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**BANK MARKET POWER AND NON-INTEREST
INCOME IN EMERGING MARKETS**

Canan Yildirim and Adnan Kasman

Working Paper No. 930

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Send correspondence to:
Canan Yildirim
Kadir Has University
canan.yildirim@khas.edu.tr

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Abstract

This paper examines how market power in traditional intermediation affects Turkish banks' involvement in non-interest income generating activities, in particular, fee and commission income. The results show that banks have different levels of market power in the loan and deposit markets and these, in turn, affect banks' commitment to non-interest generating activities differently. While banks with a limited market power in the loan market are engaged more in fee and commission generating activities, banks with a high market power in the deposit market are able to generate higher commission and fee income.

JEL Classification: D40, G21, G28, G34

Keywords: Banking; market power; fee and commission income; Turkish banking

ملخص

تبحث هذه الورقة قوة السوق في الوساطة التقليدية التي تؤثر على تورط البنوك التركية في الأنشطة المدرة للدخل من غير الفوائد، ولا سيما، إيرادات الرسوم والعمولات. وأظهرت النتائج أن البنوك لديها مستويات مختلفة من القوة السوقية في أسواق القروض والودائع والتزام هذه المصارف، بدورها، الذي يؤثر على الأنشطة المدرة للدخل من غير الفوائد بشكل مختلف. وفي حين أن البنوك لها قوة محدودة في سوق القروض وتشارك أكثر في الأنشطة المدرة للدخل للرسوم والعمولات. البنوك بقوتها السوقية العالية في سوق الودائع قادرة على توليد أعلى للعمولات ورسوم الدخل.

1. Introduction

There has been a long running expansion into non-interest income generating activities in banking due to financial deregulation, advances in information technologies and financial innovation (DeYoung and Rice, 2004a). Demircug-Kunt and Huizinga (2010) show that the average share of non-interest income in total operating income has increased from 0.33 in 1999 to 0.38 in 2007 in an international sample of banks from 101 countries. As evidenced recently by the global financial crisis, understanding determinants of banks' choices regarding their income and funding mix is crucial for developing financial policies to ensure not only competitive but also sound banking systems (DeYoung and Torna, 2013). Yet, only a handful of studies consider the factors determining banks' activity or business mix while the literature on the impact of increasing non-interest income on bank risk and returns is wide.¹ In particular, the impact of bank market power on banks' expansion into non-interest generating activities is scarcely examined in the literature. Hence, the objective of this study is to analyze Turkish banks' commitment or involvement in non-interest activities, in particular fee and commission income, and the role of banks' market power in traditional intermediation activities as determinants of banks' expansion into non-traditional income generating activities.

Non-interest income generating activities constitute an increasingly important revenue source for many emerging banking markets.² According to a recent report by Ernst and Young, net interest margins have gone down in many emerging markets due to key policy rates which are reduced to help stimulate the economy in the post crisis environment as well as increased price competition in the loan and deposit markets, and boosting non-interest income is one of the key strategies banks are adopting to ease margin compression (Ernst and Young, 2013). The report further finds for Turkey that banks are increasingly searching for ways to enhance their fee income by not only introducing new fees but also improving collection rates on existing fees. However, high banking fees and commissions charged by banks have been receiving huge criticism not only from Turkish consumers and unions but also the government.³ Consequently, in November 2013, the government introduced a new consumer protection law, which gives responsibility to the Banking Regulation and Supervision Agency (BRSA) for setting product and service fees, ending charging of commissions on some credit transactions and banning of early payment fees. Yet, non-interest income continues to surge in spite of political and public reactions and the measures to limit such revenues. At the same time, the Turkish Central Bank has faced sustained pressure from the government to reduce interest rates in order to promote economic growth in recent years.⁴ These observations serve as a motivation for this study and render Turkey a valuable setting for analyzing the underlying mechanisms in banks' expansion into non-interest activities. The contribution of the paper to the related literature is two-fold: First, this paper expands the existing literature on income mix or diversification in banking by examining the impact of market power in traditional intermediation function on banks' expansion into non-interest activities. Second, the paper uses a unique data from a major developing country's banking system. As discussed in Haselmann and

¹ See, for instance, Stiroh and Rumble(2006), Lepetit *et al.* (2008a), Demircug-Kunt and Huizinga (2010) and DeYoung and Torna (2013).

² Demircug-Kunt and Huizinga (2010) show that banks in developing countries have relatively more non-interest income share in total operating income (0.385) compared to developed countries (0.342).

³ Zafer Caglayan, then Economy Minister, has criticized banks for their high charges and stated that "Bank charges should not be exaggerated, but rather should be simpler. Some banks are morally corrupt about this matter." (Hurriyet Daily News, February 16, 2013).

⁴ See, for instance, Financial Times, 2014.

Wachtel (2007), banks behave differently under different institutional settings. Hence, the implications of previous studies on the banking systems of developed countries may not apply to the banking systems in the developing countries. These banking systems have unique and different characteristics warranting a proper and separate investigation. Examining market power in loan and deposit markets separately and their relationships with banks' commitment to non-interest related activities in the Turkish banking would provide valuable information to regulators, investors and customers.

Our empirical analysis covers almost all the commercial banks that were in operation in Turkey over the period 2003-2013 and encompasses two stages. In the first stage, we develop non-structural bank-level Lerner indices as proxies of bank market power in traditional intermediation activities of issuing deposits and lending. In the second stage, we examine how banks' market power in loan and deposit markets affect their commitments to non-interest related activities with the use of panel data models. A sensitivity analysis to test the robustness of our findings is also performed.

The main findings of the study can be summarized as follows. First, banks have different levels of market power in the loan and deposit markets. Second, market power in the loan and deposit markets affects banks' involvement in non-interest generating activities differently: banks with a limited market power in the loan market are engaged more in fee and commission generating activities, suggesting that banks are following a loss leader strategy in the loan market. In contrast, banks with a high market power in the deposit market are able to generate higher commission and fee income. Third, state-owned banks have significantly lower levels of fee and commission income which might be a sign of political interference in the pricing and business mix decisions of these banks.

The study is organized as follows. Section 2 discusses our approach to modelling non-interest activities and the literature that we draw on to develop our empirical approach. Section 3 gives a brief overview of the Turkish banking sector emphasizing the market structure and sector performance. Section 4 discusses the econometric specification employed in the measurement of market power and the modeling of non-interest income activities. The data and empirical results of the estimations are reported in Section 5. The last section discusses implications and concludes.

2. Modelling the Relationship between Bank Market Power and Fee and Commission Income

The increasing importance of non-interest income of banks and the impact of increased non-interest income on the financial performance of banks have been widely studied in the literature. However, only a few studies have examined bank characteristics most closely associated with heavy involvement in non-interest income generation. One of the earlier contributions, DeYoung and Rice (2004b) discuss that in the US, banking deregulation and technological advances led to increased competition, which in turn motivated banks to become more cost and revenue efficient, introduce more and better quality fee-based products and price fee-based products more efficiently. They further differentiate two resulting banking strategies that ascribe different roles to non-interest income. Under the first strategy, large banks with scale economies and low unit costs earn low interest margins since their products are essentially financial commodities. Hence, they need to generate large volumes of non-interest income in order to be profitable. Small banks, under the second strategy, operate in local markets and develop personal relationships with their customers who are small and informationally opaque. Accordingly, they can charge higher loan rates while paying a loyal depositor base lower interest rates making non-interest income activities less

important. Their empirical findings suggest that well-managed banks expand more slowly into non-interest activities while large banks and relationship banking generate non-interest income. Similarly, Rogers and Sinkey (1999) find for the US that larger banks have fewer core deposits and face more competitive interest rate conditions and hence have narrow spreads from traditional intermediation while being heavily engaged in non-traditional activities. Ciarrapico and Cosci (2011), on the other hand, argue that within the context of European banking, the distinction between transaction and relationship banking strategies as argued by DeYoung and Rice (2004b) might be too simplistic. They state that cross-selling banks or banks that have a high share of commission and fee income relative to interest income might have closer relationships with their customers, selling them personalized and high quality services, which impose on the customers high switching costs and enable the banks to achieve high market power. They empirically show that cross-selling banks have higher deposit to asset ratios and lower loan to asset ratios, suggesting that they follow a relationship marketing strategy by offering personalized services to depositors rather than a relationship lending strategy as adopted by traditional banking.

