

ESSAYS ON A TWO-SIDED MARKET: CREDIT CARD MARKET IN TURKEY

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ESSAYS ON A TWO-SIDED MARKET: CREDIT CARD MARKET IN TURKEY

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Thesis Abstract

Gültekin Göllü, “Essays on a Two-Sided Market: Credit Card Market in Turkey”

The credit card markets are subject to many debates in all over the world caused by their two-sided complex structure. Turkish credit card market also involves many controversial issues which originates several regulations in the market such as credit card interest rate regulation in 2006. While two sided markets have externalities, making the market complex, such regulations may have unexpected effects on the unregulated parts of the market. This thesis aims to shed light on the link between the non-interest and interest revenues of banks in the credit card market as it examines the effects of the credit card interest rate regulation in the Turkish credit card market in 2006.

In the first essay, we present a comprehensive survey of the literature on bank revenues in the credit card market. Investigating the existing empirical and theoretical studies, we conclude that although the large theoretical literature on credit cards is quite beneficial to understand the complex market mechanism, it is insufficient for policy recommendations since the results of theoretical models are quite sensitive to assumptions about the market. On the other hand, empirical studies carry vital importance to check the results of theoretical studies, to quantify the abstract calculations of theoretical models and to detect unexpected externalities in a specific market.

In the second essay, we empirically investigate the effects of a regulation in one part of two-sided credit card market to the other side. Concentrating on the Turkey experience, the article monitors the effects of credit card interest rate regulation in 2006 on non-interest revenues of banks in the market. The results indicate that the regulation on interest rates changed the banks attitude about non-interest revenues, and induced banks to consider their costs more when deciding their non-interest income strategies.

In the third essay, we analyze the relationship between the interest and non-interest revenues of banks. Using the available data for Turkey case we investigate the nature of the relationship between the two revenue types. Besides, we check evidence for the effect of the credit card interest rate regulation in 2006. Our results indicate that the interest rate regulation caused banks to shift their focus from regulated interest revenues to non-interest revenues. Moreover, the results detect that interest revenues has a negative effect on non-interest revenues. We argue that this result is due to the banks’ tendency to compete in non-interest revenues and the banks’ action to compensate their lost incomes from the regulated interest revenue. Looking at the results, we suggest careful consideration of the possible effects of a potential regulatory action to the unregulated parts of a credit card market when a regulatory action is planned.

Tez Özeti

Gültekin Göllü, “Çift Taraflı Bir Piyasa Üzerine Makaleler: Türkiye Kredi Kartı Piyasası”

Kredi kartı piyasaları tüm dünyada çift taraflı karmaşık yapılarından kaynaklanan tartışmalar doğurmaktadır. Türkiye kredi kartı piyasası da birçok tartışmalı konuyu gündeme getirmiştir ki bu konular 2006 yılındaki kredi kartı faiz oranları düzenlemesi gibi birtakım düzenlemelerin de kaynağını oluşturmaktadır. Öte taraftan çift taraflı piyasalar bazı dışsalıkları bünyesinde barındırdığından karmaşık yapıdadırlar ve olası düzenlemeler piyasanın düzenlenmeyen taraflarında beklenmeyen etkiler oluşturabilirler. Bu çalışma 2006 kredi kartı faiz oranları düzenlemesinin kredi kartı piyasası üzerindeki etkilerini inceleyerek bankaların kredi kartı piyasasından elde ettiği faiz ve faiz dışı gelirler arasındaki ilişkiyi aydınlatmaya çalışmaktadır.

Çalışmanın birinci bölümünde kredi kartı piyasasındaki banka gelirleri üzerine geniş çaplı bir araştırma ve literatür taraması sunmaktayız. Mevcut teorik ve ampirik çalışmaları inceleyerek yapılmış olan teorik çalışmaların piyasanın karmaşık işleyişini anlamakta oldukça faydalı olduğu sonucuna varıyoruz. Öte taraftan bu teorik çalışmalardaki sonuçlar teorik modeller oluşturulurken yapılan piyasa hakkındaki varsayımlara hassas bir biçimde bağlı olduğundan bu piyasayla alakalı politika üretiminde kullanma noktasında tek başlarına yetersiz oldukları sonucuna varılmıştır. Bunun yanısıra ampirik araştırmalar teorik çalışmaların sonuçlarını kontrol etme noktasında oldukça kritik bir öneme sahiptir.

İkinci bölümde çift taraflı piyasanın bir kısmındaki bir regülasyonun piyasanın diğer kısmındaki etkisi ampirik olarak incelendi. Bu bölümde Türkiye örneğine konsantre olunarak 2006 kredi kartı faiz düzenlemesinin bankaların faiz dışı gelirlerine olan etkisi incelendi. Sonuç olarak bahsi geçen düzenlemenin bankaların faiz dışı gelirleri ile ilgili tutumunu değiştirdiği bulundu. Bankaların düzenleme sonrasında bu piyasadaki masraflarını eskisinden daha fazla göz önünde bulundurarak faiz dışı gelir politikalarını belirledikleri saptandı.

Üçüncü bölümde Türkiye örneği için sahip olunan veriler kullanılarak bankaların faiz ve faiz dışı gelirleri arasındaki ilişkileri incelendi. Bunun yanısıra 2006 kredi kartı faiz düzenlemesinin etkisine dair bulgular araştırıldı. Elde edilen sonuçlara göre faiz düzenlemesi bankaların ilgi alanlarını düzenlemeye tabi tutulan faiz gelirlerinden faiz dışı gelirlere yöneltmesine sebep oldu. Aynı zamanda sonuçlar faiz gelirlerinin faiz dışı gelirler üzerinde negatif bir etkisinin olduğunu da belirtiyor. Bize göre bu bulgular bankaların faiz dışı gelirlerde rekabete girme eğilimlerinden ve düzenleme sonrası azalan gelirlerini düzenlenmeyen gelir kalemlerinden elde etme isteğinden kaynaklanmaktadır. Bu sonuçların ışığında, muhtemel bir düzenlemenin piyasanın düzenlenmeyen taraflarındaki olası etkilerinin iyice hesaplanarak yapılması gerektiğini önermekteyiz.

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CONTENTS

CHAPTER 1: A SURVEY ON THE TWO-SIDEDNESS OF CREDIT CARD MARKETS	1
Introduction	1
The Market	3
Theoretical Literature on Interchange Fees.....	11
Empirical Literature : Cost Benefit Analysis.....	22
Conclusion	25
CHAPTER 2: TWO-SIDED MARKETS: EFFECTS OF CREDIT CARD INTEREST RATE REGULATIONS ON NON-INTEREST REVENUES OF BANKS	28
Introduction	28
The Turkish Credit Card Market.....	31
Methodology and Data	35
Results.....	39
Conclusion.....	43
CHAPTER 3: SIMULTANEOUS ESTIMATION OF INTEREST AND NON-INTEREST REVENUES OF CREDIT CARD ISSUERS	45
Introduction	45
The Turkish Credit Card Market	47
Methodology and Data	52
Results	55
Conclusion	61
APPENDICES	63
A. Division of the data from the second period of 2006	63
B. Robustness Check for the Benchmark Model 1	63
REFERENCES	66

GRAPHS

1. The fees in a Four-Party Payment System	7
2. The growth rate of number of POS machines	29
3. The growth rate of credit card balances.....	29
4. The growth rate of number of credit cards	29
5. The number of annual credit card transactions in Turkey	43
6. The annual aggregate volume of credit cards transactions in Turkey	43
7. The Evolution of banks' interest and non-interest credit card revenues	44
8. Banks' interest and non-interest revenues divided by outstanding credit card balances	46
9. The growth rate of credit card balances	47

TABLES

1. The Statistics of the Variables in the Model in Chapter 2	36
2. The Results for the Benchmark Model and the Robustness Check Analysis	37
3. Growth rates of mean revenues from the pre- to the post-regulation period	48
4. Summary statistics of the variables in the model	51
5. Correlation matrix of the variables used in the model	51
6. Regression results for the 3SLS regression: Benchmark model.....	53
7. Benchmark model and the Models for Robustness Check	58

CHAPTER 1

A SURVEY ON THE TWO SIDEDNESS OF CREDIT CARD MARKETS

Introduction

Day by day credit cards penetrate into the lives of people more and more. As the technology improves the use of these practical plastics widens. Of course the increasing popularity of the credit cards is not fully related to the practicality or the benefits of them to the credit card users. The banks are also in the winners' side in the credit card market and they also help broadening of it. Non-interest revenues constitute an important item of banks' revenues in this two-sided market. These revenues consist of several kinds of fees collected from the customers of the two sides of the market, namely consumers and merchants. As this complex market evolves, many controversies, including ones originating from non-interest revenues of banks emerge between the agents of the market. These debates generate many policy issues and they sometimes lead to regulations by the regulatory authorities. As the market at hand is two-sided, these regulations on one side may expose the market to unexpected effects, generating new problems. As the credit card markets grew rapidly and generated many controversial issues due to their complex structure, they have attracted many scholars about many interesting issues. This paper is written to comprehend this complex-structured market besides exploring the theoretical and empirical literature about it, and pave the ways of future studies as it suggests beneficial research tracks.

Non-interest incomes are one of the two major income sources of banks in the credit card market. For the case of Turkey, these incomes constitute about forty percent of all the incomes of banks from this market. While they are a major income channel for banks, there are controversial issues in all items of non-interest incomes, namely interchange fees (IF), merchant discount fees (MDF), and the yearly card fees. One can easily detect these issues and the importance of the non-interest incomes of banks in

the credit card market from the recent events in this market and comments of the various scholars.

Evans and Schmalensee (2005) mention the importance of issues about merchant discount fees. They state the interest of the policymakers in these issues and connect this interest with two reasons. One is the increasing proportion of credit cards in usage as payment method, and the second is the increasing proportion of merchant discount fees among the cost items of merchants. Survey of Eurocommerce (1997) supports this argument by mentioning the increasing importance of merchant discount within costs of merchants.

The planned or implemented regulations on the non-interest income sources of banks are another clue indicating the importance of the issue. Today, as an item of non-interest income, interchange fee is limited in 20 countries in the world (Hayashi & Bradford 2008) (Source?). Besides, including Canada, Norway, there exist countries which set the interchange fee level to zero. Furthermore, in Denmark Merchant discount fee is set to zero. Moreover, investigations of regulatory agencies continue about interchange fees in many other countries (Hayashi and Bradford 2008). On the other hand, U.S. courts are considering about 50 lawsuits about collaborative action of card networks or other actions that violate free market environment in this market. The considerable amount of lawsuits is another interesting fact, implying the importance of the issue (Lyon 2006).

In this study I am going to briefly summarize the theoretical and the empirical literature on non-interest incomes in the credit card market. Before starting to review the literature, I am going to describe the mechanism of two-sided markets since it is quite different than regular markets we are familiar with. The rest of this paper is planned as follows: In the next part, I am going to focus on the credit card market as a two-sided market. In this part I am going to briefly explain the structure of the market, the agents in the market, and the costs and benefits of these agents. In the second part, I am going to summarize the existing theoretical literature on interchange fee and

credit card market. The third part is going to be on the empirical literature on cost and benefit analysis. The last part will try to take a general picture of the literature and conclude.

The Market

Two-Sided Markets

Jean-Charles Rochet and Jean Tirole were the starters of the two-sided platform markets literature with their paper in 2002 (Evans and Schmalensee 2005). The Credit card market is also a “two-sided market” which consists of two different kinds of customers, thus two sides. These two types of customers are merchants and credit card holders, namely. In the literature, two-sided markets grabbed great attention due to their quite complicated mechanism. To understand the structure of the credit card market one should also be familiar with how a two-sided market operates.

As we mentioned in a two-sided market there exist two different customer groups. The amount of demand in a two-sided market is unlike a one-sided regular market where the output is determined by the interaction of supply and demand of one customer side. In a two-sided market the amount of the demand comes into existence as a result of the interaction between the demands of these two groups for the same good (Rochet and Tirole 2003). More specifically, for the good in question to be demanded, there must be demand for that good from both sides of the market. When there exists demand from both customer groups, and a supplier ready to supply that good, the transaction occurs and both customers are charged prices which may not be equal and may vary according to the special conditions of the market. Therefore for a supplier to sell its good, it should attract both sides of the market in an appropriate ratio. For instance shopping malls supplies shopping environments. For a shopping mall to sell its good at hand, it should attract the shop owners and customers (Roson 2005). Since the desirability of a shop in the mall by a shop owner depends on the popularity of the mall, the mall should be marketing its good to its customers in both sides in the right proportion. The mall should attract enough customers to be able to rent its shops to

the firms. Besides, it also should attract firms to open shops in the mall to attract customers. By the way, the mall can price two customers at hand in different ways, but it should always consider attracting both groups in the right proportion so that it can sell its good . Since the demand for shops in the mall is determined as a result of an interaction between the two customer groups, the mall can follow various marketing and pricing strategies to attract both sides considering the nature of the relationship among two groups. As an illustration, since the popularity of a mall between the consumers would allure the shop owners, a mall may choose to promote the consumers only. In such a scenario, a mall may implement asymmetric pricing to both sides and may even negatively price the consumers (by free parking, free lotteries to visitors of the mall and so on) which will attract them and increase the demand for and thus the price of the shops in the mall. On the other hand, selling the shops for a higher price, the mall may compensate its loss from the other side of the market. Asymmetric pricing and how it will be implemented is a major issue in the two-sided market literature which we are going to mention again in section two.

The existence of asymmetric pricing is mostly related with externalities in a two-sided market. In the existence of positive externalities, paying asymmetrically high prices may be acceptable for the customer groups. Most of the time, these positive externalities compensate the losses of the customer group due to asymmetric pricing (Baxter 1983). The variety of possible externalities between the customer groups, and their close relation with the prices implemented to each group, make a two-sided market quite complicated to be understood . Since each market of this kind will have unique conditions and externalities, any attempt of optimization or policy recommendations on these markets should consider their complicated structure.

As a two-sided market, the credit card market literature also includes emphasis on how a profit-maximizing or welfare-maximizing price structure can be implemented in this market. Due to externalities, and inadequateness of the simple one-sided market framework for market efficiency calculations, profit-maximizing and welfare-

maximizing price schemes may vary in their results according to different assumptions on market structure. The debate on this issue is going to be mentioned in the theoretical literature part in section two.

The Credit Card Market as a Two-Sided Market

In the case of credit card market as a two-sided market, the good in question is a credit card transaction. The bank is the supplier of this good and the two customer groups are the merchants and the consumers. The bank is responsible for providing the necessary technological and service infrastructure to supply the good whereas it charges several kinds of prices from each group of consumers. According to the theoretical literature generally there exists asymmetric pricing in credit card markets, a pricing scheme where the merchant carries the burden of the total costs in the market (Evans and Schmalensee 2005).

