Who Bears the Burden of Banking Transformation in Turkey: An Empirical Analysis of Demand, Competition and Welfare Analysis

Abstract

This article investigates consumer demand, competition and welfare in the Turkish deposit and credit markets in 2002-2009 period by using banks'market shares in these markets. A discrete choice structural demand model developed by Berry (1994) is employed in the estimations. As market shares reflect consumers' final choices, the methodology starts with constructing the utility function of consumers who purchase deposit (loan) services from a bank. This method allows us to elaborate on demand, competition and welfare in the same analysis. In the model, a market share equation is derived from the utility function and elasticities which allow to comment on competiton are calculated. Lastly, the paper concludes with a welfare analysis based on consumers' last choices. Results of the study show that price elasticities of credit customers are much higher than those of depositors. It may yield more effective results to make price competition in credit market, whereas banks may increase their market share in deposit side by differentiating their products for depositors. There is welfare loss for depositors within 2002-2009 period, but credit customers experience an increase in their welfare in the same period.

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Demand, Competition and Welfare Analysis in the Turkish Banking Sector

INTRODUCTION

Turkish banking sector has experienced a remarkable progress since the 2000 and 2001 crises. Macroeconomic conditions have ameliorated and financial sector has deepened in this period, but banking sector has kept its dominance in the intermediation process which channels savings into the economy[1]. This paper aims to investigate the consumer demand in the banking sector in the post-crises era, and derive some conclusions in terms of competition and welfare.

Banking deregulations and capital account liberalizations of the neoliberal paradigm were pointed out the major reasons of the financial crises not only in Turkey but all around the world in the 80s and 90s. High inflation rates, increasing public expenditures and excessive public sector borrowing requirements in this era led most Turkish banks to leave their intermediary roles aside and concentrate on deficit financing by borrowing funds from abroad and investing those funds in treasury bonds[2]. This mechanism led banking sector to face with increasing open positions and exchange rate risk. Government banks had confronted with interest rate risk as a result of short-term, expensive financing policies, and suffered from excessive duty losses. Governments granted new licenses in order to minimize their borrowing costs, engendering many inefficient banks in the sector.

[1] Share of each intermediary in financial sector is in Table 3 in Appendix-1.

[2] Akın, G. Gülsün, Ahmet Faruk Aysan and Levent Yıldıran (2009).

Decreasing confidence in financial sector, increasing demand for foreign currency and resulting capital outflows led the IMF-supported exchange rate program of 1999 to collapse. Banks with high exchange rate risk were adversely affected by the drastic depreciation of TL, many of them went bankrupt, some of them were acquired by SDIF, and some went through an M&A process.[3]

During the restructuring program of banking sector, which cost about 36% of GDP, the number of banks, branches and employees decreased as a result of M&A's and license revocations in the industry until 2004. In the following consolidation period during which intensive foreign entries have occurred, the branch and employee numbers of the existing banks have started to escalate again. In the face of the global financial crisis, which started in October 2008 and affected even some giant banking groups in developed countries, the Turkish banking sector managed to remain healthy, thanks to the significant reforms in banking regulations after the 2000-2001 crises. 2009 was the most profitable year of all times for the five biggest Turkish banks and all banks (except one) in the sector profited in that year.

Determining how the demand, competition and welfare in the banking sector changed during the transformation from an inefficient sector before 2000s to a healthy banking sector in the post-crises era is important for the Turkish banking history.

We estimate a structural demand model derived from discrete choice utility functions with multinomial logit specifications. The model approaches market power of banks from consumer's point of view. As the market share of a bank is the overall result of consumers' last preferences, the factors that affect consumer preferences

[3] Banks that are passed to SDIF may be seen in Table 10; the list of banks that merged or were acquired is in Table 9 in Appendix-1.

also affect market share of banks. Berry(1994) developed a fairly user-friendly method for the estimation of such settings by transforming a logit specification into a simple regression equation. Authors who used this method for manufacturing industry added a cost specification to the model; then they derived price-cost margins (PCM) and made a full competition analysis. But deriving a cost function for banking sector is quite problematic for this demand model (because cost function settings overlap with demand settings), so we only use the method for demand, elasticity and welfare analysis. Still, we can draw conclusions about competition based on elasticity calculations.

This model was adapted to service sector first by Dick (2002) who investigated deposit demand in the U.S. banking sector. Then Horvath et al. (2006) and Nakane et al. (2006) tried the same method for the Hungarian and Brazilian banking sectors. Our study use the same model for Turkish banking sector, investigating deposit and credit markets separately.

Most of the previous studies on Turkey have concentrated on efficiency and concentration issues and studied the market as a whole. In the literature there is no study that attempts to analyze the demand structure of the Turkish deposit and credit markets separately with a structural model. The model allows to comment on consumer preferences because the estimation equation is derived from consumers' utility function. It also provides some idea about competition in that sector through price elasticities. Lastly, by calculating corresponding equivalent variations, it is also possible to observe welfare changes.

The results say that the most important characteristic is the price for consumers when they select a bank to borrow money. Depositors also pay attention

to price, but other bank characteristics are also important for their choices. Loan consumers are more price-concerned, so they have higher price elasticity than depositors who have inelastic demand for deposit services of banks. Credit customers enjoy welfare gains whereas depositors have loss of welfare during the analysis period.

The organization of paper is as follows: First we shortly mention the existing literature of discrete choice models in service sector as well as studies about Turkish banking sector. Then we mention about theoretical structure of the model and some empirical considerations. Lastly results are represented and the paper concludes.

LITERATURE[4]

There exists a very rich literature of competition in banking sector. We can divide all these works into two main groups as traditional industrial organization (TIO) and new empirical industrial organization (NEIO).

The first member of TIO literature is Structure-Conduct Performance which tries to explain positive relationship between profitability and concentration (or market share). The second is bank efficiency approach (Demsetz, 1973; Peltzmann, 1977) which states that more efficient banks will gain market share. The last approach of TIO literature is the economies of scale and scope that looks at whether banks produce optimal output mix in terms of size and composition.

The main criticism against TIO hypotheses is that they construct one way causality from market structure to performance. They don't take into account the

[4] See Degryse H. and Ongena S.(2007) and Northcott, C.(2004) for more on this literature.

effect of bank performance on market structure. NEIO literature tries to avoid this problem. The first approach of new literature is Panzar-Rosse methodology which tries to find whether the market operates under perfect competition, monopolistic competition or monopoly. The other method of NEIO is Conjectural-Variations (CV) method which was introduced by Iwata (1974) and Bresnahan (1982). They say that banks take into account the reaction of rivals when they try to select the output. As Corts (1999) shows, the CV methodology has several problems related to the interpretation of the theoretical conduct parameter and the estimation methodology.

The last approach of NEIO is the structural demand model which uses characteristic-based demand systems that models product differentiation explicitly and helps to overcome the difficulty of estimating large number of substitution parameters. This work departs from the previous literature by developing a demand model from consumers' utility function, exploring product differentiation and thus allowing heterogeneity across banks. The analysis allows to comment on consumer behavior, competition and welfare. Our study tries to exploit this vein of the literature for the Turkish commercial banking sector.

Dick finds that consumers concern prices significantly; they also take into account service fees. Nakane et al. (2006) apply the same procedure for estimating credit demand as well as deposit demand for Brazilian banking industry during 2002-2003 period. The results show for both time deposits and loans that Bertrand model overestimates the observed degree of market power and that competition is quite high.

Molnar et al. (2007) try to analyze the retail banking competition in Hungary with the same framework. They analyze three submarkets of each of credit and

deposit markets in Hungarian banking sector. Their findings are quite parallel to that of Dick's: in all markets consumers react to interest rates and to a lesser extent to service fees.

There are many studies about Turkish Banking Sector using different methods of traditional industrial organization literature, like concentration indices, HHI and efficiency models. Majority of the later studies use Panzar-Rosse method of NEIO literature and they find similar results.

Examples for traditional structural-conduct-performance are Kasman (2002), Okumuş (2002) and Günalp and Çelik (2004). Kasman finds that market concentration has no effect on profitability in the period of 1988-1996. Based on the investigation of 1989-1995 period, Okumuş concludes that there is no significant result verifing the SCP paradigm which states that market power determines the profitability. Günalp and Çelik say that they can not reach any evidence of profitability stemming from monopoly power of banks that have high market shares.

On the other hand, Aydınlı (1996) and Günalp and Çelik (2006) uses Panzar-Rosse technique and find similar results for different periods. Aydınlı finds that sector represents the characteristics of monopoly market within 1991-1994, but that structure weakens gradually and has a progressive path toward monopolistic competition. Günalp and Çelik employ the Panzar-Rosse H-statistic in their study to assess the competitive environment in the Turkish banking industry over the period 1990 to 2000. They find that competition is monopolistic, so they conclude that the observed high profitability of the Turkish banking sector does not seem to be an indication of an increase in monopoly power.

Abbasoğlu et al. (2007) examine the degree of concentration and competition in the market by applying the Panzar-Rosse approach for the years from 2001 to 2005. They find that the Herfindahl-Hirschman Index increases in the whole period, which can be interpreted as an increase in the concentration overall, although Turkey's banking sector is still characterized as non-concentrated. They also find that there is monopolistic competition in the sector throughout the whole period.

Yayla (2007) find that concentration in the relevant markets decreases in the period of 1995-1999 and increases in 2000-2005 based on different concentration indices used in the study. However, net interest margins which can be seen as the relevant prices in the sector have declined in both periods.

As seen above, majority of studies clusters around the concentration analysis. Moreover, no study has analyzed the deposit market yet. So, this study will be the first attempt to analyze deposit and credit markets separately.

THE MODEL

We use a structural demand model in order to analyze the market shares of banks in deposit and credit markets. The method that we use to get rid of endogeneity problem is based on Berry (1994). He avoids complicated nonlinear instrumental variable (IV) estimation techniques by developing a transformation method for market share function. Berry et al. (1995) use this method for the U.S automobile market; Nevo (2001) uses it for ready-to-eat cereal industry. Dick uses the same method in service sector for the first time and she estimates the demand for deposit services in the U.S.

The model starts by deriving a utility function which depends on both observed and unobserved (by econometrician) product characteristics.

One assumption of the model is that consumers decide how much they will deposit to (or take loan from) a bank before they choose a bank to buy the deposit (loan) service. So the only decision to be made is from which bank these services will be purchased.

Assume there are $i = 1,....,I_t$ consumers interested in purchasing deposit/loan services from bank $j = 0,....,J_t$ ($j = 0$ is the outside good) at time $t = 1,....T$. Let each consumer's utility function be linear such that the conditional indirect utility of consumer *i* from choosing bank *j*'s services is :

$$u_{ijt}^{d} \equiv \delta_{jt}^{d} + \varepsilon_{ijt} \equiv \alpha^{d} p_{jt}^{d} - \alpha^{s} p_{jt}^{s} + \beta^{d} x_{jt} + \xi_{jt}^{d} + \varepsilon_{ijt}$$

where p_{jt}^{d} represents interest paid by banks on deposits, p_{jt}^{s} represents service charges on deposit accounts[5], x_{jt} is a K-dimensional row vector of observed characteristics, ξ_{jt}^{d} represents unobserved bank characteristics (depicted as a mean across consumers and independent across banks) and ε_{ijt} is a mean zero random disturbance that is identically and independently distributed across consumers and choices, and $\theta_D = (\alpha^{d}, \alpha^{s}, \beta^{d})$ is the K + 2 dimensional vector of mean level of taste parameters to be estimated. Note that the parameters of the utility function do not depend on individual *i*'s characteristics. We assume that variation in consumers' taste enters only through the additive term, ε_{ijt} .

[5] Since service fee data of banks cannot be decomposed in order to get service fee from deposits, this variable is not included our estimation equation.