While the competitive conditions of the market are discussed in these studies as being among the drivers of non-interest income, the role of market power as an explicit determinant of banks' involvement in these activities are not analyzed systematically. There are only two recent studies considering this link empirically that we are aware of. Nguyen *et al.* (2012) in ASEAN banking markets report a non-linear relationship between market power and revenue diversification. More specifically, they show that at lower levels of market power in traditional loan and deposit markets banks focus more on revenue diversification while at higher levels they concentrate more on traditional interest generating activities. However, the study does not examine components of non-interest income. In a related study, Amidu and Wolfe (2013) examine how market power together with funding strategy affect net interest margins in emerging and developing countries in the pre-crisis period of 2000-2007.

Informed largely by these studies, our approach is founded on the premise that banks' level of involvement in non-interest generating activities depends on their market power in traditional banking activities together with financial features such as capitalization level, asset quality, ownership type, and other organizational capabilities necessary to manage such activities. The direction of the relationship between banks' market power and business mix is not straightforward. Banks generate non-interest income by performing both traditional and non-traditional banking activities. For instance, banks charge fees on transaction services provided to depositors which are traditional banking activities. In contrast, securities brokerage and insurance activities are non-traditional banking services generating non-interest income. Banks with a high market power in the traditional deposit and loan markets can generate high net interest incomes and hence may be less interested in developing non-interest income generating activities, such as trading income. A number of studies report that banks with lower net interest margins are engaged more in non-traditional activities (Rogers and Sinkey, 1999 for the US; Firth, *et al.*, 2013 and Cheng *et al.*, 2014 for China). On the other hand, high market power might enable banks to sell accompanying services to loan and deposit customers and charge high commissions and fees. Alternatively, banks might follow a loss leader strategy charging lower lending rates if they expect to increase their income from non-interest activities, in particular, from commission and fee related activities (Lepetit *et al.*, 2008b). Banks with limited market power in deposit markets and hence lacking the advantage of a relatively stable and low cost funding, conversely, could be motivated more towards developing non-interest activities that do not necessitate balance sheet funding (Rogers and Sinkey, 1999). Capital level and asset quality might also relate to banks' involvement in non-

traditional activities. Rogers and Sinkey (1999) maintain that banks may expand into non-interest activities to exploit the deposit-insurance guarantee. Alternatively, if non-interest activities reduce bank risk via diversification of earnings, there will be a negative relationship between bank risk and non-interest activities. The authors find for the US that banks heavily engaged in non-traditional activities display less risk and conclude that they were using non-traditional activities to strengthen their franchise values. Likewise Demircug-Kunt and Huizinga (2010) in an international sample of banks and Nguyen *et al.* (2012) find that well-capitalized banks have higher shares of non-interest income. In contrast, it is possible that banks faced with a poor loan portfolio or experiencing higher credit losses might pursue more non-traditional income to compensate for their losses. Nguyen *et al.* (2012), for example, find that banks expand more into non-traditional activities if they experience higher credit losses.

Other organizational capabilities such as existing branch networks and technological capabilities and/or human resources might also affect banks' business models. Rogers and Sinkey (1999) state that since certain non-traditional activities require specialization and use of advanced technology, a positive relationship is expected between size and non-traditional activities. Several studies report that large banks tend to have higher non-interest income (see, for instance, Rogers and Sinkey, 1999; DeYoung and Rice, 2004b; Demircug-Kunt and Huizinga, 2010; and Nguyen *et al.*, 2012). A stronger branch network might enable banks to adopt a traditional relationship based banking strategy rather than a transactions-oriented one as argued by van Ewijk and Arnold (2013).

It is also expected that banks' business mix vary across ownership types. State-owned banks might face political constraints in their business mix choices. Foreign-owned banks, on the other hand, may have easier access to expertise and advanced technologies necessary to innovate and hence orient better their activities to non-traditional business segments. Firth *et al.* (2013) examine whether state-owned Chinese banks have limited incentives or face restrictions to expand into non-traditional activities and the impact of ownership changes on banks' expansion into non-traditional activities. They report that only city commercial banks have higher levels of non-traditional business relative to the big-four state-owned banks while public listing motivates banks to expand into non-traditional income activities. Cheng *et al.* (2014), also for Chinese banks, report that there is a moderating effect of bank ownership structure. Specifically, it is found that the relationship between interest activities and non-interest activities in state-owned banks is stronger than that in non-state-owned banks suggesting that the former is affected more by the government controls on interest rates. In addition, Nguyen *et al.* (2012) find that foreign-owned banks have a larger proportion of non-interest income. Likewise, Pennathur *et al.* (2012) report for Indian banking that relative to private sector banks public sector banks earn significantly less fee income while foreign-owned banks earn higher fee income.

Finally, banks adopting an aggressive growth strategy might be motivated towards expanding more into non-interest generating activities when faced with a limited growth potential in the traditional intermediation services. Van Ewijk and Arnold (2013) show for the US banks that aggressive balance sheet expansion results in banks moving into capital markets and a transactions-oriented model of banking as opposed to a traditional, relationship-oriented model. The authors also find that while prior to the global financial crisis banks expanded fast into the transactions oriented model, in the aftermath of the crisis, they have concentrated on expanding their deposit bases and moved back to the traditional model. Additionally, Demircug-Kunt and Huizinga (2010) find that fast-growing banks tend to have higher non-interest income.

3. Overview of the Turkish Banking Sector

The Turkish banking system has undergone significant changes due to structural reform and liberalization processes in the last three decades. These efforts aimed to create a sound, competitive and efficient banking industry. Unfortunately, the accompanying macroeconomic instability and financial sector fragilities culminated in the financial crisis of 2000-2001. The economy contracted seriously, and several banks became insolvent. As a result, a new economic reform package was introduced in 2001. An integral element of the new package was the banking restructuring program, which aimed to improve the regulatory and supervisory framework as well as competition and efficiency in the system.

In the process, the number of banks decreased due to the purging of the weaker banks from the system and mergers and acquisitions. Moreover, new foreign banks entered the system, first by acquiring banks, which had been taken under the control of the Deposit Insurance Fund, and then through market-driven acquisitions. Benefiting from the macroeconomic stability and better institutional environment due to legal and regulatory reforms, the sector exhibited a strong growth performance in the post-restructuring period: the ratio of total assets to GDP increased from 61% in 2002 to 105% in 2013 (BAT, 2013).⁵ Notably, the sector demonstrated considerable resilience during and in the aftermath of the global financial crisis and had better profitability and capitalization levels than the CEE and BRICS countries (Yildirim, 2014).

A closer look at some sector-related statistics indicates that the sector's market structure and banks' involvement in non-traditional banking activities transformed in the process. The total number of banks in the sector decreased from 67 in 2001 to 45 in 2013 (-33%) while total number of branches increased from 6,983 in 2001 to 10,981 in 2013 (+57%).⁶ At the end of 2013, state-owned banks account for 28% of the total assets of the depository banking sector while privately owned Turkish banks and foreign-owned banks account for 48% and 14%, respectively. As for the size distribution in the total banking system there were 7 banks with asset sizes above \$40 billion, 5 banks between \$10 billion and \$40 billion, and 20 banks with less than \$10 billion. The number of banks with the above asset sizes in 2003 was 1, 6, and 39, respectively (BAT, 2003 and BAT, 2013). These figures show that fewer banks are operating with more branches suggesting that many of them have started to compete with each other in several geographical markets in the country.

