

## **Non-price competition in credit card markets through bank level benefits**

### **Abstract**

The attempts to explain the high and sticky credit card interest rates have given rise to a vast literature on credit card markets. This paper endeavors to explain the rates in the Turkish market using measures of non-price competition. In this market, issuers compete monopolistically by differentiating their credit card products. The fact that credit cards and all other banking services are perceived as bundle by consumers allows banks to deploy also bank level characteristics to differentiate their credit cards. Thus, credit card interest rates are expected to be affected by the features and service quality of banks. Panel data estimations also control for various costs associated with credit card lending. The results show significant and robust effects of the non-price competition variables on credit card interest rates.

**Keywords:** Credit Cards, Non-Price Competition, Switching Costs, Banking  
**JEL classification:** G21, G28, O16

### **G. Gulsun Akin**

*Department of Economics, Bogazici University, Bebek, Istanbul, Turkey*  
*e-mail: [gulsun.akin@boun.edu.tr](mailto:gulsun.akin@boun.edu.tr)*

### **Ahmet Faruk Aysan**

*Department of Economics, Bogazici University, Bebek, Istanbul, Turkey*  
*e-mail: [ahmet.aysan@boun.edu.tr](mailto:ahmet.aysan@boun.edu.tr)*

### **Gazi Ishak Kara**

*Department of Economics, University of North Carolina at Chapel Hill, USA*  
*e-mail: [gkara@email.unc.edu](mailto:gkara@email.unc.edu)*

### **Levent Yildiran**

*Department of Economics, Bogazici University, Bebek, Istanbul, Turkey*  
*e-mail: [levent.yildiran@boun.edu.tr](mailto:levent.yildiran@boun.edu.tr)*

## **Non-price competition in credit card markets through bank level benefits**

### **1. Introduction**

Credit card interest rates are higher than other consumer credit interest rates all over the world. Empirical evidence indicates that credit card interest rates are also downward-sticky and show asymmetric responses to the changes in the cost of funds. In a pioneering article on the subject, Ausubel (1991) provided evidence of this tendency in the US credit card market for the 1983-1987 period and calculated that banks earned three to four times the ordinary banking industry returns from their credit card business. Various theories have been offered by economists like Ausubel (1991), Calem and Mester (1995), Stango (2002) and Shaffer and Thomas (2007) to account for the apparent lack of competition and the stickiness of prices in this market. This paper attempts to explain the interest rates in the credit card market in Turkey by considering measures of non-price competition as well as costs.

Our premise is that the Turkish credit card market relies heavily on product differentiation which partially accounts for the high and sticky interest rates. Credit cards are differentiated by offers of benefits such as money points, traveler miles and shopping discounts. The perception of credit cards as being in a product bundle with other banking services also enables an issuer to differentiate its product further using other bank features. In Turkey, all card issuers are banks which offer a variety of banking services as well as credit cards, all at the national level. Anecdotal evidence suggests that customers obtain credit cards from banks from which they receive other banking services. This may be due to a variety reasons. A bank may give a credit card to an existing customer without much effort on the consumer's side whereas obtaining a card from a new bank usually entails more work. Aiming to avoid the

costs associated with two separate applications, a person may prefer choosing one bank to work with for all banking services including credit cards. Another explanation is that banks do not facilitate their customers' payments of credit card balances at other banks, rendering the making of monthly payments an encumbrance especially for people who like to use automated payment services. Sometimes the bank overtly bundles credit card usage with other services. These reasons and others may lead consumers to view credit cards and other bank services as a bundle, differentiating the card with the features of other services and making the quality of a bank's services in general a determinant of credit card interest rates.

When developing the empirical model, this article benefits from the duopoly model of competition with consumer switching costs in Stango (1999) and the bank pricing models proposed by Neuberger and Zimmerman (1990) and Hannan (1991). Three groups of explanatory variables are used to explain credit card interest rates. The first group encompasses cost variables: the cost of funds, default risk and liquidity risk. In the second group, we use the number of bank branches, capital ratio, and average salaries to account for the quality of general banking services and thus capture the effects of customers' viewing credit cards and other bank services as a bundle. The third category includes the credit card market shares of banks, which may affect prices due to product differentiation measures relating to the cards themselves and switching costs. This paper is the first to utilize a recently constructed quarterly panel data set for all 22 issuers in the credit card market in Turkey which spans the period from the last quarter of 2001 to the second quarter of 2006. Fixed effect regressions yield significant and robust positive effects of bank characteristics and market share on prices in the credit card market in Turkey, confirming that through non-price competition, banks are able to charge higher credit

card rates. Our results also support the hypothesis that credit card interest rates adjust to the changes in the cost of funds sluggishly even after controlling for the non-price features. These results are robust to econometric specification and methodology.

Credit card markets in developed countries have been extensively explored. However, very little research has been conducted for developing countries in spite of the recent surge in credit card markets in these economies. Among the very few, Aysan and Muslim (2006) and Aysan and Yildiz (2007) show the failure of price competition in the rapidly growing Turkish credit card market. These studies reveal that the response of credit card interest rates to the decline in the cost funds is economically insignificant. The current paper is the first to analyze the nature of non-price competition in credit cards for an emerging market. Analyzing non-price competition is important and necessary in order to design and implement effective regulations for credit card markets. The Central Bank of Turkey has been applying a price ceiling on credit card interest rates since June 2006 in accordance with the recently enacted credit card law. However, the rates still remain exceedingly high compared to other loan rates. Tightening of the price ceiling is on the agenda of the government. Any incorrectly designed regulation may have economy-wide adverse effects since increasing credit card numbers and transaction volumes made credit cards crucial for the functioning of the economy in recent years.