If we assume that the consumer heterogeneity term, ε_{ijt} follows an extreme value distribution of the form $\exp(-\exp(-\varepsilon))$, we can derive the market share for bank *j* based on the probability that consumer *i* will choose bank *j* conditional on bank characteristics. The predicted market share for bank *j* is then given by

$$S_{jt}^{d}(\delta_{t}^{d}) = \frac{\exp(\delta_{jt}^{d})}{\sum_{k=0}^{J}\exp(\delta_{kt}^{d})}.$$

Thus, the derived market shares depend only on mean utility levels δ, such that a simple structural relationship between the marginal utilities and the observed market shares is obtained.

For credit market, the demand specification is the same as that for deposit market:

$$u_{mjt}^{l} \equiv \delta_{jt}^{l} + \varepsilon_{mjt} \equiv \alpha^{l} p_{jt}^{l} + \alpha^{sl} p_{jt}^{sl} + \beta^{l} x_{jt} + \xi_{jt}^{l} + \varepsilon_{mjt}$$

where p_{jt}^{l} and p_{jt}^{sl} [6] represent interest rates paid by consumers and fees on loans respectively, and the other variables are defined similarly. The closed form solution of the multinomial logit model is the following:

$$S_{jt}^{l}(\delta_{t}^{l}) = \frac{\exp(\delta_{jt}^{l})}{\sum_{k=0}^{J}\exp(\delta_{kt}^{l})}$$

Following Berry (1994), by setting the predicted market shares equal to the observed market shares and normalizing the mean utility of the outside good to zero, one obtains[7]:

$$\ln(s_{j}^{d}) - \ln(s_{0}^{d}) = \alpha^{d} p_{jt}^{d} + \beta^{d} x_{jt} + \xi_{jt}^{d} \qquad (1)$$

[6] Service fee on loans is involved in loan rate variable since a separate service fee data is not available.

[7] For detailed derivation of market share function, see Appendix-2.

for deposit market and:

$$\ln(s_j^l) - \ln(s_0^l) = \alpha^l p_{jt}^l + \beta^l x_{jt} + \xi_{jt}^l$$

for credit market respectively. Given a simple linear regression equation derived above, we can estimate the parameters easily with OLS by regressing $\ln(s_j^d) - \ln(s_0^d)$ on (p_j^d, x_j) for deposit market and $\ln(s_j^l) - \ln(s_0^l)$ on (p_j^l, x_j) for credit market. But there is endogeneity problem in this specification because of the correlation between prices and error term that consists unobserved product characteristics. Unobserved bank characteristics such as service quality, reputation, experience, expertise, etc. may influence consumers' decisions and affect pricing decisions of banks, so those unobservables cause prices to be endogenous. The instrumental variable technique may mitigate the endogeneity problem by assigning some instrumental variables for prices which influence cost of products (and accordingly prices), but are likely to be exogenous to the pricing decisions of banks (orthogonal to market share).

From the indirect utility function and predicted market share function, one can estimate own price elasticities of bank *j* in period *t* by the following formula:

$$\eta_{jkt}^d = \frac{\partial s_{jt}^d}{\partial p_{kt}^d} \frac{p_{kt}^d}{s_{jt}^d} = \begin{cases} -\alpha^d p_{jt}^d (1 - s_{jt}^d) & if \;\; j = k \\ \alpha^d p_{kt}^d s_{kt}^d & \text{if j} \neq \text{k} \end{cases}$$

With this elasticity formula, we can compute the distribution of the elasticities for our sample and comment on competition structure of the industry for both markets.

DATA

Quarterly data are collected from the the website of the Bank Association of Turkey (BAT). There are 951 observations in the study and each observation represents the relevant variables of a specific bank in one quarter.

Since investment and development banks do not collect deposit, and they have different structure and operating aims, we excluded them from the study in order to avoid misleading results. So we include only the market shares of domestic commercial banks (state-owned and private banks) and foreign commercial banks in the analysis.

As we see in equation (1), market share of a bank is defined with respect to the outside good in the market. Other studies on discrete choice models of structural demand use thrifts and credit unions as outside good that can collect deposits although they are not commercial banks. Since thrifts and credit unions do not exist in Turkish financial markets, but participation banks collect deposit and make loans like commercial banks, it will be appropriate to use them as outside good in the regression equation. The outside good is defined as sum of four participation banks' data[8] for each quarter through the time period being analyzed. As we incorporate participation banks in the dependent variable, market shares banks should be interpreted as vis-a-vis participation banks.

We analyze demand structure of Turkish banking sector for both deposit and credit markets for the period from 2002 to 2009. The study starts from 2002 because the sector witnessed two big crises (1994 and 2001) which had significant negative impacts on not only the banking sector, but also the whole economy. Thus financial markets were characteristically very volatile before 2002 which makes it hard to

[8] Participation banks are Asya Katılım Bankası, Albaraka Türk Katılım Bankası, Kuveyt Türk Katılım Bankası and Türkiye Finans Katılım Bankası.

examine the period. The financial data of banks are also not detailed enough to include the effects of inflation accounting before 2002 (it is applied within a period but then stopped, so the data would have some gaps before and after 2002); so a coherent data collection without any shift before 2002 is almost impossible.

The market is defined as the overall deposit (credit) market in Turkish banking sector excluding interbank deposits (loans). Since the market share function is derived from utility function of consumers, it would be erroneous to include interbank deposits (loans) in the analysis. The characteristics that banks pay attention to when they lend to or borrow from another bank are quite different from those that households or firms will care. Since they are much more informed about the characteristics of other banks than other consumers, we did not incorporate interbank deposits in the model.

We also excluded the banks assigned to SDIF (Saving Deposit Insurance Fund).[9] Although they have deposit accounts in their balance sheets, they do not compete with other banks in the deposit market. There is one more exclusion from the analysis of the deposit market. There are several foreign banks operating in Turkish banking sector but practically they do not exist in the deposit market. They may be big banks in their mother countries or in the world, but they do not compete to collect deposits. They have one or a few branches in Turkey. They mainly finance themselves by funds obtained from affiliated banks or other institutions abroad. Since those banks do compete in the credit market, their exclusion from the analysis of the credit market is not necessary.

[9] Data about banks assigned to SDIF are in Appendix-1. We also exclude Adabank from the study because it does not collect deposit either.

Another difference in the analysis of credit and deposit markets should be noted. The original specification of the model includes service fees as well as interest rates, since they are a part of the price banks charge on consumers for the services they provide. But the template of income statements which is determined by the communiqué of BAT does not have such a breakdown of "fees and commissions received" account. Neither do the independent audit institutions provide such a detailed breakdown. So we do not include service fees in the deposit market analysis. But interest revenues in the financial tables of banks cover service fees gained from credit accounts. Thus service fees are included in the credit market analysis.

The important feature of the model is that it allows for product differentiation. Thus consumers can prefer one bank to another based on the characteristics of each bank. Observed bank characteristics are important for consumers about the heterogeneity of banks. We use several characteristics other than price that may affect consumer decisions such as employee per branch, number of city that bank operates, bank age and advertisement cost [10].

Table 1: Summary Statistics

Variable	*Observation*	*Mean*	*Std. Dev.*	*Min.*	*Max.*
Deposit market share	600	4.49	5.36	0.10	25.19
Credit market share	600	4.44	4.39	0.01	16.00
Deposit rate	567	2.58	0.93	0.00	9.51
Credit rate	600	5.51	3.33	1.51	28.06
Branch number	600	315.74	318.64	1	1,291
Employee per branch	600	22.03	7.12	11.32	63.83
City	600	45.83	27.51	1	81
Age	600	39.52	29.84	5	121

[10] Description of all the variables used in the study is available in the Appendix-1.

Advertisement costs	597	7,750.60	10,666.62	0	61,348
Non-performing loans	584	1.21	2.01	0	14.72
Operational cost (1)	600	713,049.20	873,692.40	-426.00	5,179,735.00
*Operational cost (2) **	600	379,138.80	511,784.00	-15,987.00	3,479,537.00

** Operational cost (2) does not include interest expense of deposits whereas operational cost (1) does So (1)was used for credit estimation, (2) was used for deposit specification.*

Number of employees per bank branch is important for consumers who are distant to technology in banking sector, so it may imply technological differences through banks. The number of city that bank operates used to capture network size and ability of geographic diversification of the bank[11] . Those two variables also reflect some other features related with bank size such as infrastructure, diversity of products and know-how. [12]

Age variable is related to the experience, expertise or reputation of banks. The first two attributes are not so appropriate for Turkish banking sector because of the new foreign entries into the market, but reputation can be relevant.

Advertisement cost affects the perception of consumers, so it captures the ability of banks for differentiating their products. We also utilize a trend variable in order to track changes in market shares through different quarters.

INSTRUMENTS

The usual problem in estimating a demand model with differentiated products is the endogeneity. Prices are usually correlated with the unobserved product

[11] Number of ATM would be relevant for this specification, but due to the lack of data and possibility of high correlation between number of branches and number of ATMs, we do not consider that variable.

[12] Dick, A. A. (2008)

characteristics[13] such as banks' service quality, financial strength, reputation, etc. It can easily be resolved by introducing instrumental variable (IV) technique into the model. A good instrument should have a high correlation with the endogenous variable, and it should not exhibit correlation with the error term of the regression equation. The first property was checked by Cragg-Donald F statistic. Stock & Yogo's (2005) critical values were used to assess the power of instruments.[14] For investigating whether the second property holds, the Sargan test was used. The null hypoarticle of this test is that the orthogonality conditions of the instruments are satisfied.

There are two types of IV for instrumenting the price. The first type is called as cost shifters that are the supply side variables which shift bank's marginal cost whereas the second type is BLP instruments[15] that shift markups.

Dick divides cost shifters into four parts: labor costs, rental and other operating costs, funding costs and several environmental variables to capture differences in marginal costs from different institutional characteristics. There are many alternatives for cost shifters such as expenditure of a bank per employee, depreciation and amortization costs, non-performing loans (as a measure for credit risk), cost of funds borrowed, proportion of commitments to loans (as a measure for diverse product characteristics), equity over assets (measure of bank capitalization) .

[13] Those are unobservable only for researcher, banks and consumers do observe them.

[14] If the F statistic exceeded the 10% maximal IV size reported by Stock&Yogo, the instrument was labeled as "very powerful". Values between 10% and 15% were marked to be "powerful", between 15% and 20% "medium", between 20% and 25% "weak", and less than 25% "very weak".

[15] BLP variables are the characteristics of other products in the market. The instrumentation is based on the assumption that pricing decision of a bank will be correlated with the characteristics of other products in the market. Products that have close substitutes will have lower markups while a product without substitutes will have a higher markup.

Using all cost shifters and BLP instruments causes overidentification problem due to the lower number of observations and lower bank numbers in the study. As a remedy for this problem, a pool of potential instruments was found, and different combinations of instruments were tried for each specification. Based on identification and strength tests, we used a comprehensive instrument called as operational cost which consists of parts of the marginal costs including personnel expenses, depreciation and amortization expenses, interest expenses (it has not counted for deposit market analysis), fees and commissions paid, losses on trading account securities, foreign exchange losses, provision for loan or other receivables losses and other operating expenses such as operational leasing expenses, maintenance and advertisement expenses. [16]

Operational costs have direct effect on prices, and they affect market shares through prices. As operational costs start to increase, then bank will probably decide increase interest revenues or decrease interest expenses in order to cover this increase in costs. So when operational costs increase, we expect a decrease in deposit rates or an increase in loan rates.

We instrument deposit rate by one more variable: non-performing loans (NPL's). As operational costs, NPL affect market shares through prices: banks with higher NPL's are generally the ones that should offer higher interest rates to collect deposits. Thus, we expect a positive relationship between NPL's and loan rate in the deposit market.

RESULTS

[16] All instrumental variables have little meaning for a potential depositor, who is not aware of them. So they should be orthogonal to unobserved demand shocks.