In addition, the importance of off balance sheet activities (OBS) increased significantly in the post-restructuring period: the volume of OBS activities increased from \$251 billion in 2003 to around \$4 trillion in 2013 (BAT, 2003 and BAT, 2013). However, we do not observe a similar upwards trend in the net non-interest income share of operating income (Figure 1 Panel A). Indeed net non-interest income seems to be volatile during the sample period mainly due to fluctuations in trading income, which is almost uniformly negative during and in the aftermath of the global financial crisis. Fee and commission income share, in contrast, exhibits a slight positive trend. Panel B and C of Figure 1 present the evolution of fee and commission income and trading income across three ownership types, respectively. Foreign-owned banks differ from both state-owned and privately-owned banks in that they have higher fee and commission income while registering higher losses

⁵ The BAT stands for the Banks Association of Turkey. The BAT publishes annual reports called "Banks in Turkey". These figures have been taken from the report published in 2014.

⁶ These figures also include development & investment banks in Turkey. At the end of 2013, there were 32 deposit banks and 13 development & investment banks.

in trading activities. State-owned banks, on the other hand, seem to be charging lower fees and/or taking lower commissions compared to the other groups.

Operating in a stronger regulatory and supervisory environment, which also involved enhanced integration with international financial markets, Turkish banks were under pressure to improve efficiency and become more competitive. They invested substantially in new banking technologies, improved risk management capabilities and enhanced both the quality and the array of their services. Recent empirical studies find that Turkish banks' efficiency performance improved in the post restructuring environment (Aysan and Ceyhan, 2008; Gunay, 2012). Yildirim (2014), however, reports that the level of competition in the system did not increase during the same period. In particular, both Yildirim (2014) and Kasman and Kasman (2015) show that during and in the aftermath of the recent global financial crisis banks' market power as proxied by the Lerner index increased significantly. Findings from these studies taken together suggest that the observed high profit levels of the sector might not be attributable entirely to efficiency gains achieved but rather uncompetitive conduct in the sector. Akin *et al.* (2013), on the other hand, find a negative price elasticity of demand in the deposit market and a higher price elasticity of demand in the credit market. Consequently, the authors argue that switching costs and banks' market power are lower in the loan market than in the deposit market.

4. Econometric Specification

In this section, we first examine the evolution of market power in Turkish banking. In line with previous studies suggesting that market power differs in different banking market segments, such as in the deposit market vs. loan market (Maudos and Fernandez de Guevara, 2007), and in activities that generate spread vs. non-interest generating activities (Bolt and Humphrey, 2010), and also taking into account the findings of Akin *et al.* (2013), we develop separate measures of market power in the loan and deposit markets. Next, non-interest activities will be related to banks' market power in deposit and loan markets and other bank specific variables derived from the previous literature.

4.1 The measure of market power

We follow the non-structural approach to the assessment of banking competition and develop a commonly used measure of the degree of market power, namely the Lerner index. The Lerner index represents the markup of price over marginal costs and the higher the markup, the greater the market power. As opposed to other commonly used non-structural measures of market competition, such as the Panzar and Rosse H-statistic (Panzar and Rosse, 1987) or the Boone Indicator (Boone, 2004), it has the benefit of capturing the dynamics of market power at bank level over time.⁷

To generate the Lerner index, we need marginal costs for each bank. As marginal costs cannot be directly observed we estimate them by using a translog cost function, which is common in the related literature since it does not require too many restrictive assumptions about the nature of the technology. The multi-product cost function for bank i at time t is defined as:

⁷ Some recent applications of the Lerner index include, among others, Carbó *et al.* (2009), Turk Ariss (2010), Weill (2013), and Kasman and Kasman (2015).

$$\begin{aligned}
\ln C_{it} = & \alpha + \beta_L \ln L_{it} + \beta_D \ln D_{it} + \frac{1}{2} \beta_{LL} (\ln L_{it})^2 + \frac{1}{2} \beta_{DD} (\ln D_{it})^2 + \beta_{LD} \ln L_{it} \ln D_{it} \\
& + \sum_{k=1}^2 \gamma_k \ln W_{kit} + \frac{1}{2} \sum_{k=1}^2 \sum_{j=1}^2 \gamma_{kj} \ln W_{kit} \ln W_{jit} + \sum_{k=1}^2 \rho_{kL} \ln L_{it} \ln W_{kit} + \sum_{k=1}^2 \rho_{kD} \ln D_{it} \ln W_{kit} \\
& + \delta_1 \text{Trend} + \frac{1}{2} \delta_2 \text{Trend}^2 + \delta_L \text{Trend} \ln L_{it} + \delta_D \text{Trend} \ln D_{it} + \sum_{k=1}^2 \varphi_k \ln W_{kit} \text{Trend} + \varepsilon_{it}
\end{aligned} \tag{1}$$

where C is operating costs, excluding funding costs or interest expenses.⁸ Operating costs depend on two outputs: total loans (L) and total deposits (D) representing the two main components of the traditional intermediation from depositors to borrowers. Two input prices are defined and included in W_{kit} : W_{lit} is the price of labor (personnel expenses divided by number of employees) and W_{2it} is the price of administrative and other operating activities (operating expenses exclusive of personnel expenses divided by total assets). Trend is time variable specified to capture the effect of technical change over time. $\varepsilon = v + u$ is a composite error term where v represents standard statistical noise and u captures inefficiency. To ensure that the estimated cost frontier is well-behaved, two standard properties of the cost function, symmetry and linear homogeneity, are imposed. The linear homogeneity conditions are imposed by normalizing operating costs and the price of administrative activities by the price of labor. The symmetry condition is imposed by coefficient restrictions. In addition, to control for heterogeneity, operating costs as well as loans and deposits are scaled by total equity, which is a netput and accounts for the banks' risk preferences.

Marginal costs for loans (mc_L) and deposits (mc_D) are calculated according to the following equations:

$$mc_{L_{it}} = \frac{C_{it}}{L_{it}} \left(\beta_L + \beta_{LL} \ln L_{it} + \beta_{LD} \ln D_{it} + \sum_{k=1}^2 \rho_{kL} \ln W_{kit} + \delta_L \text{Trend} \right) \tag{2}$$

$$mc_{D_{it}} = \frac{C_{it}}{D_{it}} \left(\beta_D + \beta_{DD} \ln D_{it} + \beta_{LD} \ln L_{it} + \sum_{k=1}^2 \rho_{kD} \ln W_{kit} + \delta_D \text{Trend} \right) \tag{3}$$

The Lerner index of market power for loans ($LLerner$) and deposits ($DLerner$) are given in the following expressions:

$$LLerner = \frac{(r_L - r - mc_L)}{r_L} \tag{4}$$

$$DLerner = \frac{(r - r_D - mc_D)}{r_D} \tag{5}$$

⁸Following Maudos and Fernandez de Guevara (2007), the cost of funds is excluded from total costs and only the prices of two factors, labor costs and other operating expenses, are included in the function. The authors argue that including financial costs would bias the results by capturing the impact of market power in the deposit markets. Other studies following the same approach include Turk Ariss (2010), Nguyen *et al.* (2012), and Amidu and Wolfe (2013).

where r_L , r_D , and r are the loans, deposits and interbank interest rates, respectively, and mc_L and mc_D are the marginal costs. $LLerner$ and $DLerner$ represent the profit maximizing margins in a less than perfectly competitive market.

