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Should the Banking Sector be Exempted from the Enforcement of Competition Law due to Concerns about Instability?

Abstract

One of the most controversial topics in banking literature is the relationship between competition and stability in the banking sector. The preliminary studies suggest that banks are more vulnerable than the firms operating in other sectors, thus intense banking competition can cause fragility. However, other studies in a more recent strand of literature oppose it and argue that fiercer competition will not necessarily destabilize the banking sector. In 2013, Turkish Competition Board decided that the largest banks operating in the sector set interest rates together in the form of cartel, and thus imposed its record fine on them. Using the invaluable findings of the Board in its decision on the exact timing of the violation, we have empirically examined the relationship between competition and stability in the Turkish loan market. To this end, the study utilized the popular Difference-in-Differences (DiD) approach, which is used in the social sciences to estimate the differential effects of a factor/event called "treatment" on a "treatment group" compared to a "control group". The results show strong evidence in favor of the competition-stability hypothesis: With the formation of the cartel between deposit banks, non-performing loan rates of almost all deposit bank segments increased very significantly. This means that Turkish deposit banks do not distribute loans to more risky customers during periods of intense competition, or alternatively that severe competition does not result in more defaults by borrowers. In conclusion, one may confidently claim that the banking sector does not have a special privilege from the perspective of stability, and thus recommend that the Competition Board apply competition rules to the banking sector without any hesitation and limitation.

Keywords: Antitrust, Bank competition, Financial stability, Non-performing loans, Franchise value.

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1. INTRODUCTION

Competition is indispensable for an efficient market system, and contributes to social justice and economic development in the following ways: In order to survive in a competitive environment, companies have to lower their prices and increase their product quality. All consumers take advantage of price declines and quality increases arising from competition OECD (2022). A competitive market means product diversity and alternatives. The consumer has the opportunity to choose the price and quality of the product he wants among many alternatives. In the case of intense competition, companies have to develop their existing products or produce new products in order to increase their market share (ICN, 2017). This technological race between companies makes the lives easier and more comfortable. Competition enables companies to produce and invest in a way that meets the demands and expectations of the consumer, thus making the best use of economic resources (OECD, 2008; Stucke, 2013). As a result of its positive effects, the competition is often seen as prerequisite for efficient markets, and the many countries in the recent years adopt competition laws in order to protect and promote the process of competition. There are now more than 125 countries all over the world applying competition law (OECD, 2020).

Competition rules are today applied to almost all economic activities including retail, telecommunications, energy, transport, broadcasting and postal services, etc. Among these activities, banking has been seen as exceptional sector given that the competition authorities have hesitated to apply competition rules on banking sector for a long time. For example, although competition rules were set in 1890 by Sherman Act in United States, they were not enforced in banking sector until 1960's. The reason is that banking activities were not seen as "commerce" and therefore not subject to the competition law (Carletti and Hartmann, 2003). The attitude of the European Commission was not different from those of the American counterparts (OECD, 2011a): Although there exists no explicit reason preventing the application of the competition rules on banking sector, the European Commission did not apply them before 1981 (Carletti and Hartmann, 2003). However, since Türkiye introduced competition law relatively late in 1994, its competition legislation includes banking sector without any doubt: In the grounds for the articles of Turkish Competition Act,[1] it is explicitly stated that the Act would be applied to service markets including banking, insurance, money, credit and capital.[2]

Turkish Competition Board conducted three separate detailed investigations on banking sector in 2011, 2013 and 2017, and levied heavy fines against investigated banks.[3, 4] Especially the second decision is important, because with this decision the Board broke all records in its history: The total fine in this decision was Turkish Liras (TL) 1.1 billion (roughly EUR 480 million), and it was four times more than the previous largest fine. This decision also broke the record of the highest fine charged on a single undertaking: The Board imposed a fine of TL 213 million (rougly EUR 92 million) on Garanti Bankasi, and this fine was just double of the previous record. During the investigation of this exceptional decision, sector representatives brought a few warnings. They stressed that the banking sector is the pillar of Turkish economy, therefore the Competition Board must take into account its special structure and functioning and avoid increasing the vulnerability in the sector (Reuters, 2013; Anadolu Agency, 2013).

[1] https://www.rekabet.gov.tr/en/Sayfa/Legislation/act-no-4054 ; https://www.rekabet.gov.tr/en/Sayfa/Legislation/act-no-4054/grounds-for-the-articles

[2] Although Turkish competition rules are enforceable in banking sector, it is worth mentioning an exception: A large number of the potential bank mergers are exempted from obtaining the permission from the Turkish Competition Board.

[3] These decisions are as follows: Decision dated 07.03.2011, numbered 11-13/243-78. Decision dated 08.03.2013, numbered 13-13/198-100. Decision dated 28.11.2017, numbered 17-39/636-276.

[4] More recently, the Competition Board conducted another investigation to determine whether banks and financial institutions violated competition rules. In its decision dated 26.08.2021 and numbered 21-40/576-279, the Board concluded that the undertakings did not act in violation of the competition rules.

