OWNERSHIP AND RISK IN DEPOSIT AND DEVELOPMENT BANKS

A Master's Thesis

by

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Management
İhsan Doğramacı Bilkent University
Ankara
October 2021

To my mother, God's first and greatest gift to me

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The Graduate School of Economics and Social Sciences

of

İhsan Doğramacı Bilkent University

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I certify that I have read this thesis and have found that is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science in Business Administration.

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ABSTRACT

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This thesis studies the risk-taking behavior of banks, classified according to their ownership status and deposit collectability, operating in Turkey for the sample period 2004-2020. The aim of this thesis is to investigate whether the risk-taking behavior of development and investment banks in comparison to deposit banks, state-owned and foreign banks in comparison to privately-owned banks are different from each other while also taking the global financial crisis of 2008 and the expansion of the Credit Guarantee Fund (CGF) since 2017 into account. The risk-taking behavior of banks with respect to their counterparts is measured by four variables by the fixed-effects: the natural logarithm of the Z-score, loan loss provisions ratio, non-performing loans ratio and the volatility of return on assets. Bank-level control variables employed are bank size, total loans-to-total assets ratio, return on assets, the liquidity ratio, non-interest income ratio, growth in real total assets, the listing status of banks in the equities and debt securities market of Borsa Istanbul. The macroeconomic control variable employed is the growth in real Gross Domestic Product (GDP). The results of my thesis show that depending on the risk measure used, we get different empirical results.

Keywords: Bank Risk-Taking, Development and Investment Banks, State-Owned Banks, Foreign Banks, Turkey

ÖZET

Üren, Egem Dilşad

Yüksek Lisans, İşletme Bölümü

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Bu tez 2004-2020 örneklem döneminde Türkiye'de faaliyet gösteren, ortaklık yapısına ve mevduat toplanabilirliğine göre ayrılmış bankaların risk alma davranışlarını incelemektedir. Bu tezin amacı Kredi Garanti Fonu (KGF)'nin 2017 yılından beri genişlemesini ve 2008 yılı küresel krizini göz önünde bulundurarak kalkınma ve yatırım bankalarının mevduat bankalarına göre, kamu ve yabancı bankalarının özel sermayeli bankalarına göre risk alma davranışlarının farklı olup olmadığını araştırmaktır. Bankaların karşıtlarına kıyasla risk alma davranışları dört ölçütle ölçülmektedir: Z-skorunun doğal logaritması, kredi zararı karşılık oranı, sorunlu krediler oranı ve varlıkların getirisinin oynaklığı. Banka seviyesinde kullanılan kontrol değişkenleri banka boyutu, toplam kredilerin toplam varlıklara oranı, varlıkların getirisi, likidite oranı, faiz dışı gelir oranı, reel varlıklarda büyüme, bankaların Borsa Istanbul'daki hisse senedi ve borçlanma senetleri piyasalarında listelenme durumlarıdır. Kullanılan makroekonomik control degiskeni, reel Gayri Safi Yurtiçi Hasıla (GSYH)'daki büyümedir. Tezimin sonuçları, kullanılan risk ölçüsüne bağlı olarak farklı ampirik sonuçların ortaya çıktığını gösteriyor.

Anahtar Kelime: Banka Risk Eğilimi, Kalkınma ve Yatırım Bankaları, Devlet Sermayeli Bankalar, Yabancı Sermayeli Bankalar, Türkiye

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CHAPTER I

INTRODUCTION

There are two prominent views regarding the existence of state-owned banks: development and political. The developmental view states that in countries with low levels of capital, business honesty and trust by the public, the government needs to intervene by initiating developmental foundations and establishing development and state-owned banks in the financial and economic sector which was inadequate in attracting investment funds by its private self (La Porta, Lopezde-Silanes and Shleifer, 2002). In contrast, the political view states that the main objective behind the government's intervention in the form of state-owned banks comes from fulfilling its political objectives by pleasing its loyal followers with subsidies (financial backing of politically wise projects whose efficiency is unessential), employment and other benefits through state-owned banks and enterprises (La Porta et al., 2002).

With respect to the developmental view, the reasons behind the existence of state-owned banks are also the reasons the behind the existence of development and investment banks such that they do not collect deposits, but only provide the necessary capital to firms in need of funds through loans. Therefore, development and investment, and state-owned banks are commonly observed in French-origin civil law countries such as Turkey who need additional government sourced funds to attract additional investment funds and to prevent defaulting on loans and bankruptcy.

In relation to the prominence of state-owned, and development and investment banks in Turkey, a natural curiosity comes regarding their levels of risk-taking behavior while accounting for recent significant developments in the financial and economic sector which may influence the risk-taking behavior exhibited by state-owned, and development and investment banks to differ from its usual norm.

In the literature, development and investment banks pose a threat to the stability of the financial and the economic sector by causing inflation or unavailability of loans if they engage in above average provision of loans and exhibit inferior risk management. This example is also considered risk-taking behavior which should be subject to supervision and regulations by the government which development and investment banks are not subject to because they do not collect deposits (Castro, 2018). Furthermore, state-owned banks are found to exhibit higher levels of risk-taking behavior and lower levels of stability (Anginer et al., 2014; Duchin and Sosyura,2012; La Porta et al, 1998, 2002, 2008; Srairi, 2013) whereas Boubakri et al. (2013) document that foreign ownership status of firms is positively associated with risk-taking measures indicating more risk-taking behavior. Also, usually, in the literature the sample of state-owned, privately-owned and foreign banks consist of deposit or commercial banks, and development and investment banks are ignored, except for Özşuca and Akbostancı (2016). Their sample consists of both deposit, and development and investment banks for Turkey.

In this thesis, I investigate the risk-taking behavior of development and investment banks with respect to their ownership status in comparison to deposit banks while considering the expansion of the Credit Guarantee Fund (the CGF) in 2017 and the global financial crisis of 2008.

The CGF has been established to provide guarantee for loan default, bridge financing and leasing, and collateral support for small and medium-sized enterprises (SMEs) and non-SMEs which have credibility but are not able to get loans due to insufficient collateral (KGF - Credit Guarantee Fund, 2019). It is interesting to see that the developmental view shares the same objectives of providing necessary funds to firms in need of capital with development and investment banks as well as the Credit Guarantee Fund (the CGF). The reason for the consideration of the CGF in my thesis is the expansion of the CGF in 2017 as a measure to alleviate the increased levels of uncertainty observed in Turkey. Thus, approximately 298 thousand loans with a volume of 208 billion Turkish Lira (TRY) were issued by the CGF in 2017 (Akyiğit, Seven and Yılmaz, 2021). Although, firms who got access to loans issued by the CGF due this expansion experienced increase in levels of employment and sales, and decline in their levels of credit default probability, the overall debt owed by the firms who got access to loans issued by the CGF and their probabilities of credit default increased (Akyiğit, Seven and Yılmaz, 2021). Therefore, this long-lasting negative externality may require monitoring and management regarding the debt of firms and banks involved.

The global financial crisis of 2008 had affected banks operating in several countries in the world although it started off in the United States (the U.S.) in 2008. Danışoğlu, Güner and Ayaydın (2018) show that banks in developed, emerging and frontier countries experienced a decline in their stability, measured by Z-score and consequentially, an increase in their levels of risk-taking behavior at significant levels during the post-crisis period in comparison to the U.S. banks. Additionally, the levels of decline in the natural logarithm of the Z-score is significantly higher for banks in

emerging and frontier countries in comparison to banks in the U.S. for both the pre-crisis and the post-crisis period. Overall, the results show that the negative externalities of the global financial crisis of 2008 on the risk-taking behavior of banks in Turkey are significant and therefore, the global financial crisis of 2008 is taken into consideration in my thesis.

In this thesis, I try to answer the following questions by using 29 deposit banks, and 13 development and investment banks operating in Turkey for the period between 2004 and 2020: (1) Are development and investment banks different from deposit banks in terms of risk-taking behavior? (2) Are state-owned and foreign banks different from privately-owned banks in terms of risk-taking behavior? Do deposit banks, development and investment banks, and banks overall change their risk-taking behavior (3) since the global financial crisis of 2008 as well as (4) the expansion of the Credit Guarantee Fund in 2017 in respective order?

The risk-taking behavior of banks is measured with four measures: the natural logarithm of the Z-score, the non-performing loans ratio, the loan loss provisions ratio, and the volatility of return on assets. There are four state-owned, nine privately-owned and sixteen foreign deposit banks whereas three state-owned, six privately-owned, and four foreign development and investment banks are operating in Turkey during the sample period. In the analysis, fixed effects model is used, controlling for bank characteristics, such as bank size, profitability, liquidity, growth in real total assets and listing status in the equities and debt securities market of Borsa Istanbul, and the growth in real GDP. The risk taking behavior exhibited by banks changes depending on the risk measure used in the empirical results. For the overall sample, state-owned banks are found to exhibit

higher variability in profitability and provide lower levels of provisions for loan loss whereas foreign banks exhibit lower levels of stability but higher levels of credit risk in comparison to privately-owned banks. When the risk-taking behavior of banks are compared to each other with respect to their deposit collectability, the results show that state-owned deposit banks have lower loan loss provisions as well as lower variability of profitability in contrast to state-owned development and investment banks who have higher variability in profitability in comparison to their privately-owned counterparts. Both foreign deposit, and development and investment banks exhibit lower levels of stability and higher levels of risk-taking behavior in comparison to their privately-owned counterparts. However, foreign deposit banks exhibit higher levels of credit risk specifically in comparison to privately-owned deposit banks whereas foreign development and investment banks have higher levels of variability in profitability in comparison to privately-owned development and investment banks.

When the expansion of the CGF in 2017 is controlled in the model, the results show that state-owned banks exhibit higher levels of stability, and lower levels of risk-taking behavior and provisions for loan loss irrespective of bank types in comparison to privately-owned banks since the expansion of the CGF in 2017. State-owned deposit banks provide loans with lower credit risk in comparison to privately-owned deposit banks since 2017. This shows that privately-owned deposit banks provided loans with higher credit risk. For state-owned development and investment banks in comparison to privately-owned development and investment banks, it is seen that their risk-taking behavior is similar to their deposit counterparts except for variability for profitability. As

for foreign development and investment banks, they are not significantly different from privately-owned banks in terms of credit risk following expansion of the CGF in 2017.

When the global financial crisis of 2008 stability of banks is taken into account, the results show that variability of profitability of banks decline for the overall sample. After the global financial crisis of 2008, there is no change in risk-taking behavior for foreign banks. Furthermore, the risk-taking behavior of state-owned deposit, and development and investment banks are different from each other after the global financial crisis of 2008.

This thesis is organized as follows: Chapter II presents empirical literature relevant to the research questions of this thesis. Chapter III presents the hypotheses tested, the empirical model, the variables used in the estimations, and the data employed. Chapter IV presents descriptive statistics and empirical results. Lastly, Chapter V provides the conclusion.

CHAPTER II

LITERATURE REVIEW

The literature review of this paper consists of two sections. The first section focuses on empirical studies conducted in order to understand the impact of origins of legal institutions on government, government ownership and in relation on economically significant outcomes. The second section focuses on a variety of empirical studies conducted in order to understand the impact of ownership status of banks on the risk-taking behavior of banks in different sample settings.