The database used in the study provides disaggregated information on interest income and expenses according to related assets and liabilities and hence does permit the construction of the prices for loans and deposits. More specifically, the loan interest rate (r_L) is calculated as the ratio of interest income on loans to total loans and the deposit interest rate (r_D) is calculated as the ratio of interest paid on deposits to total deposits. The money market rate is proxied by the yearly average of the 3-month interbank rate (TRLIBOR) reported by the Banks Association of Turkey (BAT).

4.2 The relationship between fee and commission income and market power

Based on our stance that banks' level of involvement in non-interest generating activities depends on their market power in traditional banking activities together with financial and ownership features, as discussed in Section 2, the following empirical specification is employed:

$$\begin{aligned} Fee \& \ Com_{it}(Trading_{it}) = \alpha + \beta_1 MarketPower_{it} + \beta_2 CAP_{it} + \beta_3 AssetRisk_{it} + \beta_4 Size_{it} \\ & + \beta_5 OwnControls_{it} + \beta_6 Growth_{it} + \beta_7 Crisis_t + \varepsilon_{it} \end{aligned} \quad (6)$$

where subscripts i and t index banks and years, respectively.

Following the common approach in the literature we proxy the banks' extent of expansion into non-interest activities by the share of net non-interest income in net operating income. Non-interest income includes net commission and fee income, trading income, dividend income and other non-interest income. We classify non-interest activities into two categories: fee and commission income and trading income. Trading income is made up of profit (loss) from capital market operations, profit (loss) from derivatives operations and profit (loss) from foreign exchange operations.⁹ The analysis focuses on the fee and commission income sub-category while also considering the trading income sub-category for completeness. Different components of non-interest income have different production and risk-return characteristics (DeYoung and Torna, 2013). Hence it is expected that the various factors used in our model will affect banks' level of involvement in each business activity differently, requiring analysis at the sub-category level.

MarketPower is measured by the Lerner index of market power in the loan market, deposit market or both in alternative specifications. *CAP* is the capital to total assets ratio and is included to take into account the capitalization levels and *AssetRisk* is the proxy for asset quality or credit risk and is defined as the ratio of non-performing loans to total assets. *Size* is the natural logarithm of total assets and controls for scale and scope economies. *OwnControls* are ownership dummies: State is the indicator variable for state-owned banks and Foreign for the banks in which the foreign ownership stake is at least 50 percent. Privately-owned Turkish banks are the reference category. *Growth* is defined as the change in the (log) asset size of the banks between year t and $t-1$. *Crisis* is the indicator variable for the global financial crisis which takes the value of 1 for the years 2008 and 2009. Year dummies are also included to control for unspecified intertemporal variation in the

⁹We alternatively defined trading income as non-interest income net of fee and commission income. The results from trading income and non-interest income net of fee and commission income were the same and hence we only report and discuss the results related to the former.

fee and commission income such as those due to macro-economic and business cycle effects. Table A1 in the Appendix presents definitions of the variables.

5. Data and Empirical Results

5.1 Data

Almost all commercial banks operating in Turkey between 2003 and 2013 are included in the sample.¹⁰ Annual bank level financial data and TRLIBOR were accessed through the electronic data inquiry system of the Banks Association of Turkey. The final sample is an unbalanced sample of 32 banks due to mergers and acquisitions and also banks leaving the system between 2003 and 2013. Table A2 in the Appendix presents definitions as well as descriptive statistics for the variables used to derive the Lerner index of market power and model non-interest income. Table A3 in the Appendix presents the correlations among the variables used in modelling the relationship between market power and non-interest income shares. All data are presented in year 2005 Turkish lira and winsorized at the 1st and 99th percentiles of their sample distributions in order to reduce the impact of outlying observations.

5.2 Empirical results

Figure 2 and Figure 3 show the evolution of the Lerner indexes and marginal costs, respectively, in the deposit and loan markets. First point of note to emerge from Figure 2 is that the relative market power in the loan market has been negative while displaying an increasing trend prior to 2009 suggesting that the banks were following a loss leader pricing strategy. Second, in the deposit market the relative market power has a decreasing trend up until 2009. The negative Lerner index in the loan market is mainly due to the negative spread between the loan and interbank rates rather than marginal costs, which are declining over time (see Table 1 and Figure 3). Third, in both markets, the onset of the global financial crisis seems to put an end to the observed trends; banks are no longer following a loss leader pricing strategy in the loan market. The findings of lower market power in the loan market relative to the deposit market correspond well with those of Akin *et al.* (2013).

Table 2 presents the results of regressions of fee and commission income, while analogous sets of regressions of the trading income are reported in Table 3. In both tables, specifications in Columns 1 to 3 use the Lerner index in the loan market, while specifications in Columns 4 to 6 employ the Lerner index in the deposit market. Specifications presented in the final three columns (Columns 7 to 9) include both indexes simultaneously. In each set of three regressions, the second specification includes bank ownership indicator variables, while the third includes asset growth rate as an additional control. Turning first to the regressions for commission and fee income (Table 2), the results show that banks with a limited market power in the loans market are engaged more in fee and commission income generating activities. This suggests that banks follow a loss leader strategy by charging lower lending rates, while generating higher income from commission and fee activities. The association between fee and commission income and the Lerner index of deposit market, on the other hand, is significantly positive. Hence, banks with a high market power in deposit markets are able to sell bundled services to deposit customers and charge high commissions and fees.¹¹

¹⁰ Three small foreign owned banks that left the sector early in the sample period as well as banks taken over by the Saving Deposits Insurance Fund were excluded.

¹¹ A quadratic term of the Lerner index was also included in the regression models to capture a possible non-linear relationship between fee and commission income and market power. The coefficient of the squared Lerner index in each specification was

In line with previous findings, the size variable obtains a positive and significant coefficient in almost all the specifications. However, there does not seem to be a significant relationship between our risk measures (*CAP* and *BadLoans*) and fee and commission income. That the Turkish banking regulator observes very closely both capital levels and asset quality since the crisis of 2000-01 might be the underlying reason for the non-significant relationship obtained. The global financial crisis is associated with a higher share of fee and commission income suggesting that banks expanded further into such activities to compensate for the compression in the interest margins and losses in the trading activities.¹² When ownership controls are added, state ownership is seen to be negatively and significantly related to the fee and commission income. Finally, there is some evidence that fee and commission income generating activities are associated with a slower growth rate. This could reflect that wide interest margins have been the main driver of growth in Turkish banking in recent years. When both market power measures are included simultaneously in the regressions, the preceding findings remain largely the same.

Turning to regressions where trading income is related to the same set of explanatory variables, we observe that the deposit market Lerner index is negatively associated with trading income while the loan market Lerner index obtains a statistically insignificant coefficient (Table 3). This might indicate that banks without a competitive advantage in accessing relatively stable and cheaper funding sources are motivated towards those activities that do not require balance sheet expansion. The global financial crisis indicator variable obtains a significant and negative coefficient showing that banks experienced trading losses possibly due to the heightened volatility in the markets.