The organization of the paper is as follows. In the next section, the basic features of the Turkish credit card market are described. Empirical and theoretical background for the estimations is presented in Section 3. Section 4 explains the data, variables and the empirical model. Results and robustness tests are presented in Section 4. Finally, Section 5 concludes.

## **2. The Turkish Credit Card Market**

All issuer banks in Turkey provide credit cards at the national level and compete in a large market where the total number of credit cards was 37.3 million as of December 2007. The growth performance of the Turkish credit card market in 2000s is outstanding. The number of credit cards increased almost threefold between 2000 and 2008. The average growth rate of total outstanding balances between 2003 and 2007 was 59 percent, whereas the average growth rate of the total transaction volume in the same period was 43 percent<sup>1</sup>.

A number of factors led credit cards to substitute for traditional payment instruments to a considerable extent. In addition to the usual benefits of credit cards<sup>2</sup>, Turkish consumers, who have been living with high inflation for 30 years, especially enjoy the non-interest bearing “grace period” between shopping time and payment due date. They also benefit from being able to pay in installments without any surcharge over the cash prices of goods. Additionally, customers can collect money points to be spent like cash, earn travel miles and receive discounts when they use their credit cards. Competition among issuers in Turkey has intensified on non-price measures in the market. Banks stress the numbers of installments, money points, travel miles and similar rewards, but do not emphasize interest rates in their advertisements. Co-branding and affinity cards are among the recent popular tools for credit card differentiation in Turkey. Co-branded cards with airline companies or sea transportation companies that provide frequent traveler miles and affinity cards with soccer clubs are the most common ones. Some smaller issuers also compete by

---

<sup>1</sup> For details, see the periodically published financial stability reports of Central Bank of Republic of Turkey (CBRT) and the Banking Regulation and Supervision Agency (BRSA).

<sup>2</sup> Like not having to carry cash, being able to borrow at any time, enjoying the benefits of online shopping, etc.

offering lower annual fees, teaser rates and switching checks to other issuers' customers, though competition on these features is not fierce in general.

The Turkish credit card market is highly concentrated. The market share of the six largest issuers<sup>3</sup> is 87 percent in total outstanding balances and 80 percent in the number of customers. All issuers in the market provide general banking services. Credit cards are only one of their various products. The six largest issuers are also among the main players in the deposit and consumer credit markets together with three large public banks. They have high numbers of branches, and large ATM and POS (point of sales) networks. They compete on these attributes to increase their market shares in individual banking. In this study the general service characteristics of banks are also considered within the scope of non-price competition as credit cards and other bank services can be seen as a product bundle by consumers, causing these characteristics of issuer banks to affect bank and consequently credit card choice.

### **3. Theoretical and Empirical Background**

The remarkably high credit card interest rates compared with other types of loans have been widely discussed in economic literature. Some explanations for these high rates are inherent in the characteristics of this product. One such justification is that the uncollateralized nature of credit card loans leads to higher default risk, and consequently to higher interest rates. Another is the non-interest bearing period between the day of purchase and the payment due date. Banks incur a cost in order to finance a customer's purchases during this time. Liquidity risk management, which is necessitated by the banks' obligation to be ready to lend up to the full amount of the issued credit cards' limits at any time, also requires costly measures. On top of these

---

<sup>3</sup> The six largest issuers are Yapi Kredi, Garanti, Akbank, Isbank, Finansbank and HSBC.

inherent reasons, banks may also increase their costs by trying to differentiate their products through the distribution of benefits such as money points and other rewards.

In his pioneering study, Ausubel (1991) shows that for the US market, the changes in the cost of funds are insufficient to explain the variation in credit card rates. Despite the existence of a very large number of competitors, this market seems to fail in achieving competitive rates. Ausubel accounts for this failure with the low price elasticity on the demand side emanating from search costs, switching costs and consumer irrationality, and with asymmetric information on the supply side. An adverse selection problem arises from the inability of banks to differentiate between low-risk and profit-yielding customers, and illiquid and risky customers. By decreasing its interest rate, a bank will be able to attract only customers from the undesirable second group, and this makes all banks reluctant to lower prices. Callem and Mester (1995) and Callem, Gordy and Mester (2006) introduce impatience into the picture to assess effects of search costs and asymmetric information. Patient customers with low search costs and high price elasticity of demand have low credit card balances and hence are not profitable for banks. If a bank lowers its interest rate in the presence of search costs only, it merely attracts customers from this non-profitable category. The second group of consumers is low-risk and impatient. These consumers do not want to postpone consumption and hence have high search costs. They are profitable for banks as they carry high balances. Impatient cardholders with high default risk, high search costs and high balances constitute the third group. In the presence of asymmetric information, if credit card balances (but not the types of customers) can be observed by all banks and are taken to indicate risk, all impatient consumers will have high switching costs because they will need to reduce their balances in order to be able to get new cards. A decrease in credit card interest rate

will thus only attract the non-profitable consumers. If the types are known only by their own banks, banks increase switching costs for the consumers in the second category, for example by offering higher limits, so that they do not respond to rate reductions of other banks. Any unilateral interest rate cut by a bank in this situation will thus attract only the undesirable first and third types of customers.