2.1. Empirical Literature on the Impact of the Origins of Legal Institutions, Government and Government Ownership

There has been a wide range of research conducted in order to understand the necessities and the role of the government in the formation of state-owned enterprises in the literature. However, the last twenty-three years of literature points out the role of legal framework founded or adopted in a country through colonization, conquest or free will, the case for the Republic of Turkey in its adoption of the various combinations of laws adapted from Western countries, in that country's proneness to experience certain financial and economic conditions in the long run. With respect to adoption of legal system through free-will, the Republic of Turkey is a prime case due to the influence of the French Civil Law articles on the attempts to modernize the Islamic Law during the reform movement in 1859 before the collapse of the Ottoman Empire and the adaptation of the French version of the Swiss Civil Code in 1926 after the foundation of the Republic of Turkey (Oğuz, 2005; La Porta, Lopez-de-Silanes & Shleifer, 2008).

With respect to the two pervasive legal frameworks employed in the world, common-law and French civil-law, it was found that the origin of the legal framework adopted, and the legal institutions founded in a country are significantly important for the variety of rights entitled to shareholders and creditors and ownership concentration (La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1998). The findings indicate low levels of legal protection provided to shareholders (such as remedial rights, rights designed against the intrusion of insiders and voting rights) in French civil-law countries in comparison to common law countries. Again, low levels of legal articles designed for the protection of investor and creditor rights (such as the right to take legal action for reorganization without the consent of the creditor, the right to collateral, the right of the management to await the legal settlement and the right to stay on the assets during reorganization bankruptcy; and legal reserve requirements) in the case of bankruptcy and default on loans by firms is observed in French civil-law countries in comparison to common law countries. In relation, French civil-law countries are often seen employing remedial legal methods, legal reserves and mandatory dividends in order to deal with low levels of legal protection assigned to creditor rights. An example in the case of Turkey is the legal reservation of 5 % of the net profit and the distribution of 5 % of the net profit as dividends to shareholders (Kolcuoğlu, Minasyan & Coşgüner, 2020).

When the GDP per capita is controlled, low levels of legal enforcement and quality of accounting standards are observed in French civil-law countries in comparison to common-law countries which indicate a less friendly environment for investors in French civil-law countries when compared to German civil-law and common-law countries. Lastly, in countries with a less friendly environment for investors,

corresponding to French civil-law countries, majority of shares are observed to be held by not so many owners when compared to common-law countries.

After the interpretation of the importance of origins of legal framework adopted and legal institutions founded in a country, La Porta, Lopez-de-Silanes, Schleifer and Vishny (1999) enrich the existing literature on government which was previously preceded by Schleifer (1998) on the comparison of state ownership and private ownership. The government ownership is thought to be redundant due to its inability to provide improvement on quality and decrease in costs when private ownership could provide both increase in quality and decrease in cost due to the significance of reputation of quality at stake and place among competitor firms for the private ownership (Shleifer, 1998). In addition, La Porta et al. (1999) find that countries with legal frameworks, such as socialist-law and French civil-law countries, in which the government intervenes through high levels of taxational and regulatory powers experience low levels of efficiency and quality in government and high levels of intervention by the government whereby socialist-law countries experience the least efficiency and quality and the highest governmental intervention followed by French civil-law countries, other civil-law countries and common-law countries in respective order.

After the impact of origin of laws on low levels of legal protection provided to shareholders, legal articles designed for the protection of investor and creditor rights, efficiency in government and quality in government; and high levels of intervention by the government is covered , La Porta, Lopez-de-Silanes and Shleifer (2002) next focus on government ownership of banks by stating two theories in the literature accounting for the existence of government-owned banks: development and political. The

developmental theory states the necessity of intervention by the government to initiate developmental foundations in the financial and economic sector of countries which experience low levels of capital which were inadequate for attracting investment funds, business honesty and consequential trust by the public. In contrast, the political view states the existence of intervention by the government which aims to fulfill its objectives by pleasing its loyal followers with subsidies, financial backing of politically-wise projects whose efficiency is unessential, employment and other benefits through state-owned banks and enterprises.

La Porta et al (2002) find that the average government ownership of banks in 1995 and 1970 is highest for socialist originated socialist-law countries (61.76% for 1995 and 100% for 1970) followed by French originated civil-law countries (45.45% for 1995 and 65.37% for 1970) in which Turkey belongs with an average of 56.46 for 1995 and 81.84 for 1970. The decline in the government ownership of banks but not the elimination of government ownership of banks can be observed in 1995 in comparison to 1970.

Also, the commonness of development banks is observed in French originated civil-law countries which was observed to be uncommon in socialist originated socialist-law countries, German originated civil-law countries and Scandinavian originated civil-law countries. Overall, La Porta et al (2002) show the consistency of previous results found in La Porta et al. (1998; 1999) by showing that countries with higher levels of interventionist governments, income per capita in comparison to 1960, regulations regarding banking or other areas of economic life, recurrence of price controls, corruption, roles assigned to state-owned enterprises (SOE) in economic life; and lower levels of political freedom, tax compliance, bureaucratic quality and efficiency in

governments experience higher levels of government ownership in 1995. After 10 years of their publication on the significance of the origins of law, La Porta et al. (2008) show that the results attained in previous research (La Porta et al., 1998; 1999; 2002) are still valid regarding the association of countries with French originated civil-law with higher levels of government ownership of banks and lower levels of efficient debt enforcement and legal protection of creditors and shareholders.

Within the context of government and its impact on the financial and economic sector, another perspective is brought by Duchin and Sosyura (2012) through their analysis of the linkage between government associated firms through political connections and their access to investment funds provided by the United States (U.S.) government during the global financial crisis period of 2008 and 2009. In the paper, a firm is considered to make political connections through both passive methods (such as the relationships formed between the local firm in the voting district of a politician who is running for U.S. Senate and the said politician) and active methods (such as employing politically connected employees, lobbying and making political contributions).

With these two basic methods of making political connections for firms, the paper presents three hypotheses regarding the status of a firm's political connectedness and its position during the distribution of investment funds by the government. Their first hypothesis states that government funds are more likely to be distributed to firms with political connections who are more motivated to utilize their political connections if they are performing less successfully relatively in financial and economic terms. Their second hypothesis states government funds are more likely to be distributed to firms with political connections who are willing to reduce the information asymmetry

(regarding a firm's current financial and economic status; and the estimated financial and economic conditions for the firm as well as the aggregate economy in the future) between firms and the government which will likely result in the outperformance of politically connected firms relative to politically unconnected firms. Their third hypothesis states the insignificance of a firm's political connections in the distribution of investment funds by the government.

In order to test these hypotheses, Duchin and Sosyura (2012) consider the setting and data on the Capital Purchase Program (CPP), the first and the largest Troubled Asset Relief Program (TARP) initiated by the United States (U.S.) government after the 2007 – 2008 global financial crisis, which had $204.9 billion of sources transferred to and invested in 707 financial institutions (domestically controlled banks, savings associations, savings and loan holding companies; and bank holding companies) who applied and were approved for the Capital Purchase Program (CPP) by the U.S. Treasury between October 2008 and December 2009.

The paper employs liquidity, earnings, sensitivity to market risk, management, capital adequacy and asset quality as variables of finance and demographics for which variables such as exposure to the 2007 – 2008 crisis, age, leverage (measured by total debt-to-total assets ratio), firm size (measured by the natural logarithm of market capitalization and book assets) and deposit-to-asset ratio are also controlled for. The paper employs the number of politically connected directors on a firm's board in 2008 – 2009 who are or were employed by the U.S. Congress, the U.S. Treasury and the bank; a dummy variable which takes the value of 1 if a representative from the firm's district was or is on the Subcommittee of Capital Markets or on the Subcommittee of Financial Institutions in

either 2008 or 2009, the amount of contributions made by a firm to political action committees (PACs) of political candidates as a way of supporting political campaigns; the amount of lobbying expenditures made by a firm with respect to its size in order to analyze a firm's level of political influence and an overall index of a firm's level of political connectedness in comparison to other firms in the sample dataset as distinct measures of a firm's political connections and level of political connectedness to the mentioned governmental and political institutions.

Duchin and Sosyura (2012) find that as the level of a firm's political connectedness increases, their likelihood of being approved for receival of investment funds distributed by the government increases. Also, they find a firm's tendency to apply for investment funds distributed by the government is related to its necessity for the survival of the firm, which can be observed through the firm's high levels of total debt-to-total assets ratio and low levels of capital adequacy ratio, via capitalization and the firm's level of exposure to market risk arising due to changes in risk levels of currencies, commodities and interest rates. In addition, Duchin and Sosyura (2012) find a strong and positive association between a firm's level of political connectedness and the likelihood of approval of that firm's application for the investment funds distributed by the government. The paper also found the impact of the recruitment of a director with connections to one of the firm's banking regulators as well as the impact of high levels of size, age and earnings of a firm on the likelihood of approval of that firm's application for the investment funds distributed by the government to be positive.

The theoretical and empirical literature review conducted on the impact of legal origins on economically significant outcomes is essential in comprehending the reasons behind

the employment of remedial legal requirements such as legal reserves and mandatory dividends, the commonness of state-owned enterprises (SOE) and development banks; higher levels of government-owned banks and intervention by governments; and lower levels of legal protection entitled to shareholders, creditors and investors in Turkey. The most recent study conducted by Duchin and Sosyura (2012) show that political connections are a key determinant in the approval of the application of a firm in need of additional capital, whose need of additional investment can be observed via its high levels of total debt-to-total assets ratio and low levels of capital adequacy ratio, for investment funds distributed by the government via state-owned enterprises (SOEs) even in a country like the United States (U.S.) who has English originated common-law and in relation, low levels of government intervention and government ownership of banks (La Porta et al, 1998; 2002). Therefore, it can be seen that political connections, not a firm's stable and credible financial information regarding their performance, significantly matter when a firm is in significant need of additional capital for the survival of its firm, has large enough size (the natural logarithm of total assets), has reputable age and impact in the financial and economic sector; and with political connections, applies for or requests investment funds from the government via state-owned enterprises (SOEs) via government-owned banks and financial relief programs initiated and run by the government. These current economic and legal conditions experienced in Turkey can be attributed to its French originated civil-law system which has its roots set in the reformation movement in the late 19th century before the collapse of the Ottoman Empire and the adaptation of the French version of the Swiss Civil Code in 1926 after the foundation of the Republic of Turkey. However, with the findings of Duchin and Sosyura (2012) combined with the findings of La Porta et al (1998, 2002,

2008), one can deduce that regardless of a firm's financial eligibility for further investment with adequate capital and performance level with respect to a certain standardized threshold, state-owned enterprises, banks and other financial institutions in French originated civil-law countries might exhibit higher levels of risk-taking behavior since the government is present to allocate its own funds accordingly in the case of a financial setback experienced by the bank engaged in risk-taking behavior.

2.2. Empirical Literature on the Impact of Ownership Status on Risk-taking Behavior of Banks

This section is assigned to empirical studies conducted about the impact of ownership status of banks on their risk-taking behavior. Fungáčová and Solanko (2008) examined the impact of bank characteristics (liquidity ratio, credit growth and the share of loans to individuals in total loans) on the risk-taking behavior of banks by taking size (the natural logarithm of total assets), ownership status (state-controlled, foreign and domestic private), location and the status of inclusion in the initial deposit insurance system of banks as well as macroeconomic variables proxied by Gross Domestic Product (GDP) growth for quarterly period between 1999 and 2007 for all banks in the Russian Federation. They found that larger banks with higher levels of liquidity or credit growth exhibit a higher level of stability (via higher levels of z-score). In addition, they found that the higher levels of bank size indicate higher levels of non-performing loans ratio. Also, they found that banks located in other regions other than Moscow, foreign banks and state-controlled banks exhibited higher levels of risk-taking behavior, although

state-controlled banks of a larger size demonstrated more stable risk-taking behavior in comparison to state-controlled banks of a smaller and medium size.