In literature, one may find theoretical and empirical studies supporting the warning raised by the sector representatives: These studies assert that banks are more tending to instability than the firms operating in other sectors, thus unfettered competition can cause to vulnerability and the competition restrictions are necessary to keep the banking system stable (OECD, 2011b). It has been claimed that banking instability in many developed and developing countries were due to the extreme competition resulting from the financial liberalization in the 1970s and 1980s. Similarly, they blamed the excessive competition in the U.S. financial system for the 2007-2008 subprime mortgage crisis (Beck, 2008). However, other studies in a more recent strand of literature suggest opposite: They oppose the view that the banking sector is more fragile in comparison to other sectors, and argue that stronger competition will not necessarily destabilize it (Berger et al., 2009).

This study empirically examines the relationship between competition and stability in the Turkish banking sector. To be more specific, it focuses on the Turkish loan market for a period including the above-mentioned investigation carried out by Competition Board. This investigation period permits us to examine the impact of the competition decreases on the risk taking behavior of the banks, if any. For this aim, it uses the banks' non-performing loan (NPL) ratios to measure the bank risks, namely banking distress. NPL is the most popular ex-post measure of credit risk in literature. NPL's, measured as the ratio of loans that are in default (unpaid) for a specific period to total loans, are used to evaluate the asset quality of banking sectors (Beck et al, 2015). The high levels of NPLs are blamed for the failure of financial institutions around the world especially throughout the subprime mortgage crisis. The Difference-in-Differences (DiD) approach has been utilized to examine the effects of competition on NPLs.

The structure of the study is as follows: The next section presents theoretical and empirical studies examining the relationship between competition and stability in the banking sectors. Section 3 describes the model specifications and data used. The results of the empirical analysis is presented in Section 4. Finally, Section 5 summarizes the findings and results.

2. LITERATURE REVIEW

This section presents what literature suggests about the association between bank competition and stability in the sector. There exist several in-depth literature surveys exposing this topic excellently, like Carletti and Hartmann (2003), Allen and Gale (2004), Jimenez et al. (2013) and Beck (2008).[5] In 2010, the OECD Competition Committee organized a roundtable discussion focusing on Competition, Concentration, and Stability in the Banking Sector (OECD, 2010). This study provides valuable insights into the connection between competition and stability. Notably, it highlights that theoretical models and empirical studies offer conflicting predictions regarding the relationship between competition and stability within the banking industry.

2.1. Theoretical Studies Supporting Competition-Instability Hypothesis

The "franchise value / charter value" paradigm is the mainframe of the view that the excessive competition in the banking system hampers the stability of the entire banking system.[6] The basic logic behind this paradigm is that in more competitive environments making the profits move downward, banks tempt to pursue riskier loan distribution policies, and it results in higher fragility. Simply stated, competition would reduce the franchise value of a bank and urge it to take more risky operations to preserve its former profits (Keeley, 1990). Examples of riskier policies are distributing loans to riskier clients, opening new branches without taking into account of their profitability, increasing the number of employees extensively, and decreasing capital levels, etc. These riskier behaviors lead

[5] For a comprehensive discussion on the nexus of competition and stability in European banking, see Hasan and Marinč (2016) which discusses whether and how competition policy should be amended in order to preserve the stability of the banking system during crises.

[6] Banks expect to earn a stream of profits by holding a banking license. The present value of this profit stream is called "franchise value" or equivalently "charter value" (Demsetz et al., 1996).

to increases in the NPLs and thus the probability of bank bankruptcies increase. Limitation of the competition, on the other hand, helps banks preserve their profits, and thus incentives to excessive risk taking are eliminated. In other words, banks reduce their risky operations to keep the quasi-monopoly rents given by their government charters (Jiménez et al., 2013). Some of the theoretical models predicting that competition brings fragility to the banking sectors are as follows:

Smith (1984) examines the relationship between competition and liability risk. His model assumes that probability distributions over the dates of withdrawal vary, and they only have information on their own withdrawals yielding the adverse selection problem. In such a framework, competition to attract depositors makes banks more fragile, and thus the banking system turns to be unstable. To eliminate this result, he proposes regulatory measures like ceilings on deposit rates. De Palma and Gary-Bobo (1996) also examine the trade-off between banking competition and liability risk by focusing depositors' withdrawal decisions in a Cournot competitive loan market. They reach to multiple equilibriums: Safe equilibrium suggests that banks supply a limited amount of loans at a high interest rate and thus carry no bankruptcy risk. The risky equilibrium, in contrast, presents that banks distribute extensive amount of loans. However they bear a positive probability of runs when a bad signal is received by depositors. The study suggests that a deregulated banking system is theoretically more fragile.

