-employed* and 16 percent of the sample is categorized as self-employed. Moreover, there are 87 respondents who are famers or seasonal workers, thus *Seasonal Worker* captures these customers. Customers that are not currently working but seeking for a job are represented by *Unemployed*. Only 3 percent of the sample is unemployed. Finally, customers who are not working and not looking for a job are composed of *Out of Labour Force* and 19 percent of the sample is categorized under this group. Besides, the final group is excluded from the regressions as a base category.

Table 10: Definitions of Explanatory Variables for Second Chapter

Variable	Definition
Income	Personal income per month in Turkish Lira (TL)
Income Squared	Personal income squared in TL
Female	1 if female respondent, 0 if male
Married	1 if married respondent, 0 otherwise
Age	Age in years
Age Squared	Age squared
Primary	1 if primary school graduate or did not get any schooling, 0 otherwise
Secondary	1 if secondary school graduate, 0 otherwise
High School	1 if high school graduate, 0 otherwise
University	Excluded category: 1 if university or higher degree graduate, 0 otherwise
WHOUSE	1 if owns a house, pavilion or a real state, 0 otherwise
WCAR	1 if owns a vehicle, 0 otherwise
Civil Servant	1 if the respondent is a civil servant
Self-employed	1 if the respondent is a manufacturer, craftsman or a freelancer
Seasonal Worker	1 if the respondent is a farmer or a seasonal worker
Private Sector Employee	1 if the respondent is working as an associate or a manager in the private sector
Unemployed	1 if the respondent is not currently working
Out of Labour Force	Excluded category: 1 if the respondent is classified as out of labour force
Coast	Includes Aegean, Mediterranean, East Marmara and West Marmara
Black Sea	Includes East and West Black Sea
Middle Anatolia	Includes West Anatolia and Middle Anatolia
East	Excluded category: Includes North East Anatolia, Middle East Anatolia and South East Anatolia
Town	1 if the respondent lives in town, 0 otherwise
Risky Revolver	1 if the respondent is a revolver and roll over her balance at least two months within the last twelve months
Non-risky Revolver	1 if the respondent is a revolver and roll over her balance at most one month within the last twelve months
Convenience User	Excluded category: Convenience user, 1 if the respondent does not borrow on card
Bank Services	The number of banking services the respondent utilizes
Multi-card	1 if the respondent has more than one card from different banks, 0 otherwise
Bank Level	The bank-level features of the card
Card Level Non-price	Non-price benefits of the card

Table 11: Descriptive Statistics for Second Chapter

Variable	Mean	Standard Deviation	No. of observations*
BSWITCH	0.281	0.450	2576
MSWITCH	0.978	1.299	2576
Income	1,418	1,352	2498
Income Squared	3,839,751	26,700,000	2498
Female	0.285	0.452	2576
Married	0.710	0.454	2576
Age	38.010	12.022	2571
Age Squared	1589.242	1024.501	2571
Primary	0.219	0.414	2576
Secondary	0.110	0.313	2576
High School	0.358	0.480	2576
University	0.312	0.463	2576
WHOUSE	0.403	0.491	2467
WCAR	0.343	0.475	2500
Civil Servant	0.190	0.392	2573
Self-employed	0.161	0.368	2573
Seasonal worker	0.034	0.181	2573
Private Sector Employee	0.388	0.487	2573
Unemployed	0.035	0.183	2573
Out of Labour Force	0.193	0.395	2573
Coast	0.684	0.465	2576
Black Sea	0.085	0.280	2576
Middle Anatolia	0.156	0.363	2576
East	0.075	0.263	2576
Town	0.105	0.307	2576
Risky Revolver	0.171	0.376	2576
Non-risky Revolver	0.137	0.344	2576
Convenience User	0.692	0.462	2576
Bank Services	4.267	2.564	2557
Multi-card	0.470	0.499	2572
Bank Level	3.154	1.118	2572
Card Level _nonpr2	2.750	1.135	2570

* Differing numbers are due to missing values or because the questions were not answered.

In addition to income and employment type, there are two dummy variables that control the wealth of the cardholders. *WHOUSE* and *WCAR* equal 1 if the respondent has a real estate or a motor vehicle respectively.