Laeven and Levine (2009) contribute to the existing literature by adding regulation as another main component in the research focused on understanding the impact of ownership structure of banks in the risk-taking behavior of banks. They differ from their predecessors by constricting the bank data to the 10 largest publicly-listed private banks (excluding state-owned banks) based on the 48 countries for which La Porta et al. (2008) gathered data on shareholder rights (excluding New Zealand) for the year 2001. Laeven and Levine (2009) take a wide range of regulations imposed on banks in a country into account such as deposit insurance, the minimum capital requirements, capital stringency, regulatory restrictions imposed on banks partaking in real estate activities, securities market activities and insurance activities while constructing variables for each of these factors. Also, they control for a variety of factors at the country-level such as the level of competition in banking markets, economic variance, institutional and economic development; and a variety of factors at the bank-level such as liquidity, bank size, the share of a bank' deposits in the total banking sector and bank growth as employed in previous and further research projects. Additionally, the paper employs Tobin's q as measure of bank valuation constructed to determine whether a firm or a market is under-valued, rightly valued or over-valued relatively (Hayes, 2021). In common with preceding and succeeding literature, the natural logarithm of the Z-score is preferred as measure of risk-taking by banks. Overall, Laeven and Levine (2009) found that a higher level of the restrictions imposed on a bank's activities in the case of a strong bank owner, a bank's status of deposit insurance in the case of a large bank owner with

adequate level of cash flow rights, the high level of power in the owners trigger the risk-taking behavior of banks.

The literature on the impact of ownership structure on the risk-taking behavior banks is further carried forward by Barry, Lepetit and Tarazi (2011) with their analysis on the impact of shares of stocks held by bank's shareholders with a fluctuation of less than 10% on risk-taking behavior exhibited by the set of commercial banks located in 16 European countries for the sample period between 1999 and 2005. The paper finds higher asset growth rates are observed for publicly-held banks in comparison to privately-owned banks due to lower cost and ease in capital funding through the sale of shares.

The paper employs the mean of the natural logarithm of total assets, the mean of deposits-to-total assets ratio, the mean of equity-to-total assets ratio, the mean of total operating expenses-to-total operating income ratio, loans-to-total assets ratio and net non-interest income-to-net operating income ratio to explain differences in firm size, business, leverage and efficiency of management and the quality of the variables as well as the results in respective order. Barry et al. (2011) find that differences in profitability and risk are accounted for by different shares of stocks held by different categories of owners on significant level. Specifically, as the shares of a bank's stocks held by individuals or families increase, credit and asset risk decline and as the shares of stocks held by banking institutions increase, default risk decreases due to their conventional risk-taking behavior when engaged in lending. As for public banks, the paper finds no difference in asset risk, credit risk or profitability in the case of a change in the ownership of stock shares between different categories of owners.

Overall, Barry et al. (2011) add the element of different categories of owners (banks, individual or family investors, institutional investors, managers or directors and non-financial companies) to the preceding literature who considered the restrictions imposed on a bank's activities,a bank's status of deposit insurance, the level of power in the owners, the level of cash flow rights, bank size, bank location and ownership status. Although the risk-taking behavior of banks were observed to be increasing by Leaven and Levine (2009) as the level of power of the owner (in comparison a bank's managers, debt holders and non-shareholding managers) increased, it is interesting to find that as the shares of stocks held by individuals or families, and bank institutions increased, the risk-taking behavior of banks decreased (Barry et al., 2011).

In line with the results of Barry et al. (2011), Srairi (2013) finds that family-owned banks exhibit lower levels of risk exhibited lower credit risk and higher stability in his study of the impact of ownership structure on the risk-taking behavior of 93 conventional and 40 Islamic commercial banks in Bahrain, Egypt, Jordan, Kuwait, Arabia, Sudan, Turkey, Yemen and the United Arab Emirates for the sample period 2005 – 2009. He finds the tendency of family-owned banks to prefer lower levels of portfolio diversification and to not engage in projects with high levels of risk to be the reason behind the lower levels of risk exhibited by family-owned banks. Additionally, conventional banks are found to be engaged in higher levels of credit risk in comparison to family banks.

The paper employs bank size (proxied by the natural logarithm of total assets), bank efficiency (proxied by cost-to-income ratio), return on assets (ROA), fixed assets-to-total assets ratio, business model (proxied by non-interest income-to-total operating

income ratio), asset growth, loan growth and leverage ratio as bank-level control variables. With respect to country-level control variables, the paper employs level of economic development (proxied GDP per capita), inflation (CPI), interest rates, level of banking sector development (proxied by credit to private sector-to-GDP ratio), level of competition in the banking system (proxied by the size of three largest banks-to-aggregate commercial bank size in the given country ratio), deposit insurance in a given country, the level of legal protection of shareholders' rights in a given country (proxied by an index of shareholders' statutory rights) and the minimum level of ownership share entitling a stockholder to call for an extraordinary shareholders' meeting.

In regard to the risk-taking behavior exhibited by state-owned banks in the study of Srairi (2013), it was found that state-owned banks exhibited higher levels of credit risk due to higher levels of non-performing loans-to-total loans ratio. In line with the results of Fungáčová and Solanko (2008) regarding bank size, the paper found that as the size (the natural logarithm of total assets) of a bank increases, their level of stability increases and risk decreases, due to their ability to diversify risk through a wide span of investments, loans and other financial activities. Lastly, Srairi (2013) found that as a country's levels of economic and banking sector development, legal protection of shareholders' rights and competition among banks increase, the risk-taking behavior of banks located in that country decreases.

As the literature accumulates on top of previous research, it can be seen that although the analysis of risk-taking behavior of banks are being conducted in different combinations of location, sample period and sample, the results of each study conducted are mostly exhibiting similar results with some differences which makes each

contributory research more unique in order to account for the differences which were not present or observed in previous literature.

Boubakri, Cosset and Saffar (2013) contribute to the literature with their analysis of the impact of newly privatized state-owned and foreign firms on their risk-taking behavior for 31 industrialized and 26 emerging countries for the sample period 1981 and 2007 for firms located in Latin America and the Caribbean, Africa and the Middle East, Europe and Central Asia, East and South Asia and the Pacific. However, Boubakri et al. (2013) prefer the use of 'the volatility of a firm's earnings over a period of four overlapping years within the seven-year period after privatization' as a measure of risk-taking for each newly-privatized firm in the sample in comparison in contrast to the Z-score. Overall, Boubakri et al. (2013) find state ownership status, higher levels in countries with a parliament, growth and the size of a firm to be negatively associated with its risk-taking behavior, and foreign ownership status of a firm to be positively associated with its risk-taking behavior (especially in countries with a higher level of enforcement of political rights; and in firms with less interference by the government and special veto power in regards to significant financial and operational decisions entitled to the government).

However, it can be seen that the results of Boubakri et al (2013) regarding the negative association of state-ownership status of a firm and its risk-taking behavior is not in line with the findings of the previous literature on the risk-taking behavior of banks, Duchin and Sosyura (2012), La Porta et al (1998, 2002, 2008) and Srairi (2013). It can be due to the fact that the sample dataset of Boubakri et al. (2013) consists of a wide range and different portions of observations from previously colonized English originated

common-law countries and French originated civil-law countries which were not separately analyzed in the study of Boubakri et al. (2013). Also, the difference in the risk-taking behavior of a state-owned firm and a state-owned bank should be taken into account since a state-owned firm is responsible for itself and the answer it has to give to the government. However, a state-owned bank has a wide range of portfolio of clients and are backed up by the government. Therefore, a state-owned bank, backed up by the government, might take political connections into account when transferring funds to a politically-connected firm in need of severe capital for its own survival in French originated civil-law countries and even in English originated common-law countries such as the U.S. (Duchin and Sosyura, 2012).

Anginer, Kunt and Zhu (2014) examine the relationship between competition among banks, the absolute level of risk faced by individual banks and the correlation in the risk-taking behavior of banks for 1872 publicly-listed banks located in 63 countries for the sample period 1997-2009 through the employment of 'distance-to-default (dd)', a measure of bank default risk, which was devised by Robert C. Merton (1974), in contrast the Z-score (for example, see Fungáčová and Solanko (2008), Laeven and Levine (2009), Barry, Lepetit and Tarazi (2011) and Srairi (2013)). As for measures of competition among banks in a given country, Anginer et al. (2014) employ the Lerner index, the H-statistic, bank concentration and the Hirschmann-Herfindahl index of bank concentration.

For measuring the impact of institutions and regulations on systemic risk and competition within the banking sector of a given country, the paper employs three categories of variables: measures of the restriction or enablement of competition via

state policies (entry barrier index, percentage of applications denied to establish a bank, the portion of banks which are 50% or more owned by the government), measures of supervision and bank regulations (capital stringency index, supervisory power index for measuring the level of power that a supervisory authority has in order to correct or prevent certain actions, bank asset diversification index) and measures of investment protection (deposit insurance coverage ratio, credit information sharing depth, investor protection index). As for bank-level control variables, the paper employs similar measures as done so by preceding studies mentioned previously: bank size, loan loss provisions-to-total assets, market value of total assets-to-book value of total assets ratio, net income-to-total assets in order to proxy for profitability, non-interest income-to-total operating income and reliance on non-deposit short-term funding. As for country-level control variables, different from preceding studies, the paper employs a measure of global integration (proxied by '[imports (goods and services) + exports (goods and services)]-to-GDP') and a measure of banking sector development (proxied by private credit-to-GDP).

Overall, Anginer et al. (2014) find that countries with higher levels of bank size, volatility in GDP growth, banks with market power, the natural logarithm of the number of banks, deposit insurance, government ownership of banks and restrictive public policies regarding competition; and lower levels of profitability for banks, market-to-book ratios, trade-to-GDP ratios, competition, investor protection, private monitoring and supervision exhibit higher levels of systemic risk. Also, systemic risk and fragility increase in response to an increase in the government ownership of banks. In conclusion, the paper finds banks' tendency to diversify risks to increase in response to high levels

of competition which in relation decreases the systemic risk and fragility; and increases the stability of the banking sector.

Haque and Shahid (2016) present another study on the impact of ownership status (state-owned, privately-owned and foreign) on the risk-taking behavior and profitability of banks with a sample of 55 commercial banks in the Republic of India for the period 2008 – 2011. In line with previous studies, they find that government ownership of banks is positively associated with default and credit risk of bank whereas it is negatively associated with profitability of banks due to inferior levels of risk management and the prolonging of credits experienced in the Republic of India. There is also a positive association between foreign ownership of banks and default risk.

Zhu and Yang (2016) focus on the impact of state ownership of banks on risk-taking behavior of commercial banks and the impact of foreign acquisition of commercial banks on the risk-taking behavior of state-owned commercial banks using 123 commercial banks as sample data and differences-in-differences as the paper's methodology for the sample period 2002 - 2013 in China. The paper employs similar risk-taking measures as those employed in prior studies such as capital adequacy ratio, credit risk, liquidity coverage ratio, non-performing loans ratio and return volatility whereby higher levels of non-performing loans ratio, and lower levels of capital adequacy ratio and liquidity coverage ratio are interpreted as higher levels of risk-taking behavior exhibited by banks. As for return volatility (σ(return on equities)), measured with a rolling window of 3 years, a higher level is indicative of higher levels of return volatility for banks. Also, similar bank-level control variables were employed in

comparison to prior studies examined in the literature review such as bank size, return on assets (ROA), income diversification and revenue growth.