2.2. Empirical Studies Supporting Competition-Instability Hypothesis

The view that excessive competition among banks harms the stability of the banking system has been substantiated empirically by several studies over time. They may be bank-level or cross-country studies. Some of the studies in this strand of the literature are as follows:

The seminal paper in this line of literature is Keeley (1990) showing that branching restrictions were relaxed in 1980s, thus increases in the competition among banks reduced their charter values and this caused fragility and bank failures then. Another study examining the effects of increasing in the nationwide branching in the U.S. banking system is Dick (2006). It also witnesses that loan losses increse significantly following banking deregulation. Similarly, Edwards and Mishkin (1995) conclude that falls in the profits due to more intense competition in the financial markets caused the higher risk-taking in the 1980s. They claim that excessive competition damaged their position in loan markets by eliminating their cost advantage in securing funds. Jiménez et al. (2013) study the relation between competition and risk-taking activities in Spanish banking sector for the period between 1988 and 2003. In measuring the competition, they use different variables like Lerner index, number of the banks, concentration ratio-5 (CR5) and Herfindahl-Hirschman Index (HHI) while bank risk is measured by NPL rates. They find that among the competition measures, only Lerner index has a negative relation with NPL rates, meaning that bank NPL ratios decrease with increases in the market power of the banks, as suggested by charter value hypothesis. In contrast, as for the other competition measures, no significant relation with risk-taking behavior of the banks has been found. Ariss (2010) using data set from 821 banks in 60 developing countries examines the effect of the market power on stability in banking sectors for the period between 1999 and 2005. This study witnesses that the fragility of the banks reduces as they increase their market power. Capie (1995) studies stability in the U.K. banking sector for the period between 1840 and 1940 and finds an association between fragility and more competitive time periods. Another empirical support to the traditional competition-instability hypothesis comes from Pisedtasalasai and Rujiratpichathorn (2017) for banking sector in Thailand from 1992 to 2013. This study concludes that intense competition deteriorates the stability in the banking sector due to reduction in equity capital and increases in risk-taking. However, the association between competition and instability is strong only for the period before 1997 Asian financial crisis. As for the post-crisis period, the relation between competition and instability fades.

2.3. Theoretical Studies Supporting Competition-Stability Hypothesis

In literature, several theoretical studies have appeared to challenge the conventional view that market power in banking sector increases profits and thus improves stability in the banking sector. These alternative studies mostly base their arguments on the moral hazard problem of the borrower. Several of these studies are as follows:

Caminal and Matutes (2002) conclude that weak competition may induce higher risk of failure in banking sector. They assert that weak competitive conditions makes banks to use more screening and less credit restricting for the borrower's moral hazard problem. Therefore, a bank with market power allocates more loans than competitive banks and thus has a higher risk of failure. Allen and Gale (2004) is a comprehensive study to elucidate trade-off between banking competition and stability. They study the trade-off by help of a variety of different models like agency models, financial intermediaries equilibrium models, Schumpeterian competition and spatial competition models. They reach to the conclusion that the relation between banking competition and stability vary depending on the model. Some models witness traditional competition-instability hypothesis but others do not. Stenbacka and Takalo (2019) study the impacts of the increased competition in the deposit market on banking stability by measuring the increase in the competition via reduced switching costs. They show that the effect of the increase in competition vary depending on the type of the costumer focused: The increase in the competition with established (locked-in) customers make the banking market more unstable while intense competition for setting new customer relationships results in more stable banking sector.

The most important theoretical challenge to the traditional franchise value hypothesis predicting a negative association between competition and stability comes from Boyd and De Nicoló (2005). In their model, weak competition conditions in the loan and deposit markets cause increases in loan interest rates. In the case of moral hazard, raised loan interest rates induce borrowers to raise the risk of their projects. Consequently, it results in more problematic loans and higher fragility. They suggest that borrower credit risk and instability can be diminished by introducing more competition in both loan and deposit markets. In addition, they claim that the competition and stability are linked to each other monotonically.

Summing up, the theoretical models advocating the competition-stability hypothesis are at least as convincing and consistent as the traditional competition-instability models.

2.4. Empirical Studies Supporting Competition-Stability Hypothesis

The traditional view that boosted competition can damage banking stability has been challenged by several empirical studies. Some of them are reviewed below:

A strong empirical support for the competition-stability hypothesis comes from Cihák et al. (2006). They examine the relationship between bank competition and banking system distress by studying 28 systemic banking crises in 38 countries during 1980-2003. The results witness that systemic crisis have been mostly observed in less competitive banking sytems. In other words, intense competition in banking sector diminishes the systemic bank fragility. Carletti and Vives (2008) review the literature on competition and stability and claim that competition policy rules are hereafter fully enforceable for the banking sectors, thus European Union countries start to promote competition in the banking sector.

Boyd et al. (2006) examine the relation between competition and insolvency (likelihood to fail). They measure the fragility of the banks by help of the z-index which is a bank-level indicator of distance from insolvency. They conclude that banks are prone to insolvency in less competitive banking sectors. IJtsma et al. (2017) examine the relationship between competition and stability in both bank-level and country-level for the 25 members of European Union over the 1998–2014. Their findings show no statistically significant effect of competition on either the

bank-level or the country-level stability. Yaldiz and Bazzana (2010) estimate the link between the market power and risk-taking activities of Turkish banks for the years between 2001 and 2009. To measure loan risk, they employ NPL and z-index while Lerner index is used to measure the intensity of competition. They find a significant effect of competition on stability of the banking sector.

3. MODEL SPECIFICATION AND DATA

DiD approach is a widely used method in social sciences to assess the impact of a specific factor or event on different groups. The name of the method itself accurately describes its purpose. However, before delving into the DiD approach, it is important to mention its precursor, which is the before-after analysis. In before-after analysis (also known as pre-post comparison), the outcomes of the same group are compared before and after a change in the relevant factor, such as a policy change. This analysis assumes that if the change had not occurred, the outcomes of the group members would have remained exactly the same as their pre-change situation. In other words, it assumes that any observed difference between the outcomes before and after the change is solely attributed to the change in the relevant factor (Estrada et al. 2019). However, the actual impact of the change could be larger or smaller than the observed difference. For instance, comparing NPL rates of deposit banks during the no-cartel and cartel periods would be an example of a simple before-after analysis.