In a two-sided market, the suppliers of the two sides of the market do not have to be the same. For the case of credit card market, the bank that agrees to issue credit cards is called “the issuer.” On the other hand, the bank that deals with the merchant is called “the acquirer”. The issuer and the acquirer bank can either be the same bank or they may differ. There are two types of credit card payment system in application according to this criterion, namely unitary systems and multi-party systems. The former kind is the one that is constituted by one payment system, in which the issuer and the acquirer are the same bank. In the latter system the issuer and the acquirer bank may differ or be the same. These multi-party systems are also called four-party systems since there are four main parties in that framework: the issuer, the acquirer, merchant and the card holder (Gans & King 2001).

Bank Revenues in the Credit Card Market

While our main interest in this study is in the scope of bank revenues in credit card markets, it is beneficial to define income sources of banks in this market, and the main concepts related to them. One can classify the revenues of a bank from the credit card

market as interest and non-interest revenues. The interest revenue is made up of the interest payments from the credit card holders. The interest is charged from a card holder when the holder does not pay back the transaction amount done by the card on the billing date of the card. This means that the card holder is using the card as a credit device for more than the free credit period of the card. As this channel of bank revenues is not in the scope of our interest we are not going to get into detail of its mechanism here.

The next type of bank revenues in the credit card market is non-interest incomes, which we are going to focus on. There are three sources of non-interest revenue for a bank in the credit card market. These are yearly card fees, merchant discount fees, and the interchange fees. To clarify the non-interest income sources of banks, it is needed to elaborate on the ongoing mechanism in the credit card market and further define these income sources.

The “yearly card fee” is a price that is charged to card holders once a year. The issuer bank charges this fee to the card holder that uses the bank’s card. This is the only price¹ in this market that is paid by the card holders and the banks prefer to execute this price once a year instead of charging them a specific price per transaction.

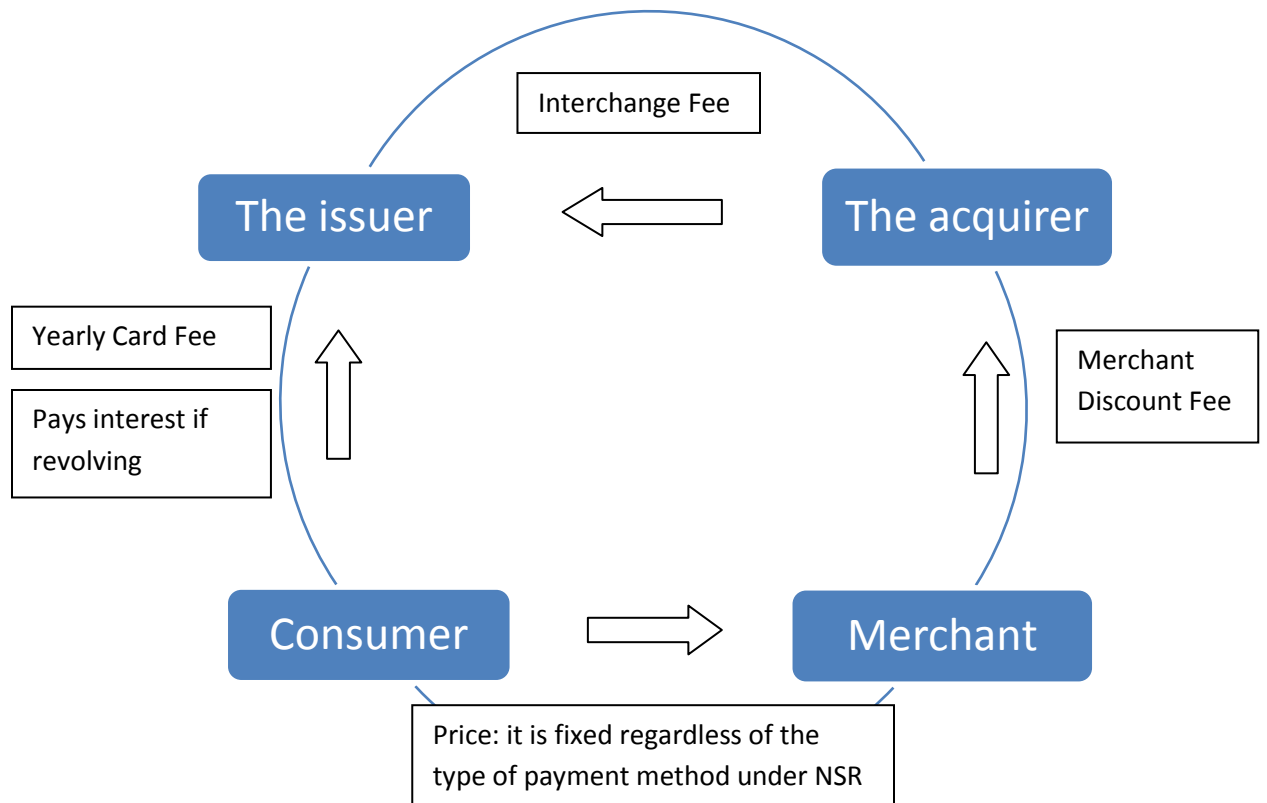
On the other side of the market, the banks charge “merchant discount fee” to the merchants. This fee is a price charged per transaction and it can vary by merchant due to the sector, size of the merchant, etc. For instance if the transaction includes traveler miles or bonuses or it is a payment by installments, the merchant discount fee may be larger than the usual amount. Mostly the banks have standardized formulas for the discount fee to charge the merchants. These formulas are calculated using overnight interest rate and some risk ratios which are foreseen by banks. These fees are determined by bilateral agreements between the acquirer banks and the merchants.

¹ If we do not consider the arguments that the MDF increase the overall level prices in the markets, thus making the MDF an indirect fee paid by consumers.

Rarely a merchant can use its market power to effectively define the merchant discount rate.

Interchange fees are the last non-interest income item of banks. It is a per transaction fee, which is paid by the acquirer bank to the issuer if these two banks differ in a transaction. So, an interchange fee is in question during a credit card transaction only in a multi-party system. The objective of such a fee is explained as compensation for the various costs of supplying credit card services (Hayashi 2008). In the literature there exists a considerable volume of discussions on the existence of interchange fees. We are going to mention these discussions in the theoretical literature part of this paper.

In a unitary payment system both the yearly card fee and the merchant discount fee are collected by the same bank. On the other hand, in a multi-party system the yearly card fee is collected by the issuer bank whereas the merchant discount fee is collected by the acquirer. Graph 1 visualizes the multi-party systems.



Graph 1: The fees in a Four-Party Payment System

A Closer Look at Multi-Party Systems: Costs and Benefits of the Agents

Being a relatively more complicated system, the multi-party system needs further explanation. The four-party systems have been in operation since 1970's (Lyon 2006) and starting with their introduction, interchange fees existed as revenue item for the issuers (Evans and Schmalensee 2005). As we have mentioned there are four main agents in this system: the credit card holder, issuer bank, acquirer bank and the merchant. Now we are going to describe the flow of interactions in a four-party system while we mention the costs and benefits for each agent.

After a transaction occurs by a credit card, the card user pays the total amount of the transaction at the end of the payment period of the card in question. The length of the payment period may differ from bank to bank and also between different credit cards, but usually it is between a month and forty days. Therefore when a credit card transaction occurs the card holder is supposed to pay the transaction amount to the card issuer bank up to forty days. On the other hand, the issuer bank has to transfer the transaction amount to the acquirer bank's account the following day of the transaction. This is the free credit property, and the main function of a credit card and it has a cost on the issuer bank. Besides, normally the acquirer bank must also transfer the transaction amount to the merchant the following day of the transaction. The merchant has a second option in which the money is transferred to the merchant's account at the end of a period of time. This time period's length also ranges between 30-40 days according to the agreement between the merchant and its bank. The costs and benefits of each alternative vary for the acquirer and the merchant. In the former option the acquirer bank receives the transaction amount minus the interchange fee from the issuer bank. In other words it receives the transaction amount but pays interchange fee to the issuer. Besides, the acquirer pays the merchant the transaction amount minus the merchant discount fee. Most of the time, this merchant discount fee is a greater amount than the interchange fee, so that the acquirer bank makes profit by only transferring the transaction amount to the merchant's account. Rarely this fee may be less than the interchange fee due to the market power of the merchant or the competitive behavior of the banks for the merchants. In such a scenario the merchant receives the transaction amount less the merchant discount fee.

In the scenario where the merchant waits for a time period to receive the full amount of the transaction, the acquirer bank takes risk to cover its costs. The acquirer bank receives the transaction amount less the interchange fee on the following day of the transaction and has to pay the full amount of transaction to the merchant at the end of the waiting period. In such a case the acquirer bank has to use the money at hand for about a month and win more than the interchange fee it pays to the issuer.

Each agent in this framework has several costs and benefits. The consumers can use the costless credit property of the credit card by consuming now and paying up to 40 days later. They do not have to carry cash with them. Besides, one can use the credit option of the credit card and take credit up to the limit of the card without any additional procedures. Purchasing by installments and shopping on the internet are other benefits of a credit card to the consumer. Lastly the promotions such as earning traveler miles, bonuses or chip money, given by banks to consumers proportional to their usage of credit card, is another benefit to the consumers (Kaya 2008). On the other hand, the major cost of a consumer is the yearly card fee which is paid to the issuer bank. Besides it is argued that there is an inflationary effect of merchant discount fees on the overall price level (Levitin 2008). If this argument is valid, all the consumers have also been paying for this indirect extra inflation fee.

On the other side of the market, a merchant can increase the number of its customers by accepting credit cards due to a number of reasons. First of all, a merchant attracts the illiquid consumers in this way (Chakravorti, 2003). Another benefit to the merchants is the possible increase of consumption by card holders due to the promotions given by banks. As these promotions are proportional to the volume of consumption by the card, the card holders may tend to consume more. Besides, widespread usage of credit cards may smooth the revenues of the merchants in specific sectors in which the monthly-paid consumers increase the density of their consumption in certain time periods, especially close to the wage payment times (Kaya 2008). There are also compulsory factors pushing merchants to accept cards. The widespread usage of credit cards, like in the case of the Turkish market, is one of them. Merchants accept cards to attract the customers who use only credit cards to pay for their transactions.

An issuer receives interchange fee per transaction from issuing a credit card whereas it has costs due to frauds, cost of funding period, operating expenses such as advertisement costs, costs of promotion expenses, and liquidity costs (Hayashi 2008).

Besides, the issuer collects annual card fees from the card holders. These two items constitutes the non-interest revenues of an issuer bank from the credit card market. When the issuer and the acquirer bank is the same in a transaction, the issuer bank receives the merchant discount fee which is a larger amount than interchange fee mostly.

Lastly an acquirer bank receives merchant discount fee per transaction from the merchant with whom it makes an agreement. The POS machine is a cost item for an acquirer but in the Turkey case, for example the banks uses common POS machines and also the merchants don't have the power to negotiate the circumstances of the agreements with the banks. The banks charge POS fee from the merchants for one time in the beginning of an agreement, which compensates their losses.

Theoretical Literature on Interchange Fees

In many countries, including U.S, revenue from interchange fees is an important part of the non-interest incomes of the banks in the credit card market. Although in the case of Turkey IF is fixed and is not the important channel of revenue for banks, in U.S. the situation is the reverse: while the interchange fee is the big slice of the cake, the merchant discount fee is the small portion of the non-interest revenues in this market. Stimulated by the importance of IF for this market, there has been a great interest by scholars on the relevant issues to this fee.

In the literature, there exists a considerable amount of theoretical works about the basic mechanism of the multi-party systems and the level of optimal interchange fee in the credit card market. Using simplifying assumptions these studies not only investigate the optimal level of interchange fees but also comment on the yearly card fees and merchant discount fees under certain market conditions. In these studies the models start with assumptions on the market conditions for each agent group in the market. These conditions basically state the nature of competition between networks, issuers, acquirers and finally merchants. Besides, other assumptions on the heterogeneity of the merchants and consumers, and the strategic behavior of the

merchants are mentioned in these studies. For any different combination of assumptions about the market structure of these agents, the results of the theoretical models vary. Therefore it is hard to make an overall assessment about the necessity, neutrality and optimal level of interchange fees. This complication is basically the result of the nature of a two-sided market and the existing externalities in credit card market.

The literature on interchange fees mainly concentrates on three issues, which will be discussed in the following subsections. The first issue is the necessity and neutrality of an interchange fee in the credit card market. Especially the early studies in the literature question the necessity of this device. After the necessity of IF is discussed in the beginnings, the next step was to investigate how the socially optimal interchange fee level differs from the profit-maximizing level (Chakravorti 2003). Lastly, the scholars investigated the effects of different market conditions on the level of IF. First of all they studied the effects of No Surcharging Rule (NSR), which is a rule that bans, charging a different price to a sale by credit card than a sale by cash on IF level. Besides, the effects of network competition on IF have been studied by many scholars.

Neutrality and Necessity Issues

The literature on interchange fees begins with the study of William Baxter (1983) where he investigates if there is a need for an interchange fee in the credit card market. Starting with this seminal paper the early works on this issue mainly discuss the necessity and the neutrality of interchange fee. Mentioning the two-sided structure of the system the author emphasizes the positive externalities between the two customer groups in the market, and makes an analysis that shows the interchange fee as a device that helps internalizing this externality. Since the costs and the benefits of the four parties in the multi-party system may differ, he argues that the optimal level of credit card usage may not be achieved without a device that corrects the differences between these costs and benefits. Using a mathematical model he shows that the interchange fee can be such a device, playing a welfare-improving role in the credit card market (Chakravorti 2003, Evans and Schmalensee 2005). Baxter assumes the

agents to be non-strategic in his model. He also assumes perfect competition everywhere in the economy in his analysis, which would be criticized in later studies.

Carlton and Frankel (1995) argue that Baxter's conclusion on the necessity of IF is not valid. They argue that if we are in a fully competitive environment where perfect competition is in effect among issuers, acquirers and the merchants, and if surcharge is allowed, then the interchange fee is neutral. This means that the interchange fee has no effect on the market, and thus can be omitted. The main valid argument about the existence of IF is its role of compensating and regulating the system costs. Thus, Carlton and Frankel's result brings new questions about financing the costs of banks in the market. The authors have an answer for this problem. The costs of the system can be covered by surcharges which will be paid by consumers who want to use credit cards. As the authors propose their solution in an environment of surcharging, they support cancelling NSR (Carlton Frankel 1995, Evans and Schmalensee 2005). They further argue that under imperfectly competitive conditions banks may over promote the use of cards against more efficient payment devices, which would harm the efficiency of the system. Later, in another study, Frankel (1998) also investigates the effect of NSR on neutrality of IF and concludes that the NSR prevents the neutrality of IF. While these studies support abolishing NSR for a more efficient market structure, the authors faced several critiques. Theoretically the assumptions of the model that Carlton and Frankel used were criticized for being very strong. Besides, contrary to the expectations of the authors, empirical evidence shows that surcharging was not implemented widely after abolishing NSR in UK, Netherland and Sweden (Evans and Schmalensee 2005).