The region where the cardholder lives and whether she resides in a town or a province centre are also controlled in the regressions. The regional dummy variables

are *Coast*, *Black Sea, Middle Anatolia* and *East.* These regions are composed of Aegean, Mediterranean, East Marmara, and West Marmara; East and West Black Sea; West and Middle Anatolia; North East, Middle East and South East Anatolia respectively. *East* is used as a reference region, and hence excluded from the regressions. The dummy variable *Town* takes value 1 if the customer resides in a town and 0 if she resides in a province centre. The summary statistics reveal that only 10 percent of the sample is living in a town.

There are also other explanatory variables that are generated from the specific survey questions. First of all, the customer type is controlled in the regressions. As prior researches indicate, different customer types have different sensitivity to changes in card interest rates. Therefore, the customer types are controlled in each regression. The survey includes various questions relating to the payment behaviours of respondents which can be used to deduce the type of customers. Convenience users are composed of respondents who pay their balance in full regularly. Revolvers are the ones that use cards as a credit instrument. Then, respondents who did not pay anything for the latest bill, or pay less than the minimum amount in the last year, or pay more than the minimum required amount but less than the full amount within the last twelve months are defined as revolvers. This study further categorizes revolvers with respect to their risk levels. Risky revolvers are composed of respondents who made a payment less than the minimum amount at least two months within the last twelve months. This criterion is set because the delinquency procedure in Turkey starts after two months following the incomplete payment.[16] Revolvers with low risks are then defined as the ones who revolve only for one month.

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[16] The survey cannot infer if the respondent rolls over for two consecutive months. However, using two-month in the last twelve months criterion can be used as a proxy for the risk classification of revolvers considering the legal procedure in Turkey. Moreover, as it is seen in Appendix B, using a three-month in the last twelve months criterion gives similar results for both regressions.

The engagement with the banking services and products is also controlled in the regressions. The survey asks eleven yes/no questions if the respondent has or uses several bank products and services such as having time deposit, liquid, investment, pension fund account and automatic payment order. The survey also includes five questions that capture how often the respondent employs other banking services such as money transferring or online banking. These answers are given in Likert scale with 1 to 5. Then, the answers are transformed into binary such that 1s become zero and others become 1 to make them consistent with the previous set of answers. Then, the independent variable *Bank Services* is calculated by adding up these 16 answers.[17]

The number of credit cards, which are issued by different banks, the customer uses is also controlled in each model.[18] *Multi-card* is a dummy variable takes value 1 if the customer has several credit cards which are issued by different banks, 0 otherwise. In this respect, 47 percent of the sample has several credit cards. Although holding several credit cards is costly, it gives the opportunity to make advantage of different properties of cards.

The survey also includes a question asking respondents to value how effective the listed factors in their choice of main card.[19] It lists various card features with Likert scale that are effective in choosing the primary card and asks respondents to value these factors from 1 to 5. There are two bank level features of the card: (i) the card is issued by the customer's main bank and (ii) the bank of the main card has a widespread ATM and branch network. *Bank Level* is the average of two reasons and captures the effect of bank level characteristics on preferring the card as a main

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[17] The survey questions are given in Table 14 in the Appendix.
[18] As it is seen in Appendix B, the number of credit cards -not necessarily of different banks- has the similar effect.
[19] Customers holding several cards were asked to choose one of them as a main card. The survey is then continued on this main card.

card. The summary statistics show that the mean for the variable is 3.15 and a higher value implies that the customer appreciates bank level features of the card more in choosing main card. Similarly, *Card Level Non-price* accounts for the effect of non-price benefits on choosing main card. It is the average of four factors: the card has a high limit; it offers more cash backs, more instalments, and discounts in more stores. It has a mean 2.34 and higher values imply that the customer considers non-price benefits more in choosing main card.

Models and Results

The probit model first investigates factors that affect the probability of being a switcher or a non-switcher. The dependent variable BSWITCH takes value 1 indicating a switcher and 0 represent a non-switcher. The second model examines the degree of rate sensitivity by an ordered probit model. The value of the dependent variable MSWITCH takes value from 0 to 3 where 0 corresponds to rate insensitivity and 3 rate sensitivity. For each regression, X_i is the vector of socioeconomic variables, Z_i is the vector of demographic variables, K_i is the vector of survey specific variables defined in the previous section.