Table 2 displays the results for deposit and credit markets respectively. There are two different specifications for each market- OLS and IV specifications.
The first and third specifications are the OLS estimations for the deposit and credit markets respectively, whereas the second and fourth specifications represent the IV estimations for the corresponding markets. The second column uses non-performing loans and operational costs as instrument for price; fourth column uses only operational costs. Adding non-performing loans into fourth specification causes overidentified regression equation, so we exclude that instrument from the analysis for the credit market.

For deposit market, IV specification yields higher coefficient value and significance for price variable. Both OLS and IV results confirm that depositors concern prices more than other bank characteristics since the coefficient of interest rate is higher than those of other characteristics. Employee per branch, city and trend variables are significant, age and advertisement variables are almost significant. Employee per branch, age and trend has an increase in both strength and significance levels by instrumenting price, whereas city and advertisement variables lose significance. R-square is lower for OLS and it doubles with IV specification. It means IV model fits the data better and exogenous variables explain larger proportion of the variation in markets shares compared with OLS.

According to IV results, consumers pay attention to deposit rates when they select a bank. Employee per branch enters the utility negatively. It may be strange at first look, but it is a likely result for Turkish banking sector. Small foreign banks usually have only one branch in Turkey that operates as head-office of that bank or

just a branch of a mother bank established in another country. They have quite higher values of employee per branch variable compared with larger banks operating in Turkey. Since higher values are related with those small foreign banks, it is not surprising to have negative sign for employee per branch variable. Another factor that is related with negative relationship between employee per branch and market share is inefficiency. Crowded branches are usually government banks' branches, private sector employs fewer personnel in their branches since they own cost-efficient higher technologies. Thus higher values of employee per branch variable can be an indicator of inefficiency. The negative sign of employee per branch coefficient implies that inefficient banks lose their market shares.

Table 2 : Regression Results

	DEPOSIT				CREDIT			
Explanatory variable	*OLS*		*IV*		*OLS*		*IV*	
	Coefficient	*P>|t|*	*Coefficient*	*P>|z|*	*Coefficient*	*P>|t|*	*Coefficient*	*P>|z|*
Interest rate	.0207272		.1233606		-.1216073		-.4067156	
	(1.85)	0.065	(2.38)	0.018	(-16.52)	0.000	(-13.35)	0.000
Employee per branch	-.0068894		-.0103827		-.0084005		-.0097071	
	(-2.52)	0.012	(-2.97)	0.003	(-4.85)	0.000	(-3.31)	0.001
Number of city that bank	.0110336		.0082305		.0117405		.0218793	
operates	(7.35)	0.000	(3.94)	0.000	(2.39)	0.017	(2.62)	0.009
Bank age	-.0069152		.1518658		.4535086		.0904402	
	(-0.12)	0.907	(1.50)	0.133	(2.08)	0.038	(0.24)	0.808
Trend	-.030702		-.0642512		-.1964742		-.0404599	
	(-1.97)	0.049	(-2.74)	0.006	(-3.17)	0.002	(-0.41)	0.679
Advertisement cost	3.50e-06		2.10e-06		3.45e-06		.0000118	
	(2.76)	0.006	(1.39)	0.165	(0.71)	0.477	(1.43)	0.153
Constant	-.2305888				-14,83306			
	(-0.11)	0.913			(-2.07)	0.039		
Observations	565		551		820		818	
R-squared	0.34		0.6527		0.1645		0.6608	
F statistic (p value)	37.45	(0.000)	31.45	(0.000)	18.87	(0.000)	8.80	(0.000)
Instruments	-		non-performing loans & operational costs		-		operational costs	
Overidentification Test (Sargan statistic)	-		2.666 Chi-sq(1):	0.1025	-		0.000 (*)	
Weak Identification Test (Cragg-Donald F statistic)	-		13.914		-		151.562	

	10% IV size: 19.93	10% IV size: 16.38
Stock&Yogo Weak ID critical values	15% IV size: 11.59	15% IV size: 8.96
	20% IV size: 8.75	20% IV size: 6.66
	25% IV size: 7.25	25% IV size: 5.53

(*) Equation is exactly identified.
T values are in paranarticle below each coefficient and respectied p values are near them. Description of variables and first stage results are in Appendix-1.

City is a variable used for measuring the extent of branch network. It has a positive and significant coefficient which means that as banks operates in more cities, they have more chance for increasing their market share. The variable has one of the smallest coefficient values meaning that it has little effect on market shares. Table 11 in Appendix-1 verifies this fact by showing deposit amounts of the first 11 cities and their shares in total distribution. These cities have more than 80% of total deposit market. So increasing city number will not help small banks significantly to increase their market shares.

Bank age, which may be a proxy for bank experience and expertise, does not turn out to be significant. Old and established banks might have market have advantage, but foreign entries as well as mergers&acqusitions may be the relevant factors lowering the significance level of that variable. Many big groups that have both experience and expertise in banking such as GE, HSBC, Citygroup, ING, BNP Paribas,...etc entered in the Turkish commercial banking sector. So, considering the age variable as an indicator of experience and expertise may cause misleading results.

The time trend variable also has an important implication for the study. The coefficient is negative and significant meaning that banks lose market share in this period. As the dependent variable is the ratio of the market share of a bank to the total market share of participation banks, decreasing market shares of bank means

that participation banks capture the deposits that are deposited in commercial banks. Although the coefficient is slightly significant in OLS, it is significant in IV estimation.

For the credit market, the price coefficient is the most significant one among others, so it has the strongest effect on market shares in IV specification. When consumers demand loan from a bank, the most important characteristic of the bank is the loan rate charged for them. As the price coefficient for the credit market is higher and more significant than that of the deposit market, we can conclude that loan customers are more price-concerned than depositors. Age variable is not significant, so it does not matter for consumer whether the bank is in that market for several years or for several decades. Advertisement expenditure is not statistically significant either. City variable is positive and significant, so banks that have larger city networks face with higher demands.

The table for regression results also displays the overidentification and instrument strength tests for IV specifications. There is no overidentification problem according to Sargan statistic and our instruments are in medium category of strength for the deposit market according to Stock&Yogo critical values. Cragg-Donald F statistic is 151,562 for the credit market which is a quite high value reflecting that operational cost is an appropriate instrument of price. R-square results also show that IV specification better fits the data than OLS.

FIRST STAGE RESULTS

First stage results of the second and fourth regressions are in the Appendix-1. Instruments of both deposit and loan rates are significant and have the expected signs. Deposit rate increases as non-performing loans increase. Since a striking increase in non-performing loans is regarded as an increase in risk of loans as well as in overall riskiness of bank, bank should increase deposit rate in order to attract potential depositors. On the other hand, increase in operational costs, as they imply a rise in service quality, will make a pressure on deposit rates in the reverse direction.

For the deposit market, age variable is negatively related with price. Older banks offer lower interest rates meaning that stability is an advantage for banks especially in preserving the market share same by offering less interest rate than others. Advertisement coefficient is positive and significant, but has little effect on price.

For the credit market, only operational cost and employee per branch variables are significant. Operational costs moves in same direction with credit rates. Since cost is higher, bank will try to increase interest gain of loans in order to cover increased costs.

ROBUSTNESS CHECK

In this section we change some variables with their alternatives and make little changes in specifications in order to test whether the results are robust. The first trial for the deposit market is to use branch number as an exogenous variable instead of city. Branch number has less effect on market share than city and its significance level is less than that of city. Fit of regression keep significance although it slightly

lost strength; still regression results did not change. In second specification, we exclude time fixed effect from regression. Major change appears in strength test of instruments. They jumped to high strength level and but fit of regression decreased. Other results are in parallel with benchmark model. In third specification we changed instruments and used first lag of deposit rate instead of operational cost and non-performing loans. This instrument is also a good candidate for instrumenting the price according to the level of Cragg- Donald F statistic. Fit of regression is also similar to that of benchmark case and overidentification tests are accepted.

We can say that our findings are robust since coefficients are of expected sign and results are close to baseline levels in all three robustness tests.

We run similar regressions for the credit market. The number of branches is not significant and has less influence on market share than city, but R- square is quite close to the benchmark case. In the second trial we excluded trend variable from regression; in third we used expenditures on fixed assets for instrumenting the price instead of operational costs. Neither the coefficient of interest rate nor the strength of instrument changed notably in both specifications; but R-square decreased.

Both specifications may be regarded as robust based on our tials, despite some little differences from the benchmark case.

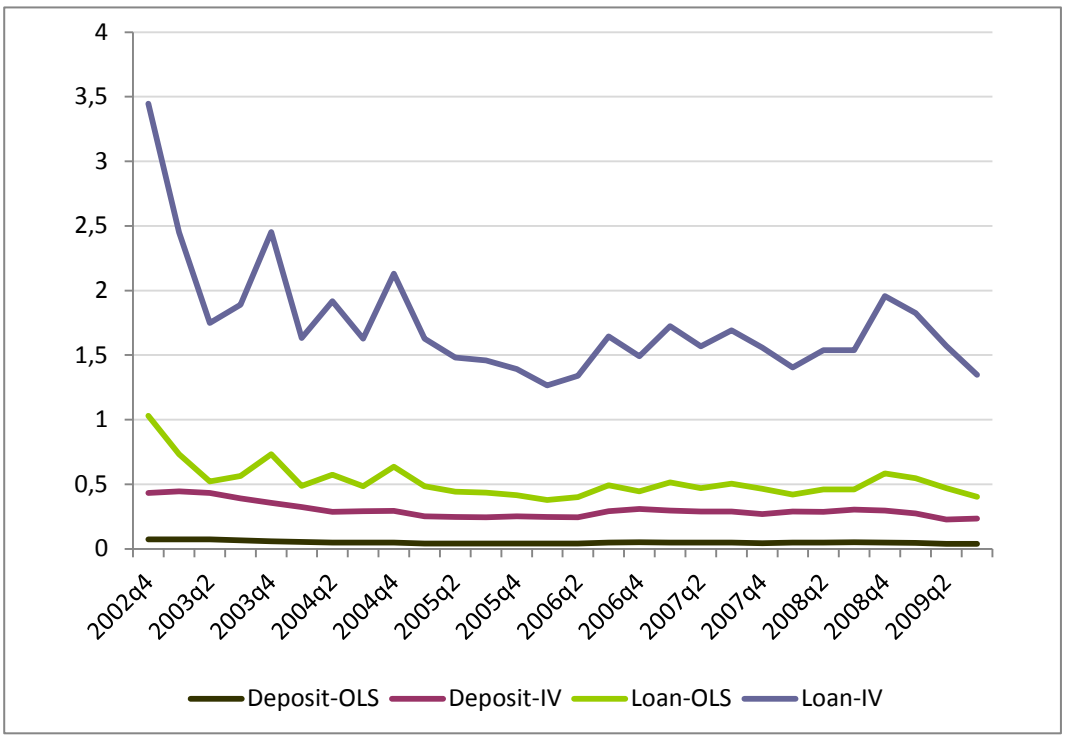
ELASTICITIES

Table 3 displays elasticity results based on estimated price coefficients obtained for both of the markets. Elasticity results are presented by quarters in order to see the results in a more detailed way.

For the deposit market, both OLS and IV specifications yield low elasticities in average. Mean price elasticity level is 0.30 for IV model whereas it is 0.05 for OLS estimation. In other words, a 1% increase in deposit rate causes 0.3% increase in market share on average. One other noteworthy result is that all percentiles have elasticity values below unity. So it may be concluded that banks do not make price competition in deposit market in our research period. They differentiate their deposit services by other characteristics of their bank such as branch network, employee number per branch, etc. instead of offering higher interest rates to depositors.

Consumers in the credit market are more price sensitive than those in the deposit market. The lowest elasticity level is 1.27 which is above unit elasticity, average level is 1.74 based on IV results.