The search cost explanation is not expected to be very relevant for the Turkish credit card market. First, there are only twenty-two issuers, which is a very small number indeed compared to the US. This is likely to make the search for a lower rate easier. Second, the Banking Regulatory and Supervisory Agency (BRSA) and the Central Bank make all current information about credit cards easily available to the public. Although adverse selection may still be a relevant factor, asymmetric information is less of a problem compared to the previous decades due to the advances in information technology, continuously improving screening and monitoring techniques, and the information sharing network (the Credit Bureau of Turkey) among banks for their customers' credit histories. The credit card market in Turkey, on the other hand, presents a very suitable setting to see how rates are affected by non-price competition.

Non-price competition in the credit card market takes different forms. One such observed form is through differentiating credit cards by bundling them with other bank services. Consumers may perceive credit cards and other banking services as a bundle for different reasons. One possible explanation is the ease of getting a credit card from a bank at which one already has an account. Making one application to a bank for all bank services including credit cards rather than making two separate applications for an account and for a credit card reduces costs. Banks may even offer credit cards to their deposit account customers. Another justification is that Turkish

banks make it more convenient for their customers to pay for their own credit cards rather than for cards issued by other banks. Making monthly credit card payments from one's account for the credit card of the same bank is easy and can be done on an automated basis for the minimum or entire amount due. On the other hand, another bank's card's payments cannot be made on an automated basis from one's deposit account. Some banks even charge fees for money transfers made to pay other banks' credit card balances. The bundling of credit cards and other services are sometimes done explicitly. For example, consumer loans are sometimes offered along with a certain amount of credit card money points, or with the opportunity of earning more money points in shopping, as an added bonus. These reasons and others may imply that issuers compete on bundles of products rather than just credit cards, making a bank's services and characteristics an important explanatory factor of its credit card interest rates<sup>4</sup>. Since credit cards are a means of either convenient payment or borrowing small amounts of money, the bank's characteristics must be influential in describing the bundle. Another reason why bank characteristics may be important is that consumers may choose credit cards for the same reasons that they choose banks. For example, a consumer may want to work with a financially sound bank or a prestigious bank as an issuer.

A widely discussed noncompetitive element in the credit card markets is switching costs. Switching cost models, in general, propose that once a customer purchases a product, she becomes locked-in. Stango (2002) adopts this assumption to the credit card markets. He proposes that before obtaining a credit card, consumers may view credit cards as functionally identical, but once they obtain one, they may

---

<sup>4</sup> Taking a vehicle or housing loan from another bank does not pose the same problems. The fixed amount of payments for such loans can be more easily followed and made, for example by placing an order for automatic periodic payment from existing bank account

not easily switch to another issuer's card with a lower interest rate. Ausubel (1991) lists a number of switching costs as follows: (i) application costs in time, effort and emotional energy, (ii) having to pay multiple annual fees by switching to another card, (iii) foregoing the benefits of a long term relationship with the current issuer, and (iv) waiting time till getting the new card. Such factors allow issuers to set prices that differ from marginal costs.

Stango (1999) examines the effects of switching costs on prices in a duopoly model of competition with consumer switching costs. The model predicts that switching costs lead to higher prices and that there is a positive correlation between market share and prices. These results are in parallel with the predictions of switching cost models. In these models, a positive correlation between market share and prices arises from the incentive of the larger firms to exploit their captive customers. Smaller firms, on the other hand, price more aggressively to gain market share. Stango (2000) states that this fact can be better explained in a dynamic model where firms take the effect of their prices on future market shares and hence on future profits into account. Therefore, firms set lower prices in the first period compared to the second period to build market share. Stango (2000) empirically tests this model. He finds evidence for significant positive effects of market share and cost volatility on the interest rate margins in the US market.

This study benefits from theoretical and empirical studies that examine bank price setting behaviour. Hannan (1991) proposes a model to examine the pricing of bank loans and deposits in which costs and bank characteristics are control variables. Berger and Hannan (1989) and Neuberger and Zimmerman (1990) also empirically analyze bank pricing behavior. Neuberger and Zimmerman (1990) investigate the reasons of the lower bank deposit rates in California and conclude that depositors

care not only for prices but also for the quality of general banking services, which are proxied by the number of branches, average salaries and overhead expenses.

We assess the effects of non-price competition strategies on credit card prices while controlling for the costs of the issuers. We propose that the average credit card interest rate set by an issuer is a function of three types of variables: (i) variables reflecting the costs of the issuer, (ii) variables related to the general characteristics of the issuer bank, capturing the effects of product differentiation through bundling, and (iii) market share, controlling for switching costs and the level of differentiation of the credit card.

In the first group, the variables are the cost of funds, the cost of default risk, and the cost of liquidity management. We proxy the cost of funds with overnight interest rates. Credit cards provide short term loans which are financed through expensive short term funds. In that sense, the overnight interest rate is a good measure of the cost of funds for credit card issuers. Ausubel (1991) states that the cost of funds is the most frequently changing part of the marginal cost for issuers and that credit card interest rates are expected to move together with the changes in the cost of funds. Therefore we expect a strong positive correlation between credit card interest rates and overnight rates.