Until the milestone study of Schmalensee (2002), all the theoretical models used a setup where all or at least one of markets were perfectly competitive. This assumption was not compatible with most of the existing credit card markets in reality. Besides, the fully competitive framework of models did not give place for profit of banks in various IF levels. On the other hand, it is practically known that the level of interchange

fee had an effect on the profits of both the issuer and acquirer banks. Considering the shortcomings of the previous models, Schmalensee improved the existing framework by an extension where both the issuer and the acquirer banks have some market power. Since the level of IF is effective on the profits of the banks, such a setup is more elucidatory as it allows for comparison between the welfare-maximizing and the profit-maximizing levels of interchange fee in the credit card market (Chakravorti 2003).

Using these assumptions, Schmalensee tried to answer if the collective determination of the interchange fee is an issue that the anti-trust agents should take action about and regulate. The author came up with several conclusions. First of all, he backs up the conclusion of Baxter that the interchange fee is a price that balances the costs between the acquirers and issuers (Schmalensee 2002). Thus it should not be seen as a regular price in the market but a device that helps internalizing the existing externalities in the credit card market (Evans and Schmalensee 2005). Besides he concludes that there should be an interchange fee in the socially optimum solution of the market (Schmalensee 2002).

Lastly, he mentions that the regulatory agencies would not be able to calculate the benefits and costs of the agents in real life and concludes that there exists no specific evidence supporting the direction of the regulation. Thus he says that “there is no economic defense for an antitrust policy favoring proprietary payment systems over cooperative payment systems” (Schmalensee 2002).

Rochet and Tirole (2002) examine the welfare consequences of a situation where the member banks of a credit card network collectively determine the interchange fees. They use a model where they allow some market power to the issuers as well as to the identical merchants while the acquirers are assumed to be perfectly competitive. While they assume no competition among networks, they introduce strategic but homogenous merchants, and in addition to NSR they consider the effects of the Honor all Cards Rule (HAC). According to this widely implemented rule, a merchant should accept all cards issued from the card network with which he made an agreement. The

merchant cannot make a distinction among cards according to their issuer banks. Lastly, the model assumes that the card-holding consumers prefer the shops where they can use their cards; merchants can behave strategically and accept cards.

The authors reach several conclusions as a result of their analysis. First of all, they conclude that the interchange fee is lowered as a result of the competition among card issuers (Hayashi and Weiner 2006). Besides, they find that if the interchange fee level is not over a certain level, there exists a positive relationship between the interchange fee level and the card usage of consumers. Moreover, they find that the IF is always determined at a higher level than the welfare-maximizing level if every agent in the market is a profit-maximizer given the assumptions above. Schmalensee and Evans (2005) criticize this result since the assumption of identical merchants is critical to it.

Another study on the neutrality of IF was done by Gans and King (2003). They investigate the necessary market conditions that make the interchange fee neutral. They find that if the merchants are competitive and able to charge different prices for different payment methods, the IF is neutral. Besides, IF is also neutral if there are merchants for all goods that accept only cash.

Summing up the studies about the neutrality of IF, the issue of surcharging and the NSR take over. Carlton and Frankel (1995), Frankel (1998), Schmalensee (2002) Rochet and Tirole (2002) and Gans and King (2003) all find that the interchange fee is neutral if surcharging is allowed for the merchants. This means that the level of IF does not have an effect on social welfare and even if IF is omitted the maximum social welfare level that can be reached in the credit card market remains the same.

The early studies on IF were rather ontological focusing on the legitimate explanation of the existence of such a fee. Later, the contribution of Schmalensee (2002) to the theoretical framework of the studies on IF changed the direction of the questions at hand. Introduction of market power to both banks (issuer and acquirer) in the model brought the questions of the level that maximizes the profit of the banks in the system. The welfare-maximizing IF level had already been investigated. The interaction

between the IF levels that maximizes the profit, social welfare and the output in the market have been investigated since then. Does the profit-maximizing IF level also maximize the social welfare? Which market conditions change the relation between the two levels? What is the output-maximizing IF level in the credit card market, and what is its position to the former specific levels? These were the main questions filling the agenda of the scholars interested in this field.

The Nature of Socially Optimal, Profit-Maximizing and Output-Maximizing Interchange Fee Levels

While Schmalensee (2002) paved the way for the analyses mentioned above, he was also the forerunner investigating the levels of the socially optimal and profit-maximizing interchange fee levels. As Evans and Schmalensee state “Being the competitive pricing structure not necessarily mean socially optimal” (Evans and Schmalensee 2005). Therefore Schmalensee (2002) investigates the conditions when these two are equal and when they are not. He finds that in a market where there exists one issuer, one consumer and the demand curves are linear, welfare-maximizing, output maximizing and the profit-maximizing interchange fee are all the same. Schmalensee (2002) also investigates the factors determining the socially optimal interchange fee level. He mentions the costs, demand conditions, the market structures among issuers and acquirers and the interaction between the consumers and the merchants as the determinants of this level.

On a similar model of payment systems Gans & King (2002) investigate the effects of several reforms which the Reserve Bank of Australia (RBA) imposes, contributing to the literature on the determinants of socially optimal IF. They find that under RBA’s assumptions on the market, the credit cards are overused and allowing surcharge can be a solution to this problem. On the other hand, they show that the determinants of socially optimal IF are: both the issuer and acquirer costs, the structure of the yearly card fees and merchant fees. Since RBA consider only the issuer costs in its regulations, they claim that the RBA’s regulated IF level can work well only under very specific

conditions. Following Schmalensee, the authors assume some market power for acquirers as well as issuers and analyze the reforms of RBA in this model. Assuming homogenous consumers in credit card benefits and monopolistic merchants, they also investigate the effects of NSR and HAC rules. They find that the profit-maximizing interchange fee is inversely proportional to issuer competition level and directly proportional to the acquirer competition level. Besides, the cost minimizing interchange fee decreases as the competition among issuer banks increases.

Rochet and Tirole (2002) also worked on the conditions which make socially optimal and profit-maximizing interchange fee levels equal. They found that the two levels are equal when the IF is larger than a certain threshold. They define this threshold as the sum of the costs in the market for issuer and the acquirer minus the merchant's benefit. On the other hand, they also concluded that an IF level less than this threshold leads to excessive usage of credit cards, above the optimal level.

Another study on the welfare and profit-maximizing IF levels was done by Wright (2004). In his study, Wright investigates the consequences of the "business stealing motive" to the profit and welfare-maximizing interchange fee levels. The author works with a similar framework and assumptions as Ganz & King (2002), but introduces strategic merchants and heterogeneous consumers in credit card benefits into the model. He finds that when the increasing interchange fee increases the profit of the issuers more than it reduces the acquirers' one, in other words, when the total profit of banks in the market in overall increase with increasing interchange fee, the interchange fee that maximizes the profit is higher than the one that maximizes the output. Besides, the profit-maximizing interchange fee is higher than the welfare-maximizing one when merchants compete according to the Hotelling model.

Chakravorti and Roson (2006) consider the effects of different intra-network competition levels to the fee levels in the market. They work with similar assumptions as Rochet and Tirole (2003), but they do not take into account the competition within a network. Considering the effects of NSR as previous studies did, they find that in a

duopoly network the total level of fees charged in the market is always lower than a situation where there is a monopoly network. Besides, they assume an asymmetric competition case where there exist two networks with different levels of fee levels. They find that the network with the lower yearly card fee charges a higher merchant discount fee than the one with higher yearly card fee.

Looking at the previous studies mentioned above one can conclude that the relative stances of the socially optimal and profit-maximizing IF levels are closely dependent on the market conditions at hand. Rochet and Tirole (2002), Wright (2004) and Schmalensee (2002) all defined necessary conditions which make the two levels converge or diverge (Chakravorti 2003).

Effects of Network Competition and NSR on Interchange Fee

One other track of the literature considers the effects of competition among the networks on the level of the interchange fee. Beginning with the early study of Manenti and Somma (2002), the authors investigated the relation between the interchange fee level and an existing network competition. The authors assume that in the market there exists competition between a not-for-profit network and a private network running for profit. The competition is assumed to run according to the Hotelling model. In the model both the issuers and acquirers receive certain margins per transaction and this margin is proportional to their costs. There exists no strategic motives for the merchants and they and the consumers are heterogeneous in their tastes about the networks which are competing. As a result of their analysis the authors find that if the ratios of issuer and acquirer prices to their costs are same, IF does not affect the network's profit in the equilibrium. Besides, networks' profits are independent of the level of the interchange fee in equilibrium. On the other hand, when the acquirer's margin is larger than the issuer's, the profit of the private network increases as the non-profit network's interchange fee increases.

Rochet and Tirole (2002) also consider the effects of network competition on the IF level. In the model, acquirers are assumed to be perfectly competitive whereas the

issuers have some market powers. Moreover heterogeneous consumers in card benefits and strategic and homogenous merchants are assumed. Focusing on the effects of network competition on the IF level, they find that in an environment where each consumer holds only one card or none, the competition among networks does not affect the interchange fee level. On the other hand, if the consumers hold more than one card, merchants' resistance to accept cards increase. Therefore the interchange fee level decreases.

In a similar study to the previous ones, Guthrie and Wright (2006) assumed perfectly competitive issuers and acquirers. Heterogeneous consumers in card benefits and strategic merchants are also assumed. Both heterogeneous and homogenous merchants in card benefits are considered in separate models. They find that when the merchants are heterogeneous in card benefits, network competition may increase interchange fees, whereas it is ineffective if the merchants are homogeneous.

Considering network competition in their model, Rochet and Tirole (2003) investigated the effects of multi-homing by card users on the level of interchange level. Multi-homing is the usage of multiple cards by one user. The authors also work on a similar framework to Guthrie and Wright's except assuming that the merchants have no strategic motives. They find three major results: First of all, the higher the number of card users using more than one card, the more is the cardholder fee and the less is the merchant fee. Besides, if there is a large budget surplus on the merchant side due to the excessive number of buyers, the banks prefer to increase the interchange fees whereas they reduce the card fee. If the cardholders cannot change their cards easily, the price structure in the market changes in behoove of merchants.

Guthrie and Wright (2003) made another study on the relation between network competition and interchange fee levels. These authors also assume that the issuers and the acquirers both receive a specific margin per transaction in the intra-network competition. Besides, issuers and acquirers are all assumed to be identical among them. The consumers are heterogeneous in their benefits of card and they do not have

a cost of holding card. On the other side, merchants are assumed to be monopolistic and strategic. Considering both circumstances where they are heterogeneous and homogeneous in card benefits, the results are investigated. In conclusion, authors find that in a world of heterogeneous merchants in card benefits, if network competition increases the interchange fee level may also increase in a case where the consumers use one card and the merchants accept more than one. On the other hand, the inter-network competition may lower interchange fees in a scenario where the consumers carry more than one card and the merchant accepts the more expensive card.

Another important issue held in the literature is the effects of No Surcharge Rule. As this rule may influence the neutrality of IF, we have partially mentioned the studies investigating the impact of this rule, in the part where the studies on the neutrality of IF are discussed. In a similar framework to previous theoretical models, Katz (2001) considers the effects of NSR, and investigates the welfare effects of this rule. The author assumes perfect competition among issuers and acquirers and monopolistic merchants. Under these assumptions he finds that when NSR is in effect, the credit card is likely to be overused than the optimal level.

One other important criticism that Katz brings to the existing theoretical models is about the calculation of merchant's benefits. Katz (2001) argues that the willingness of a merchant to accept credit cards should not be used as a measure to calculate social surplus since the acceptance of cards by a merchant has side effects on other merchants. Accepting cards when other merchants do not bring advantage to the card-accepting merchant. On the other hand, the extra profit due to this advantage is also a disadvantage for the other merchants. Therefore Katz argues that including only the willingness of a merchant for accepting cards into the equation is inadequate.

In his analysis on effect of NSR, Wright (2003) investigates if the interchange fees are socially optimal when they are privately set in the market and NSR is in effect. Moreover, he investigates the optimal interchange fee when the assumptions on the merchants and other agents vary (Scholnick et al 2008). The author adds monopolistic

merchants to the model of Rochet and Tirole (2002). He finds that NSR is favored by both network and the regulator in existence of monopolistic merchants as it increases the card demand. On the other hand, he also finds that the regulator and the network are indifferent between applying NSR and surcharge when the merchants are perfectly competitive.

Making several changes in Wright's model such as elastic demand for goods by consumers and exogenous card holding, Schwartz and Vincent (2006) investigate the welfare effects of NSR. The authors conclude that NSR decreases consumer surplus in total if the card user rebates are infeasible. Besides, they find that the rebates increase consumer surplus in total and the interchange fee level. On the other hand they decrease the surplus of cash users.

Evans and Schmalensee (2005) mention that assuming allowance of surcharging will induce all merchants to surcharge in the market is not valid. They support this argument with empirical facts, too. This rule was abolished in several countries in Europe including UK and Sweden, but according to the available data at hand, contrary to the expectations, the majority of the merchants did not return to surcharging. The authors mention two possible reasons for this observation. First, setting different prices according to the payment type may have a large transaction cost. Secondly the reason may be the tendency of the consumers to promote the merchants that accept credit cards. The authors add that no study has been conducted to examine the reasons of this practice.

To sum up, starting with Baxter (1983) there have been a considerable amount of theoretical studies on IF within the last two decades. Making various assumptions on the behavior of agents, and the market conditions of issuers, acquirers and merchants, the authors investigated many interesting issues. These issues include the neutrality and necessity of IF, and the levels of welfare-maximizing and profit-maximizing IF. The effects of network competition, multi-homing and NSR on the IF levels were also investigated within this literature.

The most important conclusion one can reach looking at the existing literature is that the results of the models are quite dependent on the starting assumptions. As the changing assumptions affect the results of the models, one should be very careful in making inferences from these models. Thus the empirical studies take over at this point (Evans and Schmalensee 2005). In the next part, we are going to take a look at the empirical studies which make cost and benefit analyses in the payment systems.

Empirical Literature : Cost Benefit Analysis

Although there exists a large amount of theoretical work on the optimal interchange fee levels in the two-sided credit card market, empirical studies are needed for several reasons to understand the market better and be able to make specific policy recommendations. First of all, the results in the theoretical models are needed to be checked via the empirical studies. Secondly, since the theoretical models give various results according to the changing assumptions on the markets, specific studies for each credit card market should be done to be able to make specific comments on the market at hand. Moreover, most theoretical models make their calculations over the costs and benefits of the agents in the market. As these costs and benefits are mostly inaccessible, the models' findings are not easy to relate to the real world. In order to be able to make policy recommendations using these models, the abstract cost and benefits should be somehow quantified so that the necessary calculations for the determination of optimal fee levels can be done. Quantification of these costs and benefits can be done by the empirical studies which concentrate on a specific credit card market. Lastly, the mechanism of the two-sided markets is not fully understood yet. Due to existing externalities in the nature of a two-sided market, there may be unexpected behaviors of the agents differing from the regular market mechanism. Since understanding and quantifying such externalities are important, the empirical studies stand on a crucial point for the future studies in the credit card market (Evans Schmalensee 2005).