Zhu and Yang (2016) found that government-owned banks exhibit higher levels of bank size, non-performing loans ratio, return on assets, risk and volatility of return on equity (σ(return on equities)); and lower levels of capital adequacy ratio, income diversification and liquidity coverage ratio than foreign banks in China. The findings of Zhu and Yang (2016) about the positive association of government-ownership of banks and their risk-taking behavior is in line with most of the previous literature, Duchin and Sosyura (2012), La Porta et al (1998, 2002, 2008) and Srairi (2013), except for Boubakri et al. (2013). The paper, unlike previous studies mentioned, also takes the foreign acquisition of government-owned banks into account which yields decline in the risk-taking behavior of government-owned banks after its acquisition by foreigners. Lastly, Zhu and Yang (2016) find that higher levels of risk-taking behavior are exhibited by government-owned banks which are controlled by the local or the central government in comparison to state-owned enterprises (SOEs).

Özşuca and Akbostancı (2016) examine the impact of interest rate changes on the risk-taking behavior exhibited by the deposit banks and the development and investment banks in the Republic of Turkey for the sample period between the 1st quarter of 2002 and the 1st quarter of 2012. The risk-taking measures employed by Özşuca and Akbostancı (2016) are similar to those employed by previous studies (Srairi (2013, Zhu and Yang (2016)): non-performing loans-to-total loans ratio, z-score (the natural logarithm of the z-score) and standard deviation of return on assets (σ(Return on Assets)) with a rolling time window of three years, except for 'expected default

frequency (EDF)'. As for measures of monetary policy behavior, the paper employs the deviation of interest rate from a benchmark level for the evaluation of monetary policy behavior and the quarterly change in the interbank interest rate to account for the risk-taking behavior exhibited by banks influenced directly by interest rates. As for bank-level control variables, the paper employs the natural logarithm of total assets (proxy for bank size), liquid assets-to-total assets ratio (proxy for liquidity) and shareholders' equity-to-total assets ratio (proxy for capitalization) as employed in previous studies ((Fungáčová and Solanko (2008), Laeven and Levine (2009), Zhu and Yang (2016)). As for country-level control variables, the paper employs GDP, HHI and quarterly changes in the returns of the stock market, a proxy for improvements in the collateral and net worth of borrowers. Different from previous studies, the paper takes global-level financial and economic variables into account: the Cboe Volatility Index (VIX). It is to measure uncertainty in the market.

Overall, the findings of Özşuca and Akbostancı (2016) for the Republic of Turkey during the 2002 – 2012 sample period regarding the size, capitalization, competition and liquidity measures are in line with the findings of prior studies mentioned in this chapter such that lower levels of bank size, capitalization, competition and liquidity are associated with higher levels of risk-taking behavior by banks. With respect to country-level control variables, of Özşuca and Akbostancı (2016) find that risk-taking behavior of banks decrease as the GDP growth rate and stock market prices increase and interest rates decline. The findings of Özşuca and Akbostancı (2016) are important for the study conducted in this paper due to the general picture presented for the relationship between

the measures employed to proxy for the risk-taking behavior of banks, bank-level and country-level factors.

Samet, Boubakri and Boubaker (2018) continue their contributions with analysis of the impact of the ownership status of 6816 unique and active commercial banks on their risk-taking behavior in 77 countries for the sample period 2000 – 2015, divided into sub-sample periods of 2000 – 2007 (pre-crisis) and 2008 – 2015 (post-crisis). They use the of the Z-score as a proxy for distance-to-default and bank stability to measure risk-taking behavior of banks. For bank-level control variables, Samet et al. (2018) employ bank size (the natural logarithm of total assets), total asset growth, ownership status dummy variable, and a dummy variable for the share of total deposits in the sector. For country-level control variables, they employ an index of creditor rights, a dummy variable which takes the value of 1 if a country has deposit insurance and 0 otherwise, GDP, HHI, inflation, an index of enforcement efficiency regarding debts and an indicator for countries with common law.

Overall, Samet et al. (2018) find that publicly-owned banks exhibit lower levels of risk-taking behavior in comparison to privately-owned banks. Also, banks exhibiting higher levels of asset growth are engaged in lower levels of risk-taking behavior. They find lower levels of risk-taking behavior exhibited by banks in countries with higher levels of efficiency in debt enforcement and common law (are in line with the findings of La Porta et al. (1998; 1999; 2002; 2008)); lower levels of inflation and higher levels of GDP and without deposit insurance.

A more recent study by Kanagaretnam, Lobo, Wang and Whalen (2019) focus on the impact of societal trust, measured by a dummy which takes the value of 1 if respondents

answer "Most people can be trusted" and 0 if respondents answer "Can't be too careful" to the question "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" asked to respondents participating in the World Value Survey (WVS) whereby a higher value indicates higher levels of societal trust, on the risk-taking behavior of banks in 40 countries for two sample periods of 2000 – 2006 (pre-crisis) and 2010 – 2012 (post-crisis). The Z-score and standard deviation of net interest margin (σ(net interest margin)) are employed as measures of risk-taking behavior exhibited by banks. For bank-level and country-level control variables, Kanagaretnam et al. (2019) employed almost similar variables in comparison to prior studies mentioned in this chapter with the exception of net interest revenue growth of a bank (for a bank-level control variables). In addition to prior studies mentioned in this chapter, Kanagaretnam et al. (2019) take 'a governance index variable (GI)' which accounts for the cross-country difference in the quality of governance based on control of corruption (whereby a higher value indicates higher levels of efficiency in corruption control), government effectiveness (proxies for the quality in policy development), political stability (proxies for competition promoted by government policies), regulatory quality (proxies for perceptions regarding the quality in regulation and policies), and voice and accountability (proxies for a country's level of democracy and freedom of speech). They find that a strong and negative association between societal trust and risk-taking behavior exhibited by banks and a lower probability of financial failure being experienced in countries with higher levels of societal trust for pre and post-crisis periods.

Jeon, Wu, Guo and Chen (2019) focus on the impact of market power in the risk-taking behavior of 1000 existing and non-existing commercial banks in 35 emerging countries (in Asia, Central and Eastern Europe and Latin America) for the sample period 2000 – 2014. The efficiency-adjusted Lerner index is used as a measure of market power of banks whereas the Z-score is used as a measure of risk-taking behavior and bank stability. Jeon et al. (2019) employ similar bank-level and country-level control variables to those studies mentioned. Overall, they find that higher levels of stability and lower levels of risk-taking are experienced when banks have higher levels of market power.

Lastly, Brandao-Marques, Correa and Sapriza (2020) examine the impact of government support and regulation on the risk-taking behavior of at most 321 banks (subsidiaries excluded) rated by Moody's Investors Service, Inc. or Fitch Ratings Inc. in 54 countries for the sample periods 2003 – 2004 and 2009 – 2010. The paper employs z-score as a measure of bank risk-taking behavior. As for measures of bank regulation, bank-level and country-level control variables, Brando-Marques et al. (2020) employ similar measures to those employed by prior studies examined in this chapter. As for measuring 'bank support', the paper employs the difference between 'bank-financial strength ratings (BFSR)' assigned by Moody's Investors Service Inc. to banks in approximately 90 countries and the long-term foreign currency deposit rating of the correspondent bank. Overall, in regards, to the impact of government support, their paper finds a significant positive relationship.

In general, state-owned banks and firms are found to be engaged in higher levels of risk-taking behavior measured by various risk-taking measures, except for Boubakri et al. (2013) who find higher levels of risk-taking behavior for foreign firms.

CHAPTER III

DATA & METHODOLOGY

This chapter consists of four subsections. The hypotheses tested, the empirical model and variables used in the estimations, and the data employed are explained in this chapter.

3.1. Hypotheses

The following four hypotheses are tested in this thesis about the risk-taking behavior of Turkish deposit and development and investment banks:

Hypothesis 1: There is no significant difference between deposit banks and development and investment banks in terms of their risk-taking behavior, controlling for bank and macroeconomic characteristics.

Hypothesis 2: There is no significant difference between risk-taking behavior of banks in terms of their ownership, Hence, the risk measures of state-owned and foreign banks are not significantly different than private banks.

Hypothesis 3: The riskiness of banks in Turkey did not change with the expansion of the Credit Guarantee Fund in 2017.

Hypothesis 4: The Global Financial Crisis of 2008 did not affect the risk-taking behavior of banks operating in Turkey.

These four hypotheses are tested for all of the banks in the sample as well as for deposit banks and development and investment banks separately.

3.2. Empirical Model

The following major fixed-effects model is used in order to test the first two hypotheses:

$$Risk_{it} = (\beta_1 \times SOB_{it}) + (\beta_2 \times FB_{it}) + (\beta_3 \times DEVELOPMENT_{it})$$
$$+ (\alpha \times BANK\_CONTROLS_{it-1}) + (\gamma \times MACRO_{t-1}) + \tau_t + \varepsilon_{it}$$

where $Risk_{it}$ is the risk-taking measures of bank i in year t; SOB_{it} is a dummy variable for state-owned banks; FB_{it} is a dummy variable for foreign bank; $DEVELOPMENT_{it}$ is a dummy variable for development and investment banks; $BANK\_CONTROLS_{it-1}$ indicates the bank characteristics that are controlled in the model based on the findings in the literature, including size, listing status of banks; $MACRO_{t-1}$ indicates the real growth rate of GDP in year $t-1$; τ_t is the year fixed-effects and ε_{it} is the error term. There are a total of 42 banks used in the analysis. The model is estimated for the time period between 2004-2020. β_1, β_2, α, γ are the coefficient variables.

In order to test the third and the fourth hypotheses, two dummy variables are created for the periods indicating the period after 2008 for the global financial crisis and the period after 2017 for the credit guarantee fund.

In the first model, only the natural logarithm of real total assets, the listing status of banks, total loans-to-total assets, return on assets and the growth in real GDP is controlled. Then, the other bank characteristics are added to the model one by one. The first model is presented because there are no changes in the impact of other control variables.

3.3. Definition of Variables

The independent and dependent variables employed in the paper are listed and explained for in Table

Risk-taking Measures: The risk-taking behavior of banks is measured by using four variables that are widely used in the literature. They are the natural logarithm of the Z-score, InZ_Score_{it}, non-performing loans ratio, $w\_NonPLoans_{it}$, loan loss provisions ratio, $ProvforLoans_{it}$, and the volatility of return on assets, σRoA_{it}.