The cost of default risk is proxied with the delinquency rates measured by the ratio of delinquent credit card balances to total outstanding credit card balances. However, delinquent loans are given as stock values and include delinquent loans from previous periods. What is more important for current credit card rates is the flow of delinquent loans, which can be measured by the first difference of delinquency rates. Delinquency rates affect prices through two different channels: by increasing issuer specific costs and by increasing switching costs. Firstly, since banks

have to keep provision for delinquent loans, higher delinquency rates are associated with higher costs and hence higher prices. In that sense, Stango (2000) includes defaults per outstanding balances as a control variable in the credit card interest margin equations. In addition, higher delinquency rates increase the captivity of customers since delinquencies worsen the credit history of consumers and decrease their chances of getting lower rate cards. Both of these channels affect the prices in the same direction; hence, we predict a positive coefficient on this variable. However, an endogeneity issue arises if we include delinquency rates on the right hand side. An increase in credit card rates increases the expected future interest burden for credit card borrowers and hence increases the probability of default (Stango, 2000). We use the lag of the first difference of delinquency rates to eliminate the potential endogeneity problem.

The liquidity risk issue in the credit card markets was first raised by Shaffer and Thomas (2007). Shaffer and Thomas criticize previous studies for having neglected the pre-commitment risk and the resulting liquidity risk of credit card lending. Unlike other loans, banks commit to lend up to a certain amount when issuing credit cards. The full utilization of this amount is solely at the discretion of the cardholders. Therefore, banks have to be prepared to lend the amount equal to the difference between total credit card limits and outstanding balances. This additional amount necessitates holding excess cash reserves and/or liquid securities, or borrowing short term loans from central bank and/or other banks. The opportunity costs arising from keeping low-yield short term reserves or the direct cost of relying on expensive short term borrowing comprise an important component of the total cost of credit card issuing. Shaffer and Thomas, therefore, argue that neglecting the cost of liquidity management results in a bias towards finding non-competitive

behavior in credit card markets. Thomas and Shaffer note that there is a high correlation between pre-commitments and the resulting liquidity risk. We capture the cost of liquidity management with the ratio of credit card limits to total assets and expect a positive coefficient on this variable.

In the second group, we include explanatory variables to capture general bank characteristics. A variable commonly included in bank pricing equations is the number of bank branches. Banks strategically invest in branches to expand their network and to reach more customers. The convenience of an extended branch network may compensate for higher credit card interest rates for consumers. Hence we predict a positive coefficient for this variable. As argued by Neuberger and Zimmerman (1990), the number of branches may not fully capture the services provided to the customers of a bank. Banks differentiate themselves by providing free or underpriced services and better service quality. For example, some banks offer higher security in online banking and POS payment systems to their customers and provide conveniences for paying credit card debts. It is difficult to measure all these different aspects of services; however, an extra service is expected to increase operating costs. Thus, the cost of services may be used as a measure of the number and quality of services. Average salaries paid by banks are used to capture the cost of services. The average salary variable is included both by Berger and Hannan (1989) and Neuberger and Zimmerman (1990). Average salary is a proxy for the quality of general bank services. If a competitive bank pays higher than average salaries, its employees are expected to provide better services in general, including better customer relations. Hence, we expect positive coefficients for these variables.

The soundness of a bank also matters for bank choice. Especially in Turkey we expect the strength of a bank to be crucial in bank choice because of the

experience of bank failures in recent history when tens of thousands of depositors lost their savings in whole or in part. As a proxy for the general health of the bank the ratio of owners' equity to total assets (capital ratio) is used and a positive effect of this variable on credit card interest rates is expected.

In the third group, we include a proxy for the non-price benefits of the credit cards and switching costs. We use the market shares of credit card issuers to capture these aspects. As in the previous theoretical and empirical studies on switching costs, we predict a positive coefficient for the market share variable in our estimations, as firms with larger captive customer bases may lean toward keeping their prices high, in order to exploit them, foregoing gaining new customers with low prices. To avoid a potential endogeneity problem, we follow Stango (2002) and use the lag of the market share variable.

#### **4. The Empirical Model and Data**

The benchmark model estimated in our regressions which tries to capture the effects of a number of variables on the equilibrium distribution of credit card interest rates is:

$$ratebp_{it} = \beta_1 L.costbp_{it} + \beta_2 l.d.delqrate_{it} + \beta_3 cclimitsA_{it} + \beta_4 branch_{it} + \beta_5 avgсал_{it} + \beta_6 capitalr_{it} + \beta_7 l.marketshare_{it} + quarter + \eta_i + \varepsilon_{it}$$

A quarterly data set covering of all 22 credit card issuers in Turkey is used to estimate this equation. We cover the post-crisis period from the last quarter of 2001 to the second quarter of 2006 after which the Central Bank started to set a price ceiling on credit card rates. Due to some missing data points, some observations are dropped to keep the number of observations constant across various specifications.

Table A1 in the Appendix presents the descriptive statistics for the variables used in the estimations<sup>5</sup>.

The dependent variable in the empirical model is the credit card interest rates of issuers (*ratebp*).<sup>6</sup> The explanatory variables in the model are the lag of opportunity cost of funds (*costbp.L1*), the lagged and differenced credit card delinquency rates (*delqrate.LD*), credit card limits as a ratio of total assets (*cclimitsA*), the number of a bank's branches (*branch*), average quarterly cost per employee (*avgsal*), owners' equity as a ratio of total assets (*capitalr*), and the market shares of issuers in the credit card market lagged by one period (*marketshare.L1*). We also include a trend variable (*quarter*) and bank dummies in the regressions.