The probit regression is

$$Pr(Y = 1) = \Phi(X_i\beta_1 + Z_i\beta_2 + K_i\beta_3) \tag{1}$$

where *Y* equals 1 if the respondent is a switcher and 0 otherwise; Φ is the cumulative distribution function of the standard normal distribution. A positive coefficient means that the variable increases the likelihood of being a switcher.

The ordered probit regression to investigate the degree of rate sensitivity takes the form

$$Y_i^* = X_i \beta_1 + Z_i \beta_2 + K_i \beta_3 + \varepsilon_i \tag{2}$$

with

$$Y_i \begin{cases} 0 \text{ if } Y_i^* \leq \mu_o, \\[2mm] 1 \text{ if } \mu_o < Y_i^* \leq \mu_1, \\[2mm] 2 \text{ if } \mu_1 < Y_i^* \leq \mu_2, \\[2mm] 3 \text{ if } Y_i^* > \mu_2, \end{cases}$$

where Y_i are the observed rate sensitivities of customers depicted in the Figure 1, ε_i is the error term, and μ_i is the threshold parameters. Figure 2 illustrates the ordinal categories of MSWITCH from 0 to 3. As it is seen, there is a monotonic increase in the rate sensitivity as MSWITCH increases. Therefore, a positive coefficient implies a higher probability of being sensitive to rate cuts.
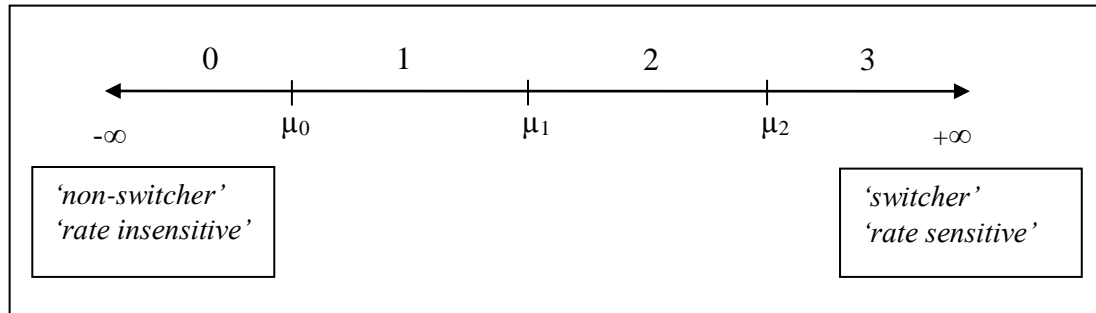
Figure 2. Ordered Probit Model - Threshold Parameters

Estimation Results

Estimations for the first equation are given in Table 12. The results show that personal income does not have significant effect on the probability of being a switcher after controlling for other socioeconomic variables. The positive and significant coefficient of *Female* implies that females are more likely to be switcher than male cardholders. This suggests that females are more willing to change their cards with cards having lower interest rates. On the other hand, the coefficients of

Married, *Age*, and *Age Squared* are not significant. The marital status and being older or younger do not significantly affect the likelihood of being a switcher.

Table 12: Results of the Probit Regression

	Coefficient	Std. Err.
Income	0.000	0.000
Income Squared	0.000	0.000
Female	0.141**	0.068
Married	-0.125	0.077
Age	0.007	0.017
Age Squared	0.000	0.000
Primary	0.289***	0.095
Secondary	0.189*	0.107
High School	0.009	0.077
WHOUSE	0.048	0.066
WCAR	0.088	0.068
Civil Servant	-0.070	0.117
Self-employed	-0.029	0.124
Seasonal Worker	0.224	0.170
Private Sector Emp.	-0.070	0.105
Unemployed	0.038	0.176
Coast	-0.092	0.110
Black Sea	-0.075	0.145
Middle Anatolia	-0.120	0.126
Town	0.050	0.097
Risky Revolver	0.536***	0.076
Non-risky Revolver	0.509***	0.083
Bank Services	-0.041***	0.014
Multi-card	0.156**	0.062
Bank Level	-0.015	0.031
Card Level Non-price	0.131***	0.031
Constant	-0.998***	0.349
Number of obs = 2263		
Log pseudolikelihood = -1269.7938		
Pseudo R2 = 0.0592		

*, **, and *** highlight the significance at 10 percent, 5 percent, and 1 percent respectively.