A problem with before-after analysis (single-difference approach) is that there may be numerous factors, other than the cartel, that could influence the NPL rates of banks. For example, macroeconomic conditions in Türkiye could affect NPL rates. Therefore, it is not possible to accurately measure the true effect of the cartel solely by observing and comparing NPL rates of deposit banks during no-cartel and cartel period. It is necessary to account for all other factors that might affect NPL rates. The DiD approach tackles this issue by introducing an additional comparison. It compares the before-and-after changes in outcomes of a group affected by the relevant change or event with the before-and-after changes of another group (control group) that is not affected by it.

If the DiD method is applied to the study, the first difference is the difference between the pre- and post-outcomes of the treatment group (deposit banks). Since the same group (treatment group) is compared with itself, the first difference is used to control for factors that do not vary over time within the treatment group (deposit banks). It is important to note that the first difference calculated in this way is essentially the aforementioned before-after analysis. As for the factors that do change over time (time-varying factors) within this group, the second difference is introduced. In the second difference, the before-and-after change in outcomes is measured for a different control group (participation banks) in a similar manner.

The control group must fulfill two crucial conditions (Maier-Rigaud and Sudaric, 2019): First, the treatment (competition change due to the cartel) should not have affected the control group. Second, since the control group is used to estimate the counterfactual scenario in the absence of treatment, it should accurately represent the change in outcomes that would have been observed in the treatment group without the treatment. However, this does not imply that the treatment and control groups necessarily need to have identical pre-treatment conditions. These two conditions are satisfied by the participation banks.

Once calculating these two differences, it becomes possible to isolate the effects of other time-varying factors on the treatment group by subtracting the second difference from the first difference, thereby "cleaning" the observed outcomes of the treatment group.

To measure the effect of competition on the stability of the banking sector, it is important to have appropriate measures for both competition and stability. Bank stability is often measured in a negative manner, typically by examining individual or systemic bank distress. Systemic banking distress refers to periods when the banking system is unable to effectively fulfill its role in intermediation functions such as depos-

it-taking, lending, and payment services for the economy (Beck, 2008).

Individual bank distress can be assessed by proximity to bankruptcy or actual entry into bankruptcy. One measure is the z-index, which calculates the sum of the capital-asset ratio and return on assets, weighted by the standard deviation of return on assets. This ratio indicates the number of standard deviations a bank is away from insolvency and provides an estimate of the likelihood of failure (Boyd et al., 2006). Alternatively, researchers have also utilized the NPL ratio as an indicator of fragility. In literature, NPL ratio is the most popular ex-post measure of credit risk and instability in banking sector. NPLs may be defined as bank loans that are subject to late repayment or are unlikely to be repaid by the borrower. Credit risk is the primary risk factor for most banks, so in this study, banks' NPL ratios are taken as a measure of risk taking. This study estimates Equation (1) in the DiD framework. Dependent variable, NPL_t, is the average non-performing loan rate in the banking sector for the month *t*.

$$NPL_t = \alpha + \beta + Cartel_t + \gamma \cdot Depos_t + \delta \cdot \\ \cdot Cartel_t \cdot Depos_t + \omega \cdot GDPg_t + \varphi \cdot Unemp_t + \\ + \theta \cdot Exch_t + \rho \cdot Inf_t + \varepsilon_t \quad (1)$$

Similar to any typical DiD application in the literature, the first task is to determine treatment, treatment group and control group. The treatment is usually a one-time change in something which affects treatment group, but not affect control group.

Since the motivation of this study is to measure the effect of the competition on the bank stability in Türkiye, the treatment in the study is the change in competition, and thus it should be measured somehow. In literature, different methods are applied to measure the bank competition. The simplest and the most problematic method is to use market structure measures such as number of banks, concentration ratios, or HHI indices. These indicators rest on only market structure (market shares) of the rivals without taking into account of their strategic competitive behaviors. Thus, market structure measures are poor indicators for the competitive environment in which banks operate (Cihák et al., 2006). More updated literature called New Empirical Industrial Organization (NEIO) rejects the conclusion of the Structure-Conduct-Performance (SCP) hypothesis, and claims rightfully that there is no direct relationship from structure to the performance (competition) in any market. Alternatively, some studies may use competition measures, such as the Panzar and Rosse's (1987) H-Statistics or Lerner index. H-Statistics measures the elasticity of banks' revenues relative to input prices by imposing certain restrictive assumptions on banks' cost function and on equilibrium of the market. Lerner index measures a bank's market power by relating the price to marginal cost. Calculating the marginal cost is the difficult part of using Lerner index in empirical studies.