The overnight borrowing rate of the previous quarter is used as a proxy for the cost of funds. Credit card delinquency rate is the ratio of the average quarterly delinquent loans to the average quarterly outstanding credit card balances. Average salary is calculated by dividing the total quarterly personnel expenses to the average number of employees in that quarter. Outstanding credit card balances are used as a proxy for the market shares of the issuers. Credit card balances and delinquent credit card loans data are obtained from the Central Bank of Turkey. Other balance sheet items of the issuer banks, and the numbers of bank branches and employees are collected from the database of the Banks Association of Turkey.

We estimate our model using fixed effects panel data regression. Random effects regressions are only consistent and efficient if the explanatory variables are not correlated with the individual effects. In our model, we use the same period switching cost variables to explain the variation in credit card rates. Therefore the

---

<sup>5</sup> Credit card interest rates and the cost of funds are expressed as basis points, which are the average monthly rates for each quarter.

<sup>6</sup> Banks charge different interest rates on their different cards. Credit card rates in our study are weighted averages of all these different interest rates charged by an issuer. These rates are collected by the BRSA.

individual effects are likely to be correlated with the explanatory variables. To detect this correlation, we perform the Hausman test and the results provide support for using fixed effects regressions.<sup>7</sup>

## 5. Estimation Results

Table A2 in the Appendix presents the pair-wise correlations between the variables used in the estimations. All of the explanatory variables in the benchmark specification are significantly correlated with the credit card interest rates. The correlation of the credit card rates is highest with the lag of the cost of funds and the trend variables. Table 1 presents the results of the fixed effects regressions. Our benchmark specification is given in the first column. All explanatory variables in this specification except for the delinquency rate are significant at 5% level with the expected signs. The highly significant and negative coefficient of the trend variable indicates a prominent downward trend in the credit card rates in recent years. The coefficient on the cost of funds is 0.48 and indicates that a 10 percent decrease in the cost of funds leads to a 4.8 percent decrease in the average credit card interest rates even after controlling for the other variables pertaining to the credit card market. The estimated coefficient indicates that the impact of the changes in the cost of funds on the credit card interest rates is not substantial. Under the assumption of perfect competition, Ausubel expects this coefficient to be close to one. The sluggish adjustment of credit card interest rates to the cost of funds indicates the lack of price competition in the market.

The delinquency rate variable, another cost measure, turns out to be insignificant. This result is not surprising for the Turkish credit card market. Until the

---

<sup>7</sup> See Table A.3 in the Appendix.

regulation in 2006, banks in Turkey extended their credit card customer bases heedless of the default risks. They acquired high risk customers by distributing credit cards on the streets or at universities without asking for guarantors or examining consumers' income status while they were more prudent in giving other consumer credits. Moreover, they were sending credit cards to their deposit customers without their request? Given the extremely high credit card interest margins, changes in the default risk did not constitute an essential factor in banks' pricing decisions.

Estimation results indicate that liquidity management costs have a positive and significant effect on credit card interest rates. However, the effect of this variable on the credit card interest rates is not as large as suggested by Shaffer and Thomas (2007) in Turkey. A one percentage point increase in the liquidity risk measure increases the average credit card interest rate by 1.5 basis points.

The coefficient of the number of bank branches variable is significant at 5% level and it indicates that if a bank has 100 more branches, consumers accept 38 basis points higher interest rates. This effect is substantial considering the large differences in the number of branches between big and small banks in Turkey. In our data set, one of the banks has over 1000 branches, three banks have between 500 and 1000 branches, eleven banks have between 100 and 499 branches, and seven banks have less than 100 branches. The significant and positive coefficient on the average salary variable also reflects the importance of general banking services in credit card choice. This variable takes the highest coefficient among the explanatory variables. Results indicate that if the average quarterly salary increases by TL 1,000, the bank charges a 16 basis points higher credit card interest rate. Capital ratio enters the benchmark equation with a highly significant and positive coefficient, indicating the importance of the soundness of a bank. The coefficient of this variable shows that

consumers are willing to pay a 3.16 basis points higher interest rate on average when a bank has a one percentage point higher capital ratio. The results for these three variables show that bank characteristics are an important determinant of credit card interest rates.