The education level of the cardholders is controlled with four dummy variables and the highest level (university graduates or respondents having higher degrees) is excluded as a reference group. Then, *Primary* and *Secondary* have positive coefficients that are significant at 1 percent and 10 percent respectively, while the

coefficient of *High School* is not significant. These results reveal that customers with little schooling are more likely to be switchers than more educated cardholders.

WHOUSE and *WCAR* are wealth indicators that are dummy variables taking value 1 if the respondent has a real estate or a motor vehicle respectively. Both coefficients are insignificant implying that wealth indicators are not important factors in explaining the customer's willingness to switch to a lower interest rate card.

The regression also controls the employment type of cardholders. Respondents that are classified as out of labour force are used as a base category. The results show that the employment type does not have a significant influence on the probability of being a switcher.

The coefficients of regional dummy variables suggest that the likelihood of being a switcher is not significantly different for customers living in the *Coast, Black Sea* and *Middle Anatolia* than customers living in the *East-* the reference region. The insignificant coefficient of *Town* also implies that residing in a town or a province centre does affect the probability of being a switcher either.

After controlling socioeconomic and demographic variables, the customer type is a significant factor in the willingness of switching to a lower rate card. This study categorizes customers into three: convenience users, revolvers with low default risks, and revolvers with high default risks. Convenience users are excluded from the regression since they are used as reference group. The coefficients of *Risky Revolver* and *Non-risky Revolver* are both positive and significant at 1 percent. The result suggests that in general, revolvers are more willing to change their cards with lower rate cards than convenience users. This finding supports the adverse selection theory such that lowering card rates would disproportionately attract revolvers. It also agrees with the result of Kim et al. (2005) that they show that revolvers have lower

rates than convenience users on average. Moreover, the coefficient of risky revolvers is greater than non-risky revolvers implying that revolvers with high risks are more likely to be switchers than revolvers with low risks.

The negative and significant coefficient of *Bank Services* suggests that cardholders having or using more of banking services and products are more likely to be non-switchers. In other words, these customers are not eager to change their cards because of a rate cut. This is mostly because those customers face higher switching costs.[20]

The results also reveal that holding several credit cards issued by different banks increases the probability of being a switcher (Table 19 in Appendix B indicates that holding more than one card- not necessarily of different banks- gives the same results). This finding suggests that holding several credit cards gives customers the opportunity to choose the card with the lowest interest rate.

The last two variables related to the factors that are important in choosing the card as a main card. The coefficient of *Bank Level* is negative but not significant meaning that valuing bank level features of the card more or less does not have significant effect on the probability of being a switcher. On the other hand, the coefficient of *Card Level Non-price* is significantly positive. This result implies that customers who value non-price benefits of the card are more likely to be switchers.

The ordered probit model is used for the second equation. This regression is run with a dependent variable which captures customer's rate sensitivity with four ordinal categories from 0 to 3. As illustrated in Figure 2, there is a monotonic increase in the rate sensitivity as the dependent variable increases. In other words, a

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[20] See also the first chapter.

positive coefficient implies an increase in the probability of being sensitive to rate cuts and vice versa.

Table 13: Results for the Ordered Probit Regression

	Coefficient	Std. Err.
Income	0.000	0.000
Income Squared	0.000	0.000
Female	0.133**	0.067
Married	-0.149*	0.077
Age	0.009	0.017
Age Squared	0.000	0.000
Primary	0.303***	0.093
Secondary	0.212**	0.106
High School	0.012	0.075
WHOUSE	0.048	0.065
WCAR	0.071	0.067
Civil Servant	-0.055	0.116
Self-employed	-0.019	0.123
Seasonal Worker	0.187	0.163
Private Sector Emp.	-0.058	0.103
Unemployed	0.052	0.174
Coast	-0.127	0.110
Black Sea	-0.093	0.145
Middle Anatolia	-0.130	0.127
Town	0.003	0.093
Risky Revolver	0.521***	0.074
Non-risky Revolver	0.487***	0.081
Bank Services	-0.043***	0.014
Multi-card	0.167***	0.062
Bank Level	-0.014	0.030
Card Level Non-price	0.116***	0.030
Threshold 1	0.989	0.344
Threshold 2	1.017	0.344
Threshold 3	1.103	0.344
Number of obs = 2263		
Log pseudolikelihood = -1558.0694		
Pseudo R2 = 0.0477		

*, **, and *** highlight the significance at 10 percent, 5 percent, and 1 percent respectively.