> **The Natural Logarithm of the Z-score:** Z-score is employed as a measure of risk-taking, fragility and stability of banks in the literature (for example, see Fungáčová and Solanko (2008), Srairi (2013), Barry et al. (2011), Boubakri et al. (2013), Samet et al. (2018), Kanagaretnam et al. (2019), Jeon et al. (2019) and Brando-Marques et al. (2020)). Similar to Laeven and Levine (2009) and Özşuca and Akbostancı (2016), the natural logarithm form of the Z-score, INZ_Score_{it}, is taken because of the above average skewed nature of the Z-score. The higher values of this score indicate stability of banks whereas lower levels indicate fragility of banks. It is calculated as follows:

$$INZ\_Score_{it} = \ln\left(\frac{Return\ on\ Assets_{it} + Equity\ Ratio_{it}}{\sigma RoA_{it}}\right)$$

> where equity ratio is defined as total shareholders' equity-to-total assets ratio. The volatility of return on assets, σRoA_{it}, is calculated as the standard deviation of return on assets with a rolling window of 3 years:

$$\sigma RoA_{it} = the\ volatility\ of\ Return\ on\ Assets_{it} = \sigma\left(\frac{Net\ Income_{it}}{Total\ Assets_{it}}\right)$$

Non-performing Loans Ratio: The non-performing loans ratio, $w\_NonPLoans_{it}$, is employed as a measure of credit risk of a bank. In the literature, Fungáčová and Solanko (2008), Srairi (2013), Zhu and Yang (2013), and Özşuca and Akbaş (2016) also used this measure as a measure of bank risk. The higher values of the non-performing loans ratio indicate higher levels of risk-taking behavior, particularly credit risk, exhibited by banks. According to Srariri (2013), state-owned banks are expected to have a higher non-performing loans ratio. This variable is winsorized to limit the impact of outliers in the data. It is calculated as follows:

$$w\_NonPLoans_{it} = \text{Non} - \text{performing Loans Ratio}_{it} =$$

$$\left(\frac{Loans\ under\ Follow-up\ (Gross)_{it}}{Total\ Liabilities_{it}} \right)$$

Loan Loss Provisions Ratio: The loan loss provisions ratio, $ProvforLoans_{it}$, is employed as a measure of risk-taking behavior as Anginer et al (2014). The higher values of the loan loss provisions ratio indicate higher levels of expense set aside by banks in the case of a potential late loan payment, defaults on loans and loan payments by customers. The higher the loan loss provision ratio of a bank, the higher the risk-taking behavior of a bank. It is calculated as follows:

$$ProvforLoans_{it} = \text{Loan Loss Provisions Ratio}_{it}$$

$$= \left(\frac{\begin{array}{c} Provision\ for\ Loans \\ or\ Other\ Receivables_{it} \end{array}}{Total\ Assets_{it}} \right)$$

The Volatility of Return on Assets: The volatility of return on assets, σRoA_{it}, is employed as a last measure of risk-taking behavior of banks as in Laeven and Levine (2009) and Özşuca and Akbostancı (2016). This measure provides an explanation for whether the movements in the Z-score are due to the banks' levels of available capital or asset risk. The higher levels of volatility of return on assets indicate higher levels of risk-taking and asset risk. It is the standard deviation of RoA_{it} of a bank over three-year period.

Listing Status Dummy Variable: Two dummy variables are created for the listing status of banks: for equity listing, BI_Equity_{it}, and for debt securities, BI_Debt_{it}. These variables take a value of one if a bank is allowed to list their stocks and bonds at Borsa Istanbul, respectively, and zero otherwise.

Bank Type Dummy Variable: There are two types of banks: Deposit collecting banks, $Deposit_{it}$, and development and investment banks, $DevInv_{it}$. These variables take the value of one if the bank is a deposit bank (or development and investment bank in the case of $DevInv_{it}$) and zero otherwise.

Ownership Status Dummy Variable: Ownership status of banks are measured by three dummy variables: state-owned ($State_{it}$), foreign ($Foreign_{it}$) and privately owned banks ($Private_{it}$). The banks under deposit insurance fund are not included in the estimations. In the literature, it is found that state-owned banks are more fragile, have lower levels of z-score (Anginer et al., 2014), and show higher levels of risk-taking behavior (Duchin and Sosyura (2012), La Porta et al (1998, 2002, 2008) and Srairi

(2013) whereas Boubakri et al. (2013) document that foreign ownership status of firms is positively associated with risk-taking measures indicating more risk-taking behavior.

Credit Guarantee Fund Dummy Variable: Credit guarantee fund, CGF_t , is a dummy variable and takes the value of one for the years 2017, 2018, 2019 and 2020, and zero otherwise. Considering the expansion of the credit guarantee fund after 2017, the interaction variables, CGF_SOB_{it} and CGF_FB_{it}, are employed in order to test how state-owned banks and foreign banks change their risk-taking behavior with the expansion of credit guarantees:

$$CGF\_SOB_{it} = (CGF_t \times State_{it})$$

$$CGF\_FB_{it} = (CGF_t \times Foreign_{it})$$

Global Financial Crisis of 2008 Dummy Variable: A dummy variable indicating the period after the global financial crisis of 2008, $GFC2008_t$, which takes the value of one for the years between 2009 and 2020, and zero otherwise. Considering the widespread impact of the crisis globally in and after 2008, the interaction variables, GFC_SOB_{it} and GFC_FB_{it}, are employed in order to investigate how state-owned and foreign banks change their risk-taking behavior after the global financial crisis of 2008 (the GFC). They are calculated as follows:

$$GFC\_SOB_{it} = (GFC2008_t \times State_{it})$$

$$GFC\_FB_{it} = (GFC2008_t \times Foreign_{it})$$

Growth of real Gross Domestic Product (GDP): The growth of real Gross Domestic Product (GDP) adjusted for the year 2020, $\Delta\prod GDP_{it-1}$, is controlled in the model as in

Fungáčová and Solanko (2008), Anginer et al. (2014), Özşuca and Akbostancı (2016) and Samet et al. (2018). A negative relationship is expected between growth rate in the economy and bank's risk taking based on the evidence from the literature.

$$\Delta \prod GDP_{it-1} = the\ growth\ of\ real\ GDP_{it-1} = \left(\frac{\prod GDP_{it} - \prod GDP_{i(t-1)}}{\prod GDP_{i(t-1)}}\right)$$

where '$\prod GDP_{it-1}$' is the annual GDP adjusted for the Consumer Price Index (CPI).

Capital Adequacy Ratio: The capital adequacy ratio, w_CAR_{it}, is one of the bank characteristics controlled in the model, similar to Duchin and Sosyura (2012), and Zhu and Yang (2016). The higher values of the capital adequacy ratio indicate higher levels of available capital funding and in relation, lower levels of risk-taking behavior exhibited by banks and higher levels of stability. In order to eliminate the effect of extreme values, it is winsorized at five percent level. It is calculated as follows:

$$w\_CAR_{it-1} = Capital\ Adequacy\ Ratio_{it-1}$$

$$= \left(\frac{Tier\ 1\ Capital_{i(t-1)} + Tier\ 2\ Capital_{i(t-1)}}{Risk - weigted\ Asstets_{i(t-1)}}\right)$$

Liquidity Ratio: The liquidity ratio, $LiqAtoTA_{it-1}$, is another bank characteristic employed to control for the ability of a bank to pay off its current liabilities. In the literature, Fungáčová and Solanko (2008), Laeven and Levine (2009), Duchin and Sosyura (2012), Zhu and Yang (2016), and Özşuca and Akbostancı (2016) also control for banks' liquidity in examining the risk-taking behavior of banks. It is calculated as follows:

$$LiqAtoTA_{it-1} = Liqudity\ Ratio_{it-1} = \left(\frac{Liquid\ Assets_{it-1}}{Total\ Asstets_{it-1}}\right)$$

Total Loans-to-Total Assets Ratio: The total loans-to-total assets ratio, $TLtoTA_{it-1}$, is a bank-level control variable employed to measure how much of total assets is financed by creditors through debt instead of owners through equities (for example, see Barry et al (2011), and Duchin and Sosyura (2012)). The higher levels of total loans-to-total assets ratio indicate higher levels of risk-taking by banks and default risk. It is calculated as follows:

$$TLtoTA_{it-1} = Total\ Loans-to-Total\ Assets\ Ratio_{it-1} = \left(\frac{Total\ Loans_{it-1}}{Total\ Assets_{it-1}}\right)$$

Measures of Bank Size: The size of bank is measured with two variables: the natural logarithm of real total assets of a bank, $In\prod TA_{it-1}$. Bank size is included in the model based on the results of the studies by Fungáčová and Solanko (2008), Barry et al. (2011), Duchin and Sosyura (2012), Srairi (2013), Boubakri et al. (2013), Anginer et al. (2014), Özşuca and Akbostancı (2016), Samet et al. (2018), and Jeon et al. (2019). In general, larger banks are expected to exhibit lower levels of risk-taking behavior due to their ability to diversify their risk through a wide span of investments, loans and other financial activities. Total assets of all banks are expressed in terms of 2020 data.

Asset Growth: In addition to bank size, the growth rate of bank's assets, $\varDelta\prod TA_{it-1}$, is included in the model as in Samet et al. (2018). Banks exhibiting higher levels of asset growth are expected to engage in lower levels of risk-taking behavior. The asset growth rate is estimated as follows:

$$\varDelta\prod TA_{it-1} = \left(\frac{In\prod TA_{it} - In\prod TA_{i(t-1)}}{In\prod TA_{i(t-1)}}\right)$$

Return on Assets: Return on Assets, $RoA_{i(t-1)}$, is also controlled in the regression model in order to measure the amount of profit that a bank can generate from its assets (for example, see Srairi (2013), Zhu and Yang (2016)). It is the ratio of total profit to total assets.

Non-interest Income Ratio: The non-interest income-to-total operating income ratio, $NIInctoTOI_{i(t-1)}$, is a bank-level control variable employed to measure how much of the income comes from transaction and deposit fees in comparison to interest (for example, see Barry et al (2011), Srairi (2013) and Anginer et al. (2014)). The higher levels of non-interest income-to-total operating income ratio indicate higher levels of risk-taking by banks and default risk. It is calculated as follows:

$$NIIncTOI_{i(t-1)} = Non - Interest\ Income - to$$
$$- Total\ Operating\ Income\ Ratio_{i(t-1)}$$
$$= \left(\frac{Non - interest\ Income_{i(t-1)}}{Total\ Operating\ Income_{i(t-1)}} \right)$$

In order to eliminate potential endogeneity, the lagged values of the control variables are included in the estimations as the name of each variable implies. The models are estimated by using robust standard errors. Standard errors are adjusted for heteroskedasticity and autocorrelation.

3.4. Data

All of the banks included in the sample are deposit banks, and development and investment banks which are members of the Banks Association of Turkey for the sample period between 2004 and 2020. The sample consists of 714 observations and 42 banks which were legally active during the period analyzed.

Except for the listing status of banks, all bank-level data are acquired from the financial statements obtained from the Banks Association of Turkey and the official website of Public Disclosure Platform.

There are 28 deposit banks, and 13 development and investment banks operating in Turkey during the sample period. There are three state-owned, nine privately-owned and sixteen foreign deposit banks whereas three state-owned, six privately-owned, and four foreign development and investment banks in 2020. One deposit bank is under the control of the deposit insurance fund. The listing status of all banks in both the equities and the debt securities market of Borsa Istanbul are summarized in Table 1.

The ownership and listing status of banks changed during the sample period. We observe that 11 banks (one privately-owned deposit bank, seven foreign deposit banks and three foreign development and investment banks in t2020) out of 42 banks in the sample experienced changes in ownership status during the sample period.

Three state-owned deposit banks are listed in the debt securities market of Borsa Istanbul. All of them can sell their debt securities to qualified investors whereas only Turkiye Halk Bank and Turkiye Vakiflar Bank are listed in the equity market of Borsa Istanbul. There were no changes in their ownership status during the sample period.

Among the nine privately-owned deposit banks in 2020, only one of them (Fibabank) experienced a change of ownership status during the sample period. In terms of their listing status in the equities market of Borsa Istanbul, four out of nine banks (Akbank, Sekerbank, Turkiye Is Bank, and Yapi ve Kredi Bank) are listed for the whole sample period whereas Turk Ekonomi Bankasi was listed for the first time. Only six private deposit banks are qualified to issue and trade their debt securities in Borsa Istanbul. Akbank, Sekerbank, Fibabank, Turk Ekonomi Bank, Turkiye Is Bank, and Yapi ve Kredi Bank are listed since 2011-2012.