In the literature, there have been several attempts to quantify the social costs and benefits of various transaction methods. Gresvik and Owre (2003) present a study on banks in Norway. They investigate the actual costs and incomes of banks in the payment system by calculating possible cost and income items in various payment systems. According to their findings, overall cost of the banks is decreasing in time while the income has been rising.

There are other works which try to calculate the cost of a transaction with various payment methods to different agents in the market. Using the available data and making plausible assumptions, Humphrey et al (2003) try to calculate the costs of the various payment instruments for banks, retailers and for society overall. They mention that a payment method can differ in costs according to the country it is executed. They add that this difference may depend on the availability of different payment instruments, the level of scale effects in those economies, and the items included in the cost and pricing calculations.

Including cheques and Giros beside cash, credit and debit cards in the calculations, the authors conclude that an electronic payment's cost is at most half the cost of a paper-based transaction. Besides, adding some factual statistics they argue that the payment costs for banks have decreased dramatically in recent years. They also mention that there exists scale economies for both paper-based and electronic payment methods but the scale effect in electronic payments is much larger than the one in paper-based methods. Therefore the authors propose to pass to electronic payment methods as long as the various considerations of the users such as convenience, safety or accuracy are met for the electronic methods. One important point that the authors are missing is taking into account externalities. Since there are various externalities especially in the credit card market, such analysis excluding externality benefits of the agents can be misleading for conclusions about the optimal payment method.

Stavins (1997) has another study that investigates the social costs and benefits of various payment methods. The author basically concentrates on the benefits of

electronic payment methods over the paper-based payments. For such a comparison the author focuses on transactions by cheque. Since cheque transactions can be made either electronically or on a paper-based basis, a comparison can be made between the two methods. Making assumptions on the calculation of the costs and benefits, the author calculates the net benefits of both ways of transactions for the various agents including the banks, intermediaries and the paying customer. After comparing the results for the whole society, Stavins concludes that electronic checks are less costly than their paper-based counterparts. On the other hand, the study mentions the practical obstacles that may prevent the widespread usage of electronic payment methods. Lastly, when Stavins calculates the benefits of a transaction to the average consumer, he assumes several benefit items. These items can be increased in number as one thinks the various benefits of a payment method from different perspectives.

The studies mentioned up to now investigate the costs and benefits of various payment methods for one or more agents in a market. Although some of them include credit cards in their calculations, some do not. Besides, these studies omit many side benefits in the market for various agents. Hahn et al (2006) make one of the best efforts to measure the costs and the benefits of the agents in the credit card market. First of all they list all the possible cost and benefit items in this market. Then they make several assumptions on measurement of costs and benefits. Using these assumptions and the available data they calculate approximate values of these items for different transaction sizes and types .

For the calculation of cost items they use merchant surveys which try to measure the costs. Using the data on average transaction sizes for each payment method, namely cash, debit card, credit card and check, they calculate the average costs of using different payment methods. Furthermore, they make several assumptions on the same cost and benefit calculations for the other agents, in the market. Lastly taking into account the net benefits to each agent in the model they calculate the cost of each method of payment and compare them.

The authors conclude that there does not exist a unique payment method which is optimal in all circumstances. Instead, the optimal way varies according to the transaction size, store type and some other specific factors. Besides, they find that paying with credit card is not a more costly method than paying with check or cash in many type of transactions.

Although Schmalensee and Evans (2005) emphasizes the importance of such empirical work and mention this study as one of the best attempts to measure costs and benefits, they also find this study inadequate to assess payment system performances.

As the market conditions vary in each country's credit card market, empirical studies become quite important in determining the optimal levels of card usage, fee levels and necessity for a regulation in a specific credit card market. But the necessary cost and benefit quantification should cover all the possible costs and benefits for all agents in the market. For instance using credit cards has several side benefits for a card holder such as the ability to shop on the internet or not carrying cash in the pocket (Kaya 2008). Besides, each transaction type has such costs and benefits for each agent in the system which should be taken into account for a healthy comparison between the payment methods or calculating the optimal usage levels. Of course the externalities are included in the essence of side benefits that we mentioned above. But once all the externalities are taken into account and all cost and benefit items are quantified, considering the distribution of the agents in their benefits, it is possible to make healthy assessments about a credit card market.

Conclusion

Credit card markets are rapidly growing all over the world. While the complex structure of this two-sided market generates many controversies, the scholars and the policy makers have paid great attention to it. There exists a large theoretical literature based on a similar framework. The main conclusions of these studies vary as the assumptions of them change. Although these theoretical models are quite beneficial to understand

the mechanism of the market, they are not enough to understand a credit card market and infer policy recommendations about it (Evans and Schmalansee 2005).

There are several reasons which make empirical studies quite important for a credit card market. First of all, the main conclusions of the existing theoretical studies need to be checked. Secondly the costs and benefits used in the models should be quantified so that the models can be implemented to real life cases. Lastly there may be unexpected mechanisms in a specific credit card market due to the possible externalities in the system. These mechanisms and unknown externalities can be revealed by the empirical studies. For instance the reasons of the unimplemented surcharge in surcharge free credit card markets is not studied yet (Evans and Schmalansee 2005). Furthermore most of the public policies are implemented regarding many social issues also. Thus the empirical studies in credit card markets carry vital importance.

On the other hand, there is a lack of empirical studies in this market. Schmalansee and Evans (2005) emphasize the importance of empirical studies to assess the under or over usage of credit cards in the market. While they stress that calculating the optimal fee levels is practicable, they note that there are no credible studies doing this job up to now. Considering all costs and benefits for each agent in the market, optimality calculations seem quite helpful to comment on the market efficiency issues. The future empirical studies should carefully consider the conditions of each agent's market. Besides, cost and benefit calculations should cover all possible items caused by the credit card market. Moreover, empirically calculating these benefits may be problematic if they are not held with caution. Quantifying the positive and negative externalities is the most crucial part of these studies. Any incomplete calculation may end up with wrong results. Lastly if the quantification of these benefits does not cover the heterogeneity of the agents, the possible social results of the policy implementations should also be considered carefully as the policies which only consider the optimality calculations may have catastrophic effects on the ones on the

margins of the population. These effects may cause harsh welfare losses like in the cases of credit card debt related suicides in Turkey.

CHAPTER 2

TWO SIDED MARKETS: EFFECTS OF CREDIT CARD INTEREST RATE REGULATIONS ON NON-INTEREST REVENUES OF BANKS

Introduction

Credit card markets are growing all over the world. The most important feature of a credit card market is its two-sided structure. While consumers can use credit cards as a payment and credit tool, merchants benefit by selling their goods to illiquid consumers. These cards not only have many advantages to consumers and merchants but also they are very profitable for banks. A bank can earn from the customers in both sides, namely consumers and merchants. We classify the bank revenues in credit card markets into two: non-interest revenues and interest revenues. The interest revenue is gained only from the consumer side of the market as it consists of the interest payments of consumers. On the other hand, non-interest revenues may come from both sides. It is the summation of the yearly card fees from consumers, the merchant discount fees received from the merchants and the interchange fees paid between the banks. This study investigates the evolution of the cost sensitivity of non-interest revenues of banks in the Turkish credit card market before and after the credit card interest rate regulation in 2007. The Panzar-Rosse method is used to detect how the cost sensitivities of bank revenues evolved in the post-regulation period to assess competitiveness of firms' behavior. In this way, a conclusion about the banks' reaction to the regulation is inferred.

In a two-sided market a bank has the option of asymmetrically pricing both customer groups and generally the prices are asymmetric. In these asymmetric priced markets the merchants carry the burden of the market usually (Evans and Schmalensee 2005). The complex interaction between the two sides of the credit card markets is the source of many controversies in the market. These controversies grab the attention of

regulatory authorities all over the world, and many regulations on credit markets are planned or implemented in many countries². Since the agent groups in this market are large, these controversies concern a large portion of the population in a country. Thus the controversial issues of credit card market lead to important legal cases as well as regulatory actions by the related authorities. On the other hand, any regulatory attempt that targets only one of the revenue sources for banks may produce unexpected and undesirable results. Therefore, any regulatory action should be implemented considering the effects of a regulation on both sides and income channels of banks in the market. Thus, it is crucial to examine the effects of a regulation to the overall mechanism of a two-sided market.

Starting with the NaBanco's lawsuit against Visa in 1979, non-interest revenues of banks in the credit card market have been the subject of many lawsuits in all over the world (Evans and Schmalensee 2005). Today in various US courts, there are 50 lawsuits pending related to interchange fees only (Lyon 2006). Being subject to many conflicts and cases, the non-interest revenues of banks draw the attention of policy makers in various countries. Regulatory authorities also took action in many countries' credit card markets. There are countries which limit the fees in this market to zero, whereas there are those which regulate the rules and interest rates of the market. The Turkish authorities also regulate the credit card market. The interventions on interchange fees in 2005 and on interest rates in 2006, and the recent yearly card fee regulation are the major efforts of regulatory authorities in the country to reshape this market. On the other hand, the complex structure of two-sided markets blurs the effects of regulations in these markets. While the two sides of such markets interact as the market evolves, any regulation on one side of these markets may have affects on the unregulated parts. Therefore, regulations which do not consider the overall mechanism of credit card

² In Australia The Reserve Bank of Australia regulated interchange fees and abolished no surcharge rule (NSR). In EU, Visa had to lower cross-border interchange fee after pressure of EU. In UK, Office of Fair Trading started investigation on MasterCard. Master Card lowered IF during investigation. Netherland, Switzerland and UK also abolished NSR (Hayashi 2008).

markets may bring about unexpected and undesirable results. This fact underlines the importance of understanding how the credit card markets operate and how a regulation may affect the overall market mechanism.

The main and more general purpose of this article is to examine how the regulations in one part of a two-sided market may have effects on the other parts of the market. Focusing on the Turkey experience, the article monitors the effects of the credit card interest rate regulation on the non-interest revenues of banks in the market. Our results indicate that the regulation on interest rates changed the banks' attitudes about non-interest revenues, and induced banks to be more sensitive to their costs when deciding on their non-interest income strategies.

Panzar and Rosse (1982, 1987) introduced the method used in this paper. The method was mainly designed to measure the competitiveness of a market and used to evaluate the banking sector by many scholars. These authors generally measured the competitiveness of the banking sector in a specific market based on the banks' revenues in their empirical works. Some of these studies focused on overall interest revenues³ whereas some others analyzed total revenue instead⁴. On the other hand, Schaffer (2007) implemented Panzar-Rosse method for the credit card market only, and used the total revenues of banks from this market. Different from the previous implementations of Panzar-Rosse technique, our study applies the method using non-interest incomes. Such an attempt is unique in the literature and important as it explores the evolution of the banks' non-interest incomes over a specific time period.

The article is organized as follows: the next part briefly explains the Turkish credit card market. In the third part the methodology and the data used in this study are introduced. The fourth part gives the results of our study, and the last part concludes with comments on the implications of these results.

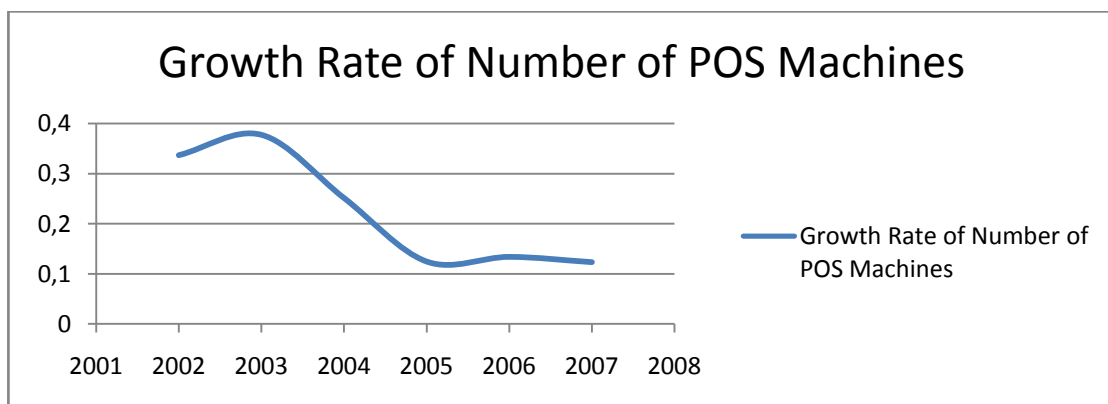
³ For an example one can see : Mkrtchyan, 2005

⁴ For an example one can see : Girardone and Casu, 2006

The Turkish Credit Card Market

The credit card market in Turkey can be described as a young market although it has been 34 years since the first credit card was used in the country⁵. These cards started to be widely used during 1990's in the Turkish market (Kaya 2009). On the other hand, the real acceleration in the market emerged in the last decade. The total number of credit cards in Turkey was around 15 millions in 2002. In six years' time this number almost tripled and became 43 millions. Not only the credit cards but also the number of POS machines tripled from around 500,000 to 1,500,000 in the same period⁶. Recently, this rapid growth in the market is slowing down in relative terms. The graphs 2 to 4 show the decreasing trend in the growth rate of the market. Considering the limited population in the country, this normal deceleration shows that the market is getting saturated as the time passes. Since the growth rate of the market was too high, the last decade was an important period for the banks in Turkish credit card market. The market shares of banks have been mostly shaped in this period. Since the consumers don't switch their cards frequently in this market due to the switching costs (Ausebel 1991), gaining market share in the early growth period of the market was crucial.