5.3 Robustness checks

In this section, we assess whether our main conclusions as previously discussed remain robust when we replace our market power measures by alternative controls derived from the previous literature. Table 4 presents the results of regressions of the fee and commission income (Columns 1 to 4) and trading income (Columns 5 to 8). We first test if the level of local presence measured by the ratio of number of branches to total loans (*Local*) affects banks' business mix. A stronger branch network is associated with a traditional relationship based banking strategy rather than a transaction-oriented one and hence it might proxy market power in traditional intermediation (van Ewijk and Arnold, 2013). The proxy for the level of local presence, *Local*, obtains a negative sign in both specifications (Columns 1 and 4) as expected, but it lacks statistical significance. In the following two specifications, we employ the ratio of the number of employees to deposits (*EmpDep*) and loans (*EmpLoan*) as proxies for the degree of personalization of services (DeYoung and Rice, 2004b). The results show that banks providing more personalized services to deposit customers achieve higher levels of both fee and commission and trading income. Concerning fee and commission income, this could be suggesting that personalization of services is providing banks with market power and hence ability to charge higher fees. The positive and significant relation of *EmpDep* with the trading income, on the other hand, is surprising and might imply inefficient use of human resources in traditional lending activities. In contrast, personalization of services to loan customers (*EmpLoan*) is negatively and significantly related to commission and fee income. Hence, a traditional relationship based loan business and a transactions oriented credit business generating fee and commission income seem to be alternatives. Finally, taking into

insignificant, suggesting a linear relationship between fee and commission income and market power. The results are not presented but are available upon request.

¹² See Figure 1 Panel A for the negative trend in trading income share over time and in particular the impact of the crisis on the profitability of this activity.

account that banks' liability structure might affect the activity mix since some non-interest activities do not require balance sheet funding (Rogers and Sinkey, 1999), we test whether banks that have a higher concentration of deposits in funding sources have lower non-interest income share. Our liability structure proxy, *DepAss*, is defined as total deposits divided by total assets, and obtains a negative sign in both regressions for commission and fee income as well as trading income as expected, while failing to achieve statistical significance.

6. Conclusions

Using a panel data set of Turkish banks between 2003 and 2013, this study explores the link between market power and non-interest activities. Turkish banking provides a valuable setting for analyzing the underlying mechanisms in banks' expansion into non-interest activities due to the fact that it underwent major restructuring and regulatory reform with significant implications for bank efficiency and competitive conduct.

The study expands the literature on two accounts. First, it measures the Turkish banking market competition in two traditional market segments: loan and deposit markets. The findings indicate that the level of competition in the deposit market is lower than that in the loan market. The second contribution of the study is the modelling of non-interest related activities, while explicitly taking account of market power in traditional banking. The results suggest that market power in the deposit and loan businesses affect banks' involvement in fee and commission income differently. While banks with a limited market power in the loan market are engaged more in fee and commission generating activities, banks with a high market power in the deposit market are able to generate higher fee and commission income. In addition, the study also finds that state-ownership is associated with lower levels of fee and commission income activities implying that there might be continuing political interferences in the activity mix and/or pricing decisions of these banks.

Our study provides important implications for bank regulators and policy makers. The findings emphasize the need to understand the motivations of banks towards engaging more in non-traditional activities and the links between market power and banks' activity mix. Policy makers should take measures, which might need to differ across market segments, to improve the varying competitive conduct of banks in order to reduce intermediation costs, which are critical for economic efficiency.

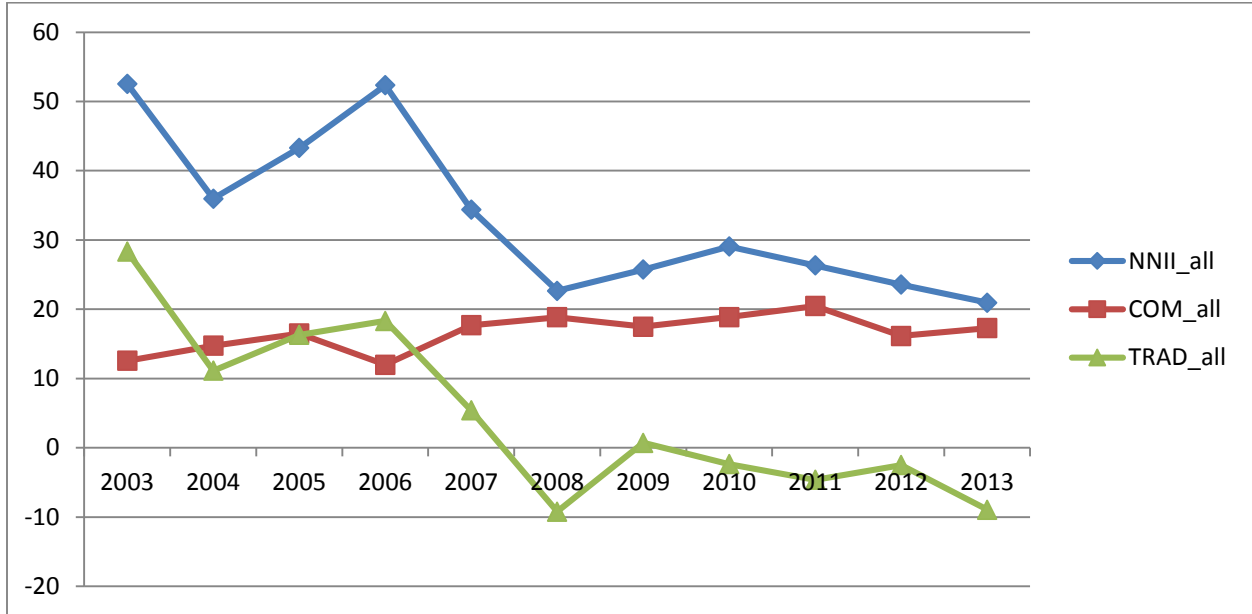
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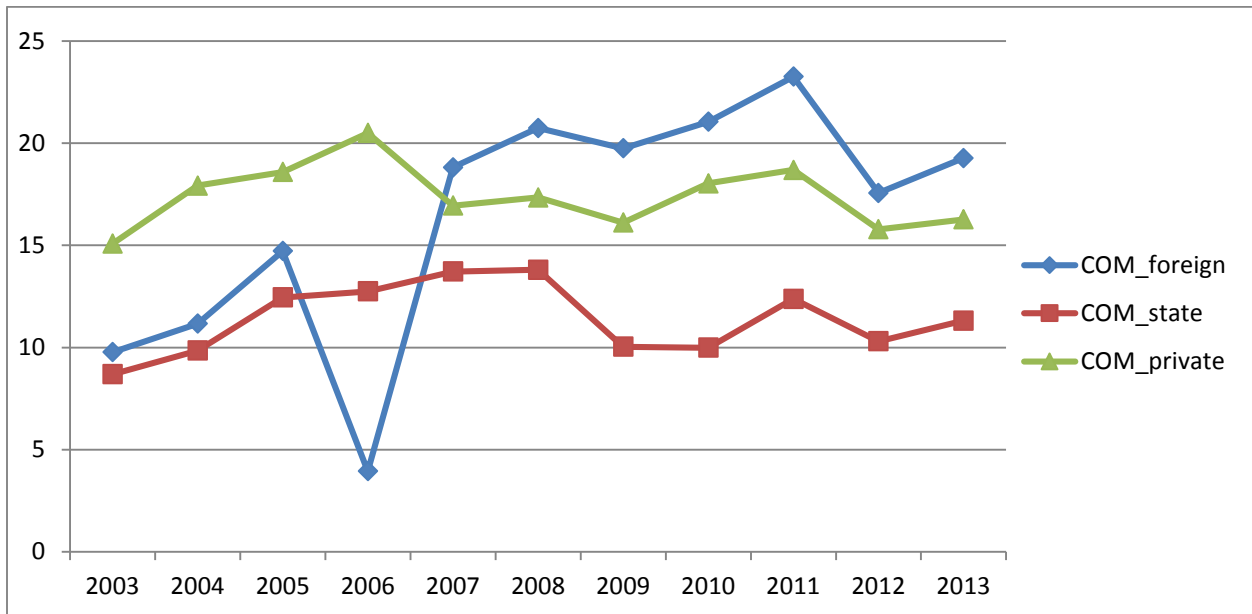
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Figure 1: Evolution of Non-Interest Income Over Time