There was no change in the ownership status of three state-owned development and investment banks during the sample period. Only Turkish Development and Investment Bank (Turkiye Kalkinma ve Yatirim Bankasi) is listed on the equities market of Borsa Istanbul for the whole sample period whereas another one, Turk Eximbank (Turkiye Ihracat Kredi Bankasi) is listed on the debt securities market of Borsa Istanbul since 2018.

None of the six private development and investment banks have experienced any changes in their ownership status during the period 2004-2020. In the case of their listing status in the equities and the debt securities market of Borsa Istanbul, two private development and investment banks (Aktif Investment Bank and TSKB - Turkish Industrial and Development Bank) are listed in the equities market for the whole sample period whereas only one (Nurol Investment Bank.) has been listed on the debt securities market since 2016.

Lastly, two out of four foreign development and investment banks - BankPozitif Credit and Development Bank, and Bank of America Investment Bank - experienced changes

in their ownership status from private to foreign in 2006 whereas one - Pasha Investment

Bank – was private bank for two years in the sample period. None of the foreign

development and investment banks are listed in the equities market of Borsa Istanbul

whereas Pasha Investment Bank has been listed on the debt securities market of Borsa

Istanbul since 2016.

Table 1: List of Banks employed in the Sample Data during the Sample Period

Name of Banks active and a member of the Banks Association of Turkey during the Sample Period (2004 - 2020)					
Ownership Status for the Year 2020	Bank Type	Previous Change of Ownership Status	Listing Status of Bank (in Borsa Istanbul A.S.) or (Private Placement - Sale to Qualified Investor)		Year Founded
			Equities Market	Debt Securities Market	
3 State-Owned	**Deposit Bank**				
• Turkiye Cumhuriyeti Ziraat Bankasi A.S.		No Previous Change	Non-Listed	Listed (since 2012)	1863
• Turkiye Halk Bankasi A.S.		No Previous Change	Listed (since 2007)	Listed (since 2014)	1938
• Turkiye Vakiflar Bankasi T.A.O.		No Previous Change	Listed (since 2005)	Listed (since 2012)	1924
9 Privately-Owned	**Deposit Bank**				
• Adabank A.S.		No Previous Change	Non-Listed	Non--Listed	1985
• Akbank T.A.S.		No Previous Change	Listed	Listed (since 2011)	1948
• Anadolubank A.S.		No Previous Change	Non-Listed	Non-Listed	1996
• Sekerbank T.A.S.		No Previous Change	Listed	Listed (since 2011)	1953
• Fibabanka A.S. (previously known as 'Millenium Bank A.S.', 'BankEuropa Bankasi A.S.' and 'Sitebank A.S.')		Foreign (before 2012)	Non-Listed	Listed (since 2012)	1984
• Turk Ekonomi Bankasi A.S.		No Previous Change	Non-Listed (Listed between 2000-2015)	Listed (since 2012)	1927
• Turkish Bank A.S.		No Previous Change	Non-Listed	Non-Listed	1981
• Turkiye Is Bankasi A.S.		No Previous Change	Listed	Listed (since 2011)	1924
• Yapi ve Kredi Bankasi A.S.		No Previous Change	Listed	Listed (since 2011)	1944
16 Foreign	**Deposit Bank**				
• Arap Turk Bankasi A.S.		No Previous Change	Non-Listed	Non-Listed	1977
• Alternatifbank A.S.		Privately-Owned (before 2013)	Non-Listed (Listed before 2016)	Non-Listed	1992
• Bank Mellat		No Previous Change	Non-Listed	Non-Listed	1984
• Citibank A.S.		No Previous Change	Non-Listed	Non-Listed	1981
• Denizbank A.S.		Privately-Owned (before 2006)	Non-Listed (listed between 2004-2019)	Listed (since 2011)	1997
• Deutsche Bank A.S.		No Previous Change	Non-Listed	Non-Listed	1988
• QNB Finansbank A.S. (previously known as 'Finansbank A.S.')		No Previous Change	Listed	Listed (between 2011-2015)	1987
• Habib Bank Limited		No Previous Change	Non-Listed	Non-Listed	1982
• HSBC Bank A.S.		No Previous Change	Non-Listed	Non-Listed	1990
• JPMorgan Chase Bank N.A. (previously known as 'The Chase Manhattan Bank')		No Previous Change	Non-Listed	Non-Listed	1984
• Turkland Bank A.S. (previously known as 'MNG Bank A.S.'		Privately-Owned (before 2007)	Non-Listed	Non-Listed	1986
• ING Bank A.S. (previously known as 'Oyak Bank A.S.')		Privately-Owned (before 2007)	Non-Listed	Non-Listed	1996
• Societe Generale (SA)		No Previous Change	Non-Listed	Non-Listed	1989
• Burgan Bank A.S. (previously known as 'Eurobank Tekfen A.S.' and 'Tekfenbank		Privately-Owned (before 2007)	Non-Listed	Non-Listed	1992
• ICBC Bank Turkey A.S. (previously known as 'Tekstil Bankasi A.S.')		Privately-Owned (before 2015)	Listed	Non-Listed	1986
• Turkiye Garanti Bankasi A.S.		Privately-Owned (before 2015)	Listed	Listed (since 2011)	1946

Source of Data for the Listing Status of Banks: https://www.kap.org.tr/en/Pazarlar (Borsa Istanbul A.Ş. - Equity Market & Debt Securities Market)

Table 1. (cont'd)

Ownership Status	Bank Type	Previous Change of Ownership Status	Listing Status of Bank (in Borsa Istanbul A.S.) or (Private Placement - Sale to Qualified Investor)		Year Founded
			Equities Market	**Debt Securities Market**	
1 **Deposit Insurance Fund**	**Deposit Bank**				
• Birlesik Fon Bankasi A.S. (previously known as 'Bayindirbank A.S.')		No Previous Change	Non-Listed	Non-Listed	1958
3 **State-Owned**	**Development and Investment Bank**				
• Iller Bankasi A.S.		No Previous Change	Non-Listed	Non-Listed	1933
• Turk Eximbank - Turkiye Ihracat Kredi Bankasi A.S.		No Previous Change	Non-Listed	Listed (since 2018)	1987
• Turkiye Kalkinma ve Yatirim Bankasi A.S.		No Previous Change	Listed	Non-Listed	1975
6 **Privately-Owned**	**Development and Investment Bank**				
• Aktif Yatirim Bankasi A.S. (previously known as 'Calik Yatirim Bankasi A.S.')		No Previous Change	Listed	Non-Listed	1999
• Diler Yatirim Bankasi A.S.		No Previous Change	Non-Listed	Non-Listed	1998
• GSD Yatirim Bankasi A.S.		No Previous Change	Non-Listed	Non-Listed	1998
• Istanbul Takas ve Saklama Bankasi A.S. (previously known as 'IMKB (Istanbul Menkul Kiymetler Borsasi) Takas ve Saklama Bankasi A.S.')		No Previous Change	Non-Listed	Non-Listed	1995
• Nurol Yatirim Bankasi A.S.		No Previous Change	Non-Listed	Listed (since 2016)	1999
• Turkiye Sinai Kalkinma Bankasi A.S.		No Previous Change	Listed	Non-Listed	1950
4 **Foreign Bank**	**Development and Investment Bank**				
• BankPozitif Kredi ve Kalkinma Bankasi A.S. (previously known as 'C Kredi ve Kalkinma Bankasi A.S.' and 'Toprak Yatirim Bankasi A.S.')		Privately-Owned (before 2006)	Non-Listed	Non-Listed	1999
• Standard Chartered Yatirim Bankasi Turk A.S. (previously known as 'Credit Agricole Yatirim Bankasi Turk A.S.', 'Calyon Yatirim Bankasi Turk A.S.', 'Calyon Bank Turk A.S.' and 'Credit Agricole Indosuez Turk Bank A.S.')		No Previous Change	Non-Listed	Non-Listed	1990
• Pasha Yatirim Bankasi A.S. (previously known as 'TAIB Yatirim Bank A.S.')		Privately-Owned (for 2013 and 2014) (otherwise Foreign)	Non-Listed	Listed (since 2016)	1987
• Bank of America Yatirim Bank A.S. (previously known as 'Merrill Lynch Yatirim Bank A.S.' and 'TAT Yatirim Bankasi A.S.')		Privately-Owned (before 2006)	Non-Listed	Non-Listed	1992

Source of Data for the Listing Status of Banks: https://www.kap.org.tr/en/Pazarlar (Borsa Istanbul A.Ş. - Equity Market & Debt Securities Market)

CHAPTER IV

EMPIRICAL RESULTS

This chapter is divided into two sub-sections. The first subsection discusses descriptive statistics and correlation between variables, the second subsection discusses the empirical results of this thesis.

4.1. Descriptive Statistics

In Table 2.1, we see that deposit banks exhibit higher levels of stability, non-performing loans ratio, loan loss provisions ratio, bank size, liquidity, the listing status for both equities and debt securities market, and lower levels of capital adequacy ratio and growth in real total assets in comparison to development and investment banks.

In Table 2.2, it can be seen that state-owned deposit banks exhibit higher levels of non-performing loans ratio, real total assets and share of total assets in the sector, and lower levels of capital adequacy ratio, liquidity ratio and non-interest income ratio in comparison to foreign and privately-owned deposit banks. Also, the total loans-to-total assets ratio, return on assets, capital adequacy ratio, liquidity ratio, growth in real total assets and non-interest income ratio exhibit higher levels of variability for both foreign and privately-owned deposit banks.

In Table 2.3, we see that state-owned banks exhibit higher levels of the natural logarithm of Z-score, listing status in the equities market, real total assets, share of total assets in the sector and capital adequacy ratio in comparison to foreign and privately-owned development and investment banks. In contrast, foreign development and investment banks exhibit higher levels of provision for loans ratio, volatility in return on assets,

listing status in the debt securities market, the liquidity ratio and the non-interest income ratio. Overall, higher levels of variance are observed within the same independent, dependent and dummy variables for foreign development and investment banks in comparison to state-owned and privately-owned development and investment banks.

In order to understand the association of the dependent and the independent variables employed, the correlation results are shown below in Table 3. It can be observed that there is a less than perfect negative association, $\rho_{\text{INZ\_Score}_i \sigma \text{RoA}_i} = 0.60$, between the natural logarithm of Z-score, and the volatility of return on assets.

As for the association between the share of total assets in the sector and the natural logarithm of the real total assets, it is close to perfect positive, $\rho_{\%\text{TAinSector}_{it-1} \text{ln}\prod \text{TA}_{it-1}} = (0.74)$. Therefore, the share of total assets in the is used to eliminate any multicollinearity between bank characteristics and total assets as well as on the effect of the natural logarithm of total assets. Lastly, the association between the liquidity ratio and the total loans-to-total assets ratio is close to perfect negative, $\rho_{\text{LiqAtoTA}_{it-1} \text{TLtoTA}_{it-1}} = (0.88)$, which is to be expected since higher levels of liquidity experienced by a bank would mean higher levels of total assets and lower levels of total loans experienced by the same bank. In order not to encounter any problems with the empirical regression results, we insert independent variables one at a time in the regression equations for robustness.