Differently from all other studies in the literature, to include the competition into the analysis as a treatment, this study benefits from a Competition Board decision which is result of deep investigations and analysis: The Competition Board conducted an investigation into the 12 largest banks, which account for approximately 80% of the market in total. As a result of detailed analysis, the Board concluded in March 2013 that these banks violated the competition rules via collusion to determine trade terms for cash deposit interest, loan interest and credit card fees together between 21.8.2007 and 22.9.2011. The period of competition infringement is represented by help of a dummy variable named $Cartel_t$ in Equation (1). It takes the value of 1 for the period between September 2007 and September 2011, for other months it takes the value of 0.

To make distinction between control group and treatment group, another dummy variable, named $Depos_t$ in Equation (1), is used. The Board's investigation and infringement allegation is only related with deposit banks, not participation banks. In addition, both deposit and participation banks have operated under similar conditions in Türkiye.[7] Thus, the study

[7] Participation banks which compose the Islamic banking were emerged in the middle of 1980s as a result of deregulation efforts in Türkiye. In 2005, participation banks were completely entered into the authorization of the Banking Regulation and Supervision Agency (BRSA), through the

uses the participation banks as control group. It means that $Depos_t$ takes the value of 0 if the observation belongs to a participation bank. In contrast, its value is equal to 1 for deposit banks.

The study also includes several macroeconomic variables that may affect NPL ratio to the model specification presented in Equation (1): Due to the decrease in NPL ratios during economic revival and increase in stagnation periods, GDP growth rate is generally found to be negatively associated with NPL ratio (Nkusu, 2011; Klein, 2013; Skarica, 2014; Beck et al, 2015). For a similar reason, unemployment levels are positively linked to NPLs as high unemployment can affect adversely the debt servicing capacity of borrowers (Nkusu, 2011; Klein, 2013; Skarica, 2014). Another factor that may affect NPLs is the exchange rate. In literature, most of the studies (Kalluci and Kodra, 2010; Moinescu and Codirlaşu, 2012; Fofack, 2005) find a negative relationship between the depreciation of the exchange rate and NPLs, meaning that the depreciation of the domestic currency may trigger impaired loans. However, Castro (2013) shows that appreciated domestic currency may also lead to the higher NPLs. The last macroeconomic explanatory variable that may affect NPLs is inflation. But, the effect of inflation on NPLs is inconclusive in the literature: On the one hand, increase in inflation results in lower real income, which jeopardize repayment of loans (Klein, 2013; Fofack, 2005). On the other hand, since inflation erodes the real value of NPLs, a negative relationship between NPLs and inflation can also be detected (Nkusu, 2011; Khemraj and Pasha, 2009).

Under the general specification given in Equation (1) the study generates twenty separate estimations by studying NPL rates of five different loan types as dependent variables and four different banking segments for $Depos_t$ variable. Five types of loans studied are (*i*) instalment commercial loans, (*ii*) consumer loans in general, (*iii*) housing loans under consumer loans, (*iv*) vehicle loans under consumer loans, and (*v*) personal finance loans under consumer loans. Four banking segments which are used as treatment groups separately include (*i*) all deposit banks in general, (*ii*) State-owned deposit banks, (*iii*) foreign deposit banks, and (*iv*) domestic private deposit banks. To be more precise, among twenty alternatives, for example, if the non-performing vehicle consumer loan rates of the foreign deposit banks is used, it means that the effect of lower competition observed between September 2007 and September 2011 on non-performing vehicle consumer loan rates of the foreign deposit banks is searched. Examining different loans and banking segments individually enables us to measure the effect of competition on the stability of different loans distributed by different deposit bank types.

The study uses the national monthly[8] aggregated observations for Turkish banks during the period between January 2005 and September 2011.[9] Thus, there exist 81 observations for each loan type / banking segment combination, and since it uses two separate loan types, namely control group (participation banks) and treatment group (deposit bank type) for each banking segment, 162 observations are used in each of the twenty alternative regression models. Table 1 describes summary statistics of the NPL rates for each loan type / segment combination.

5411 Banking Law. Thus they completely have the same functions, responsibilities and rights with the conventional deposit banks (Batir et al., 2017). Considering the intense and ever-increasing competition between participation banks operating in interest-free system and deposit banks operating in interest-based system, the participation banks can be safely used as control group.

[8] Since GDP growth rate is an important determinant of the NPLs and only quarterly data for the GDP growth rates exist, missing monthly observations of GDP growth rate between two non-missing quarterly observations were created by a linear prediction between the said non-missing observations by using the linear interpolation (ipolate) command in Stata.

[9] The preliminary inquiry of the decision, which is the subject of the study, started in May 2011. Subsequently, on-site inspections (dawn raids) were carried out until September and a preliminary inquiry report was prepared in October. This preliminary inquiry report uncovered the investigation team's alleged violations. Therefore, it is highly probable that bank behavior after that date was affected by the ongoing investigation. Therefore, data up to September 2011 were included in the study.