Panel A: Net Non-Interest Income (NNII) and Its Two Components



Panel B: Commission and Fee Income across Different Ownership Categories



Panel C: Trading Income across Different Ownership Categories

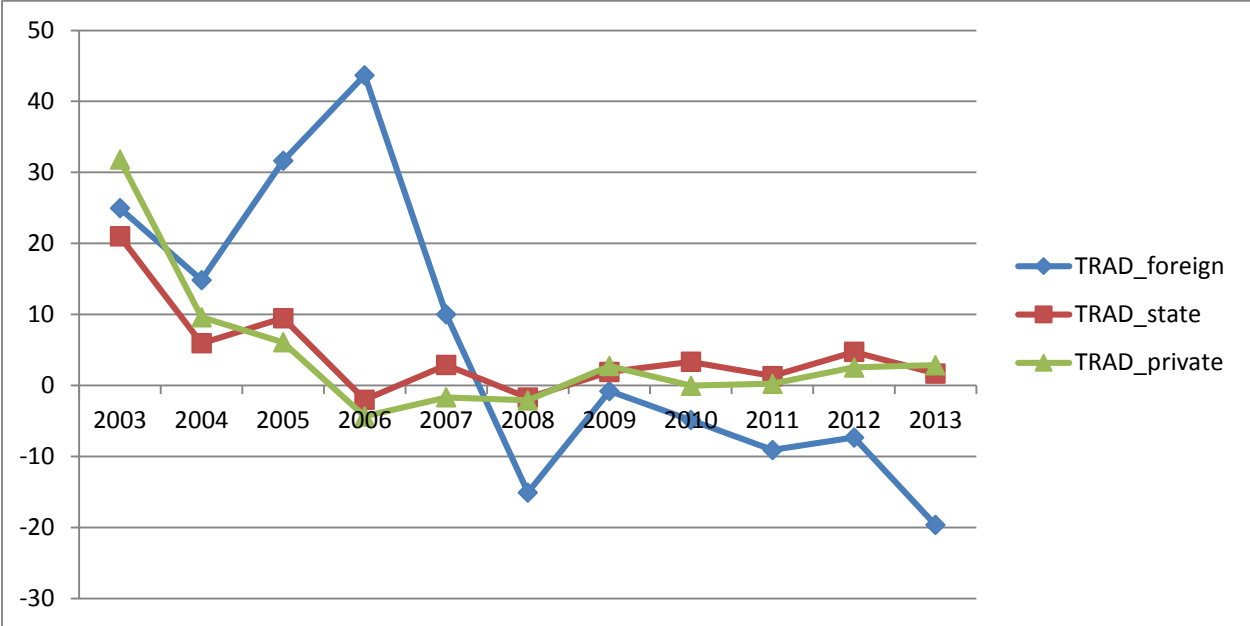


Figure 2: Lerner Indexes in Deposit (DLerner) and Loan Markets (LLerner)

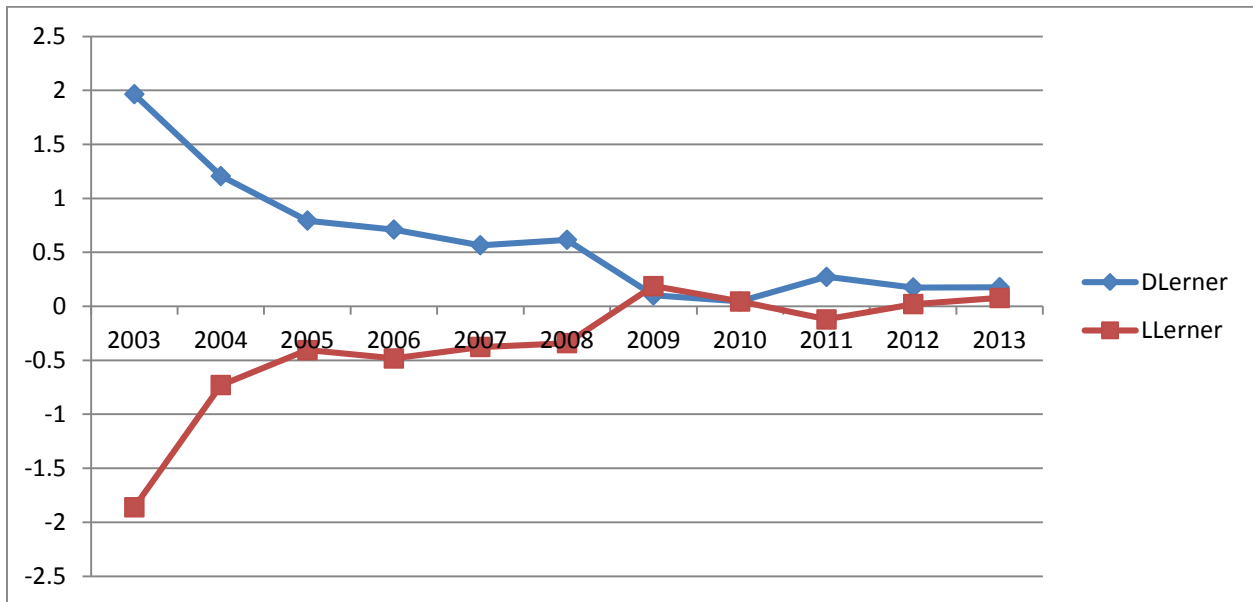


Figure 3: Marginal Costs of Deposits (MCD) and Loans (MCL)