The estimation results are given in Table 13 and it is seen that results are similar to the previous regression. The positive and significant coefficient of *Female* implies that females are more rate sensitive than male cardholders. On the other hand, the

coefficient of *Married* is negative and significant at 10 percent suggesting that married respondents are more insensitive to credit card interest rate reductions than single, widowed, divorced or separated customers.

The results show that customers with little schooling- primary and secondary school graduates- are more likely to be responsive to rate cuts than more educated cardholders (university graduates or customers holding higher degrees). These findings also comply with the results of first regression.

The positive coefficients of risky and non-risky revolvers imply that revolvers are more rate sensitive than convenience users. In other words, revolvers are ready to switch their cards given a relatively low interest rate cuts. This finding also supports the adverse selection problem banks face: unilaterally decreasing credit card interest rates would attract only revolvers. Furthermore, revolvers who borrow from their credit cards for longer periods are more rate sensitive than those borrow for shorter periods (Table 20 shows that the results are robust in terms of the definition of risky revolvers).

The negative and significant coefficient of *Bank Services* implies that engagement with banking services makes customers insensitive to rate reductions. The results also reveal that holding several credit cards issued by different banks increases the likelihood of being rate sensitive (Table 21 in Appendix B indicates that holding more than one card- not necessarily of different banks- does not change the results). The coefficient of *Bank Level* is not significant whereas the coefficient of *Card Level Non-price* is significantly positive which suggests that customers who value non-price benefits more are likely to be responsive to rate cuts. All these findings are consistent with the results of the first regression.

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Conclusion

It has been claimed that the justifications for the high and sticky interest rates of credit cards and high profitability of card issuers mainly lie on the demand side. The explanations argue that cardholders deviate from the behavioural assumptions of perfect competition, that is to say, the demand for credit cards is inelastic in terms of interest rates. This study hence investigates the sensitivity to changes in card rates. It uses a unique data set which depicts the credit card market of an emerging market economy from the demand side.

The study finds evidence that revolvers are more sensitive to changes in the interest rates of credit cards than convenience users who do not intend to borrow from their cards. This conclusion hence supports the adverse selection theory: lowering credit card interest rates would disproportionately attract high risk credit-constrained customers who intend to borrow from their cards. Therefore, banks do not compete on rates to reduce their risks.

The estimation results also reveal that customers with little schooling are more concerned about rates than more educated consumers. Customers holding more than one card are also sensitive to rate reductions. This finding suggests that holding several cards enables customer to use the card with the lowest interest rate among many cards she owned. The results show that customers who use more of banking services, on the other hand, are insensitive to rate reductions. A possible justification might be the fact that these customers face higher switching costs.

APPENDIX

TABLE THAT IS REFERRED TO IN BOTH CHAPTERS

Table 14: Survey Questions Related to Banking Services

	YES	NO			
Do you have time deposit account?					
Do you have liquid account?					
Do you have investment account?					
Do you have pension fund account?					
Do you have automatic payment order?					
Do you have wage account if you are working?					
Do you make tax and insurance payments via bank?					
Have you ever got an automobile loan?					
Have you ever got a housing loan?					
Have you ever got a consumer credit?					
Have you ever got a commercial credit?					
How often do you use...	Never (1)	Seldom (2)	Sometimes (3)	Often (4)	Very often (5)
internet banking?					
telephone banking?					
ATMs?					
money transferring operations?					
commercial banking services?					