Figure 1 : Elasticity results.



We also see in Figure 1 that price elasticity in deposit market do not show volatility during the period. Depositors do not show high response to price changes, they do not withdraw their money although deposit rates go down. This is the case to 7.50% from 17.50% as happened in Turkey after crisis. Average deposit rate of banks has decreased Central Bank has decreased overnight interest rates gradually (overnight interest was 17.25% in November 2002; it is 6.50% in February 2010). Banks have decreased interest rates but have lost neither their market share nor their depositors as a result of inelastic demand of deposits. Reason of that fact may be the dominance of banks in the whole financial sector[17] and also bond returns which are the main substitute of deposits follows a decreasing path during the same period[18]. Whatever the reason is, depositors do not change their point of view about price no matter what the path of economy is- recovery or growth period[19].

Disparity in consumer mobility between two markets may affect the difference of price elasticity between depositors and credit customers. We know that depositors are less mobile than credit customers, so this immobility may cause to pay less attention to price for selecting a bank to deposit their money. Many banks do not have branch in many cities across the country. So depositors especially in small cities or in districts concern closeness of bank branch when they select a bank regarding the internet branch is a quite new innovation for those people.

We come across another noteworthy result in credit market. The price elasticity trend of credit customers in reconstruction period is different from that in growth period. In figure 2, there is a downtrend from high elasticity levels to unit

[17] Share of banks in the whole Turkish financial sector may be seen in Table 3 in Appendix-1.

[18] Investment preferences of savers are in Table 4 in Appendix-1.

[19] We define the analysis period before 2006 as “recovery period”, after 2006 as “growth period”.

elasticity before 2006 whereas there exists an upward trend after 2006. Average elasticity value is 1.94 before 2006 whereas it declines to 1.52 in growth period (2006-2008). According to that result, credit customers are more sensitive to interest rates in recovery period, but they concern prices less in growth times. We also see from the figure that elasticity declines when there are upward jumps in growth rate (Periods of 2003q4-2004q1, 2006q1-2006q2 and 2007q4-2008q1). One reason of this fact may be increasing need of credit for new investment and consumption expenditures. Credit customers demand loan no matter what the price level is.

Figure 2: Credit rate elasticity and growth rate.

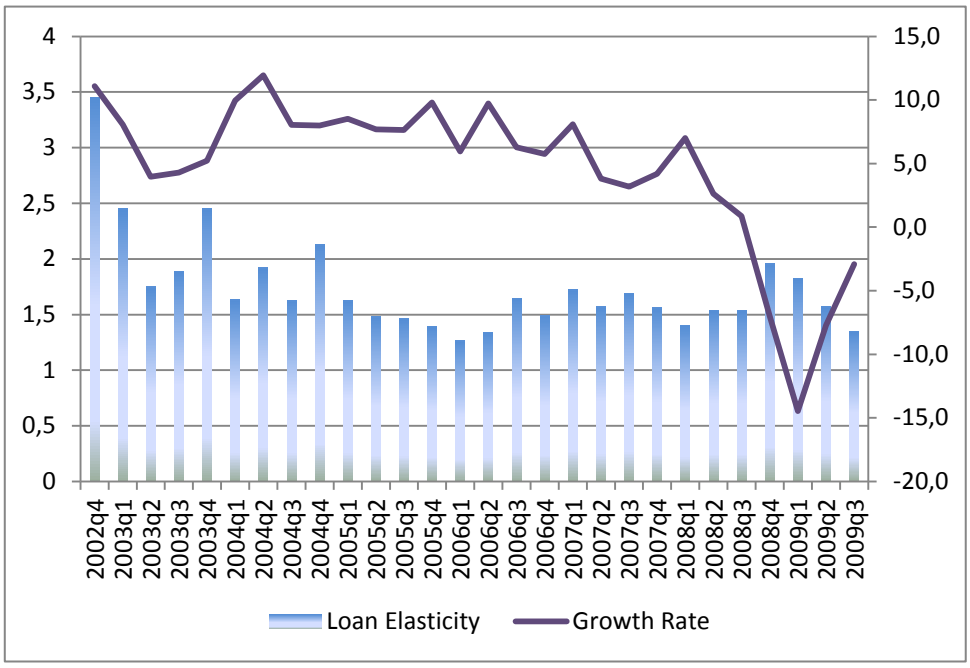


Figure 2 also highlights the experience of elasticity decline beginning from the end of 2008 when the repercussions of global financial crisis were stared in Turkey.

Indeed, we witnessed increasing demand for bank loans regardless of the price level. The downtrend between 2008-2009 shows this change in consumer behavior.[20]

One robustness check for elasticity calculation is to exclude some banks from the analysis. We calculate the elasticity again without five biggest bank of Turkey[21]. We obtained Figure 10 which has the same characteristic as benchmark case. So we can conclude that elasticity results are robust.

CONSUMER WELFARE EFFECT

Another implication of this model is that it allows applying welfare calculations for consumers in order to see whether an average consumer is better-off or worse-off between two choice sets. Although there does not exist a specific regulation or deregulation occurred during the period, changes made by regulatory authorities as well as improvements in macroeconomic conditions might cause welfare changes for consumers. It may also be interesting to see welfare changes between two consecutive quarters.

It is necessary to note that price changes are not the only source of welfare changes; elements that are in consumer utility function have also effect on welfare. Together with price changes, other bank characteristics may change and they may outweigh or strengthen the effect of price on welfare. So welfare results should be perceived as an overall effect of all characteristics.

[20] The figure of deposit market which shows the relation between growth rate and deposit rate elasticity is in appendix, beacuse the relationship is not so apparent since deposit rate elasticity do not change during the analysis period at all.

[21] The five banks are selected based on the average market share of each bank during the analysis period. The figure is in Appendix.

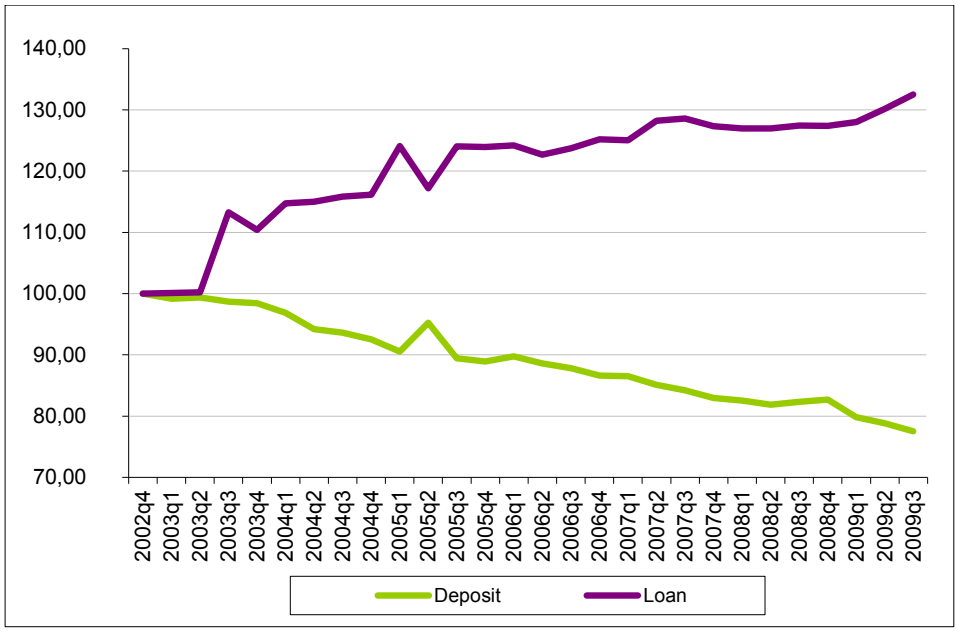
To find the effect of changes in banking sector on consumers, we follow Small and Rosen's (1981) expected equivalent variation (EV) approach in the context of discrete choice models. EV measures welfare change in the choice set between period s and s-1 in a given market. It is defined as the amount of money that make consumer indifferent in expectation, between two choice sets. The formula is as follows:

$$EV = S_s(p', x'; \theta_D) - S_{s-1}(p, x; \theta_D)$$

while $S(p, x; \theta_D) = \ln\left[\sum_j^J \exp(\delta_j(p_j, x_j; \theta_D))\right] / \alpha$

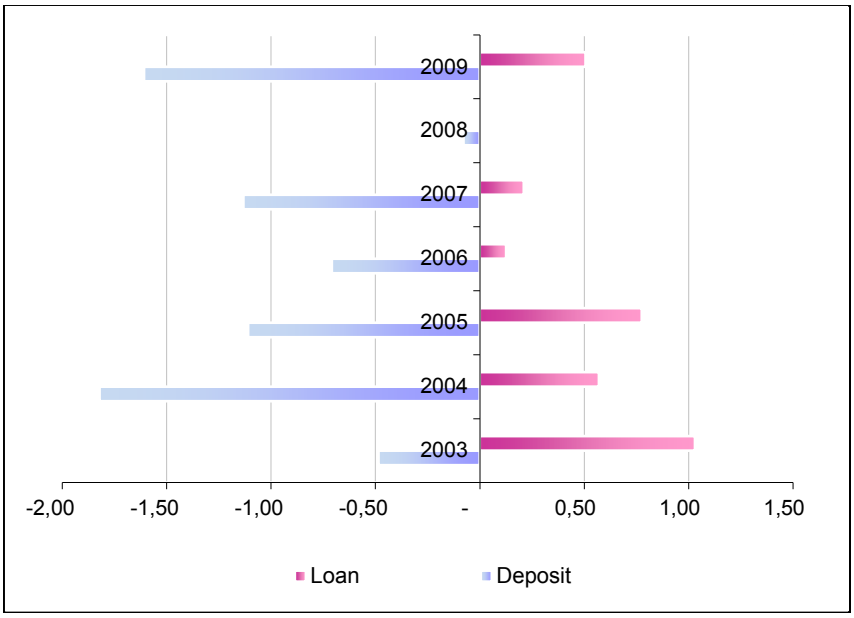
Based on this calculation, consumers face a welfare loss between 2002-2009 periods in the deposit market. Figure 3 shows how consumer choice set has lost in value during 2002-2009 periods. The main reason of such a welfare loss is the decreasing trend of interest rates which can be seen in Table 2 of Appendix-1. Progress in branch and city characteristics as well as increasing trend in tangible asset investments could not compensate negative impact of deposit rate reduction, so welfare loss resulting from the downturn of deposit rates outweigh welfare gain based on improvements in those characteristics.

Figure 3: Change in choice sets of deposit /credit customers (2002q4=100)



According to Figure 3, credit customers face welfare gain contrary to depositors during the period. For most of the quarters we observe welfare gain for credit customers despite of losses in a few quarters. The yearly changes in welfare are represented in Figure 4, changes by quarters are in Figure 9 in Appendix-2. Other than several loss quarters, most of the time credit customers have welfare gain, but depositors face with welfare loss between 2002-2009 periods. So we can say that the winning side is the people who spend more (maybe they invest or consume more); savers have lost welfare during growth periods.

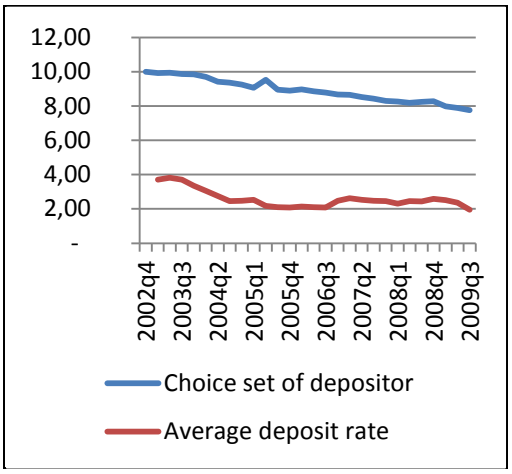
Figure 4: Welfare gain/loss of consumers (yearly).