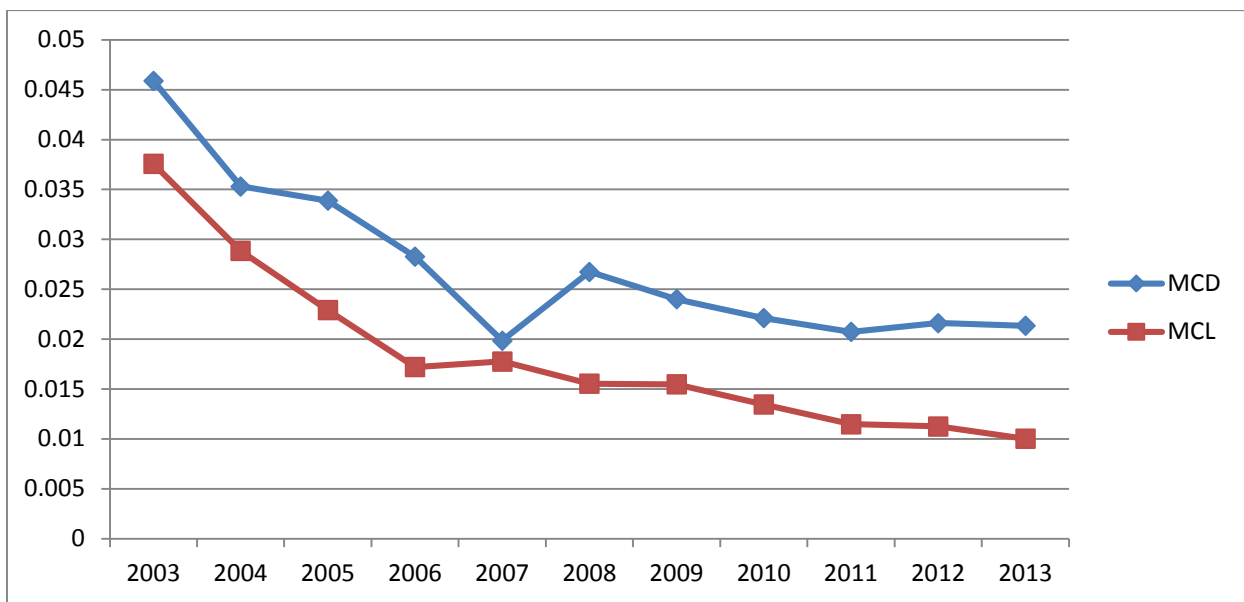


Table 1: Evolution of Marginal Costs, Interest Rates and Lerner Indexes

Year	<i>MCL</i>	<i>MCD</i>	r_D	r_L	<i>r</i>	<i>DLerner</i>	<i>LLerner</i>
2003	0.038	0.046	0.131	0.161	0.402	1.965	-1.862
2004	0.029	0.035	0.097	0.162	0.239	1.207	-0.730
2005	0.023	0.034	0.078	0.139	0.166	0.794	-0.405
2006	0.017	0.028	0.089	0.132	0.176	0.711	-0.482
2007	0.018	0.020	0.102	0.143	0.176	0.566	-0.377
2008	0.016	0.027	0.093	0.144	0.174	0.616	-0.342
2009	0.015	0.024	0.067	0.140	0.096	0.102	0.188
2010	0.013	0.022	0.051	0.094	0.074	0.045	0.046
2011	0.011	0.021	0.053	0.090	0.086	0.274	-0.121
2012	0.011	0.022	0.056	0.103	0.087	0.174	0.020
2013	0.010	0.021	0.042	0.086	0.067	0.177	0.077

Notes: *MCL*, *MCD*, r_D , r_L , *r*, *DLerner*, and *LLerner* denote marginal costs of loans, marginal costs of deposits, deposit interest rate, loan interest rate, TRLIBOR, Lerner index for deposit market and Lerner index for loan market, respectively. Marginal costs, interest rates and Lerner indexes are asset weighted averages.

Table2: Commission and Fee Income

	1	2	3	4	5	6	7	8	9
<i>LLerner</i>	-1.812*** (-4.093)	-1.954*** (-4.004)	-2.424*** (-4.029)				-1.555*** (-3.069)	-1.709*** (-3.299)	-2.371*** (-4.718)
<i>DLerner</i>				0.836*** (2.968)	0.900*** (3.112)	1.249*** (3.581)	0.724** (2.610)	0.795*** (2.875)	1.227*** (3.994)
<i>CAP</i>	0.113 (0.859)	0.131 (1.007)	0.180 (1.380)	0.142 (1.055)	0.161 (1.209)	0.202 (1.534)	0.111 (0.919)	0.131 (1.111)	0.136 (1.295)
<i>Size</i>	1.388 (1.627)	2.086** (2.712)	2.253*** (2.884)	1.436* (1.721)	2.200*** (2.945)	2.478*** (3.284)	1.753** (2.148)	2.473*** (3.449)	2.810*** (3.934)
<i>Risk</i>	0.184 (0.272)	0.283 (0.430)	-0.187 (-0.275)	0.044 (0.064)	0.128 (0.199)	-0.507 (-0.786)	0.277 (0.428)	0.399 (0.664)	-0.039 (-0.063)
<i>Crisis</i>	8.679*** (3.303)	8.549*** (3.264)	4.015 (1.609)	7.288*** (3.076)	6.916** (2.710)	2.920 (1.403)	10.499*** (4.238)	10.759*** (4.119)	2.478* (1.700)
<i>DState</i>		-9.950*** (-4.976)	-9.754*** (-4.969)		-9.974*** (-4.932)	-10.218*** (-4.694)		-10.646*** (-5.425)	-10.918*** (-5.334)
<i>DForeign</i>		-0.214 (-0.076)	0.634 (0.234)		0.250 (0.089)	0.931 (0.339)		-0.761 (-0.287)	-0.093 (-0.037)
<i>Growth</i>			-1.576 (-0.800)			-4.364** (-2.041)			-3.845* (-1.762)
<i>Constant</i>	-14.925 (-1.018)	-24.929* (-1.856)	-22.264 (-1.487)	-14.004 (-0.998)	-24.957* (-1.991)	-25.027* (-1.832)	-22.526 (-1.625)	-32.997** (-2.700)	-30.086** (-2.314)
<i>N</i>	322	322	290	322	322	290	322	322	290
<i>R</i> ²	0.064	0.095	0.102	0.066	0.097	0.109	0.085	0.120	0.141

Note: Columns report estimated coefficients (t-statistics). All specifications include year dummy variables. Equations estimated using robust standard errors clustered at bank level. ***, **, and * denote statistical significance at 1%, 5% and 10%, respectively. See Table A1 for variable definitions.

Table3: Trading Income

	1	2	3	4	5	6	7	8	9
<i>LLerner</i>	0.579 (0.272)	0.736 (0.302)	1.423 (0.481)				-0.066 (-0.047)	0.159 (0.094)	1.337 (0.554)
<i>DLerner</i>				-1.809** (-2.684)	-1.882** (-2.557)	-2.009* (-1.970)	-1.814*** (-2.870)	-1.872*** (-2.747)	-1.996* (-2.019)
<i>CAP</i>	0.338 (0.737)	0.329 (0.713)	0.284 (0.654)	0.345 (0.807)	0.327 (0.762)	0.318 (0.797)	0.344 (0.808)	0.329 (0.773)	0.355 (0.907)
<i>Size</i>	0.457 (0.296)	0.691 (0.528)	0.057 (0.047)	-0.473 (-0.361)	-0.196 (-0.174)	-0.662 (-0.605)	-0.459 (-0.309)	-0.222 (-0.179)	-0.849 (-0.653)
<i>Risk</i>	-2.021 (-1.025)	-2.075 (-1.011)	-1.831 (-0.795)	-2.263 (-1.257)	-2.324 (-1.269)	-1.807 (-0.935)	-2.253 (-1.151)	-2.349 (-1.152)	-2.071 (-0.887)
<i>Crisis</i>	-27.851*** (-4.518)	-28.957*** (-3.821)	-8.568 (-1.278)	-41.856*** (-5.559)	-43.065*** (-5.284)	-6.452 (-1.012)	-41.720*** (-5.019)	-43.422*** (-4.433)	5.408 (1.117)
<i>DState</i>		1.216 (0.328)	3.028 (1.004)		2.793 (0.768)	4.526 (1.485)		2.856 (0.728)	4.920 (1.402)
<i>DForeign</i>		2.730 (0.445)	2.136 (0.325)		3.924 (0.733)	2.742 (0.465)		4.018 (0.658)	3.319 (0.494)
<i>Growth</i>			8.742 (0.889)			12.724 (1.351)			12.432 (1.333)
<i>Constant</i>	22.216 (0.680)	18.430 (0.662)	-4.435 (-0.176)	41.633 (1.571)	36.682 (1.665)	5.437 (0.244)	41.270 (1.318)	37.429 (1.437)	8.290 (0.332)
<i>N</i>	322	322	290	322	322	290	322	322	290
<i>R²</i>	0.083	0.084	0.052	0.099	0.101	0.064	0.099	0.101	0.066

Note: Columns report estimated coefficients (t-statistics). All specifications include year dummy variables. Equations estimated using robust standard errors clustered at bank level. ***, **, and * denote statistical significance at 1%, 5% and 10%, respectively. See Table A1 for variable definitions