**Table 1: Estimation Results (Fixed Effects)**

<b>Dependent Variable: ratebp</b>	<b>Benchmark Specification Model I</b>	<b>Model II</b>	<b>Model III</b>	<b>Model IV</b>
<b>costbp.L1</b>	0.48*** (4.16)	0.49*** (4.31)	0.49*** (4.26)	0.49*** (4.36)
<b>delqrate.LD</b>	0.04 (0.08)	0.03 (0.06)	-0.01 (-0.01)	-0.01 (-0.01)
<b>cclimitsA</b>	1.53*** (2.75)	1.55*** (2.74)	1.55*** (2.75)	1.56*** (2.75)
<b>branch</b>	0.38** (2.22)	0.36** (2.13)	0.37** (2.19)	0.36** (2.11)
<b>avgsal</b>	15.55*** (3.13)	16.17*** (3.46)	15.68*** (3.16)	16.22*** (3.46)
<b>capital</b>	3.16*** (3.35)	3.10*** (3.36)	3.29*** (3.54)	3.21*** (3.47)
<b>marketshare.L1</b>	6.24** (2.04)	6.45** (2.11)	6.22** (2.03)	6.41** (2.09)
<b>quarter</b>	-16.20*** (-5.00)	-16.43*** (-5.03)	-16.05*** (-4.97)	-16.28*** (-4.98)
<b>offbsA</b>		0.02 (0.46)		0.02 (0.41)
<b>netprofitA</b>			0.86 (0.43)	0.72 (0.36)
<b>constant</b>	358.19*** (5.07)	352.13*** (5.19)	352.05*** (5.04)	347.63*** (5.12)
<b>Number of obs.</b>	328	328	328	328
<b>R-squared</b>	0.8456	0.8457	0.8457	0.8457

Notes: 1. (\*\*\*), (\*\*) and (\*) indicate significance at 1%, 5% and 10% levels, respectively.

2. t statistics are provided in parentheses.

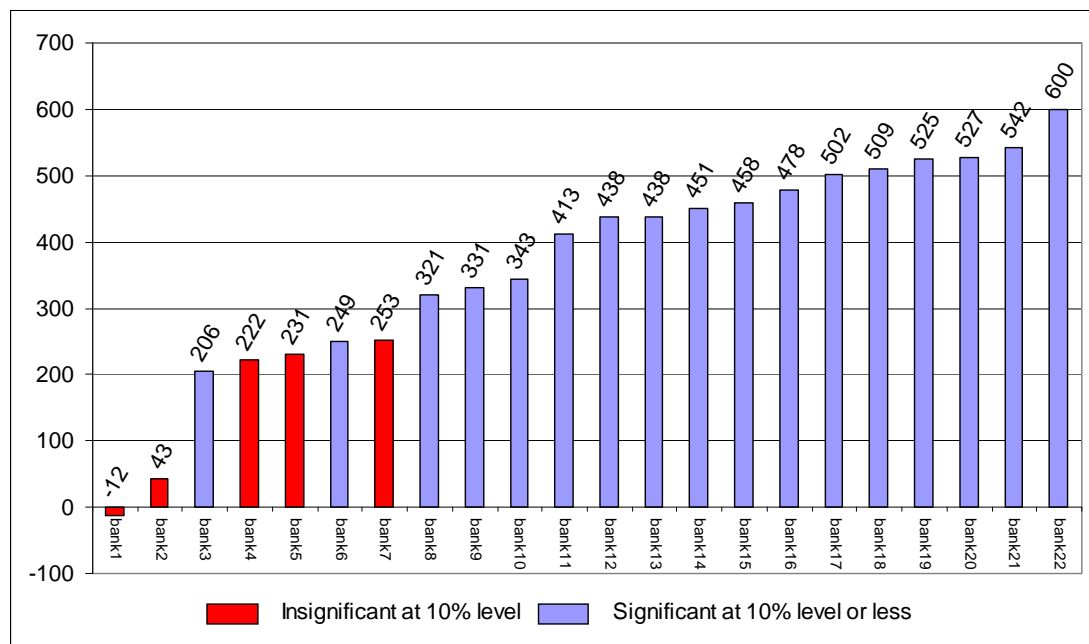
3. Credit card interest rates and the cost of funds are expressed as basis points.

The coefficient of the lagged value of the market share variable is significant at 5% level with the expected positive sign. A one percentage point increase in market share enables the issuer to charge a 6 basis points higher credit card interest rate. Given the differences of market shares of large and small issuers, the effect of

market share on credit card interest rates can be quite high. The largest firm in the market is about 11,150 times larger than the smallest firm in terms of outstanding balances. This finding confirms the expectations of the switching cost models, indicating that banks with larger market shares exploit their captive customers by applying higher credit card interest rates.

The pricing strategies of public banks, on the other hand, may differ from those of private banks due to the differences in their priorities. Public banks may price more in favor of consumers because of their social welfare concerns. Graph 1 gives the distribution of issuer-specific fixed effects for 22 banks for the benchmark model. The bank with the lowest fixed effect coefficient is a public bank. The second lowest coefficient belongs to a private bank which is run like a public bank due to its ownership structure. Two other public banks have the sixth and eighth lowest fixed effect coefficients. These findings indicate that after controlling for costs and product differentiation, public banks price more in favor of consumers compared to private banks.

**Graph 1: Distribution of Slope Coefficients for Model I**



In order to check the robustness of our results, other related explanatory variables are added to the benchmark specification (Model I). First include the ratio of off-balance sheet items to total assets (*offbsA*) is included in Model II. Off-balance sheet items basically contain credit commitments and derivative instruments. This variable reflects the technology and product diversity of a bank. In that sense, it may affect credit card interest rates positively through the bundling effect. However, the coefficient of this variable in the second column of Table 1 turns out to be insignificant. Signs and significances of the other explanatory variables are not altered much when we add the *offbsA* variable to the estimations.

Secondly, in Model III, the ratio of net profits to total assets (*netprofitA*) is added to the benchmark specification. This ratio can be considered as an additional measure of the soundness of a bank like capital ratio. Therefore a positive coefficient is expected for this variable. In Model IV, both *offbsA* and *netprofitA* are used. The results of these estimations are presented in columns 3 and 4 of the same table. Again, signs and significances of other explanatory variables do not change. However, the coefficient of *netprofitA* variable is not significantly different from zero.