Graph 2:

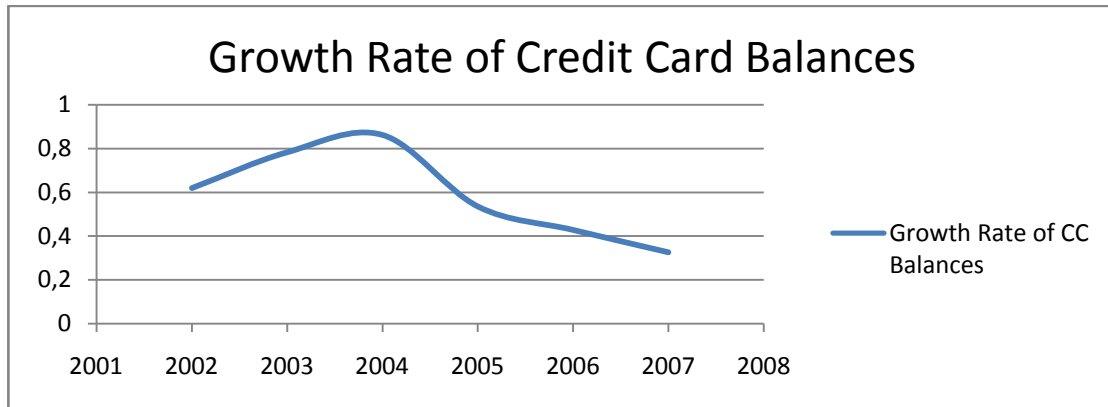


⁵ The website of Interbank Card Center (2008) : www.bkm.com.tr

⁶ The website of Interbank Card Center (2008) : www.bkm.com.tr

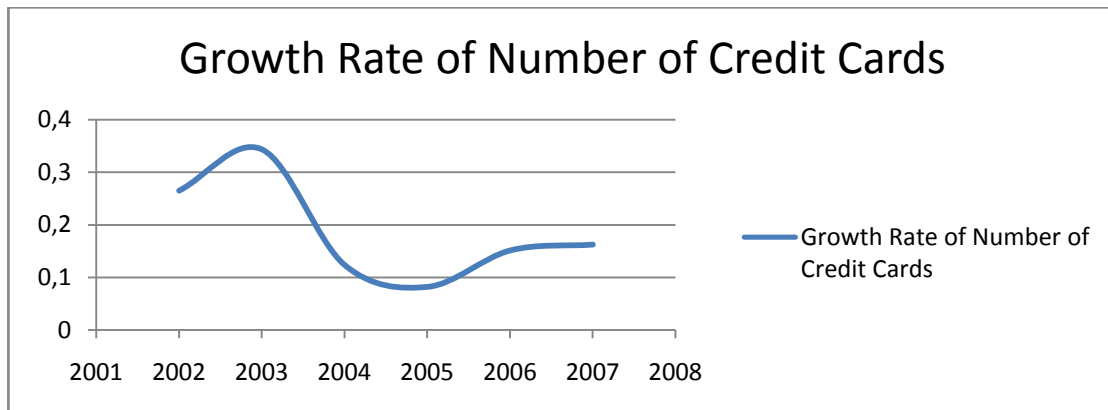
Source: The website of Interbank Card Center (2008): www.bkm.com.tr

Graph 3:



Source: The website of Interbank Card Center (2008): www.bkm.com.tr

Graph 4:



The website of Interbank Card Center (2008): www.bkm.com.tr

The interest revenues of banks in the Turkish credit card market have been a hot topic in 2000's due to the cases of cardholders suffering severely from harsh interest fee levels, breeding many social problems including suicides of indebted consumers. On the other hand, the non-interest incomes of banks are another huge amount of revenue source for banks in credit card market. According to our data the non-interest incomes of 21 banks from the Turkish Credit Card Market between 2002 and 2008 is 41 % of the all income from this market.

The non-interest revenues of banks in this market have also been a subject of debate as there have been several lawsuits about them. In 2005 Turkish Competition Authority (TCA)⁷ fined Interbank Card Center (ICC)⁸ due to its monopolistic determination of interchange fees⁹. Furthermore, no surcharge rule (NSR) was subjected to a lawsuit in 1991. Petroleum Product Employers Union (PUIS) and Turkish Gas Stations Employers Union (TABGIS) were preventing any attempt of surcharging by the oil stations. TCA stopped PUIS' and TABGIS' applications of prevention of surcharge (Karayol 2007). Moreover, after the widespread implementation of yearly card fees in 2007, there have been cases considering reimbursement of these fees to the card holders. In 2008 a consumers' application for the reimbursement of the yearly fee ended in his favor. After the appeal of the related bank, the case is taken by the higher court. If this continuing case ends to the favor of the consumer in the higher court, the result may be a model for all the consumers and cause banks to reimburse all fees collected (Kaya 2009).

The Fee Level Trends in the Market

The fee levels in the market generally follow an increasing trend if the regulated IF is not considered. The IF level in Turkey is determined by the ICC, but since the TCA decision in 2005, the IF is determined according to a standard formula prepared by the TCA. Thus one can argue that this fee is indirectly regulated. The IF level was 1.08 % in July of 2009¹⁰ whereas it was 2.7 % in 2004 (Karayol 2007) and was between 5 -5.75 % in January of 2000¹¹. On the other hand, yearly card fees were commonly not collected

⁷ TCA is the public authority in Turkey responsible for providing and protecting the competition in markets.

⁸ ICC is a special organization of the major players in the Turkish credit card market. ICC also determines the interchange fee level I the market.

⁹ <http://webarsiv.hurriyet.com.tr/2005/07/14/672076.asp>

¹⁰ www.bkm.com

¹¹ <http://www.milliyet.com.tr/2000/01/21/t/yazar/kalkan.html>

from the consumers until 2007. Card issuers preferred not to collect it, most probably as a strategy to gain market share in the early growth periods of the market. Nevertheless, all of the banks started to charge yearly card fees by 2007. Lastly, the merchant discount fees seem to have an increasing trend although the IF is decreasing. For instance, the merchant discount fees of Garanti Bank for Arcelik retailers from any other banks' credit card that is passed from the Garanti Bank's POS machine has the following trend: In July 2006 it was 1.90 % . It was 2% in April 2007 and 2.2 % in October of the same year. In a transaction where the acquirer and issuer bank are different the acquirer pays interchange fee to the issuer. Therefore Garanti Bank should reflect the IF level to the merchant discount fees. Taking into account that the IF has decreased in this period, one can realize the considerable increase in merchant discount fee level. Thus, omitting the regulated interchange fee one can conclude that the overall level of fees in the credit card market follows an increasing trend especially after 2007. This trend may be due to the young age of the market. Banks may have chosen to gain market share in the early periods by keeping the fee levels low. In other words banks sacrificed some of their non-interest incomes for the sake of a higher market share.

While the Turkish credit card market is a growing market for banks there exist many controversies about it which puts possible regulations stand at a crucial point. At the moment, non-interest revenues of banks are not regulated, except the IF level. The credit card interest rate regulation in 2006 was a major regulation, which aimed at only one revenue item of banks in the market. A price ceiling was set on credit card interest rates limiting the interest revenues of banks. Since the banks have several revenue sources in the two-sided credit card market, these regulations on only one item may lead banks to compensate their losses from other revenue channels. Consistent with this argument, the banks in the Turkish market started to charge yearly card fees after 2007 and the merchant discount fees increased in the post-regulation period. This idea constructs the basic motivation of this study, inspiring us to investigate the evolution of non-interest revenues of banks in pre and post regulation periods.

Methodology and Data

In this study Panzar-Rosse Method is used (Panzar and Rosse 1987). Before starting to explain our purpose of using this technique it is elucidatory to shortly mention the method of this test and the intuition behind it.

The Panzar-Rosse Test and the H statistic:

The Panzar Rosse technique is applied via a regression analysis in which “revenues” are the dependent variable. Input price variables in the sector as well as some other cost and revenue shifting variables stand in the right hand side of the equation. All these cost variables are in logarithmic form so that their coefficients give their elasticities. The test statistics in this technique, H , is the sum of these input price elasticities of revenue.

If the firms in the market of interest are competitive, any change in input prices will be reflected in the total costs of the firm due to the assumed first degree homogeneity of total costs in all input prices. While a firm tries to survive in a competitive environment it has to reflect this increase to its prices so that its revenues increase in the same proportion to its costs. Therefore the input price elasticity of revenue should be equal to one for a firm in a competitive environment (Schaffer 2007).

On the other hand, a monopolistic firm tries to equate its marginal revenue to marginal cost. Thus, higher marginal costs mean higher marginal revenue for such a firm. Since we assume diminishing marginal revenue, an increase in the input costs means an increase in the marginal revenue, thus a decrease in the total revenue. Therefore, the H statistic for a monopoly should be less than zero. If the H statistic is between 0 and 1, one can conclude that the firm is in monopolistic competition (Schaffer 2007).

Although the classical interpretation of H statistic focuses on a conclusion on the competition level in a market, different inferences can be made using the Panzar-Rosse technique. The essence of this test relies on the cost sensitivity of revenues. In other words, The H statistic measures the cost sensitivity of the revenues. Thus, looking at

the H statistic, one can infer how changes in the costs of a firm are reflected to its revenues.

Not only input prices but also various control variables, which are thought to shift the revenue or cost curves of banks, are included in the model of a Panzar-Rosse test. These control variables may shift either or both curves. In the previous studies these variables were chosen to control for risk taking behavior, size effect, structural properties and macroeconomic changes in the economy. Schaffer (2007) adds variables which account for the liquidity cost for banks.

Although there are many studies in the literature which use total revenue or interest revenue of banks as the dependent variable, this study is unique as it uses non-interest income on the left hand side. We use the PR to measure the sensitivity of the non-interest revenues to the costs of banks in the market. In this way we make inferences about the banks' behavior in the credit card market. One can detect clues if the banks have changed their concern in non-interest incomes between two different periods, by looking at the cost sensitivities of its non-interest income. For instance, if the H statistics gets larger one can argue that the banks consider their costs when they demand various fees from the customers of the market, implying a competitive structure. Whereas, if the H statistic is low, one can conclude that the banks do not care about the costs when they decide the levels of their fees, implying the existence of market power.

In this study we mainly concentrate on the interaction between the two sides of the market. More specifically we examine the effects of credit card interest rate regulations on non-interest incomes. For this reason we use Panzar-Rosse method to detect, if there is, a change in the behavior of the banks that affects their non-interest revenues. To elaborate, we divided our data into two. The first part is until the end of 2006 and the second period starts with the first period of 2007. The former period is the pre-regulation period whereas the latter is the post-regulation one. Comparing the

corresponding H statistics for both periods, we are going to comment on the effects of regulation in one side of the market to the behavior of banks in the other side.

The Model and Data

For this study we collected our data from several sources including the Central Bank of Republic of Turkey, the Banks Association of Turkey, and the Regulatory and Supervisory Authority of Turkish Banking System. Our data consists of the relevant quarterly data items of nineteen banks between the last quarter of 2002 and last quarter of 2008. Although there are 22 banks of interest three of them are eliminated due to the lack of proper data items.

The model we use in this study is:

$$\begin{aligned} \ln NIR_{it} = & \beta_0 + \beta_1 \ln CF_{it} + \beta_2 \ln PK_{it} + \beta_3 \ln W_{it} + \beta_4 \ln AGE_{it} + \beta_5 \ln CQ_{it} \\ & + \beta_6 \ln LC1_{it} + \beta_7 trend_t + \beta_8 trendsq_t + \beta_9 REG \times \ln CF_{it} \\ & + \beta_{10} REG \times \ln PK_{it} + \beta_{11} REG \times \ln W_{it} + \beta_{12} REG_t + \varepsilon_{it} \end{aligned}$$

In the model, *NIR* is the quarterly non-interest revenues of banks. This item includes all the fee revenues, namely interchange fees, merchant discount fees and the annual card fees. *CF*, *PK*, and *W* are cost of funds, price of physical capital and average wage, respectively. These variables are the input prices of this market and the sum of their coefficients give us the H statistic for the first period in this model. *CF* is the ratio of Interest expenses on funding resources to all funding resources. These resources include deposits, borrowings and money market takings. *PK* is calculated by the ratio of depreciation expenses to fixed assets. Lastly, *W* is the average personnel expenses of a bank derived by dividing total personnel expenses to the number of employees. Following Schaffer *AGE* is added to the model. The longevity of a bank may have positive effects on its revenues due to increasing experience, and trust generated in public leading to a large customer base. In the model *CQ* stands for the overall credit quality which is a proxy for the risk taking behavior of bank. The variable is constructed by dividing the non-performing credit card balances to the overall credit card balances.

We expect the coefficient of it to be positive if banks are able to assess the credit risk and correctly price it. On the other hand its coefficient can be negative due to the negative effects of high amounts of credit losses on the revenues of banks (Schaffer 2007). Following Schaffer we use a variable to measure liquidity cost in our model. *LC* is a proxy to control the effect of liquidity management costs in the model. This variable is constructed as the ratio of borrowings of a bank from the money market to outstanding credit card balances. We expect this variable to cause the H statistic to be closer to one. In other words, addition of liquidity cost variable is expected to raise the results for sensitivity of revenues to costs (Schaffer 2008). Considering the comments of Bikker et al (2006) about the theoretical construction of Panzar-Rosse model, we did not include “total assets of a bank” or other size variables in the model. Bikker argues that the inclusion of total assets in the right hand side of Panzar-Rosse model has the same effect as using “bank revenue over total assets” as the dependent variable. He shows that when “total assets” is included in the right hand side the H statistics is overestimated.

To eliminate the effect of a possible trend we added *trend* and the *trendsq* to the model. *Trendsq* is the square of the trend variable, which is added to capture a quadratic effect of time as the growth rate is decreasing in the market. *FB* is funds borrowed from other banks by a bank in the short run. It is included to control for the credibility of a bank in the customers’ eye. Since it is not easy to measure it, we take the credibility of a bank in the eye of other banks as a proxy for this. Since banks consider the possible risks of a bank before giving credit, *funds borrowed (FB)* by a bank can proxy the credibility of that bank. This variable is included in the benchmark model for robustness check, and the coefficient of it is expected to be positive. *OFB* stands for the off-balance sheet volume of a bank. Off balance sheet banking includes complex products which are not included in a bank’s regular balance sheet (Manfred et al 1993). Therefore the volume of these activities can be used as a proxy for the creativity of a bank. We use this variable to check the robustness of our benchmark model also. *REG* is a dummy variable which equals to zero in the pre-regulation period

and one in the post-regulation period. Therefore, its coefficient gives us the change in the constant for the second period. The last three variables in the model are the interaction terms of *REG* and the input price variables, reflecting the change in the coefficients of input prices after the regulation. The H statistic for the second period equals the summation of the coefficients of input prices and the coefficients of these interaction terms. *Table 1* presents the summary statistics for the data.

Moreover, we run our regression after we take *PK* variable out to check for the short run results of our model (Schaffer2007). Besides, following Schaffer (2007) we also run our regression for the lagged values of the input prices to check for the robustness of our model.

Table 1: The Statistics of the Variables in the Model:

Variable	Mean	Std. Dev.	Minimum	Maximum
Non Interest Revenues*	44016.140	59508.110	1.000	297244.000
Cost of Funds	0.025	0.009	0.004	0.108
Price of Physical Capital	0.039	0.026	0.001	0.180
Average Wage**	11.484	3.051	4.308	22.699
Age of Bank	47.930	30.522	5.500	120.000
Credit Quality	0.070	0.052	0.001	0.397
Liquidity Cost	6.660	24.433	0.000	222.177

* Non-Interest Revenue values are in YTL units.

** Wage is in 1000 YTL units

Results

The results of our regression analysis are summarized in Table 2. Five regressions are presented. In the first column we introduce the results of our benchmark model. Adding the variables *funds borrowed (FB)* and *off-balance sheet (OFB)* we report the results of robustness check in the following columns. Later on we check our results, using lagged input prices in the regression.