Table 1. Descriptive Statistics of Non-Performing Loan Rates by Segments and Loan Types (%)

Segment	NPL	Obs.	Mean	Std.Dev.	Min	Max
Participation	***commercial***	81	2.62	1.14	1.03	5.26
	consumer	81	2.07	0.90	0.77	4.17
	housing	81	1.28	0.69	0.31	2.78
	vehicle	81	3.23	1.78	1.21	7.35
	personal	81	4.70	2.28	0.52	16.31
Deposit	***commercial***	81	4.08	3.34	0.55	10.96
	consumer	81	2.07	1.30	0.66	4.58
	housing	81	0.98	0.74	0.11	2.39
	vehicle	81	5.17	3.61	0.82	12.58
	personal	81	2.24	1.41	0.53	4.71
State-Owned Deposit	***commercial***	81	4.52	2.82	0.00	9.52
	consumer	81	0.97	0.46	0.47	1.89
	housing	81	0.81	0.57	0.09	1.84
	vehicle	81	5.13	2.36	0.80	9.42
	personal	81	0.81	0.53	0.23	1.73
Foreign Deposit	***commercial***	81	3.29	3.28	0.03	9.06
	consumer	81	3.23	2.38	0.51	7.31
	housing	81	1.00	0.80	0.12	2.37
	vehicle	81	4.42	2.76	0.20	9.16
	personal	81	5.39	3.84	0.77	12.12
Domestic Private Deposit	***commercial***	81	4.15	3.69	0.64	12.42
	consumer	81	2.42	1.56	0.65	5.67
	housing	81	1.10	0.85	0.10	2.80
	vehicle	81	5.48	4.16	0.87	14.45
	personal	81	2.57	1.52	0.81	6.43

Taking conditional expectations for two treatment periods (no-cartel and cartel periods) and two separate groups (participation and deposit banks) in Equation (1), one may get the mean NPL rates for the following four groups: (*i*) Pre-treatment nontreated, (*ii*) Post-treatment nontreated, (*iii*) Pre-treatment treated, and (*iv*) Post-treatment treated. The first three of these four groups are not affected by the treatment (cartel formation) while the treatment affects only the fourth group.

$$E[NPL_t|Cartel_t = 0, Depos_t = 0] = \alpha \quad (8)$$

$$E[NPL_t|Cartel_t = 1, Depos_t = 0] = \alpha + \beta \quad (9)$$

$$E[NPL_t|Cartel_t = 0, Depos_t = 1] = \alpha + \gamma \quad (10)$$

$$E[NPL_t|Cartel_t = 1, Depos_t = 1] = \alpha + \beta + \gamma + \delta \quad (11)$$

Now, one may compute the difference-in-differences by first calculating the before-and-after difference in the NPLs of deposit banks (treatment group), then calculating it for the participation banks (control group), and finally subtracting the latter from the former:

DiD impact = $[E[NPL_t|\text{Cartel}_t = 1, Depos_t = 1] - E[NPL_t|Cartel_t = 0, Depos_t = 1]] - [E[NPL_t|Cartel_t = 1, Depos_t = 0] - E[NPL_t|Cartel_t = 0, Depos_t = 0]]$

DiD impact = $[(\alpha + \beta + \gamma + \delta) - (\alpha + \gamma)] - [(\alpha + \beta) - (\alpha)]$

DiD impact = δ

Thus, the effect of the cartel (decrease in the competition) on the NPL rates is estimated by β, which is the parameter of interacted variable between two dummy variables. If this parameter is found to be positive, it means that decreases in the competition (change in the *Cartel* from 0 to 1) leads to higher risk-taking in banking sector, a finding contravening to the traditional competition-instability hypothesis. In contrast, negative sign of this parameter indicates that decreases in the competition (change in the *Cartel* from 0 to 1) leads to lower risk-taking, a finding supporting the traditional competition-instability hypothesis.

4. EMPIRICAL RESULTS

The Equation (1) is estimated for twenty different model specifications. The findings regarding the coefficients of explanatory variables in these twenty alternative specifications are presented in different panels of Table 2. The columns of the panels in this table present five different loan types, while their rows represent the different banking segments.

Panel A in Table 2 reports the results for the important parameter for the study, β, namely the parameter of the interaction variable. As seen from this panel, it is found that this critical coefficient β is significantly positive for almost all banking segment/loan type combinations: 18 out of 20 estimations provide positive and significant coefficient β, meaning that banks in all segments lend to more risky clients (regardless of the type of client) during periods of low competition. Among twenty banking segment – loan type combinations, only one exception to this finding exits: During the cartel period, only the non-performing rates of housing loans decreased in state banks segment. In short, the finding of the study is a strong and consistent challenge to the conventional competition-instability hypothesis.

Panel B in Table 2 presents the estimation results for the coefficient of GDP growth in different model specifications. A negative coefficient is found for this explanatory variable in 14 regressions, 10 of which provide also significant coefficients. Thus, this finding is rather in line with both theoretical and empirical literature suggesting a negative association between economic growth and NPLs.

In all 20 regressions, a significant positive coefficient is found for the unemployment variable, as presented in Panel C in Table 2. This finding is fully consistent with the literature and confirms that problematic loans increase in bad times and *vice versa*. Comparing the results related to the coefficients of GDP growth and unemployment, it is observed that NPLs are more affected by unemployment rather GDP growth.