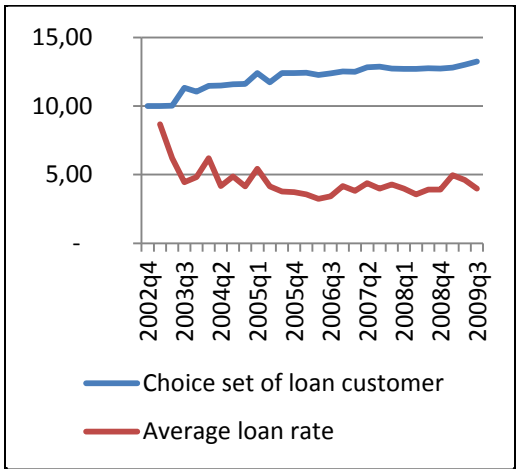


Especially for quarterly changes, we wonder the correlation between welfare levels of customers in two markets. The correlation coefficient of welfare changes in credit and deposit market is –0,54, so there exists negative correlation between welfare change of a potential depositor and that of a credit customer.

Figure 5 shows that welfare condition of a depositor is proportional to deposit rates whereas that of a credit customer is inversely proportional to credit rates. When interest rates go down, depositors lose welfare but credit customers have welfare gain as expected. The reverse case is also true.

Figure 5: Choice set of customers and average interest rates





CONCLUSION

In this study the main aim was to draw main features of the Turkish deposit and credit markets based on demand, elasticity and welfare analysis. A structural demand model derived from discrete choice utility functions is employed to unravel consumer preferences.

We conclude that consumers are less price-concerned in the deposit market than those in the credit market. Regressions with instrumental variables fit the data better than basic OLS regressions in both markets, and we conclude that the results are robust based on robustness checks. It should be also pointed that price is a more dominant factor in the credit market than in the deposit market. Trend variable has a negative sign for both markets reflecting that participation banks steal the market shares of commercial banks.

Another result of the study is about elasticity and competition structure of the market. Borrowers have more elastic demand for loans, but depositors have inelastic demand. It may be interpreted as there is price competition in credit market, whereas banks make non-price competition in deposit side. Banks have chance to increase

their market shares by increasing their prices in deposit market. Based on welfare calculations, depositors have welfare loss whereas loan customers have welfare gain during the period.

One extension to the study may be adding a cost function into the model. Authors who used this method for manufacturing industry added a cost specification to the model; then they derived price-cost margins (PCM) and made a full competition analysis. But deriving a cost function for banking sector is a bit problematic for this demand model because cost function settings (functions based on both intermediation and production approach) overlap with this demand setting. So competition analysis by using an appropriate cost specification may be a good extension for market analysis.

Another extension may be incorporating nested logit specification to the study. Nested logit give chance for grouping banks a priori based on similar behaviors in the sector. The most widely-used strategy is grouping banks according to their size. But in our study size dummies were not significant; so grouping banks according to their asset size would not work for this analysis. But it may be interesting to work with nests for Turkish case in other studies.

APPENDIX A

DESCRIPTIVE STATISTICS AND TABLES

Table 5: Description of Variables

Variable	*Description*

Market share	Amount of deposits (loans) that bank collected (gave) / Total deposit (loan) amount of market
Interest rate	Interest expense (gain) on deposits (of loans) of a bank / Bank's total deposits (loans)
City	Number of cities that bank operates
Employee per branch	Number of employee per branch of that bank
Bank age	Years since beginning of bank's operations
Advertisement cost	Advertisement expense of a bank at each quarter
Operational costs	Fees and commissions paid+losses on trading account securities+Foreign exchange losses+Provision for Loan Losses or other Receivables+Other Operating Expenses / Total deposits of bank
Non-performing Loan	Non-Performing loans / Total loans
Number of branch	Number of branch that bank has in that quarter

Table 6: Sample Statistics

Variable	*2002-4*	*2009-3*
Interest rate of deposits	3.71	2.00
	(2.03)	(0.84)
Interest rate of total loans	25.60	12.06
	(4.33)	(2.09)
Number of branch	267	400
	(303.15)	(375.89)
Number of city	42	49
	(27.30)	(29.20)
Employee per branch	21	20
	(6.41)	(5.42)
Advertisement costs	1,364.4	7,213.6
	(2,260.4)	(9,115.3)
Non-performing loans	4.14	1.99
	(4.85)	(1.56)
Operational costs(1)	515,646.8	1,326,802.0
	(671,285.2)	(1,506,042.0)
Operational costs(2)	232,872.2	920,766.6
	(229,189.2)	(1,018,402.0)

Standar deviations are in paranarticle.

TABLES RELATED WITH BANKING SECTOR INDICATORS

Table 7: Asset Size of Turkish Financial Sector

(Billon TL)	2002	2003	2004	2005	2006	2007	2008	09.2009	Share (%) 09.2009
CBRT	74.1	76.5	74.7	90.1	104.4	106.6	113.5	109.5	10.9
Banks	216.7	255	313.8	406.9	499.5	581.6	732.8	798.4	79.3
Financial Leasing Companies	3.8	5	6.7	6.1	10	13.7	17.2	14.6	1.5
Factoring Companies	2.1	2.9	4.1	5.3	6.3	7.4	7.8	9	0.9
Consumer Finance Companies	0.5	0.8	1.5	2.5	3.4	3.9	4.7	4.5	0.4
Asset Management Companies	-	-	-	-	-	0.2	0.4	0.4	0.04
Insurance Companies	5.4	7.6	9.8	14.4	17.4	22.1	26.5	30.6	3.0
Pension Companies	0	3.3	4.2	5.7	7.2	9.5	12.2	14.9	1.5
Securities Intermediary Institutions	1	1.3	1	2.6	2.7	3.8	4.2	5.2	0.5
Securities Investment Partnerships	0.1	0.2	0.3	0.5	0.5	0.7	0.6	0.7	0.1
Securities Investment Funds	9.3	19.9	24.4	29.4	22	26.4	24	29.8	3.0
Real Estate Investment Partnerships	1.1	1.2	1.4	2.2	2.5	3.9	4.3	4.7	0.5
Enterprise Capital Investment Partnerships	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.01
TOTAL	314.1	370.4	437.8	560.1	668.8	770.5	936	1,006.80	100.0

Source: BRSA Financial Market Report, September 2009.

Table 8: Investment Preferences of Domestics and Foreign Residents

						Domestic Dist.	General Dist.
Domestic Residents (TL Million)	Dec.07	Jun. 08	Dec.08	Mar.09	Jun.09	Jun.09	Jun.09
TL Deposit	206,081	228,596	262,738	261,513	267,446	46	39.5
FX Deposit Account	111,619	127,933	141,858	149,266	144,767	24.9	21.4
Precious Metal Account	163	298	344	588	583	0.1	0.1
Funds Collected by Participation Banks	14,626	17,096	18,638	21,255	22,029	3.8	3.3
GS	56,852	62,006	63,237	67,594	68,348	11.7	10.1
Eurobond	4,309	3,961	4,867	5,467	5,272	0.9	0.8
Investment Funds	26,381	24,44	23,979	28,719	28,347	4.9	4.2
Repo	2,733	2,484	2,199	2,099	1,911	0.3	0.3
Pension Investment Funds	4,566	5,167	6,373	6,878	7,672	1.3	1.1
Insurance Premium Production	10,931	6,239	11,779	3,256	5,289	0.9	0.8
Stocks	31,07	22,981	20,04	23,468	30,324	5.2	4.5
Subtotal	458,392	494,962	543,942	570,103	581,988	100	86
Foreign Residents (USD Million)							
Stocks	69,876	43,482	27,15	23,773	38,15	61.5	5.6
GS	30,363	27,6	16,92	13,861	16,417	26.5	2.4
Eurobond	378	600	595	783	829	1.3	0.1
Deposit	4,984	5,466	6,553	6,214	6,607	10.7	1
Subtotal	105,601	77,148	51,218	44,357	62,003	100	9.2
GENERAL TOTAL (TL Million)	581,385	589,368	622,306	644,978	676,859	-	100

Source: BRSA Financial Markets Report, September 2009.

Table 9: Operational Indicators of Banking

	2002	2003	2004	2005	2006	2007	2008	2009/9	Change**
Number of Banks	54	50	48	51	50	50	49*	49*	0
State Deposit Banks	3	3	3	3	3	3	3	3	0
Private Deposit Banks	20	18	18	17	14	12	11	11	0
Banks under SDIF	2	2	1	1	1	1	1	1	0
Global Capital Deposit Banks	15	13	13	13	15	17	17	17	0
Development and Investment Banks	14	14	13	13	13	13	13	13	0
Participation Banks	5	5	5	4	4	4	4	4	0
Number of Branches	6,254	6,157	6,365	6,537	7,296	8,117	9,304	9,428	54
Deposit Banks	6,087	5,949	6,088	6,228	6,898	7,653	8,724	8,832	49
Development and Investment Banks	19	20	21	25	42	42	44	46	-4
Participation Banks	148	188	256	292	356	422	536	550	9
Number of Personnel	124,009	124,030	127,944	138,724	150,793	167,760	182,667	182,226	-242
Deposit Banks	118,329	118,607	122,630	127,857	138,426	153,212	166,328	165,483	-474
Development and Investment Banks	-	-	-	5,126	5,255	5,361	5,307	5,275	-21
Participation Banks	2,530	3,504	4,791	5,747	7,112	9,187	11,032	11,468	253
Number of ATM	12,035	12,726	13,556	14,836	16,513	18,795	21,953	23,284	551
Number of POS***	-	-	-	1,141	1,283	1,629	1,886	2,007	32
Number of Deposit Account ***	67,993	78,790	80,087	82,958	86,131	91,063	91,101	95,591	1,860
Number of Participation Account ***	-	-	-	1,202	1,414	1,623	1,855	2,418	111
Number of Credit Customers ***	15,784	18,707	25,168	29,153	30,685	35,403	36,693	38,454	-285
Number of Credit Card Customers ***	11,752	13,518	19,104	25,155	25,580	27,658	25,677	25,862	-26
Number of Customers not able to pay their debt ***	-	-	-	755	1,008	1,086	1,575	2,474	392

Source: BRSA, CMB, ISE, CBRT, CRA

** A bank under liquidation was not included in the total.*

*** Change between 2008 and 2009 years.*

**** Numbers are in thousand.*

Table 10: Financial Soundness Indicators

%	2002	2003	2004	2005	2006	2007	2008	2009/9
Capital Adequacy Standard Ratio	25.3	30.9	28.2	23.7	21.9	18.9	18	20
Net Foreign Exchange Position/ Net worth	-	1.1	-0.5	-0.6	1	0.3	-0.6	0.6
Total Loans/ Total Deposits	35.5	42.6	52	62.2	71.2	80	80.8	76.8
Personal Loans/Total loans	4.5	9.7	12.8	18.8	21.7	23.8	22.6	33
Receivables under follow-up/ Gross Loans	17.6	11.5	6	4.8	3.8	3.5	3.7	5.3
FX assets/Total Assets	38	36.2	31.3	33.1	28.3	30.3	27.1	38.1
Deposits/Liabilities	72.5	73.4	71.4	69.9	70.6	70.4	68.8	70.6
FX Liabilities/Total Liabilities	50.4	43.3	40.1	35.9	37.8	33.5	34.9	32.4
ROA	1.4	2.5	2.3	1.7	2.5	2.8	2	2.4
ROE	11.2	18.1	15.8	12.1	21	24.8	18.3	18.9

Source: BRSA, CMB, ISE, CBRT, CRA

Table 11: Balance Sheet Indicators

Billion	2002	2003	2004	2005	2006	2007	2008	2009/3
Total Assets	212.7	249.7	306.4	406.9	499.7	581.6	732.5	798.4
Total Loans	49	66.2	99.3	156.4	219	285.6	367.4	375.7
Securities	86.1	106.8	123.7	143	158.9	164.7	194	241.5
Affiliates and Subsidiaries	8.7	9.2	11.8	11.1	9.2	10.9	10.3	12.1
Fixed Assets	7.7	8.3	8.5	7.7	7.4	7.9	9.6	9.7
Deposits	138	155.3	191.1	251.5	307.6	356.9	454.6	488.9
Funds borrowed from abroad	11	17	22	36	49	61	62	58
Equity capital	25.7	35.5	46	54.7	59.5	75.8	86.4	105.4
Profit of the period	2.9	5.6	6.5	6	11.4	14.9	13.4	15.7
Off-balance sheet items	75.3	107.2	527.6	206	277.4	385.5	476	638.6

Source: BRSA

Participation banks are included since 2005.