Table 2: The Results for the Benchmark Model and the Robustness Check Analysis

Variable	BENCHMARK		+ OFB		+ FB		+OFB+FB		LAGGED INPUT PRICES	
	coeff.	t stat	coeff.	t stat	coeff.	t stat	coeff.	t stat	coeff.	t stat
Intercept	7.22	3.65***	6.14	3.09 ***	9.76	4.92***	9.04	4.43 ***	2.51	1.08
Cost of Funds	0.25	2.83***	0.27	3.13 ***	0.24	2.96***	0.26	3.09 ***	0.21	2.45 **
Price of Physical Capital	-0.12	-2.34 **	-0.13	-2.73 ***	-0.13	-2.72 ***	-0.13	-2.89 ***	-0.13	-2.78 ***
Wage	0.08	0.49	0.14	0.83	0.09	0.58	0.11	0.71	0.3	1.93 *
AGE	0.35	0.65	-0.19	-0.34	-0.31	-0.57	-0.55	-0.98	1.46	2.29 **
Credit Quality	-0.15	-3.33***	-0.13	-2.81 ***	-0.17	-3.76 ***	-0.16	-3.47 ***	-0.16	-3.4 ***
Liquidty Cost	-0.11	-6.07***	-0.11	-6.48***	-0.1	-5.81 ***	-0.1	-5.99 ***	-0.1	-5.72 ***
Trend	0.09	5.67 ***	0.08	5.18***	0.09	6.11 ***	0.09	5.77 ***	0.09	4.88 ***
Trend Square	0	-1.46	0	-1.66 *	0	-1.57	0	-1.68 *	0	-1.46
Off Balance Sheet			0.2	2.89***			0.1	1.47		
Funds Borrowed					0.1	2.73 ***	0.1	2.65 ***		
REG* Cost of Funds	-0.04	-0.17	0.13	0.55	0.35	1.47	0.39	1.65 *	0.03	0.21
REG* Price of Physical Capital	0.32	4.29 ***	0.33	4.46***	0.37	5.14 ***	0.37	5.14 ***	0.25	3.59 ***
REG* Wage	0.46	2.00 **	0.40	1.76 *	0.27	1.17	0.26	1.15	0.38	1.56
REG	-0.02	-0.03	0.73	0.74	2.06	1.98**	2.22	2.13**	0.15	1.67*
R squared	0.81		0.82		0.82		0.82		0.83	
F test	91.96***		87.94***		89.14***		83.30***		93.78***	
Number of Observations	287		287		286		286		265	
IT=0 *	3.63*		4.96**		6.88***		7.44***		2.59*	
IT=1 *	0.45		0.14		0.01		0.01		0.7	
	Pre	post	Pre	post	Pre	Post	pre	post	pre	post
H stat	0.21	0.95	0.28	1.14	0.21	1.20	0.24	1.26	0.38	1.04
F stat : H=0	1.33	7.04***	2.24	9.92***	1.39	11.74***	1.72	12.89***	4.83**	7.16***
F stat : H=1	18.26***	0.02	15.76***	0.13	19.14***	0.3	17.91***	0.53	11.91***	0.01

*IT is the sum of the coefficients of interaction terms.

The H statistic is 0.21 for the pre-regulation period and 0.95 for the regulation period according to the benchmark model. Applying the necessary tests, we find that in the first period the H statistic is not significantly different from zero which means that it is in the monopoly region. On the other hand it cannot be rejected that H is different from one in the post-regulation period, meaning that it stands in the competitive region. Moreover, the sum of coefficients of the interaction terms ($REG \times CF + REG \times PK + REG \times W$) is strictly larger than zero. The results do not change much in the various specifications of our model for robustness check. Only when we use lagged input prices the H statistic in the first period stands in the monopolistic competition region where we reject that it is equal to both one and zero. On the other hand when we check for the H statistic for the second period, we cannot reject that it is equal to one. Thus the same conclusion can be inferred looking at the results of this version of our model, too. Looking at these statistics we conclude that there is an increase in the H statistic between the two periods, which means that the banks' revenues became more sensitive to their costs in the post-regulation period.

There are two explanations for this conclusion which are closely related with the two-sided structure of the market. Firstly, after the regulation on interest rates, the banks in this market lost their ability to earn excessive income from interest revenues. Thus, they used the non-interest income channel to compensate their revenue losses. Secondly the market share in credit card market is quite crucial. The banks non-interest revenues are related with their market shares. Therefore the banks may have kept the fees in the market low to issue more cards and give more POS machines to the merchants in the early 2000's in an attempt to expand their market shares. The widespread usage of credit cards by consumers also creates pressure on merchants. As credit cards become more widely used, merchants are pressured into keeping POS machines. Thus, the banks may have tried to increase their future non-interest incomes by keeping the fees low in the early periods of the market. On the other hand, as credit card usage in the market increases, the market becomes saturated. Therefore the banks may have quit their strategy of fighting for market share by keeping fee levels

low in the post-regulation period. In this way, their non-interest revenues became more sensitive to their costs.

As for the other explanatory variables, under all specifications of our model the coefficient of *CQ* is negatively significant at 1 % significance level. We interpret this result as the negative effect of unsuccessful risk management by banks on their non-interest revenues in the credit card market. Besides, a bank may be considering its non-performing credit card balances when it decides its strategy on non-interest revenues. Therefore one can conclude that bad risk management in the credit card market has a negative effect on non-interest incomes. Another coefficient that is robustly negative in all modifications of the models is liquidity cost. It is negatively significant in 1 % significance level in all the models. The banks always need to decide where to use their liquid funds. Since allocating these funds to merchants is riskier when liquidity becomes more costly, banks would discourage the merchants from using these funds. Therefore, they increase the discount fees and thus decrease total non-interest revenues. This would explain the negative coefficient in the non-interest revenue regression. Unsurprisingly the *trend* coefficient is significantly positive, though not significant under all specifications. Besides, coefficient of *trend square* is negative in all of the regressions. This result is consistent with our expectations about the quadratic characteristics of the trend in this market. It implies that there is an increasing trend at a decreasing rate in the market. On the other hand, only in two of the models it is significantly different from zero, which weakens this inference. Age of banks seem to be insignificant under all specifications.

When it comes to variables used for robustness check, *Funds borrowed (FB)* has a positively significant coefficient where it is included in the model. While it is a proxy for the credibility of a bank, one can conclude that the credibility of a bank makes it more preferable and increases its non-interest revenues. *Off-balance sheet items (OFB)* have also a positive sign if it is included. On the other hand, its effect becomes insignificant but remains positive, when it is included in the model together with *FB*. Since this item

was included as a proxy for the creativity of a bank, it can be argued that the creativity has positive effect on a bank's non-interest incomes in the credit card market. This argument makes sense as we know that the banks in the Turkish credit card are engaged in non-price competition. Thus, it is logical that more creative banks are more challenging and earning more. Lastly, *REG* has a positive significant effect in the specifications where *FB* or *FB* and *OFB* both are included in the model. It is also positively significant when the lagged values of the input prices are used in the benchmark model. While it is not significant in the other specifications of the model, we have another evidence for the positive effect of interest rate regulation on the non-interest revenues of banks in the market.

Conclusion

The credit cards market is a broad market, concerning a large population comprising credit card holders, merchants and banks. While the two sided structure of the market produces many controversial issues, the regulatory authorities have an increasing concern on this market in all over the world. On the other hand, it is important to consider the possible effects of a regulation in one side of the market as it may have unexpected side effects on the other side. The banks may try to compensate the loss in their revenues from the regulated side by pushing their revenue options in unregulated items.

This study contributes to our understanding of a two-sided credit card market mechanism and the possible effects of regulation in such a market. In the Turkish case, our results imply that after the credit card interest rates regulation in 2006, banks in the market altered their behavior. The banks did not consider their input costs when they decided on the fee levels affecting their non-interest revenues before the regulation. In the post-regulation period they started taking them into account when making these decisions.

Besides, anecdotal evidence and data suggest that the banks increased the fees they charge both sides except the regulated interchange fee. This means that regulation on

credit card interest rates caused banks to turn to non-interest revenue items. While the annual card fees constitute a small portion of the non-interest revenues in the market (Karayol 2007), the merchants carry the burden of the regulation in Turkey case.

This picture suggests that the possible effects of a regulation in the unregulated parts of a two-side market need to be taken into consideration when making policy decisions. While this study is unique as it explores the effects of a regulation, similar studies carry great importance. Further studies may check the competitiveness of the issuer and acquirer markets if the annual card fee revenues can be decomposed from the non-interest revenue data. While the theoretical models studying credit card markets build their models on assumptions about the market structures, such studies can contribute to check whether the theoretical models fit to a market of interest.

CHAPTER 3

SIMULTANEOUS ESTIMATION OF INTEREST AND NON-INTEREST REVENUES OF CREDIT CARD ISSUERS

Introduction

Credit cards are widely used all over the world today and the credit card markets are expanding in many countries. These markets are different from the usual markets and involve many controversies due to their two-sided structure. Subject of many studies, two-sided markets are complex structures including two different customer groups. For the credit card markets these two customers are merchants and consumers. Both customers have benefits from using credit cards. For instance consumers have the option of using credit cards as a credit tool whereas the merchants have the benefit of selling their goods to illiquid customers without risk. On the other hand, banks price both customers in exchange for these benefits, and gain large revenues. The bank revenues in the credit card market can be classified into two as interest and non-interest revenues. The former is the revenues coming from the interest fees charged from the consumers. On the other hand, the non-interest revenues consist of the fees charged from both types of customers in the market. Basically it is the summation of the yearly card fees from the consumers, interchange fees paid between the acquirer and issuer banks and the merchant discount fees from the merchants. This study mainly examines the interaction of these two revenues for banks. Considering a period involving a regulation in one of these two revenue types, the study examines the interaction between the two revenue types and the effects of the regulation on both revenue sources. In this way, general conclusions are inferred about banks' behavior in credit card market.

Two-sided markets are environments where the supplier has the opportunity to asymmetrically price the customer groups. In two-sided credit card markets this option is widely used while the burden is on the merchant side generally (Evans & Schmalensee 2005). Complicated interaction between the two sides is the source for

many controversies in the credit card markets. These controversies are followed by legal cases or regulatory actions of the authorities in many cases. There have been regulations by the Turkish authorities in the market also. Regulations on interchange fees in 2005 and credit card interest rate regulation in 2006 are two major interventions to the market. Recently the yearly card fees are also regulated in the market.

Despite the regulations, the problems in these markets may continue or change shape and location in the market mechanism due to the two-sided structure of the market. Besides, there are positive externalities in the market which should be recognized before the implementation of a regulation. For example, it may seem that merchants are bearing the burden in the market when consumers are not charged annual fees, but then this may increase credit card usage and hence sales, benefiting merchants eventually. The complex structure of credit card markets makes it necessary to beware of the effects of a regulation on both sides of the market to avoid unexpected consequences.

The main purpose of this article is to examine the interaction of the non interest and interest revenues of banks in the credit card markets. As the article focuses on the Turkish credit card market, the effects of the credit card interest rate regulation in 2006 are examined. The regulations' effects on the two revenue types are considered. Our results indicate that the regulation in 2006 affected the two revenue types in different directions. Besides, banks shifted their focus to their non-interest revenues instead of the regulated interest revenues.

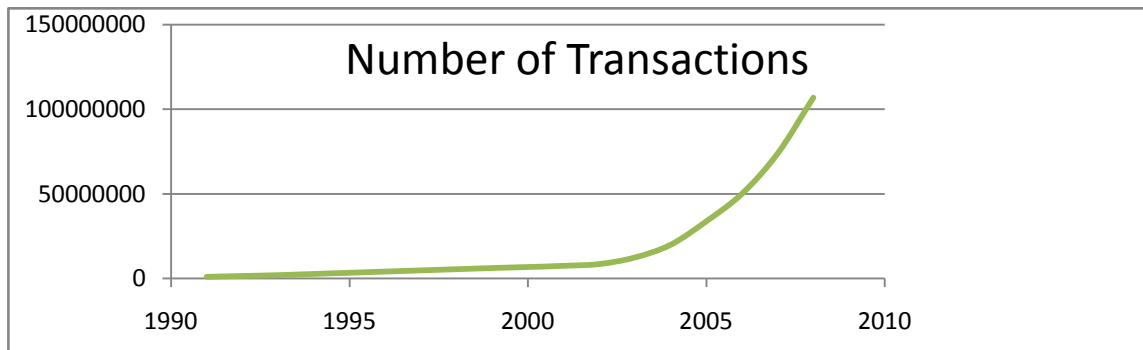
Three Stage Least Squares (3SLS) method is used in this study. Our data consists of credit card revenues and various other variables of individual banks in the Turkish banking sector between the years 2002-2008. The data comes from various sources including Central Bank of Republic of Turkey, the Banks Association of Turkey, and the Regulatory and Supervisory Authority of Turkish Banking System.

The article is in the following order: The second part introduces the Turkish credit card market, and gives some statistical facts related to the content of this article. The third part explains the methodology used in the analysis of this study and the data used for it. Fourth part presents the results and the last part concludes.

The Turkish Credit Card Market

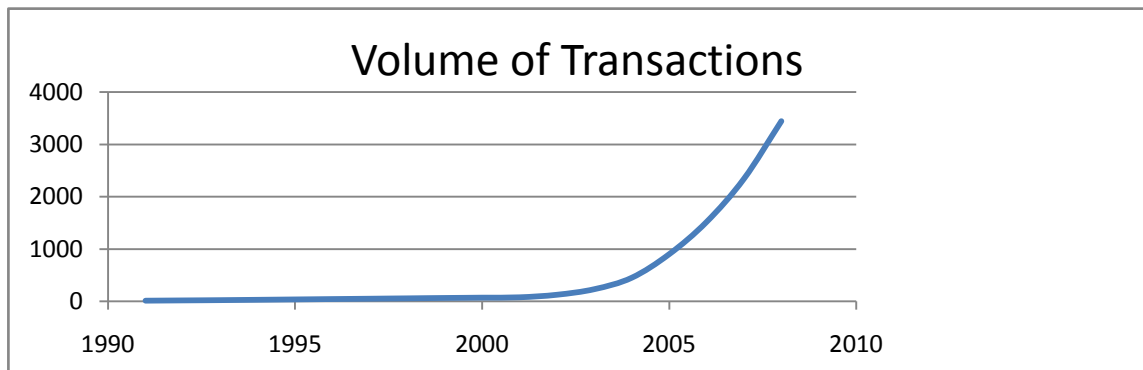
Credit cards have been used in Turkey since 1970's. Despite the market's longevity, the real expansion in the market has been realized in the last decade. Graphs 5 and 6 visualize the rapid growth in the market during the last years.