Two more control variables are used to check the robustness of the estimations. Table A3 in the appendix reports the results of these specifications. One of these control variables is the ratio of fixed assets to total assets (*fixedassetsA*). Credit card issuing is a costly business. Establishing secure and convenient credit card systems necessitates substantial fixed investment. Banks that provide more secure and convenient credit card services invest heavily in technological infrastructure. These investments include infrastructure for providing online services, establishing POS systems and extending the number of retailers incorporated in this

system. These investments are reflected to consumers as better services and hence increase the level of differentiation. The other control variable is the ratio of overhead expenses to total assets (*overheadA*). This variable is used by Neuberger and Zimmerman (1991) in addition to the average salary variable to proxy the quality of banking services. Significant positive coefficients are found for these variables as expected. The signs and significances of the variables in the benchmark specification do not change, except that the market share variables become insignificant in Model V.<sup>8</sup> These experiments confirm that the results are robust to different specifications.

Lastly, we check the robustness of the results to the econometric model used in the estimations. The same equation is estimated using random effects. Except two differences, results remain the same: the number of bank branches variable becomes statistically insignificant and the market share variable has lower significance in the random effects regression. Results of the random effects estimation of the benchmark model are presented in the Table A3 in the Appendix. The Hausman test is used in order to check if the fixed effects regression is statistically different from the random effects regression. The null hypothesis that the difference in coefficients is not systematic is rejected (See Appendix, Table A3). The Hausman test reveals a correlation between explanatory variables and individual effects. Therefore, the fixed effects estimation is consistent and efficient while the random effects estimation is not. Hence, the choice of the fixed effects regression specification is justified.

## **6. Conclusion**

In this study, the determinants of the distribution of credit card interest rates in the Turkish market are analyzed. Issuer banks differentiate their products by

---

<sup>8</sup> We run these regressions separately due to high correlation between these two variables. Additionally we drop the capital ratio variable in these regressions due to the high correlation of this variable with these control variables.

providing a number of non-price benefits to their credit card customers, bundling their product with other services, and making use of switching costs. The general quality of banking services and bank characteristics are important for card choice since many cardholders use other services of the issuer bank as well, causing them to view all these services as a product bundle. Some other ways of differentiating credit cards are distributing money points and travel miles, enabling consumers to pay shopping bills in installments and offering discounts to cardholders. This market is subject to switching costs.

An empirical model is estimated to examine the effect of measures of non-price competition on credit card rates. A quarterly panel data set for all 22 issuers in the credit card market in Turkey, spanning the period from the last quarter of 2001 to the second quarter of 2006, is used. We benefit from the bank pricing models in the literature to build the empirical model. We control for the costs of funds, default risk and liquidity risk management in credit card operations. The number of bank branches, average salaries and capital ratio are used as proxies for the quality of general banking services. The effects of differentiation of credit cards and switching costs are captured with the market shares of the issuers. Fixed and random effects regressions show that non-price competition has an important effect on credit card interest rates in Turkey.

This paper is the first to study the role of non-price competition in the credit card market of an emerging market economy. The indicated importance implies that efforts concentrated on this aspect by financial market regulators will help enhance competition in credit card markets, for example by allowing credit card users to be able to automatically pay their credit card balances from their accounts at different banks.

## 7. Appendix

Table A1: Descriptive Statistics

		Observations for each variable			
N (overall)		328			
N (between)		22			
T -bar (within)		14.91			
Variable		Mean	Std. Dev.	Min	Max
ratebp	overall	626.61	141.86	275	995
	between		82.71	504.69	841.94
	within		116.57	320.67	955.43
costbp.L1	overall	226.85	109.92	112.50	479.90
	between		35.17	155.70	264.15
	within		105.24	81.86	460.29
delqrate.LD	overall	0.15	10.13	-163.65	44.48
	between		3.38	-12.05	8.88
	within		9.71	-151.44	49.51
cclimitsA	overall	12.66	15.66	0.43	83.99
	between		15.23	1.13	59.56
	within		6.21	-16.73	38.77
branch	overall	290.55	303.53	8	1176
	between		298.74	9	1151.94
	within		22.44	225.14	432.49
avgsal	overall	9.54	2.34	4.73	16.43
	between		1.98	7.11	14.88
	within		1.35	6.63	14.76
capitalr	overall	13.01	5.33	2.38	59.35
	between		3.95	7.69	20.43
	within		3.83	-2.19	51.92
marketshare.L1	overall	5.10	6.93	0	28.29
	between		6.72	0.01	24.17
	within		0.94	1.84	9.22
quarter	overall	11.74	4.65	3	19
	between		1.37	10.00	14.5
	within		4.48	3.74	19.74
offbsA	overall	196.54	144.78	7.29	809.77
	between		111.21	44.95	527.51
	within		90.03	-226.85	525.65
netprofitA	overall	0.81	2.14	-17.61	5.85
	between		1.43	-4.91	2.10
	within		1.69	-11.89	7.77