The estimation results regarding the coefficient of exchange rate are presented in Panel D in Table 2. 16 out of 20 regressions provide a positive relationship between depreciation of the Turkish lira (captured by an increase in exchange rate) and NPL rates. These positive coefficients are significant in 9 regressions. Thus, the direction and degree of relationship seem to vary according to the type of loan and the banking segment examined. For example, as for the installment commercial loans (presented in the second column of Panel D), depreciation of the Turkish lira creates very significant increases in the NPLs. But this positive relationship is not so clear for consumer loans (presented in other columns of Panel

Table 2. Regression Results of Alternative Models for the Explanatory Variables

Panel A. The Coefficient of Interaction Variable (δ)					
	Commercial Loans	**Consumer Loans**	**Consumer Loans-*Housing***	**Consumer Loans-*Vehicle***	**Consumer Loans-*Personal Finance***
Deposit	5.2332***	1.0773***	0.2298**	3.2841***	3.1318***
Deposit-State	4.7405***	-0.3247**	-0.0634	1.2989***	1.6602***
Deposit-Foreign	5.1044***	2.7294***	0.2482*	2.1710***	6.5814***
Deposit-Domestic Private	5.5785***	1.4952***	0.4035***	3.9803***	3.1886***
Panel B. The Coefficient of GDP Growth Rate (ω)					
	Commercial Loans	**Consumer Loans**	**Consumer Loans-*Housing***	**Consumer Loans-*Vehicle***	**Consumer Loans-*Personal Finance***
Deposit	0.0190	-0.0173*	-0.0119*	-0.0313	-0.0082*
Deposit-State	-0.0349**	-0.0256***	-0.0141***	-0.0535***	-0.0118
Deposit-Foreign	0.0595***	0.0256	0.0002	-0.0402*	0.0880**
Deposit-Domestic Private	0.0249	-0.0232**	-0.0162**	-0.0219	-0.0389
Panel C. The Coefficient of Unemployment (φ)					
	Commercial Loans	**Consumer Loans**	**Consumer Loans-*Housing***	**Consumer Loans-*Vehicle***	**Consumer Loans-*Personal Finance***
Deposit	0.6021***	0.2785***	0.1659***	0.5468***	0.2026***
Deposit-State	0.4604***	0.1896***	0.1522***	0.3505***	0.0923
Deposit-Foreign	0.4914***	0.3494***	0.1589***	0.3091***	0.4552***
Deposit-Domestic Private	0.6841***	0.3132***	0.1776***	0.6592***	0.2271***
Panel D. The Coefficient of Exchange Rate (θ)					
	Commercial Loans	**Consumer Loans**	**Consumer Loans-*Housing***	**Consumer Loans-*Vehicle***	**Consumer Loans-*Personal Finance***
Deposit	3.1724***	0.2407	0.5266*	0.4941	-1.7418
Deposit-State	1.7427***	-0.2131	0.4122**	0.0027	-2.1600**
Deposit-Foreign	4.4606***	2.0099***	0.9333***	1.0338	1.2430
Deposit-Domestic Private	3.2817***	0.0538	0.4245*	0.4532	-2.3421**
Panel E. The Coefficient of Inflation (ρ)					
	Commercial Loans	**Consumer Loans**	**Consumer Loans-*Housing***	**Consumer Loans-*Vehicle***	**Consumer Loans-*Personal Finance***
Deposit	-0.0413	-0.0042	-0.0144	0.0886	0.0341
Deposit-State	-0.0801	0.0032	-0.0113	0.1710***	0.0418
Deposit-Foreign	-0.0346	-0.0177	-0.0214	0.0296	0.0126
Deposit-Domestic Private	-0.0338	-0.0116	-0.0142	0.1028	0.0144

*, ** and *** represent statistically significance at 10%, 5% and 1% levels, respectively.

D). This is quite expected result considering that firms using commercial loans borrow and trade more in foreign currency than the people preferring consumer loans. In short, the firms that are more unhedged borrowers in comparison to the consumer loan users are more adversely affected by the depreciation of Turkish lira.

Lastly, the results of the inflation variable are mixed, which is indeed in line with the empirical predictions of the previous studies. As seen from the Panel E in Table 2, both negative and positive coefficients for this variable are found and also almost none of them are statistically significant. It means that inflation does not have a systematic influence that is valid for all banking segment/loan type combinations. However, ignoring the insignificancy of the coefficients for a while, one may derive some results by doing a vertical assessment on the table by taking a specific loan and examining the relationship between inflation and NPLs for that specific loan type. Such a loan-specific assessment yields some interesting findings: In high-volume loan types such as commercial and housing consumer loans, the increase in inflation causes a decrease in NPLs. On the contrary, higher inflation leads to an increase in problematic loan rates in low-volume loans like vehicle and personal finance loans.

5. CONCLUSION

The results of both theoretical and empirical literature on the relationship between the level of competition in the banking system and the stability of the banking sector are quite confusing. The literature fails to present conclusive evidence in favor of either of the two hypotheses, namely competition-instability hypothesis and competition-stability hypothesis. Several reasons for these ambiguous results may be listed:

First, the relationship between competition and stability in the banking sector may be indeed contradictory. It means that this relationship may be varied depending on the countries, banking service, banking segment or time period focused by a study in the literature.