Graph 5: The number of annual credit card transactions in Turkey



Source: The website of Interbank Card Center (2008): www.bkm.com.tr

Graph 6: The annual aggregate volume of credit cards transactions in Turkey



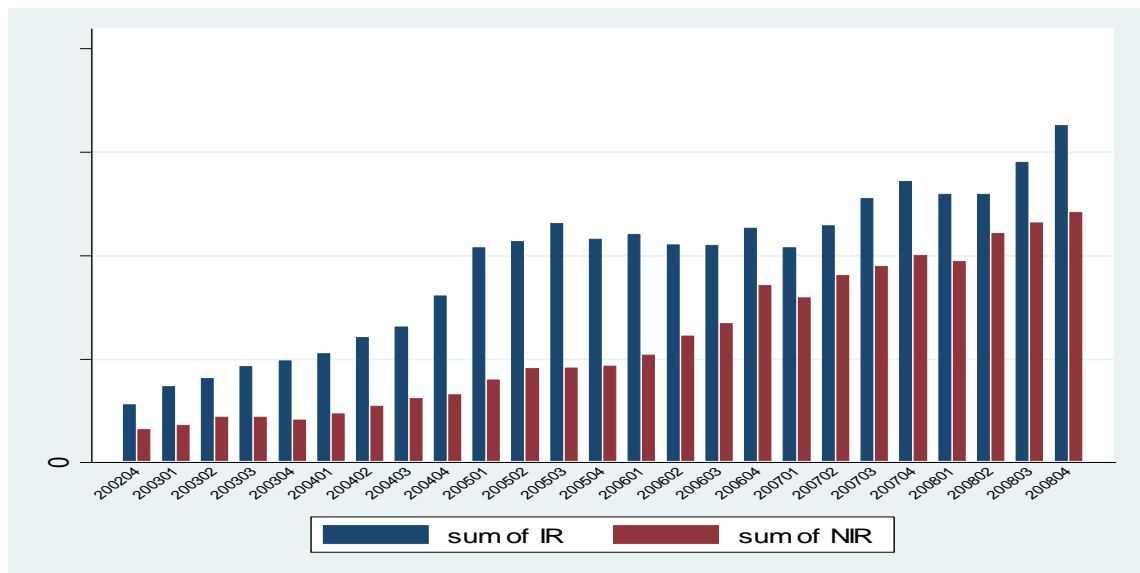
Source: The website of Interbank Card Center (2008): www.bkm.com.tr¹²

¹² Available data covers the years between 2002 and 2008. The data for the prior period is projected approximately assuming that the related values followed a non-decreasing trend.

Following this increasing trend, the non-interest and interest revenues of the banks in the market also grew steadily. The mentioned trend can be seen in Graph 7 where the sums of banks non-interest (NIR) and interest revenues (IR) over time are presented.

While both revenue types of the banks in the market follows an increasing trend, starting with 2006 inertia is observed in the interest revenues whereas the non-interest revenues get into an expansion period. The reverse trends of the revenue types are quite significant that it can be detected even by visual inspection. Graph 7 shows the sum for each revenue type for all banks over time. The start of these reverse trends is not by chance at the same time, when the Central Bank of Republic of Turkey (CBRT) announced that it was going to start to regulate the credit card interest rates. The regulated interest rates meant limited income opportunities for banks in the interest revenue side of the income channels. Considering this information, the significant increase in the non-interest revenues of banks in Graph 7 raises suspicions about a possible shift in the focus of banks from interest revenues to the non-interest side.

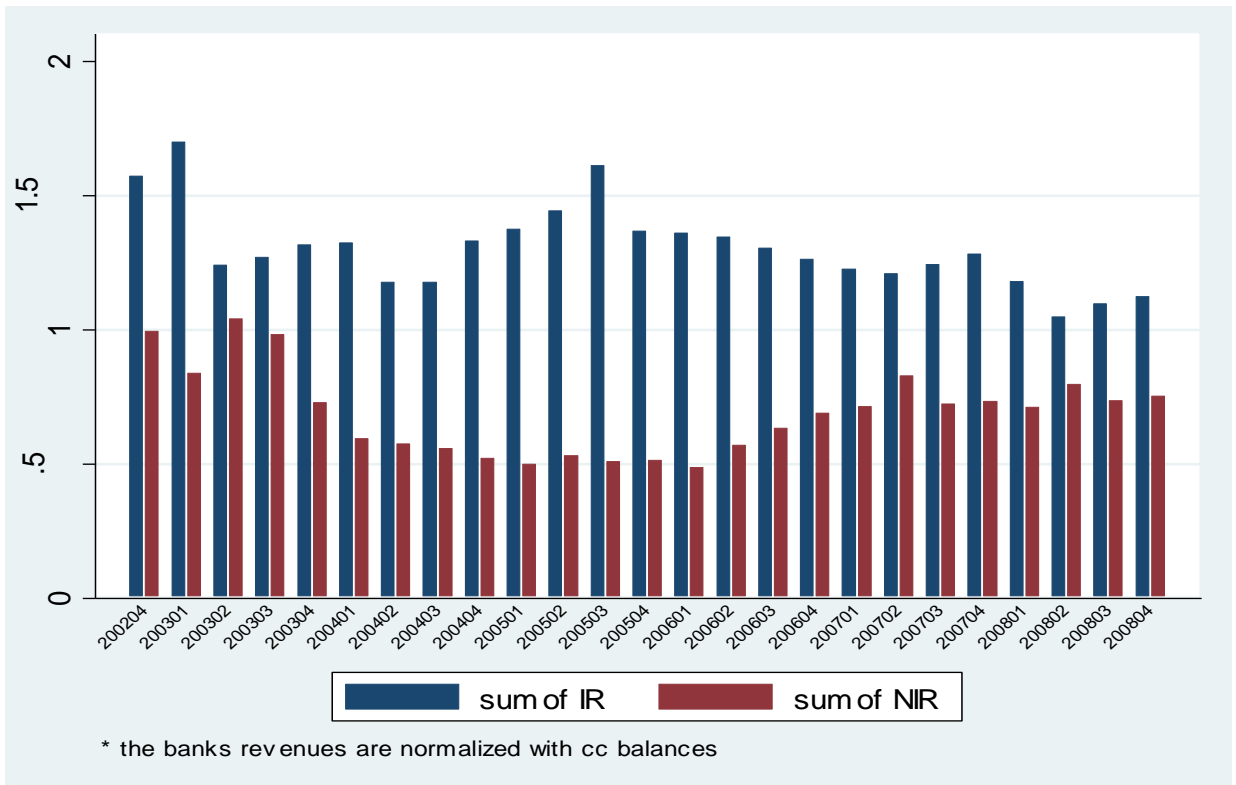
Graph 7: The Evolution of banks' interest and non-interest credit card revenues



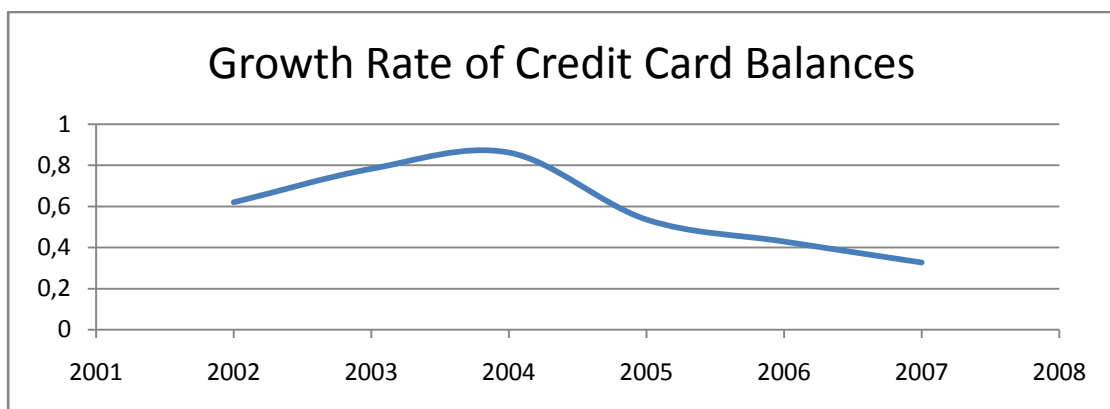
Graph 8 intensifies these suspicions. In this graph, the variables of interest are the interest and non-interest revenues divided by overall credit card balances. These variables are more reliable to inspect a shift of trend between the revenue types as they show how much a bank earns of each revenue type from a unit credit card transaction volume. Such a normalized variable detects if a bank started to earn more non-interest revenues from a unit volume of transaction instead of interest revenues. In Graph 8 one can see the reverse movements of two revenue types. Almost in each period, these two revenue types moved in opposite directions, supporting the idea that banks are inclined to make shifts between revenue channels in credit card markets according to the conjuncture.

Another important point one can catch from the graphs of the market is that the lowest non-interest revenues per credit card balance occurred during the fastest growth period in the market. In Graph 8, 2004 and 2005 are the years when the non-interest revenues per balance are in the minimum level for banks. Graph 5 and 6 shows that these periods are the start of expansion period for the market at the same time. Besides, Graph 9 shows that 2004 is the year when the growth rate of credit card balances was at its peak level. Considering the important effects of switch costs, these early periods of the market were quite important for the banks to gain market share. Therefore banks may have kept the fee levels in the market low in this period to be able attract both types of customers in the market, namely consumers and merchants. On the other hand, one can see that a growth period started for the non-interest revenues per credit card balances in 2006, when the growth rates in the market settled down.

Graph 8: Banks' interest and non-interest revenues divided by outstanding credit card balances



Graph 9: The growth rate of credit card balances



These graphs suggest that the trends of the bank revenues change around the year 2006, the date of the interest rate regulation announcement. Since the interest rate ceiling started to limit banks' interest rates by the last quarter of 2006, we divided our data in two parts from here to explore the effects of the regulation. We continue our analysis by keeping our attention on the differences between the two periods. From this point on we are going to call the period before 2007 as the pre-regulation period whereas the latter period is going to be called the post-regulation period. Besides, Graph 8 visualizes that the second period of 2006 is a critical point in the evolution of the bank revenues in last decade. Thus, we repeated our analysis by dividing our data from this point also and present the results in the appendix to this chapter.

The significant difference between the growth rates of both revenue types can also be seen when the growth rates of mean revenues of each type over time are checked. In Table 1 the growth rates of mean interest revenues and mean non-interest revenues between the pre-regulation and post-regulation periods are shown. Mean non-interest revenues of banks between the two periods grew approximately 3 times the same rate for interest revenues. This result also supports the increasing tendency of banks to non-interest revenues in the regulation period. Moreover, the banks started to widely collect the yearly card fees from the consumers. Besides, anecdotal evidence supports the increasing trend in merchant discount fees in the post regulation period.

Table 3: Growth Rates of Mean Revenues from the Pre- to the Post-Regulation Period

NIR	0.971646
IR	0.363016

There have been two major regulations by regulatory authorities in the revenue sources of banks in the Turkish credit card market. The first one was the regulation of interchange fees, and the second one was the credit card interest rate regulation, mentioned above. Both of these regulations are somehow problematic as they only

control one kind of credit card income for banks at a time, the latter heavily affecting one side of the market. Originating from the two-sided structure of credit card markets, such one-sided regulations may have unexpected effects on the market. For instance banks may choose to compensate their lost revenues by concentrating in the unregulated sides of the market. The picture of the Turkish credit card market above makes us suspect such a change in the banks' focus from interest income to non-interest income. As the yearly card fees constitute a small portion of the bank revenues in this market (Karayol 2005), one can conjecture that such a shift is the reallocating the burden of the market on merchants instead of the consumers. In the following parts of this paper, we are going to follow up on this conjecture.

Methodology and Data

In this study our model is the following system of equations:

$$\begin{aligned} \ln NIR_{it} = & \beta_0 + \beta_1 \ln IR_{it} + \beta_2 \ln CF_{it} + \beta_3 \ln PK_{it} + \beta_4 \ln W_{it} \\ & + \beta_5 \ln AGE_{it} + \beta_6 \ln CQ_{it} + \beta_7 \ln LC1_{it} + \beta_8 \ln OB_{it} + \beta_9 trend \\ & + \delta_i + \varepsilon_{it} \end{aligned}$$

$$\begin{aligned} \ln IR_{it} = & \gamma_0 + \gamma_1 \ln NIR_{it} + \gamma_2 \ln CF_{it} + \gamma_3 \ln PK_{it} + \gamma_4 \ln W_{it} \\ & + \gamma_5 \ln AGE_{it} + \gamma_6 \ln CQ_{it} + \gamma_7 \ln LC1_{it} + \gamma_8 \ln I_{it} + \gamma_9 trend + \delta_i \\ & + \varepsilon_{it} \end{aligned}$$

The method we use in this study is three stage least squares method, shortly known as 3SLS. 3SLS method is a combination of two stage least squares (2SLS) and generalized least squares (GLS), used when there is a system of equations in which endogenous variables stand as explanatory variables in other equations (Kennedy 1998, p 166). This method simply consists of three steps. First, using 2SLS the endogenous variables are estimated. In the next step the estimated structural equations' errors are calculated and using these errors the variance-covariance matrix of disturbance terms in the system is estimated. Lastly, using this estimated matrix GLS is applied to estimate the equation system.

This method is used in simultaneous equation systems. It is used when one or more of the regressors in an equation are thought to be correlated with the error term of any of the equations in the system. This method is preferred since it is consistent and asymptotically more efficient than 2SLS (Kennedy 1998, p 166).

As this study explores the interaction between the interest and non-interest revenues of banks in the credit card market we preferred to use 3SLS since both of the revenue types are determinants of each other. Apart from other determinants of these endogenous variables, we also added instrumental variables to the model for the endogenous variables.

Our data for this study is collected from Central Bank of Republic of Turkey, The Banks Association of Turkey and Banking Regulation and Supervision Agency. The data covers quarterly data of nineteen banks between the last quarters of 2002 and 2008.

Although there are 22 banks, some were eliminated since they were marginal in the statistics of interest. More specifically, we eliminated the data having the non-interest revenue over total revenue ratio less than 0.1 or higher than 0.9.

It is necessary to explain the variables that are employed in this model. Firstly, *NIR* is the quarterly non-interest revenues of banks. This item comprises all the fee revenues, including interchange fees, merchant discount fees and the yearly card fees. Secondly, *IR* stands for the interest revenues of each bank in the given period. The independent variables used in the model are selected based on previous studies which estimate revenue equations¹³. *CF*, *PK* and *W* denote the cost of funds, price of physical capital and average wage, respectively. These variables point to the input prices of this market. *CF* is the ratio of interest expenses on funding resources to all funding resources. These resources cover deposits, borrowings and money market takings. *PK* denotes to the ratio of depreciation of fixed assets to fixed assets. *W* is the average personnel expenses of a bank calculated by dividing total personnel expenses to the

¹³ For an example using these variables in revenue regressions one can see Schaffer (2007).

number of employees. Other than input price variables, *AGE* is used in the model to check the effect of the longevity of a bank. In this model, *CQ* represents the overall credit quality which is a proxy for the risk taking behavior of bank, and it is derived through dividing the non-performing credit card balances to the overall credit card balances. A variable to measure the liquidity cost, *LC*, is also employed in this model. It is significant to remark that *LC*, which is derived by dividing the borrowings of a bank from the money market to outstanding credit card balances, is a proxy to control the effect of liquidity management costs in the model. In order to eliminate the effect of a possible trend, the trend variable is included in the model. *REG* is a dummy variable that is to be zero in the pre-regulation period and one in the post-regulation period. For this reason, its coefficient provides information about the change in the intercept term for the second period.