Table A2: Pair-wise Correlations

	ratebp	costbp. L1	delqrate .LD	cclimits A	branch	avgsal	capitalr	marksh are.L1	quarter	offbsA	netprofit A
ratebp	1										
costbp. L1	0.75*	1									
delqrate .LD	-0.04	-0.08	1								
cclimits A	0.23*	-0.07	0.03	1							
branch	-0.14*	0.08	0	-0.15*	1						
avgsal	-0.26*	-0.50*	-0.01	0.41*	-0.20*	1					
capitalr	0.09*	-0.04	-0.09*	0.33*	-0.11*	0.31*	1				
markets hare.L1	0.13*	0.10*	-0.01	0.22*	0.38*	0.03	0	1			
quarter	-0.75*	-0.96*	0.09*	0.04	-0.06	0.52*	-0.01	-0.09	1		
offbsA	-0.07	-0.38	0.04	0.43*	-0.26*	0.46*	0.15*	0.07	0.38*	1	
netprofit A	0.03	0	0.36*	0.12*	0.13*	-0.20*	-0.29*	-0.03	0	0.10*	1

(\*) Indicates significance at 10% level

Table A3: Random Effects Estimation and Additional Robustness Tests

<b>Dependent Variable: ratebp</b>	<b>Random Effects Model I</b>	<b>Fixed Effects Model V</b>	<b>Fixed Effects Model VI</b>
<b>costbp.L1</b>	0.50*** (4.42)	0.42*** (3.55)	0.53*** (4.53)
<b>delqrate.LD</b>	0.09 (0.21)	0.08 (0.16)	0.00 (0.01)
<b>cclimitsA</b>	1.59*** (3.00)	1.92*** (3.54)	1.41** (2.56)
<b>branch</b>	-0.05 (-0.92)	0.41** (2.32)	0.36** (2.40)
<b>avgsal</b>	9.67** (2.55)	14.47*** (2.83)	15.30*** (3.33)
<b>capitalr</b>	2.59** (2.55)		
<b>marketshare.L1</b>	3.11* (1.74)	4.22 (1.32)	8.76*** (2.94)
<b>quarter</b>	-13.27*** (-4.54)	-17.04*** (-5.08)	-15.83*** (-4.94)
<b>fixedassetsA</b>		3.64*** (2.91)	
<b>overheadA</b>			8.61*** (3.27)
<b>constant</b>	518.89*** (8.34)	414.74*** (5.81)	372.38*** (5.67)
<b>Number of obs.</b>	328	328	302
<b>R-squared</b>	0.6387	0.8411	0.8420
<b>Hausman Chi<sup>2</sup>(8) P Value of Chi<sup>2</sup>(8)</b>	99.44 (0.00)		

Notes: 1. (\*\*\*), (\*\*) and (\*) indicate significance at 1%, 5% and 10% levels, respectively.

2. z and t statistics provided in parentheses for random and fixed effects estimations respectively.

3. Credit card interest rates and the cost of funds are expressed as basis points.

4. Model VI is estimated for the period between 2002q4 and 2006q2 due to data limitation for overhead expenses. Therefore the number of observations drops to 302.

5. Hausman test tests the null hypothesis that the difference in coefficients of fixed effects and random effects estimations of the benchmark specification is not systematic.

## 8. References

- Ausubel, L.M. (1991). "The failure of competition in the credit card market", *American Economic Review*, 81: 50-81.
- Aysan, A. F., and N. A. Müslim (2006). "Assessing the Competition in the Credit Card Market in Turkey: A New Empirical Evidence", *International Management Development Research Yearbook*, K. Erdener & H. Talha (eds.), Vol.15, pp. 147–154, International Management Development Press, Hummelstown, Pennsylvania, USA.
- Aysan, A. F., and L. Yildiz (2007). "The Regulation of the Credit Card Market in Turke," *The International Research Journal of Finance and Economics*, 2(11):141-154.
- Berger, Allen and Timothy Hannan (1989). "The Price-Concentration Relationship in Banking," *Review of Economics and Statistics*, 71:291-99.
- Calem, Paul S. and Loretta J. Mester (1995). "Consumer Behavior and the Stickiness of Credit-Card Interest Rates," *The American Economic Review*, 85(9):1327-1336.
- Calem, Paul S., Michael B. Gordy and Loretta J. Mester (2005). "Switching Costs and Adverse Selection in the Market for Credit Cards: New Evidence," Federal Reserve Bank of Philadelphia Working Paper No. 05-16.
- Chen, Yongmin (1997). "Paying Customers to Switch", *Journal of Economics and Management Strategy*, 6:877-897.
- Hannan, Timothy (1991). "Foundations of the Structure-Conduct-Performance Paradigm in Banking", *Journal of Money, Credit and Banking*, 23(1):68-84.
- Neuberger, J. A. and Zimmerman, G. C. (1991). "Bank pricing of retail deposit accounts and the California rate mystery," *Economic Review*, Federal Reserve Bank of San Francisco.
- Shaffer, S. and L. Thomas (2007). "A Reassessment of Market Power Among Credit Card Banks", *Applied Financial Economics*, 17:755-767.
- Stango, V. (1999). "Competition and Pricing in the Credit Card Market", Working Paper.
- Stango, V. (2000). "Competition and Pricing in the Credit Card Market", *The Review of Economics and Statistics*, 82(3): 499-508.
- Stango, V. (2002). "Pricing with Consumer Switching Costs: Evidence from the Credit Card Market", *Journal of Industrial Economics*, December.