Table 2.1. Descriptive Statistics for All Bank Types

Bank Type	Variable	Mean	Std. Dev.	Min	p25	p50	p75	Max	Obs
Deposit	IN_Z_Score	3.45	1.02	0.81	2.93	3.53	4.16	5.11	493
	w_NonPLoans	4.05	3.69	0.00	1.65	3.32	5.44	17.51	473
	ProvforLoans	1.14	2.19	(2.90)	0.36	0.84	1.34	37.99	493
	σRoA	0.01	0.03	0.00	0.00	0.00	0.01	0.33	493
	Deposit	1.00	0.00	1.00	1.00	1.00	1.00	1.00	493
	DevInv	0.00	0.00	0.00	0.00	0.00	0.00	0.00	493
	State	0.10	0.30	0.00	0.00	0.00	0.00	1.00	493
	Private	0.38	0.49	0.00	0.00	0.00	1.00	1.00	493
	Foreign	0.48	0.50	0.00	0.00	0.00	1.00	1.00	493
	BI_Equity	0.38	0.49	0.00	0.00	0.00	1.00	1.00	493
	BI_Debt	0.22	0.41	0.00	0.00	0.00	0.00	1.00	493
	LAG_In⎡⎤TA	22.76	2.32	16.24	21.16	22.72	24.82	26.28	493
	LAG_‰TAinSector	3.21	4.59	0.00	0.12	0.56	4.04	18.68	493
	LAG_TLtoTA	46.44	23.27	0.00	32.07	54.39	65.17	84.72	493
	LAG_RoA	0.02	0.05	(0.63)	0.01	0.01	0.02	0.32	493
	w_LAG_CAR	33.43	34.84	13.19	15.11	17.94	31.49	150.61	493
	LAG_LiqAtoTA	40.72	23.68	8.37	23.87	32.34	51.82	99.81	493
	LAG_NIInctoTOI	30.08	33.57	(241.00)	19.27	28.89	38.72	374.06	493
	LAG_Δ⎡⎤TA	4.23	43.36	(88.75)	(14.52)	(2.43)	14.19	464.71	493
DevInv	IN_Z_Score	3.32	1.10	0.81	2.47	3.37	4.14	5.11	221
	w_NonPLoans	3.56	5.33	0.00	0.00	0.97	4.31	17.51	211
	ProvforLoans	0.93	2.19	(0.35)	0.08	0.33	0.85	18.32	221
	σRoA	0.03	0.04	0.00	0.00	0.01	0.03	0.21	221
	Deposit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	221
	DevInv	1.00	0.00	1.00	1.00	1.00	1.00	1.00	221
	State	0.23	0.42	0.00	0.00	0.00	0.00	1.00	221
	Private	0.49	0.50	0.00	0.00	0.00	1.00	1.00	221
	Foreign	0.28	0.45	0.00	0.00	0.00	1.00	1.00	221
	BI_Equity	0.15	0.36	0.00	0.00	0.00	0.00	1.00	221
	BI_Debt	0.06	0.24	0.00	0.00	0.00	0.00	1.00	221
	LAG_In⎡⎤TA	20.63	2.05	16.13	18.99	20.59	22.26	24.25	221
	LAG_‰TAinSector	0.33	0.57	0.00	0.01	0.07	0.37	3.88	221
	LAG_TLtoTA	48.59	32.44	0.00	5.55	61.46	74.79	97.12	221
	LAG_RoA	0.02	0.08	(0.41)	0.01	0.02	0.04	0.29	221
	w_LAG_CAR	52.38	39.95	13.19	20.20	39.62	71.45	150.61	221
	LAG_LiqAtoTA	37.40	28.03	0.35	18.56	27.16	53.15	98.42	221
	LAG_NIInctoTOI	26.20	46.52	(442.15)	12.04	25.63	40.04	113.73	221
	LAG_Δ⎡⎤TA	14.94	88.76	(85.48)	(13.15)	(1.31)	20.25	991.58	221
Total	IN_Z_Score	3.41	1.05	0.81	2.84	3.49	4.15	5.11	714
	w_NonPLoans	3.90	4.26	0.00	0.74	2.75	5.22	17.51	684
	ProvforLoans	1.07	2.19	(2.90)	0.24	0.70	1.22	37.99	714
	σRoA	0.02	0.03	0.00	0.00	0.01	0.02	0.33	714
	Deposit	0.69	0.46	0.00	0.00	1.00	1.00	1.00	714
	DevInv	0.31	0.46	0.00	0.00	0.00	1.00	1.00	714
	State	0.14	0.35	0.00	0.00	0.00	0.00	1.00	714
	Private	0.41	0.49	0.00	0.00	0.00	1.00	1.00	714
	Foreign	0.42	0.49	0.00	0.00	0.00	1.00	1.00	714
	BI_Equity	0.31	0.46	0.00	0.00	0.00	1.00	1.00	714
	BI_Debt	0.17	0.38	0.00	0.00	0.00	0.00	1.00	714
	LAG_In⎡⎤TA	22.10	2.44	16.13	20.31	22.20	24.06	26.28	714
	LAG_‰TAinSector	2.32	4.05	0.00	0.05	0.35	2.01	18.68	714
	LAG_TLtoTA	47.11	26.45	0.00	29.36	56.32	66.75	97.12	714
	LAG_RoA	0.02	0.06	(0.63)	0.01	0.02	0.03	0.32	714
	w_LAG_CAR	39.29	37.51	13.19	15.65	19.99	49.72	150.61	714
	LAG_LiqAtoTA	39.69	25.13	0.35	21.99	31.24	52.21	99.81	714
	LAG_NIInctoTOI	28.88	38.06	(442.15)	16.85	28.44	39.01	374.06	714
	LAG_Δ⎡⎤TA	7.55	61.26	(88.75)	(14.06)	(2.26)	15.47	991.58	714

Table 2.2. Descriptive Statistics for Deposit Banks sorted by Ownership Status

Bank Type	Ownership	Variable	Mean	Std. Dev.	Min	p25	p50	p75	Max	Obs
Deposit	**State**	**IN_Z_Score**	3.78	0.75	2.25	3.20	3.70	4.23	5.11	51
		w_NonPLoans	4.35	3.27	1.21	2.33	3.76	4.87	17.51	51
		ProvforLoans	0.87	0.39	0.10	0.55	0.87	1.07	1.96	51
		σRoA	0.00	0.00	0.00	0.00	0.00	0.00	0.01	51
		Deposit	1.00	0.00	1.00	1.00	1.00	1.00	1.00	51
		DevInv	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51
		State	1.00	0.00	1.00	1.00	1.00	1.00	1.00	51
		Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51
		Foreign	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51
		BI_Equity	0.59	0.50	0.00	0.00	1.00	1.00	1.00	51
		BI_Debt	0.49	0.50	0.00	0.00	0.00	1.00	1.00	51
		LAG_In∏TA	25.57	0.35	24.78	25.34	25.53	25.88	26.28	51
		LAG_‰TAinSector	10.42	3.42	6.81	7.75	8.40	13.78	18.68	51
		LAG_TLtoTA	50.70	18.27	11.79	33.83	58.44	66.23	69.64	51
		LAG_RoA	0.02	0.01	0.00	0.01	0.02	0.02	0.03	51
		w_LAG_CAR	22.92	18.50	13.19	14.30	15.61	20.03	99.31	51
		LAG_LiqAtoTA	27.72	12.44	8.37	19.86	26.02	35.09	54.33	51
		LAG_NIInctoTOI	26.11	10.98	(6.54)	20.37	26.41	31.17	74.95	51
		LAG_Δ∏TA	2.79	15.07	(24.81)	(7.81)	0.32	14.43	35.72	51
Deposit	**Foreign**	**IN_Z_Score**	3.21	1.06	0.81	2.56	3.34	4.00	5.11	238
		w_NonPLoans	4.32	4.40	0.00	0.68	3.30	5.94	17.51	230
		ProvforLoans	0.93	1.09	(2.90)	0.21	0.74	1.30	9.25	238
		σRoA	0.01	0.02	0.00	0.00	0.01	0.02	0.09	238
		Deposit	1.00	0.00	1.00	1.00	1.00	1.00	1.00	238
		DevInv	0.00	0.00	0.00	0.00	0.00	0.00	0.00	238
		State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	238
		Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	238
		Foreign	1.00	0.00	1.00	1.00	1.00	1.00	1.00	238
		BI_Equity	0.19	0.40	0.00	0.00	0.00	0.00	1.00	238
		BI_Debt	0.09	0.28	0.00	0.00	0.00	0.00	1.00	238
		LAG_In∏TA	21.92	1.98	17.29	20.60	21.94	23.70	25.93	238
		LAG_‰TAinSector	1.12	1.96	0.00	0.07	0.23	1.72	11.59	238
		LAG_TLtoTA	44.16	23.65	0.00	28.08	49.27	64.47	78.91	238
		LAG_RoA	0.02	0.04	(0.18)	0.00	0.01	0.03	0.22	238
		w_LAG_CAR	34.99	31.80	13.19	16.05	19.55	40.19	150.61	238
		LAG_LiqAtoTA	45.77	24.33	12.47	25.75	37.82	58.37	99.81	238
		LAG_NIInctoTOI	30.92	43.74	(241.00)	17.42	28.56	40.46	374.06	238
		LAG_Δ∏TA	6.96	57.39	(88.75)	(19.21)	(4.88)	14.91	464.71	238
Deposit	**Private**	**IN_Z_Score**	3.70	0.96	0.81	3.22	3.75	4.39	5.11	187
		w_NonPLoans	3.65	2.74	0.00	1.77	3.11	5.02	17.51	186
		ProvforLoans	1.44	3.23	0.00	0.56	0.90	1.49	37.99	187
		σRoA	0.01	0.04	0.00	0.00	0.00	0.01	0.33	187
		Deposit	1.00	0.00	1.00	1.00	1.00	1.00	1.00	187
		DevInv	0.00	0.00	0.00	0.00	0.00	0.00	0.00	187
		State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	187
		Private	1.00	0.00	1.00	1.00	1.00	1.00	1.00	187
		Foreign	0.00	0.00	0.00	0.00	0.00	0.00	0.00	187
		BI_Equity	0.60	0.49	0.00	0.00	1.00	1.00	1.00	187
		BI_Debt	0.33	0.47	0.00	0.00	0.00	1.00	1.00	187
		LAG_In∏TA	23.19	2.38	16.24	22.09	23.15	25.50	26.17	187
		LAG_‰TAinSector	4.19	5.10	0.00	0.30	1.02	9.41	16.05	187
		LAG_TLtoTA	51.11	21.51	0.00	41.38	58.17	66.28	84.72	187
		LAG_RoA	0.01	0.06	(0.63)	0.01	0.01	0.02	0.07	187
		w_LAG_CAR	30.24	38.74	13.19	14.49	16.69	20.23	150.61	187
		LAG_LiqAtoTA	36.32	22.34	8.59	21.89	29.78	42.19	95.67	187
		LAG_NIInctoTOI	29.45	21.67	(156.45)	20.33	29.46	38.59	130.73	187
		LAG_Δ∏TA	2.61	24.00	(57.78)	(12.71)	0.12	14.83	110.72	187

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Table 2.3. Descriptive Statistics for Development and Investment Banks sorted by Ownership Status