Table 12: Capital Structure Analysis in Turkish Banking Sector

		State, Private and Foreign Distribution of Shareholders (%)				
				Global Capital Share (%)		
Bank Name	Share within Total Assets	State	Private	Proportional Share (*)	Stock Market Share	Total (**)
Abn Amro Bank N.V.	0.2	0	0	100	0	100
Adabank A.Ş.	0	100	0	0	0	0
Akbank T.A.Ş.	11.3	0	64.7	10.3	25	35.3
Alternatifbank A.Ş.	0.4	0	100	0	0	0
Anadolubank A.Ş.	0.5	0	100	0	0	0
Arap Türk Bankası A.Ş.	0.1	15.4	20.6	64	0	64
Bank Mellat	0.1	0	0	100	0	100
Bankpozitif Kredi ve Kalkınma Bankası A.Ş.	0.2	0	30.2	69.8	0	69.8
Birleşik Fon Bankası A.Ş.	0.1	100	0	0	0	0
Calyon Yatırım Bankası Türk A.Ş.	0	0	0	100	0	100
Citibank A.Ş.	0.7	0	0	100	0	100
Aktif Yatırım Bankası A.Ş.	0	0	100	0	0	0
Denizbank A.Ş.	2.6	0	0.2	75	24.9	99.9
Deutsche Bank A.Ş.	0.2	0	0	100	0	100
Diler Yatırım Bankası A.Ş.	0	0	100	0	0	0
Finansbank A.Ş.	3.4	0	0.2	58.2	41.5	99.8
Fortis Bank A.Ş.	1.4	0	5.8	65	29.2	94.2
Gsd Yatırım Bankası A.Ş.	0	0	100	0	0	0
Habib Bank Limited	0	0	0	100	0	100
HSBC Bank A.Ş.	1.7	0	0	100	0	100
İller Bankası	1	100	0	0	0	0
JP Morgan Chase Bank National Assoc.	0	0	0	100	0	100
Merrill Lynch Yatırım Bank A.Ş.	0	0	0	100	0	100
Millennium Bank A.Ş.	0.1	0	0	100	0	100
Nurol Yatırım Bankası A.Ş.	0	0	100	0	0	0
Ing Bank A.Ş.	2	0	0	100	0	100
Societe Generale S.A.	0.1	0	0	100	0	100
Şekerbank t.A.Ş.	1.1	0	58.3	0	41.7	41.7
T.C. Ziraat Bankası A.Ş.	15.1	100	0	0	0	0
Türk Ekonomi Bankası A.Ş.	1.7	0	55.1	35.1	9.9	44.9
Türkiye Garanti Bankası A.Ş.	12.6	0	39.6	20.8	39.6	60.4
Türkiye Halk Bankası A.Ş.	7.2	75	1.8	0	23.3	23.3
Türkiye İhracat Kredi Bankası A.Ş.	0.8	100	0	0	0	0
Türkiye İş Bankası A.Ş.	13.4	0	77.7	0	22.3	22.3
Türkiye Kalkınma Bankası A.Ş.	0.1	99.1	0.9	0	0	0
Türkiye Sınai Kalkınma Bankası A.Ş.	0.8	5.3	72	0	22.7	22.7
Türkiye Vakıflar Bankası T.A.O.	7.7	74	2.9	0	23.1	23.1

(continued)

Bank Name	Share within Total Assets	State, Private and Foreign Distribution of Shareholders (%)		Global Capital Share (%)		
		State	Private	Proportional Share (*)	Stock Market Share	Total (**)
Taib Yatırım Bankası A.Ş.	0	0	0.7	99.3	0	99.3
İMKB Takas ve Saklama Bankası A.Ş.	0.2	11.7	83.5	4.9	0	4.9
Eurobank Tekfen A.Ş.	0.5	0	30	70	0	70
Tekstil Bankası A.Ş.	0.2	0	95.1	0	4.9	4.9
Turkish Bank A.Ş.	0.1	0	60	40	0	40
Turkland Bank A.Ş.	0.1	0	9	91	0	91
WestLB A.G.	0	0	0	100	0	100
Yapı ve Kredi Bankası A.Ş.	8	0	42.5	38.1	19.4	57.5
Albaraka Türk Katılım Bankası A.Ş.	0.7	0	24.8	61.9	13.3	75.2
Asya Katılım Bankası A.Ş.	1.4	0	62.8	0	37.3	37.3
Kuveyt Türk Evkaf Finans Kurumu A.Ş.	0.8	0	19.8	80.2	0	80.2
Türkiye Finans Katılım Bankası A.Ş.	1	0	35.3	64.7	0	64.7
Total (%)	100	28.3	32	20	19.7	39.7

Source: BAT, BRSA

Table 13: Banks that Changed Status Between 2001-2009

Bank	Status	Date
Akbank	Acquired 20% of shares by Citibank	Dec 6 2006
Citibank	Started to operate as a deposit bank	Mar 31 2004
Denizbank	Acquired 75% of shares by Dexia	Oct 17 2006
Deutschebank	Started to operate as a deposit bank	Oct 15 2004
Tekfenbank	Acquired 70% of shares by Eurobank EFG	Mar 16 2007
Finansbank	Acquired 46% of shares by National Bank of Greece	Jul 28 2006
Türk Dış Ticaret Bankası	Acquired 89% of shares	Jul 4 2005
Demirbank	Acquired 100% of shares by HSBC	Dec 13 2001
Oyakbank	Acquired 100% of shares by ING Bank	Dec 24 2007
Şekerbank	Acquired 34% of shares by Turanalem Securities	Dec 21 2006
TEB	Acquired 42% of shares by BNP Paribas	Feb 10 2005
Emlak Bankası	Transferred to Halk Bankası	Jul 9 2001
Garanti Banksı	Acquired 25% of shares by General Electric	Dec 22 2005
Fibabank	Acquired 100% of shares by Finansbank	Apr 3 2003
Koçbank	Acquired 100% of shares by Yapı Kredi Bankası	Oct 1 2006

Source:SDIF

Table 14: Banks Taken Over by SDIF (1998-2003)

Bank	Takeover Date	Status	Resolution Date
Bank Expres	Dec 12 1998	Sold to Tekfenbank	Jun 30 2001
Interbank	Jan 7 1999	Merged with Etibank	Jun 15 2001
Esbank	Dec 21 1999	Merged with Etibank	Jun 15 2001
Egebank	Dec 21 1999	Merged with Sümerbank	Jan 26 2001
Yurtbank	Dec 21 1999	Merged with Sümerbank	Jan 26 2001
Yaşarbank	Dec 21 1999	Merged with Sümerbank	Jan 26 2001
Sümerbank	Dec 21 1999	Transferred to Oyakbank	Jan 11 2002
Etibank	Oct 27 2000	Merged with Bayındırbank	Apr 4 2002
Bank Kapital	Oct 27 2000	Merged with Sümerbank	Jan 26 2001
Demirbank	Dec 6 2000	Shares transferred to HSBC	Oct 30 2001
Ulusalbank	Feb 28 2001	Merged with Sümerbank	Apr 17 2001
Iktisat Bankası	Mar 15 2001	Merged with Bayındırbank	Apr 4 2002
Sitebank	Jul 9 2001	Shares transferred to Novabank	Jan 25 2002
Bayindirbank	Jul 9 2001	Restructured as Birleşik Fon Bankası	Dec 7 2005
Kentbank	Jul 9 2001	Merged with Bayındırbank	Apr 4 2002
EGS Bank	Jul 9 2001	Merged with Bayındırbank	Jan 18 2002
Tarişbank	Jul 9 2001	Shares transferred to Denizbank	Dec 27 2002
Toprakbank	Nov 30 2001	Merged with Bayındırbank	Sep 30 2002
Pamukbank	Jun 19 2002	Transferred to Halkbank	Nov 12 2004
Imarbank	Jul 3 2003	Decision to liquidate taken	Continuing

Source:SDIF

Table 15: City Ranking Based on Deposit Share*

	2002		2003		2004		2005		2006		2007		2008	
	Amount	Share	Amount	Share	Amount	Share	Amount	Share	Amount	Share	Amount	Share	Amount	Share
İstanbul	59,888,161	44.2	65,300,890	42.6	78,566,104	41.9	102,812,754	44.1	129,479,945	45.2	144,208,516	43.5	190,808,744	45.6
Ankara	24,131,746	17.8	29,154,062	19.0	35,438,504	18.9	42,307,527	18.1	48,759,328	17.0	63,764,885	19.2	73,958,073	17.7
İzmir	8,201,514	6.1	9,038,590	5.9	11,120,204	5.9	13,980,026	6.0	17,932,289	6.3	20,148,889	6.1	26,087,456	6.2
Bursa	3,763,752	2.8	4,307,912	2.8	5,292,784	2.8	6,234,687	2.7	7,665,908	2.7	8,575,093	2.6	10,613,581	2.5
Antalya	3,000,856	2.2	3,370,037	2.2	4,410,568	2.4	5,469,134	2.3	6,696,451	2.3	7,803,556	2.4	9,824,946	2.3
Adana	2,294,776	1.7	2,580,472	1.7	3,320,450	1.8	3,971,371	1.7	5,056,626	1.8	6,070,860	1.8	7,568,976	1.8
Kocaeli	2,245,306	1.7	2,673,044	1.7	3,471,282	1.9	3,934,774	1.7	4,044,864	1.4	4,487,236	1.4	5,616,682	1.3
İçel (Mersin)	1,611,824	1.2	1,808,997	1.2	2,329,445	1.2	2,946,871	1.3	3,625,793	1.3	4,320,309	1.3	5,175,875	1.2
Muğla	1,286,626	0.9	1,590,679	1.0	1,965,655	1.0	2,609,950	1.1	3,414,243	1.2	3,943,103	1.2	4,790,969	1.1
Balıkesir	1,341,944	1.0	1,563,587	1.0	1,942,869	1.0	2,340,587	1.0	2,862,128	1.0	3,478,550	1.0	4,234,242	1.0
Konya	1,607,305	1.2	1,896,833	1.2	2,151,096	1.1	2,438,964	1.0	2,883,944	1.0	3,388,282	1.0	4,091,402	1.0
Other cities	26,087,483	19.3	29,942,236	19.5	37,284,889	19.9	44,105,275	18.9	53,921,405	18.8	61,212,740	18.5	75,738,712	18.1
Total	135,461,293	100.0	153,227,340	100.0	187,293,849	100.0	233,151,920	100.0	286,342,924	100.0	331,402,020	100.0	418,509,658	100.0