APPENDIX A: CHAPTER I

Table 15: Robustness Tests for First Chapter

	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Constant	-3.622***	0.914	-3.748***	0.919	-4.582***	0.962
Income	0.001***	0.000	0.000*	0.000	0.000***	0.000
Income Squared	0.000	0.000	0.000	0.000	0.000	0.000
Female	0.142	0.176	0.191	0.174	0.135	0.174
Married	0.409**	0.194	0.368*	0.194	0.442**	0.194
Age	0.310***	0.051	0.283***	0.051	0.305***	0.051
Age Squared	-0.002***	0.001	-0.002***	0.001	-0.002***	0.001
Primary	-1.680***	0.259	-1.309***	0.269	-1.652***	0.258
Secondary	-0.751***	0.285	-0.434	0.291	-0.727**	0.285
High School	-0.062	0.203	0.040	0.205	-0.078	0.202
WHOUSE	0.316*	0.175	0.279	0.175	0.327*	0.175
WCAR	0.580***	0.189	0.459**	0.190	0.563***	0.189
Civil Servant	-0.629*	0.356	-0.677*	0.357	-0.703**	0.355
Self-employed	-1.442***	0.370	-1.399***	0.369	-1.379***	0.370
Seasonal Worker	-1.448***	0.457	-1.282***	0.452	-1.545***	0.460
Private Sector Emp.	-0.593*	0.323	-0.579*	0.322	-0.640**	0.324
Unemployed	-0.406	0.442	-0.357	0.444	-0.483	0.439
Coast	0.723***	0.228	0.361	0.235	0.741***	0.229
Black Sea	0.642*	0.336	0.392	0.339	0.773**	0.339
Middle Anatolia	0.656**	0.292	0.479*	0.291	0.767***	0.294
Town	-0.461*	0.268	-0.338	0.263	-0.374	0.264
Risky Revolver	-0.248	0.189				
Non-risky Revolver	-0.406**	0.212				
Bank Services			0.192***	0.037		
Multi-card			0.306*	0.163		
Bank Level					0.457***	0.077
Card Level Price					-0.015	0.072
Card Level Non-price					-0.128	0.091
Number of obs.	2276		2257		2268	
R-squared	0.243		0.253		0.252	

The regression runs with three different specifications for the robustness of survey specific variables-each specification controls for the socioeconomic and demographic variables.

*, **, and *** highlight the significance at 10 percent, 5 percent, and 1 percent respectively.

Table 16: Results with New Definition of Revolvers

	Coefficient	Std. Err.		Coefficient	Std. Err.
Income	0.000	0.000	Akbank	-1.420***	0.278
Income Squared	0.000	0.000	Albaraka	-1.536***	0.311
Female	0.176	0.171	Anadolubank	(dropped)	
Married	0.404**	0.192	Bankasya	-2.982***	0.451
Age	0.280***	0.050	Citibank	-1.365	1.121
Age Squared	-0.002***	0.001	Denizbank	-2.208***	0.783
Primary	-1.206***	0.264	Eurobank	(dropped)	
Secondary	-0.420	0.290	Finansbank	-2.180***	0.343
High School	0.021	0.203	Fortis	-2.279***	0.530
WHOUSE	0.184	0.172	Garanti	-1.433***	0.252
WCAR	0.453**	0.187	Halkbank	-2.296***	0.696
Civil Servant	-0.932***	0.353	Hsbc	-1.280***	0.313
Self-employed	-1.402***	0.364	ING	-2.160***	0.696
Seasonal Worker	-1.325***	0.459	Isbank	-0.834***	0.288
Private Sector Emp.	-0.661**	0.319	Kuveytturk	-2.458*	1.338
Unemployed	-0.496	0.441	Millennium	(dropped)	
Coast	0.305	0.242	Sekerbank	1.176	1.014
Black Sea	0.523	0.340	Tekstilbank	-5.098***	0.389
Middle Anatolia	0.429	0.291	Turkishbank	(dropped)	
Town	-0.313	0.257	Turkland	(dropped)	
Risky Revolver	-0.194	0.237	TEB	-3.016***	0.591
Non-risky Revolver	-0.392**	0.183	Turkiyefinans	-3.465***	0.858
Bank Services	0.187***	0.037	Vakifbank	-0.461	0.529
Multi-card	0.364**	0.164	Ziraat	-1.623***	0.505
Bank Level	0.375***	0.076	Constant	-2.713***	0.981
Card Level Price	0.035	0.073			
Card Level Non-price	-0.215**	0.090			
Number of obs = 2250					
R-squared = 0.2976					

Revolvers who made a payment less than the minimum required amount at least three months within the last twelve months are defined as risky. Estimations show that using a three-month in the last twelve months criterion does not alter the results using two-month criterion for the risk classification of revolvers.
'Yapi Kredi Bank' is excluded from the regression.

*, **, and *** highlight the significance at 10 percent, 5 percent, and 1 percent respectively.