Table 4: Further Specifications

	Dependent Variable: Fee and Commission income				Dependent Variable: Trading income			
	1	2	3	4	1	2	3	4
<i>CAP</i>	0.229 (1.480)	0.299 (1.531)	0.236 (1.519)	0.186 (0.827)	0.156 (0.309)	0.318 (0.750)	0.200 (0.425)	0.122 (0.221)
<i>Size</i>	1.510 (1.627)	2.284** (2.377)	1.672* (1.932)	2.209*** (3.327)	-1.513 (-0.707)	0.827 (0.868)	-0.548 (-0.391)	0.857 (0.749)
<i>Risk</i>	-0.587 (-0.916)	-0.784 (-1.092)	-0.742 (-1.104)	-0.616 (-1.015)	-1.180 (-0.697)	-1.720 (-0.961)	-1.807 (-0.921)	-1.447 (-0.822)
<i>Crisis</i>	4.787** (2.098)	4.298* (1.734)	4.648** (2.053)	4.395* (1.787)	-6.859 (-1.081)	-8.868 (-1.324)	-7.772 (-1.211)	-8.709 (-1.310)
<i>DState</i>	-8.522*** (-4.124)	-9.277*** (-4.114)	-8.676*** (-4.075)	-8.523*** (-3.583)	4.829 (1.432)	2.210 (0.908)	3.791 (1.344)	3.555 (1.156)
<i>DForeign</i>	1.249 (0.476)	1.423 (0.469)	2.011 (0.670)	1.277 (0.470)	-0.499 (-0.101)	1.111 (0.212)	2.626 (0.428)	0.703 (0.149)
<i>Growth</i>	-2.852* (-1.901)	-1.145 (-0.645)	-3.042* (-1.714)	-2.356 (-1.372)	5.483 (0.512)	10.393 (1.073)	5.607 (0.512)	8.466 (0.825)
<i>Local</i>	-303.983 (-1.239)				-1371.867 (-1.478)			
<i>EmpDep</i>		7.974*** (5.808)				11.814*** (5.139)		
<i>EmpLoan</i>			-10.302* (-1.872)				-36.146 (-1.605)	
<i>DepAsset</i>				-0.103 (-0.720)				-0.200 (-0.613)
<i>Constant</i>	-9.443 (-0.532)	-23.867 (-1.288)	-12.486 (-0.747)	-14.689 (-0.816)	26.314 (0.602)	-17.807 (-0.865)	8.096 (0.270)	-3.166 (-0.125)
<i>N</i>	290	290	290	290	290	290	290	290
<i>R</i> ²	0.079	0.100	0.079	0.078	0.078	0.060	0.068	0.055

Note: Columns report estimated coefficients (t-statistics). All specifications include year dummy variables. Equations estimated using robust standard errors clustered at bank level. ***, **, and * denote statistical significance at 1%, 5% and 10%, respectively. See Table A1 for variable definitions.

Appendix

Table A1: Variable Definitions

Variable	Definition
Operating costs (C)	Personnel and other operating expenses, thousands of TL, at constant 2005 prices.
Loans (L)	Total loans, thousands of TL, at constant 2005 prices.
Deposits (D)	Total deposits, thousands of TL, at constant 2005 prices.
Price of personnel (W_1)	Ratio of personnel expenses to number of personnel (x100)
Price of administrative activities (W_2)	Ratio of administrative and other operating activities (operating expenses exclusive of personnel expenses) divided by total assets(x100)
Trend	Time trend
Total equity	Total owners' equity; thousands of TL, at constant 2005 prices.
Loan interest rate (r_D)	Ratio of interest income on loans to total loans (x100)
Deposit interest rate (r_L)	Ratio of interest paid on deposits to total deposits (x100)
Interbank rate (r)	Yearly average of the 3-month interbank rate (TRLIBOR)
Operating income	Interest income + net commission and fee income + trading income + dividend income + other non-interest income - interest expense
Fee & Com income	Ratio of net fee and commission income to net operating income (x100)
Trading income	Ratio of profit (loss) from capital market operations + profit (loss) from derivatives operations + profit (loss) from foreign exchange operations to net operating income (x100)
Dlerner	Deposit Market Power as measured by the Lerner index
Llerner	Loan Market Power as measured by the Lerner index
CAP	Ratio of owners' equity to total assets
Size	Log of total assets; thousands of TL, at constant 2005 prices.
Risk	Asset risk as measured by the ratio of bad loans to total assets (x100)
Crisis	Global financial crisis dummy which takes the value of 1 for the years 2007 and 2008.
DState	Indicator variable which takes the value of 1 for state owned banks
DForeign	Indicator variable which takes the value of 1 for foreign owned banks
Growth	Annual growth as defined by yearlychange in log real assets
Local	Number of branches to total loans (x100)
EmpDep	Number of employees to total deposits (x100)
EmpLoan	Number of employees to total loans (x100)
DepAsset	Ratio of deposits to total assets (x100)

Table A2: Descriptive Statistics

Variable	Obs.	Mean	StDv	Min	Max
Operating costs (C)	323	546856.8	684632.6	1481.284	2507355
Loans (L)	322	8964951	1.39e+07	2728	5.87e+07
Deposits (D)	322	1.15e+07	1.74e+07	1757.642	6.99e+07
Price of personnel (W_1)	323	58.011	40.688	26.889	273.474
Price of administrative activities (W_2)	323	.026	.018	.001	.152
Total equity	323	2078564	3104109	9590.194	1.21e+07
Loan interest rate (r_D)	322	.129	.062	.0194	.667
Deposit interest rate (r_L)	322	.086	.316	.002	5.697
Interbank rate (r)	323	.162	.095	.067	.402
Operating income	323	1116046	1549057	-2015.561	5691923
Fee & Com income	323	16.537	15.354	-191.218	60.853
Trading income	323	5.216	42.995	-141.058	602.173
DLerner	322	1.478	3.482	-5.922	30.535
LLerner	322	-.819	1.705	-11.810	5.398
CAP	323	15.804	10.310	3.927	66.723
Size	323	1.78e+07	2.66e+07	39148.79	1.00e+08
Risk	323	2.102		0	8.237
Crisis	323	.180	.384	0	1
DState	323	.102	.303	0	1
DForeign	323	.486	.501	0	1
Growth	291	.108	.309	-2.246	1.454
Local	322	.006	.0172	.000	.289
EmpDep	322	.111	.353	.003	6.088
EmpLoan	322	.135	.314	.007	4.820
DepAsset	322	56.106	19.121	.364	87.885

Note: See Table A1 for variable definitions.

Table A3: Cross Correlation Matrix

	Fee & Com inc.	Trading income	DLerner	LLerner	CAP	Size	Risk	Crisis	DState	DForeign	Growth	Local	EmpDep	EmpLoan	DepAsset
Fee & Com inc.	1.000														
Trading income	-0.665	1.000													
DLerner	0.139	-0.062	1.000												
LLerner	-0.147	-0.021	-0.227	1.000											
CAP	0.065	0.004	0.224	-0.299	1.000										
Size	0.052	-0.007	-0.196	0.220	-0.267	1.000									
Risk	-0.024	-0.068	-0.077	0.192	0.228	-0.095	1.000								
Crisis	0.035	-0.075	0.002	0.132	0.038	-0.007	0.124	1.000							
DState	-0.117	0.004	-0.097	0.114	-0.183	0.473	0.000	-0.000	1.000						
DForeign	0.036	-0.002	0.261	-0.270	0.349	-0.499	0.073	0.055	-0.337	1.000					
Growth	-0.041	0.067	0.152	0.055	-0.348	-0.001	-0.208	-0.081	-0.014	-0.017	1.000				
Local	-0.155	-0.129	0.169	-0.036	0.128	-0.198	0.068	-0.016	-0.043	0.035	-0.131	1.000			
EmpDep	0.144												1.000		
EmpLoan	-0.134	-0.080	0.122	-0.006	0.118	-0.199	-0.053	-0.053	-0.071	0.151	-0.123	0.778	0.078	1.000	
DepAsset	-0.089	-0.063	-0.418	0.488	-0.518	0.294	-0.036	0.032	0.307	-0.415	0.084	-0.120	-0.343	-0.054	1.000

Note: See Table A1 for variable definitions.