Source: BAT

** Ranking is based on the year of 2008.*

RESULT TABLES

Table 16: First Stage Results

Explanatory variable:Interest rate	*Deposit Market*		*Credit Market*	
	Coefficient	*P>|t|*	*Coefficient*	*P>|t|*
Employee per branch	.0301716 (2.82)	0.005	-.0274968 (-3.42)	0.001
City	.0215312 (3.71)	0.000	.0207484 (0.94)	0.349
Bank age	-1.618372 (-7.39)	0.000	-1.296192 (-1.32)	0.189
Advertisement costs	.0000174 (3.56)	0.000	.0000231 (1.06)	0.290
Trend	.3541161 (6.05)	0.000	.4267513 (1.65)	0.100
Non-performing loans	.0729938 (4.79)	0.000	- -	-
Operational costs	-3.598964 (-2.35)	0.019	.2323697 (12.31)	0.000
Trend 2	1.305851 (5.69)	0.000	-1.877472 (-1.94)	0.052
Trend 3	.8368494 (4.36)	0.000	-3.956792 (-5.03)	0.000
Trend 4	.1661134 (0.99)	0.320	-3.606784 (-5.53)	0.000
Trend 5	-.434368 (-2.66)	0.008	-2.400525 (-3.97)	0.000
Trend 6	.5292575 (2.42)	0.016	-3.618887 (-3.99)	0.000
Trend 7	-.1519585 (-0.82)	0.411	-3.350088 (-4.60)	0.000
Trend 8	-.4783392 (-2.90)	0.004	-4.432134 (-7.33)	0.000
Trend 9	-.8491567 (-5.13)	0.000	-3.814352 (-6.52)	0.000
Trend 10	.1051479 (0.50)	0.618	-4.261129 (-4.96)	0.000
Trend 11	-.3179118 (-1.77)	0.077	-4.905631 (-7.19)	0.000

(continued)

Explanatory variable: Interest rate	*Deposit Market*		*Credit Market*	
	Coefficient	*P>|t|*	*Coefficient*	*P>|t|*
Trend 12	-.7145599 (-4.43)	0.000	-5.353765 (-9.27)	0.000
Trend 13	-1.042705 (-6.26)	0.000	-5.945632 (-10.27)	0.000
Trend 14	.1371064 (0.68)	0.500	-5.456523 (-6.63)	0.000
Trend 15	-.1173887 (-0.67)	0.501	-5.856164 (-8.88)	0.000
Trend 16	-.1697152 (-1.03)	0.302	-5.227798 (-9.14)	0.000
Trend 17	-.4582082 (-2.58)	0.010	-6.245151 (-10.18)	0.000
Trend 18	.8718042 (4.15)	0.000	-4.932643 (-6.01)	0.000
Trend 19	.4079825 (2.24)	0.025	-5.433738 (-8.19)	0.000
Trend 20	.1125021 (0.66)	0.506	-5.683599 (-9.84)	0.000
Trend 21	-.4293111 (-2.36)	0.018	-6.531683 (-10.44)	0.000
Trend 22	1.070318 (5.01)	0.000	-6.036615 (-7.41)	0.000
Trend 23	.5572587 (2.96)	0.003	-6.283866 (-9.37)	0.000
Trend 24	.3951165 (2.19)	0.029	-6.714525 (-11.03)	0.000
Trend 25	.0422664 (0.22)	0.826	5.707596 (8.72)	0.000
Trend 26	1.132203 (4.58)	0.000	-5.515632 (-6.79)	0.000
Trend 27	.4101321 (1.75)	0.082	-2.033265 (-2.97)	0.003
Observation	551		818	
R-squared	0.053		0.1674	
Fstatistic	13.91		151.56	

Trend variables starts with year last quarter of 2002, ends with third quarter of 2010. Trend 1 and 28 dropped .
T values are in paranarticle below each coefficient and respectied p values are near t statistics.

Table 17: Robustness Check

Explanatory variable	*DEPOSIT MARKET*						*CREDIT MARKET*					
	(I)		(II)		(III)		(I)		(II)		(III)	
	Coefficient	*P>|t|*	*Coefficient*	*P>|z|*	*Coefficient*	*P>|t|*	*Coefficient*	*P>|z|*	*Coefficient*	*P>|t|*	*Coefficient*	*P>|z|*
Interest rate	.1577569		.091129		.0738932		-.4027048		-.3395678		-.3212919	
	(3.24)	0.001	(3.59)	0.000	(3.06)	0.002	(-13.38)	0.000	(-9.56)	0.000	(-7.72)	0.000
Employee per branch	-.013497		-.0088564		-.008297		-.0099065		-.0164017		-.0159691	
	(-4.01)	0.000	(-3.23)	0.001	(-2.98)	0.003	(-3.39)	0.001	(-4.17)	0.000	(-4.21)	0.000
Number of city that bank operates	-		.0084749		.009739		-		.0274812		.0270929	
	-	-	(4.59)	0.000	(6.13)	0.000	-	-	(2.52)	0.012	(2.58)	0.010
Bank age	.1699541		.0000588		.0474561		-.0430534		-1.026618		-.9763331	
	(1.61)	0.108	(0.00)	0.998	(0.74)	0.462	(-0.12)	0.907	(-5.57)	0.000	(-5.08)	0.000
Trend	-.0653112		-.0260347		-.0457962		-.0004521		.2380199		.2241536	
	(-2.59)	0.010	(-4.88)	0.000	(-0.78)	0.433	(-0.00)	0.996	(4.92)	0.000	(4.42)	0.000
Advertisement cost	2.39e-06		2.27e-06		2.73e-06		.0000152		-.0000149		-.0000143	
	(1.45)	0.146	(1.84)	0.066	(2.05)	0.040	(1.87)	0.062	(-1.44)	0.151	(-1.44)	0.150
Number of branch	.0002819						.0001855					
	(2.04)	0.042					(0.28)	0.777				
Observations	551		551		543		818		818		815	
R-squared	0.5467		0.3493		0.6981		0.6171		0.1950		0.1620	
F statistic (p value)	18.09	(0.000)	39.96	(0.000)	36.40	(0.000)	37.98	(0.000)	31.50	(0.000)	25.03	(0.000)
Instruments	non-performing loans & operational costs		non-performing loans & operational costs		first lag of interest rate		operational costs		operational costs		expenditures on fixed assets	
Overidentification test-Sargan statistic (Ho:No overidentfication)	1.006		2.186		0.000 (*)		0.000 (*)		0.000 (*)		0.000 (*)	
	Chi-sq(1):	0.3159	Chi-sq(1):	0.1393	-		-		-		-	
Weak Identification Test (Cragg-Donald Wald F statistic)	17.597		42.180		215.300		153.849		97.795		62.074	
Stock&Yogo Weak ID critical values	10% IV size:	19.93	10% IV size:	19.93	10% IV size:	16.38	10% IV size:	16.38	10% IV size:	16.38	10% IV size:	16.38
	15% IV size:	11.59	15% IV size:	11.59	15% IV size:	8.96	15% IV size:	8.96	15% IV size:	8.96	15% IV size:	8.96
	20% IV size:	8.75	20% IV size:	8.75	20% IV size:	6.66	20% IV size:	6.66	20% IV size:	6.66	20% IV size:	6.66
	25% IV size:	7.25	25% IV size:	7.25	25% IV size:	5.53	25% IV size:	5.53	25% IV size:	5.53	25% IV size:	5.53

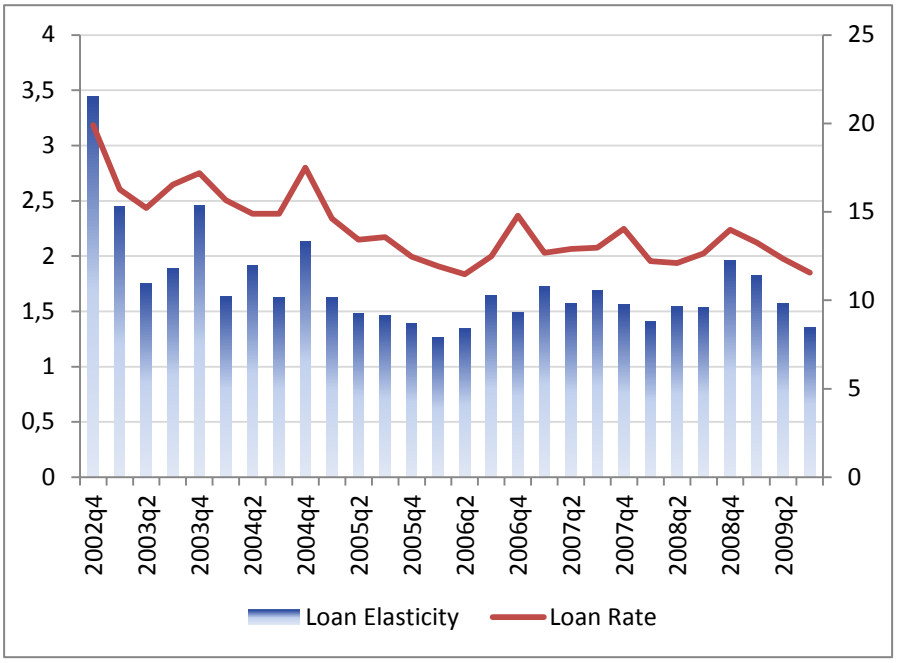
T values are in paranarticle below each coefficient and respectied p values are in the column near t statistics.

(*) Equation is exactly identified.

APPENDIX B

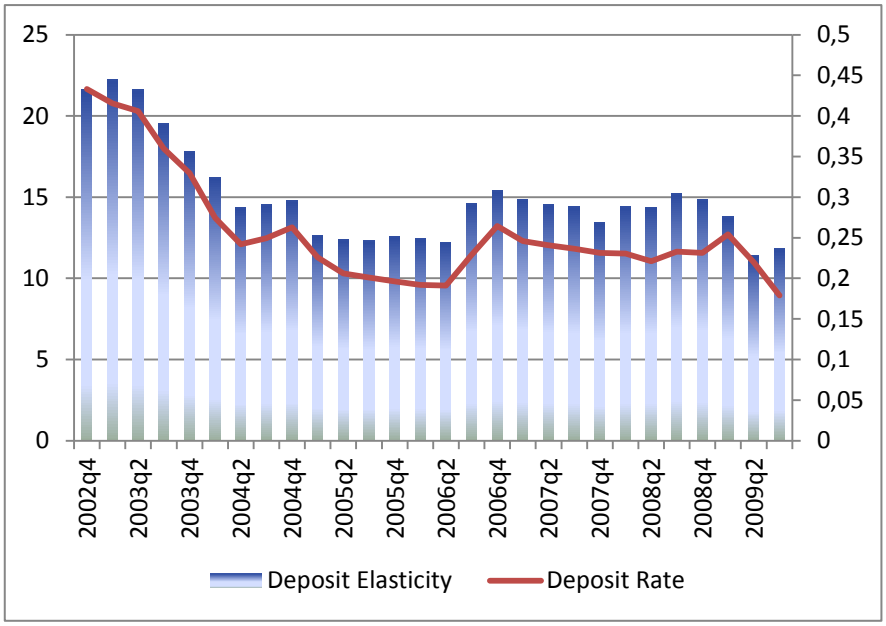
ELASTICITY AND WELFARE FIGURES

*Figure 6: Loan rate elasticity and loan rate.**



*Loan rate is weighted by market share of each bank.

*Figure 7: Deposit rate elasticity and deposit rate.**



*Deposit rate is weighted by market share of each bank.