Table 17: The Model Excluding the Smallest Issuer

	Coefficient	Std. Err.		Coefficient	Std. Err.
Income	0.000	0.000	Akbank	3.671***	0.388
Income Squared	0.000	0.000	Albaraka	3.558***	0.428
Female	0.177	0.171	Anadolubank	(dropped)	
Married	0.406**	0.192	Bankasya	2.097***	0.517
Age	0.281***	0.050	Citibank	3.742***	1.169
Age Squared	-0.002***	0.001	Denizbank	2.876***	0.824
Primary	-1.208***	0.264	Eurobank	(dropped)	
Secondary	-0.419	0.290	Finansbank	2.912***	0.437
High School	0.019	0.203	Fortis	2.816***	0.599
WHOUSE	0.188	0.172	Garanti	3.659***	0.383
WCAR	0.451*	0.187	Halkbank	2.808***	0.748
Civil Servant	-0.928***	0.353	Hsbc	3.813***	0.413
Self-employed	-1.406***	0.363	ING	2.932***	0.749
Seasonal Worker	-1.312***	0.458	Isbank	4.261***	0.411
Private Sector Emp.	-0.658**	0.319	Kuveytturk	2.626*	1.396
Unemployed	-0.490	0.440	Millennium	(dropped)	
Coast	0.301	0.242	Sekerbank	6.263***	1.049
Black Sea	0.519	0.340	Turkishbank	(dropped)	
Middle Anatolia	0.426	0.291	Turkland	(dropped)	
Town	-0.316	0.257	TEB	2.083***	0.630
Risky Revolver	-0.236	0.196	Turkiyefinans	1.642*	0.889
Non-risky Revolver	-0.428**	0.211	Vakifbank	4.622***	0.592
Bank Services	0.187***	0.037	Yapikredi	5.096***	0.389
Multi-card	0.362**	0.163	Ziraat	3.477***	0.574
Bank Level	0.374***	0.076	Constant	-7.823***	1.041
Card Level Price	0.036	0.073			
Card Level Non-price	-0.215***	0.090			
Number of obs = 2250					
R-squared = 0.2976					

'Tekstilbank', one of the smallest issuers in terms of market share, is excluded. The positive and significant coefficients of bank dummy variables imply that each card issuing bank enjoys some kind of market power.

*, **, and *** highlight the significance at 10 percent, 5 percent, and 1 percent respectively.

APPENDIX B: CHAPTER II

Table 18: New Definition of Revolver - The Probit Model

	Coefficient	Std. Err.
Income	0.000	0.000
Income Squared	0.000	0.000
Female	0.141**	0.068
Married	-0.124	0.077
Age	0.007	0.017
Age Squared	0.000	0.000
Primary	0.290***	0.095
Secondary	0.189*	0.107
High School	0.009	0.077
WHOUSE	0.048	0.066
WCAR	0.088	0.068
Civil Servant	-0.070	0.117
Self –employed	-0.028	0.124
Seasonal Worker	0.225	0.170
Private Sector Emp.	-0.069	0.105
Unemployed	0.039	0.176
Coast	-0.090	0.110
Black Sea	-0.074	0.145
Middle Anatolia	-0.119	0.126
Town	0.050	0.096
Risky Revolver	0.516***	0.090
Non-risky Revolver	0.529***	0.072
Bank Services	-0.041***	0.014
Multi-card	0.156**	0.062
Bank Level	-0.015	0.031
Card Level Non-price	0.131***	0.031
Constant	-0.995***	0.349
Number of obs = 2263		
Log pseudolikelihood = -1269.8254		
Pseudo R2 = 0.0592		

New classification for risk levels of revolvers: Revolvers who made a payment less than the minimum required amount at least three months within the last twelve months are defined as risky. Estimations show that using a three-month in the last twelve months criterion does not alter the results using two-month criterion for the risk classification of revolvers.

*, **, and *** highlight the significance at 10 percent, 5 percent, and 1 percent respectively.