Second reason for the inconsistency between the studies on the relationship between competition and stability may be that they use varying techniques and data types. For example, there are application differences in the literature on methods of measuring competition. Some studies simply use the concentration ratios, while others prefers more sophisticated but assumption-based indices such as the HHI, Lerner, Tobin's q, and H-statistic. As for the stability side, there exist different definitions for the fragility. The most common measures for the banking stability are the NPL, z-index, systemic banking distress, the likelihood of specific bank fragility. To sum, the results of the studies in the literature are highly sensitive to the definitions of both competition and fragility, and also they vary depending on individual or systemic bank stability.

This paper is an attempt to understand and clarify the relationship between competition and stability that is measured by NPL rates in the Turkish banking sector. It is different from the previous works in the literature for several reasons: Most of the works in the literature use very contradictive assumption that there exists a direct relationship between market structure and its competitiveness. In contrast, this study does not use any measures like CR4, HHI etc. to measure the competition in the banking sector. Instead, it uses a dummy variable to point out the intensity of competition in the banking sector by benefitting a cartel decision taken as a result of deep investigations by Turkish Competition Board. In addition to the intensity of competition, the study also included other variables that are listed among the determinants of NPLs in the literature. Other explanatory variables are GDP growth rate, unemployment rate, exchange rate and inflation. Another difference of this study from others in the literature is that rather than focusing only limited number of loan types and banking segment, it runs 20 separate regressions simultaneously and separately for five different loan categories and four banking segments. In this way, it determines if the relationship between competition and NPLs varies with the banking segment and the type of loan.

The study is very conclusive on the relationship between degree of competition and NPLs. It finds strong evidence in favor of the compe-

tition-stability hypothesis: With the formation of the cartel by deposit banks during September 2007 - September 2011 period, NPL rates of almost all deposit bank segments increased very significantly. The sole slight exception to this finding comes from the state banks segment for the housing consumer loan: The non-performing rates of housing loans of state banks decreased trivially during the cartel period. This trifling difference may be due to the difference of the state banks from other banks with respect to risk management strategies, supervisory measures, and sources of capital.

The study's robust result supporting the competition-stability hypothesis has an important policy implication: It witnesses that Turkish deposit banks do not distribute loans to more risky clients during the periods of the intense competition. Alternatively this finding implies that the inability of borrowers to pay back their loans is not aggravated during the fierce competition periods. In the light of these results, one may safely claim that the banking sector is not special from the perspective of stability, and suggest that intense competition does not necessarily worsen stability in this sector. Hence, just as the Competition Board applies the competition rules to any other sector, it should continue to apply these rules to the banking sector without any hesitation and limitation.

The results are also consistent with the findings in the literature in terms of other determinants of NPLs. The study shows that deteriorating economic environment such as the slowdown in economic growth and higher unemployment result in higher NPLs. As for the impact of exchange rate and inflation on NPLs, the results are rather mixed, completely parallel to the relevant literature. The direction and degree of relationship varies according to the type of loan and the banking segment examined.

The study can be extended in various ways. In the first place, instead of using aggregated sector data, it may be repeated by using bank-specific data. In addition, further work may replicate the same analysis by using alternative definitions for stability and competition.

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Treba li bankarski sektor biti izuzet od primjene zakona o tržišnom natjecanju zbog zabrinutosti za stabilnost?

Sažetak

Jedno od najkontroverznijih pitanja u literaturi o bankarstvu je odnos između konkurencije i stabilnosti u bankarskom sektoru. Preliminarna istraživanja sugeriraju da su banke osjetljivije od poduzeća koja djeluju u drugim sektorima, pa intenzivna konkurencija među bankama može dovesti do nestabilnosti. Međutim, novija istraživanja iz ovog područja opovrgavaju takve tvrdnje i argumentiraju da jača konkurencija ne mora nužno destabilizirati bankarski sektor. Tursko povjerenstvo za zaštitu tržišnog natjecanja utvrdilo je 2013. godine da su najveće banke u sektoru dogovarale kamatne stope u obliku kartela te im je stoga izreklo rekordnu kaznu. Koristeći dragocjene nalaze Povjerenstva o točnom vremenu kršenja pravila, empirijski je ispitivan odnos između konkurencije i stabilnosti na turskom tržištu kredita. U tu svrhu, istraživanje je primijenilo popularan pristup razlike-u-razlikama, koji se koristi u društvenim znanostima za procjenu diferencijalnih učinaka nekog faktora/događaja, tzv. "tretmana", na "tretiranu skupinu" u usporedbi s "kontrolnom skupinom". Rezultati pružaju snažne dokaze u korist hipoteze o konkurenciji i stabilnosti: Formiranjem kartela među depozitnim bankama, stope nenaplativih kredita gotovo svih segmenata depozitnih banaka značajno su porasle. To znači da turske depozitne banke ne plasiraju kredite rizičnijim klijentima tijekom razdoblja intenzivne konkurencije ili, alternativno, da jaka konkurencija ne rezultira većim brojem neispunjenih obveza od strane zajmoprimaca. Zaključno, može se s povjerenjem tvrditi da bankarski sektor nema poseban privilegij s aspekta stabilnosti, te se stoga preporučuje da Povjerenstvo za zaštitu tržišnog natjecanja primjenjuje pravila konkurencije na bankarski sektor bez oklijevanja i ograničenja.

Ključne riječi: Antimonopol, bankarska konkurencija, financijska stabilnost, nenaplativi krediti, vrijednost franšize.