Figure 8: Deposit rate elasticity and growth rate

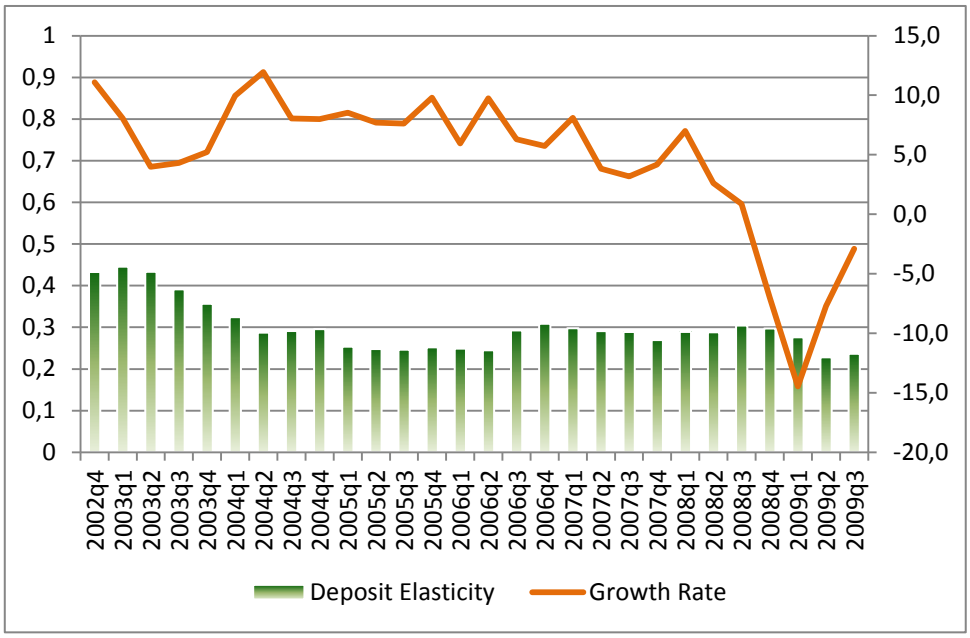


Figure 9: Welfare change of credit and deposit customers (quarterly)

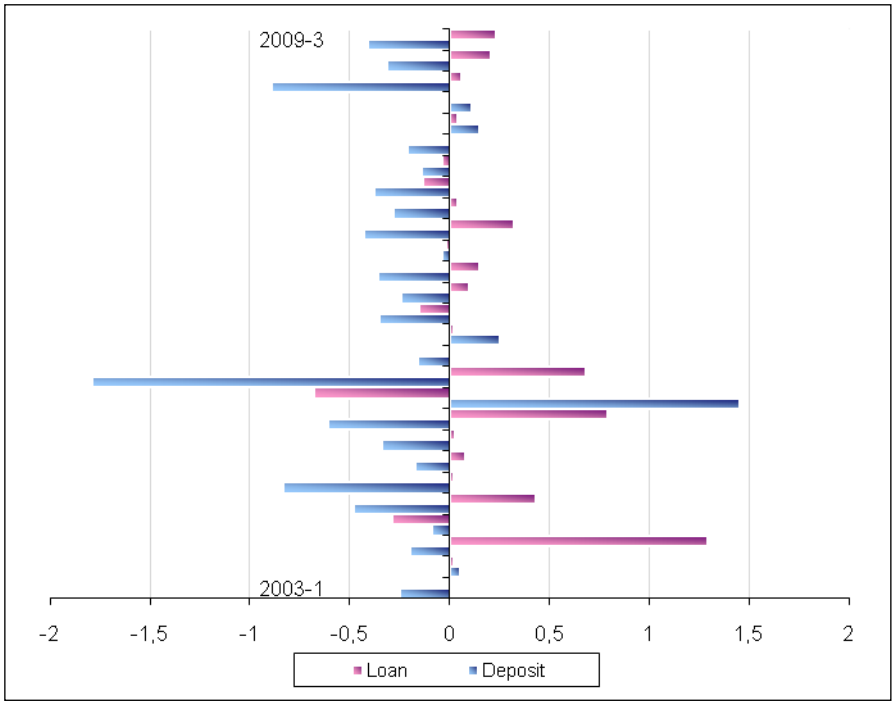
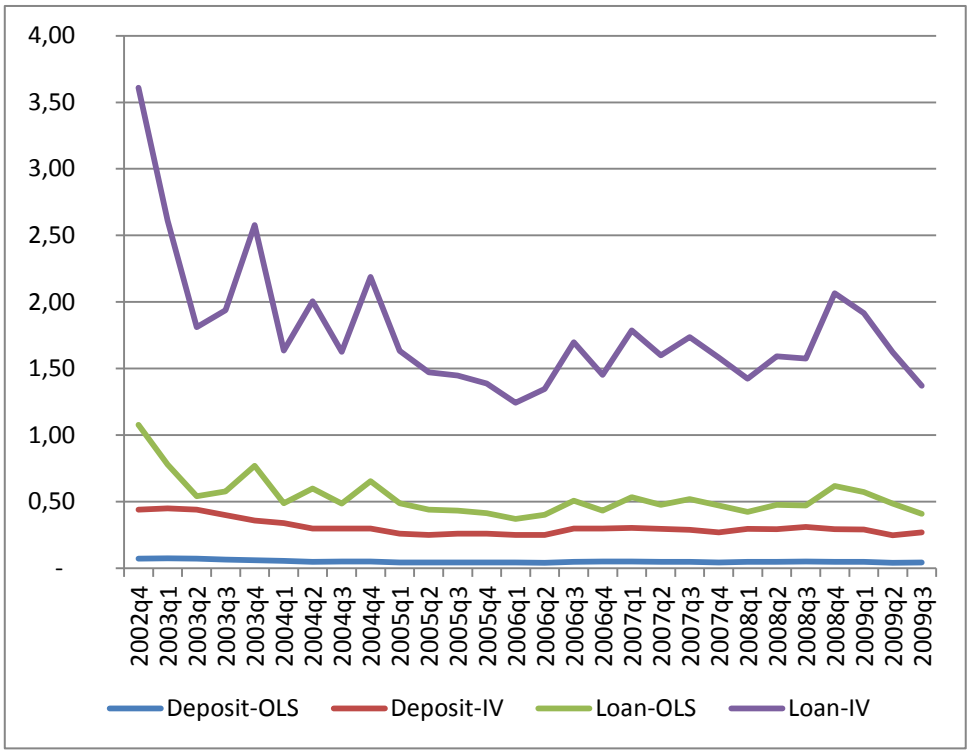


Figure 10: Elasticity results (5 biggest banks are included).



APPENDIX C

DERIVING MARKET SHARE FUNCTION FROM UTILITY OF CONSUMER[22]

Mean Utility Level

Demand analysis starts with a simple utility function based on random coefficients specification. The utility of consumer i for product j is given by

$$u_{ij} = x_j \tilde{\beta}_i - \alpha p_j + \xi_j + \varepsilon_{ij} \qquad (2)$$

where $\left(x_j, p_j\right)$ are observed product characteristics, ($\tilde{\beta}_i, \varepsilon_{ij}$) are consumer-specific taste parameters which are unobserved to the econometrician. ξ_j might be thought as the mean of consumers' valuations of an unobserved product characteristic, ε_{ij} represents the distribution of consumer preferences about this mean. Consumer i's taste parameter for characteristic k may be decomposed as

$$\tilde{\beta}_{ik} = \beta_k + \sigma_k \zeta_{ik} \qquad (3)$$

where β_k is the mean level of the taste parameter for product k and the mean-zero ζ_{ik} has an identically and independently distributed standard normal distribution across individuals and characteristics. Combining (2) with (3), the utility function may be rewritten as

$$u_{ij} = x_j \beta + \xi_j - \alpha p_j + \varepsilon_{ij} + \nu_{ij}$$

with

$$\nu_{ij} = \left[\sum_k x_{jk} \sigma_k \zeta_{ik} \right] + \varepsilon_{ij}$$

[22] Derivation procedure is in the article of Berry, S.T. (1994). Each stage in Appendix-2 is written based on that article.

The term v_{ij} is a mean-zero, heteroskedastic error and it captures the effects of the random taste parameters. Mean utility level of product j, will be then:

$$\delta_j = x_j\beta - \alpha p_j + \xi_j \tag{4}$$

Market Share Function

We know that each consumer purchases one unit of the good that gives the highest utility. So, conditional on the characteristics (x,ξ) and prices p, consumer i will purchase one unit of good j if and only if for all $k \geq 0$ and $k \neq j$,

$U\left(x_j,\xi_j,p_j,v_i,\theta_d\right) > U\left(x_k,\xi_k,p_k,v_i,\theta_d\right)$.

This inequality also defines the set of unobservable taste parameters, v_{ij}, that result in the purchase of good j. Let us also define the set of consumer unobservables that lead to the consumption of good j as $A_j(\delta) = \left\{v_i / \delta_j + v_{ij} > \delta_k + v_{ik}, \forall k \neq j\right\}$. The market share of the jth firm is then the probability that v_i falls into the region A_j. Given a distribution, $F(\cdot,x,\sigma)$ for v, with density $f(\cdot,x,\sigma)$, this market share is

$$S\left(\delta\left(\mathrm{x,p},\xi\right),x,\theta\right) = \int_{A_j(\delta)} f\left(v,x,\sigma_v\right)dv$$

where the integral is over the set of consumer unobservables implicitly defined by Aj.

After defining predicted market share, consider a demand equation that relates observed market shares, s_j, to the market shares that are predicted by the model, S_j:

$$s_j = S_j\left(x,p,\xi,\theta\right)$$

The right-hand side of this equation contains both prices and product level demand errors. But there exists a problem of endogenous prices correlated with the

unobservables. Instrumental variables methods may be a remedy, but the unobservables enter market share function in a nonlinear fashion, so using traditional IV procedures is impossible.

To solve this problem, Berry proposes transforming the market shares so that the unobserved product characteristics appear as a linear term. He begins with simple case in which the distribution of consumer unobservables is known, so that market shares depend only on mean utility levels:

$$s_j = S_j(\delta)(j = 1, ..., N)$$

At the true values of δ and of market shares, these equation must hold exactly, and also the model should fit the data exactly. The exact fit of the model conditional on the mean utility levels δ can be exploited in an estimation procedure. If the vector-valued equation $s = S(\delta)$ can be inverted to produce the vector $\delta = S^{-1}(s)$; then the observed market shares uniquely determine the means of consumer utility for each good. [23]

As there exists a unique vector $\delta(s)$, it can be used in a simple estimation procedure. When the density of v is known, then the market share function depends only on the vector δ, so the calculated mean utility levels can be treated as a known,

[23] Under weak regularity conditions on the density of consumer unobservables, the existence of a unique $\delta^*(s)$ that satisfies $s = S(\delta^*(s))$ is established in the appendix of Berry (1994). There, Berry shows that (conditional on setting the mean utility of the outside good, δ_0, equal to zero) the market share function is one-to-one. He also establishes that, for every possibly observed vector of market shares, s, there is a vector of utility means δ that will create that observed vector by the relation $s = S(\delta)$. Thus, every vector of observed market shares can be explained by one and only one vector of utility means. For any density $f(\cdot, x)$, we can therefore calculate the vector δ from observations on the market shares alone.

nonlinear transformation of the market shares, s. From (4), for the true values of (β, α);

$$\delta_j(s) \equiv x_j\beta - \alpha p_j + \xi_j \tag{5}$$

We can treat (5) as an estimation equation and use standard instrumental variables techniques to estimate the unknown parameters. We can run an appropriate instrumental variables regression of $\delta_j(s)$ on (x_j, p_j) to estimate (β, α), treating ξ_j as an unobserved error term.

$\delta_j(s)$ is a transformation of the original data, so inverting the market share function may be problematic; but the estimation procedures is similar to that take some other transformation of the observed data (e.g., logarithms) as a dependent variable.

Including an assumption that $\tilde{\beta}_i = \beta$ (no random coefficients) and that ε_{ij} is identically and independently distributed across products and consumers with the extreme value distribution function $\exp(-\exp(-\varepsilon))$ into the model; then market share of product j is given by well-known logit formula as

$$S_j(\delta) = \frac{e^{\delta_j}}{\left(\sum_{k=0}^{N} e^{\delta_k}\right)}$$

Taking the ln of $S_j(\delta)$ and $S_0(\delta)$ and substracting them from each other gives our regression equation as (mean zero of outside good is assumed to be zero):

$$\ln(s_j) - \ln(s_0) = \delta_j \equiv x_j\beta - \alpha p_j + \xi_j$$

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