Table 19: Holding Several Cards - The Probit Model

	Coefficient	Std. Err.
Income	0.000	0.000
Income Squared	0.000	0.000
Female	0.138**	0.068
Married	-0.126	0.077
Age	0.006	0.017
Age Squared	0.000	0.000
Primary	0.293***	0.095
Secondary	0.193*	0.107
High School	0.017	0.076
WHOUSE	0.046	0.066
WCAR	0.088	0.067
Civil Servant	-0.063	0.117
Self –employed	-0.024	0.124
Seasonal Worker	0.231	0.170
Private Sector Emp.	-0.063	0.105
Unemployed	0.046	0.176
Coast	-0.094	0.110
Black Sea	-0.074	0.145
Middle Anatolia	-0.118	0.126
Town	0.050	0.096
Risky Revolver	0.535***	0.076
Non-risky Revolver	0.500***	0.083
Bank Services	-0.041***	0.014
Multi-card	0.149**	0.062
Bank Level	-0.016	0.031
Card Level Non-price	0.132***	0.031
Constant	-0.986***	0.348
Number of obs = 2267		
Log pseudolikelihood = -1272.9921		
Pseudo R2 = 0.0584		

'Multi-card' is a dummy variable taking value 1 if the respondent has more than one credit card, not necessarily of different banks; 0 otherwise. The results show that holding several cards increases the probability of being a switcher.

*, **, and *** highlight the significance at 10 percent, 5 percent, and 1 percent respectively.

Table 20: New Definition of Revolver - The Ordered Probit Model

	Coefficient	Std. Err.
Income	0.000	0.000
Income Squared	0.000	0.000
Female	0.133**	0.067
Married	-0.148*	0.077
Age	0.009	0.017
Age Squared	0.000	0.000
Primary	0.304***	0.093
Secondary	0.213**	0.106
High School	0.012	0.075
WHOUSE	0.049	0.066
WCAR	0.071	0.067
Civil Servant	-0.055	0.116
Self –employed	-0.017	0.123
Seasonal Worker	0.188	0.163
Private Sector Emp.	-0.058	0.104
Unemployed	0.053	0.174
Coast	-0.125	0.110
Black Sea	-0.092	0.145
Middle Anatolia	-0.129	0.127
Town	0.003	0.093
Risky Revolver	0.501***	0.089
Non-risky Revolver	0.509***	0.071
Bank Services	-0.043***	0.014
Multi-card	0.167***	0.062
Bank Level	-0.014	0.030
Card Level Non-price	0.116***	0.030
Threshold 1	0.985	0.344
Threshold 2	1.013	0.344
Threshold 3	1.100	0.344
Number of obs = 2263		
Log pseudolikelihood = -1558.1254		
Pseudo R2 = 0.0476		

New classification for risk levels of revolvers: Revolvers who made a payment less than the minimum required amount at least three months within the last twelve months are defined as risky. Estimations show that using a three-month in the last twelve months criterion does not alter the results using two-month criterion for the risk classification of revolvers.

*, **, and *** highlight the significance at 10 percent, 5 percent, and 1 percent respectively.

Table 21: Holding Several Cards - The Ordered Probit Model

	Coefficient	Std. Err.
Income	0.000	0.000
Income Squared	0.000	0.000
Female	0.130*	0.067
Married	-0.149*	0.076
Age	0.008	0.017
Age Squared	0.000	0.000
Primary	0.307***	0.093
Secondary	0.217**	0.106
High School	0.019	0.075
WHOUSE	0.047	0.065
WCAR	0.071	0.067
Civil Servant	-0.047	0.115
Self –employed	-0.014	0.123
Seasonal Worker	0.194	0.163
Private Sector Emp.	-0.051	0.103
Unemployed	0.060	0.174
Coast	-0.128	0.110
Black Sea	-0.092	0.145
Middle Anatolia	-0.128	0.127
Town	0.003	0.093
Risky Revolver	0.520***	0.074
Non-risky Revolver	0.479***	0.081
Bank Services	-0.042***	0.014
Multi-card	0.161***	0.062
Bank Level	-0.015	0.030
Card Level Non-price	0.117***	0.030
Threshold 1	0.976	0.344
Threshold 2	1.004	0.344
Threshold 3	1.091	0.344
Number of obs = 2267		
Log pseudolikelihood = -1561.3952		
Pseudo R2 = 0.0470		

'Multi-card' is a dummy variable taking value 1 if the respondent has more than one credit card, not necessarily of different banks; 0 otherwise. The results show that holding several cards increases the probability of rate sensitivity.

*, **, and *** highlight the significance at 10 percent, 5 percent, and 1 percent respectively.

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