As mentioned, we included instrumental variables for the endogenous dependent variables in the model. For interest revenues we used interest rates, *I*, whereas we instrumented non-interest revenues with outstanding credit card balances, *OB*. While we choose the instrumental variables we paid attention to choose the ones those are correlated with the instrumented variable but not the other endogenous variable's error term. Both interest rates and outstanding credit card balances meet this criterion as they are expected to affect only the endogenous variable they are used to instrument, or affecting the other endogenous variables through the variable they are used to instrument¹⁴. All the variables in the model are in the log form. The descriptive statistics of the data are given in Table 2 below, and the correlation matrix is presented in Table 3.

For robustness check we replaced the instrumental variable for *IR*, *I*, with non-performing balances *NPB*, which gives the credit card balances that were not paid by the consumers at the end of the payment period for the credit card transactions. Since

¹⁴ The correlation of *OB* and the residuals of the second regression in the system is quite low.

the interest rate is charged from the unpaid balances, we expect this is also a good instrument for the interest revenues.

Table 4: Summary Statistics of the Variables in the Model:

Variable	Mean	SD	Minimum	Maximum
NIR	44016.14	59508.11	1.00	297244.00
PK	0.04	0.03	0.01	0.18
W	11.48	3.05	4.30	22.70
AGE	47.93	30.52	5.50	120.00
CQ	0.07	0.05	0.00	0.40
LC	6.66	24.43	8.32E-05	222.18
IR	67595.26	84946.66	5.00	432990.00
OB	1207262.00	1645443.00	10.00	7139693.00
I	66.54	16.45	33.00	101.76

*W values are divided by 1,000,000 YTL in the data

Table 5: Correlation Matrix of the Variables Used in the Model

Column1	NIR	IR	CF	PK	W	AGE	CQ	LC	OB	I
NIR	1									
IR	0.78	1								
CF	-0.17	-0.12	1							
PK	-0.13	-0.18	-0.27	1						
W	0.38	0.33	-0.20	-0.06	1					
AGE	0.19	0.15	0.16	-0.54	-0.01	1				
CQ	-0.07	-0.08	-0.15	0.18	0.23	-0.15	1			
LC	-0.17	-0.19	-0.10	0.09	0.14	-0.16	-0.11	1		
OB	0.93	0.92	-0.16	-0.13	0.41	0.16	-0.07	-0.17	1	
I	0.15	0.24	0.04	0.27	-0.26	-0.29	0.09	-0.21	0.19	1

Results

Table 4 summarizes the regression results of our benchmark model. The results are intriguing as they show that the interaction between the two variables of interest, interest and non-interest credit card revenues, is not symmetrical. Likewise, the

coefficients of the other regressors in the two regressions are different. The two types of revenue are not related to these control variables in the same manner.

Our results indicate that the dummy for interest rate regulation period, *REG*, is significantly positive for non interest income whereas it is negative and significant for interest revenues. This result supports the argument that the credit card interest rate regulation in 2006 reduced the banks' interest incomes in the market. On the other hand, since the regulation did not control the banks' other income channels, banks preferred to shift their focus on their non-interest revenues. Thus the regulation had a positive effect on the non-interest incomes of banks.

The effects of the non-interest and interest revenues to each other also provide evidence for the banks' inclination to shift towards non-interest revenues when their interest incomes are reduced. The coefficient of interest income in the non-interest income equation is negative and close to being significant at the 10 % significance level. Normally, the amounts of two revenue types are expected to be highly correlated since both of these bank revenues are highly related with the transaction amount executed by the card holders of the bank. The major components of banks' non-interest revenues are interchange fees and merchant discount fees in the Turkish credit card market (Karayol 2007). Since these two items are collected by banks per transaction, non-interest revenues of banks are expected to increase as the transaction volume increases. Interest revenues are also expected to go up with the transaction volume since the amount of revolving balances is expected to increase with the overall credit card balance. Therefore, both non-interest and interest revenues should be moving in the same direction. Taking this information into account, the negative coefficient of interest revenue in the non-interest revenue equation becomes more interesting. There is evidence that lower interest revenues in the credit card market caused non-interest revenues to increase.

Table 6: Regression Results for the 3SLS Regression: Benchmark Model

Exp. Var.	End. Var.	
	NIR	IR
Non-Interest Revenues		1.72 9.36***
Interest Revenues	-0.51 -1.54	
REG dummy	0.3 3.91***	-0.25 -2.33***
Interest Rates		-0.57 -3.48***
Outstanding Balance	0.97 3.36***	
Cost of Funds	0.19 2.39**	-0.32 -2.50**
Price of Physical Capital	-0.03 -0.63	0.15 2.05**
Wage	0.24 1.62	-0.29 -1.26
AGE	-0.79 -1.37	-0.14 -0.18
Credit Quality	0.03 0.75	0.06 0.79
Liquidity Cost	-0.11 -5.60***	0.16 4.31***

Table 6: continued

Exp. Var.	End. Var.	
	NIR	IR
Trend	0.01 0.38	-0.05 -3.70***
Constant	6.7 3.06***	-4.15 1.24
Observation	277	277
Chi Square Statistic	11016.45	4502.92
Probability	0.00	0.00

On the other hand, non-interest income is positively significant at 1 % significance level in the interest income equation. This result reflects the expected relationship between the types of revenues. Consequently, looking at these results it can be argued that the banks shift their revenues to non-interest income sources when their interest incomes decrease. On the contrary, we do not observe a similar interaction in the interest income side, but the banks' interest revenues move in the same direction with their non-interest incomes.

The explanation of this result is related to the banks' behavior in the Turkish credit card market. The banks in this market do not compete in interest rates but there exists non-price competition among them (Akin, Aysan, Kara and Yildiran 2009). On the other hand, banks may compete in non-interest revenues such as yearly card fees and merchant discount fees to gain market share in the early periods of the market. Considering these are the prices that the two customer types of the market face directly, the importance of the competition in these prices become clearer. Consequently, banks may compete in fees in the pre-regulation period and decrease

their non-interest revenues as their interest income increases. Besides, they reflect the reduction in their interest revenues as an increase to their non-interest revenues in the post-regulation period as the market shares are shaped in the saturated market.

Our instrumental variable in the second equation, interest rate has a significant negative effect on interest revenues. This may be due to increasing number of transactions and higher amounts of credit card balances after the reduction in interest rates. The news of the regulation may induce consumers to use the credit option of the credit cards more than before, along with the increasing popularity of credit cards. Consequently the interest income of the banks may have increased due to the increasing volume of revolving balances although the regulated interest rates are lower.

The other instrumental variable, outstanding credit card balances (*OB*) has a significantly positive coefficient, which is consistent with our expectations. The non-interest revenues are expected to be closely connected with the volume of transactions since the merchant discount fee and interchange fee are charged as a portion of the transaction amount. Therefore as the total volume of transactions increases, both the credit card balances and non-interest revenues should increase. This variable's effect on interest income is expected to be indirect¹⁵.

Liquidity cost (*LC*) has a significantly negative effect on non-interest revenues, and a significantly positive effect on the interest incomes of the banks. When liquidity becomes more costly, banks need to decide about how to allocate their liquid funds between consumers and merchants. Since merchants pay less, the banks' choice would be to lend more heavily to consumers instead. To discourage merchants from taking these funds, banks can increase discount fees and thus decrease total non-interest revenues. This would explain the negative coefficient in the non-interest revenue

¹⁵ The correlation between *OB* and the residuals of the interest income regression run separately is quite low.

regression. Also, when liquidity costs are high, consumers are more likely to revolve. This would increase interest income, as confirmed by the regression result.

Of the cost variables, only CF displays a positive significant sign for non-interest income, indicating that banks reflect this cost item to the fees they charge in the market. On the other hand; CF has a negative sign for interest income. Even though the cost of funds decreased over time, the accompanying fall in interest rates was lower, and the quantity borrowed increased at the same time. This is a likely explanation for the lower cost of funds being related to higher interest revenues. The only other cost variable which is significant is the price of physical capital in the interest income regression. It can be inferred from this result that the banks are reflecting their physical capital depreciation to their interest rates.

The trend coefficient for interest income is negative and significant, most probably reflecting the effect of regulation. Although the dummy variable *REG* captures the effect of the regulation period, it does not depict the changes in the price ceiling. The credit card interest rates were decreased several times in last 4 years. The trend coefficient captures this decreasing trend in interest revenues. Trend coefficient is insignificant for the non-interest revenues equation, indicating that there is not an extra trend effect, which the other variables do not capture.

Longevity of banks (*AGE*) and credit quality (*CQ*) are insignificant variables for both revenue types. The results for the robustness check can be found in tables A.1, A.2 and A.3 in the appendix. A.1 presents the results of redefining the regulation period. In tables A.2 and A.3 we replaced the interest rate in the second regression with non-performing balances (*NPB*) and *OB* in the first regression with outstanding balances divided by non-performing balances (*OBNP*).

To sum up, our analyses provide evidence for the credit card interest rate regulation's decreasing effect on interest revenues and increasing effect on non-interest revenues of banks. Our results indicate that there is a remarkable interaction between the two income sources of the banks in the credit card market. While we detect a slight

negative effect from interest revenues to non-interest revenues, the reverse relation does not hold since the banks only compete in non-interest items in this market. The picture tells us that the credit card interest rate regulation in 2006 reduced the interest revenues of banks in the market and since the items in the non-interest revenue side are mostly not regulated, banks shifted their interest to the non-interest sources to compensate their lost incomes.

Conclusion

The credit card markets in the world and their controversial issues are expanding day by day. The Turkish credit card market is one of the most rapidly growing ones. As generally a large portion of a country is involved in these markets, any controversy about them is in the concern of regulatory authorities. The regulatory attempts in the Turkish credit card market mostly deal with only one side of the market. On the other hand, the special structure of the two-sided markets may lead to unexpected results on the market mechanism in the case of a regulation. While banks have the option to shift their focus towards their unregulated revenue sources, any regulation may generate new effects on various agents in the market. Therefore, it is important to investigate the results of a regulation and the interaction between the revenue sources of banks in a regulated environment.

This study contributes to our understanding of the two-sided credit card market mechanism as it displays the interaction between the possible revenue sources of the banks in the market. Besides, it is a unique study to our knowledge as it empirically explores the effects of the interest rate regulation in the Turkish credit card market on the behavior of banks.

The results of this study indicate that the banks in the Turkish credit card market shifted their focus towards non-interested revenues after the credit card interest rate regulation in 2006. In this way, they compensated their revenue losses in interest income. Considering the results of this study one can infer that the regulation did work in the sense that it had a decreasing effect on the interest revenues of banks. On the

other hand keeping in mind that most of the non-interest revenues of banks consist of the fees from the merchants, it can be argued that the burden of the market is also shifted from consumers to merchants. The results of this study suggest that the possible effects of a potential regulatory action to the unregulated parts of a credit card market need to be considered. Otherwise, the two-sided structure of credit card markets may generate unexpected and undesirable consequences.

Further empirical studies on the evolution of the market and effects of regulations would contribute to the knowledge about the mechanism of the two-sided credit card markets. Especially if the yearly card fees can be decomposed from the non-interest revenues data, the competitiveness of the issuer and acquirer markets can be checked. Such data is not available yet to our knowledge. There is a considerable literature on the mechanism of credit card markets and these theoretical studies rely on specific assumptions about the market structure. Thus, checking the competitiveness of issuer and acquirer sides of the market would provide opportunity to evaluate if the theoretical models fit the market of interest.

APPENDIX

A. Division of the data from the second period of 2006

In the benchmark model of this study we have divided our data from the first period of 2007 to define the regulation period. The Graph 8 suggests another possible critical cutoff point: the second period of 2006. Therefore we checked our results by dividing our data from the second period of 2006.

Besides, to check for the robustness of the results of the benchmark model, interest rate in the second regression is replaced with Non Performing Balances (NPB). The results are very similar to our benchmark model though there are some differences. First of all, the Interest revenues lose its negative effect for non-interest revenues. Considering that they should have a strongly positive relation as they have in the second equation, this result still supports the idea that increasing interest revenues does not have an increasing effect on non-interest revenues. Secondly, the effect of the regulation, REG, loses its significance but its coefficient remains positive. Lastly, OB loses its significance in the first regression. Results can be seen in Table A.1.

B. Robustness Check for the Benchmark Model 1

Table A.1 presents the results for the model where interest rate in the second regression is replaced with Non Performing Balances (NPB) for robustness check. The results for are very similar to our benchmark model though there are some differences. First of all, the Interest revenues lose its negative effect for non-interest revenues. Considering that they should have a strongly positive relation as they have in the second equation, this result still supports the idea that increasing interest revenues does not have an increasing effect on non-interest revenues. Secondly, the effect of the regulation, REG, loses its significance but its coefficient remains positive. Lastly, OB loses its significance in the first regression. The outcome is pretty much the same where the OB is replaced by outstanding balances minus non-performing balances

Table A.1 : Benchmark model and the Models for Robustness Check

Exp. Var.	End. Var.					
	NIR		IR		NIR	
REG2			0.26	-0.49		
			3.27***	-4.47***		
Outstanding Balance- Non-Performing Balance					0.93	
					3.38***	
Non-Interest Revenues		1.72		1.65		1.73
		9.36***		9.56***		9.22***
Interest Revenues	-0.51		-0.56		-0.48	
	-1.54		-1.39		-1.51	
REG	0.3	-0.25			0.3	-0.25
	3.91***	-2.33***			3.91***	-2.33**
Interest Rates		-0.57		-0.5		-0.57
		-3.48***		-3.26***		-3.48***
Outstanding Balance	0.97		1.01			
	3.36***		2.95***			
Cost of Funds	0.19	-0.32	0.25	-0.28	0.19	-0.32
	2.39**	-2.50**	3.10***	-2.42**	2.39**	-2.50**
Price of Physical Capital	-0.03	0.15	-0.02	0.13	-0.03	0.15
	-0.63	2.05**	-0.54	1.96*	-0.62	2.05**
Wage	0.24	-0.29	0.24	-0.22	0.26	-0.29
	1.62	-1.26	1.5	-1.01	1.78*	-1.27
AGE	-0.79	-0.14	-1.03	-0.04	-0.76	-0.14
	-1.37	-0.18	-1.61	-0.06	-1.33	-1.27
Credit Quality	0.03	0.06	-0.02	0.13	0.09	0.06
	0.75	0.79	-0.52	1.75*	1.62	0.79
Liquidity Cost	-0.11	0.16	-0.12	0.16	-0.11	0.16
	-5.60***	4.31***	-5.55***	4.53***	-5.64***	4.28***
Trend	0.01	-0.05	0.01	-0.04	0.01	-0.05
	0.38	-3.70***	0.99	-2.83***	0.48	-3.68***

Constant	6.7 3.06***	-4.15 1.24	7.77 3.13***	-4.01 -1.27	6.96 3.16***	-4.16 -1.24
Number of Observations	277	277		277		277
Chi squared	11016.45	4502.92	9975.00	4998.63	11151.38	4489.44
Probability	0.00	0.00	0.00	0.00	0.00	0.00

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