Bank Type	Ownership	Variable	Mean	Std. Dev.	Min	p25	p50	p75	Max	Obs
DevInv	State	IN_Z_Score	3.82	0.98	1.73	3.16	3.83	4.77	5.11	51
		w_NonPLoans	2.69	4.63	0.00	0.01	0.82	2.75	17.51	51
		ProvforLoans	0.52	0.78	0.00	0.04	0.27	0.53	3.75	51
		σRoA	0.02	0.03	0.00	0.00	0.01	0.02	0.12	51
		Deposit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51
		DevInv	1.00	0.00	1.00	1.00	1.00	1.00	1.00	51
		State	1.00	0.00	1.00	1.00	1.00	1.00	1.00	51
		Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51
		Foreign	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51
		BI_Equity	0.33	0.48	0.00	0.00	0.00	1.00	1.00	51
		BI_Debt	0.06	0.24	0.00	0.00	0.00	0.00	1.00	51
		LAG_In∏TA	22.85	0.89	21.09	22.00	23.10	23.46	24.25	51
		LAG_‰TAinSector	0.94	0.84	0.15	0.24	0.85	1.00	3.88	51
		LAG_TLtoTA	74.80	13.93	37.72	69.91	77.44	83.00	97.12	51
		LAG_RoA	0.03	0.04	(0.18)	0.01	0.02	0.04	0.18	51
		w_LAG_CAR	64.11	41.06	13.41	24.11	62.53	81.43	150.61	51
		LAG_LiqAtoTA	19.67	11.52	0.45	11.29	18.66	26.65	49.03	51
		LAG_NIInctoTOI	17.84	16.11	(26.95)	9.05	15.17	25.63	78.68	51
		LAG_Δ∏TA	4.38	16.69	(27.40)	(9.04)	3.16	14.39	56.26	51
DevInv	Foreign	IN_Z_Score	2.53	1.04	0.81	1.92	2.37	3.31	4.77	62
		w_NonPLoans	3.55	5.66	0.00	0.00	0.00	5.59	17.51	55
		ProvforLoans	1.44	3.41	(0.35)	0.04	0.31	1.00	18.32	62
		σRoA	0.06	0.06	0.00	0.02	0.03	0.09	0.21	62
		Deposit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62
		DevInv	1.00	0.00	1.00	1.00	1.00	1.00	1.00	62
		State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62
		Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62
		Foreign	1.00	0.00	1.00	1.00	1.00	1.00	1.00	62
		BI_Equity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62
		BI_Debt	0.08	0.27	0.00	0.00	0.00	0.00	1.00	62
		LAG_In∏TA	19.24	1.58	16.13	17.97	19.05	20.50	21.92	62
		LAG_‰TAinSector	0.05	0.06	0.00	0.00	0.01	0.06	0.24	62
		LAG_TLtoTA	25.23	31.50	0.00	0.00	5.64	63.82	83.97	62
		LAG_RoA	0.01	0.11	(0.36)	(0.01)	0.01	0.04	0.29	62
		w_LAG_CAR	62.79	43.54	13.19	26.20	50.03	96.49	150.61	62
		LAG_LiqAtoTA	52.39	29.75	4.90	19.97	61.22	79.33	95.98	62
		LAG_NIInctoTOI	35.36	82.99	(442.15)	23.03	41.51	79.81	113.73	62
		LAG_Δ∏TA	33.58	157.86	(85.48)	(27.88)	(7.60)	21.79	991.58	62
Devinv	Private	IN_Z_Score	3.54	0.95	0.81	3.02	3.57	4.21	5.11	108
		w_NonPLoans	3.99	5.46	0.00	0.35	1.76	3.88	17.51	105
		ProvforLoans	0.83	1.63	0.00	0.17	0.38	0.85	14.38	108
		σRoA	0.02	0.03	0.00	0.00	0.01	0.02	0.21	108
		Deposit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	108
		DevInv	1.00	0.00	1.00	1.00	1.00	1.00	1.00	108
		State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	108
		Private	1.00	0.00	1.00	1.00	1.00	1.00	1.00	108
		Foreign	0.00	0.00	0.00	0.00	0.00	0.00	0.00	108
		BI_Equity	0.16	0.37	0.00	0.00	0.00	0.00	1.00	108
		BI_Debt	0.05	0.21	0.00	0.00	0.00	0.00	1.00	108
		LAG_In∏TA	20.39	1.83	16.20	19.04	19.90	22.18	23.37	108
		LAG_‰TAinSector	0.21	0.30	0.00	0.01	0.03	0.32	1.05	108
		LAG_TLtoTA	49.62	29.37	0.00	30.64	58.08	70.41	95.65	108
		LAG_RoA	0.03	0.06	(0.41)	0.02	0.03	0.05	0.21	108
		w_LAG_CAR	40.86	33.92	13.19	17.57	28.19	51.94	150.61	108
		LAG_LiqAtoTA	37.18	27.74	0.35	19.34	28.38	42.91	98.42	108
		LAG_NIInctoTOI	24.88	17.82	(24.26)	12.49	25.72	36.11	71.89	108
		LAG_Δ∏TA	9.23	39.66	(67.41)	(12.45)	1.53	22.38	198.22	108

Table 3. Correlation Table of the Independent and Dependent Variables

	IN_Z_Score	w_NonPLoans	ProvforLoans	σRoA	Deposit	DevInv	State	Private	Foreign	BI_Equity	BI_Debt	LAG_In∏TA	LAG_‰TAinSector	LAG_TLtoTA	LAG_RoA	w_LAG_CAR	LAG_LiqAtoTA	LAG_NIInctoTOI	LAG_Δ∏TA	LAG_Δ∏GDP
w_NonPLoans	(0.11)	1.00																		
ProvforLoans	(0.22)	0.25	1.00																	
σRoA	(0.60)	(0.01)	0.36	1.00																
Deposit	0.05	0.05	0.02	(0.24)	1.00															
DevInv	(0.05)	(0.05)	(0.02)	0.24	(1.00)	1.00														
State	0.14	(0.04)	(0.08)	(0.07)	(0.17)	0.17	1.00													
Private	0.19	(0.03)	0.05	(0.09)	(0.10)	0.10	(0.36)	1.00												
Foreign	(0.29)	0.05	0.02	0.14	0.21	(0.21)	(0.35)	(0.73)	1.00											
BI_Equity	0.15	0.07	0.12	(0.21)	0.23	(0.23)	0.12	0.22	(0.30)	1.00										
BI_Debt	0.21	(0.01)	0.07	(0.19)	0.20	(0.20)	0.11	0.12	(0.19)	0.36	1.00									
LAG_In∏TA	0.25	0.01	0.03	(0.44)	0.40	(0.40)	0.35	0.01	(0.25)	0.60	0.44	1.00								
LAG_‰TAinSector	0.19	(0.01)	0.03	(0.21)	0.34	(0.34)	0.33	0.07	(0.30)	0.50	0.49	0.74	1.00							
LAG_TLtoTA	0.31	0.08	0.02	(0.38)	(0.04)	0.04	0.23	0.07	(0.23)	0.28	0.30	0.41	0.13	1.00						
LAG_RoA	0.18	(0.10)	(0.33)	(0.29)	(0.09)	0.09	0.05	(0.01)	(0.02)	(0.04)	(0.04)	(0.02)	(0.01)	0.01	1.00					
w_LAG_CAR	(0.14)	(0.17)	(0.02)	0.47	(0.26)	0.26	0.06	(0.11)	0.04	(0.34)	(0.26)	(0.55)	(0.27)	(0.54)	0.13	1.00				
LAG_LiqAtoTA	(0.23)	(0.15)	(0.08)	0.28	0.06	(0.06)	(0.25)	(0.06)	0.25	(0.31)	(0.29)	(0.41)	(0.21)	(0.88)	0.05	0.50	1.00			
LAG_NIInctoTOI	(0.08)	(0.17)	(0.01)	0.14	0.06	(0.06)	(0.07)	(0.01)	0.06	0.02	(0.04)	(0.04)	0.02	(0.18)	0.08	0.08	0.11	1.00		
LAG_Δ∏TA	(0.24)	(0.13)	0.19	0.23	(0.09)	0.09	(0.03)	(0.04)	0.07	(0.05)	(0.07)	(0.02)	(0.05)	(0.14)	(0.10)	0.07	0.15	0.11	1.00	
LAG_Δ∏GDP	(0.04)	(0.02)	0.02	0.01	0.01	(0.01)	0.01	0.05	(0.04)	0.06	(0.22)	0.11	0.01	(0.07)	(0.09)	0.06	0.15	0.01	0.19	1.00

4.2. Regression Results

The main results of the empirical model and the hypothesis testing on the risk-taking behavior of banks, measured via the four risk-taking measures (Z-score, non-performing loans ratio, loan loss provisions ratio and the volatility of return on assets are presented in this section. In the fixed-effects model, each control variable is inserted one-by-one, therefore I only present the results of these two models for each dependent variable employed.

In TABLE 4.1 below, the empirical results for Hypothesis 1 are presented. When the natural logarithm of the Z-score is used as a dependent variable, the results show that foreign deposit, and development and investment banks have a negative and significant coefficient at one percent level indicating that lower levels of stability and higher levels of risk-taking behavior by foreign banks are observed irrespective of bank type. Overall, when the natural logarithm of Z-score is employed as a dependent variable, the results show that foreign banks are more prone to risk-taking and exhibit lower levels of stability in comparison to private banks which cannot be said for state banks since its coefficient is positive and not significant. When the total loans-to-total assets ratio and profitability of banks increases, their z-score whereas when growth in real GDP increase, and growth in real total assets decreases and the stability of banks increase. When there is an increase in the growth of real GDP, the stability of banks of this type increases.

When non-performing loans ratio is used as a dependent variable, the results show that foreign banks have a positive and significant coefficient at five percent level in Model (3), and at one percent level in Model (4) indicating that foreign banks have higher levels of non-performing loans ratio and in relation, they exhibit higher levels of risk-taking behavior, in particular credit risk. In addition, banks that are listed in the equities market have higher levels of non-performing loans ratio. Although total loans-to-total assets has a positive and significant coefficient at one percent level in Model (3), its coefficient becomes negative and not significant with the introduction of other control variables in Model (4). A decline in the non-performing loans ratio, thus credit risk, is observed when there is an increase in total loans-to-total assets ratio. However, with the introduction of other control variables in Model (4), the results show that the liquidity ratio, the non-interest income ratio and growth in real assets have negative and significant coefficients at five or ten percent implying that as a bank's ease in paying off its current liabilities, income from transaction and deposit fees in comparison to its interest income and quickness in growing its assets increase, its credit risk declines.

As for the employment of loan loss provisions ratio as a dependent variable, state banks have a negative, and significant coefficient at one percent level in comparison to private banks indicating that the managers of state-owned banks set aside higher levels of provisions in the case of a potential late loan payment, defaults on loans and loan payments by customers, and therefore, all of them exhibit higher levels of risk-taking behavior.

Lastly, when the volatility of return on assets is used as a dependent variable, the results of Model (7) and Model (8) are consistent. Development and investment banks are

found to have higher variability in their profitability in comparison to privately-owned deposit banks. Also, banks with stocks traded in Borsa Istanbul have positive and significant coefficients at one or five percent level. As the percentage of total assets financed by debt, profitability of banks and the real rate at which an economy grows increases, asset risk declines.

In Table 4.2. and Table 4.3. below, the empirical results for Hypothesis 2 for deposit, and development and investment banks are presented in respective order.

Banks regardless of their type have a lower stability than privately-owned banks whereas there is no significant difference between state-owned and privately-owned banks regardless of their type in terms of their stability measure, the Z-score. As for control variables, the results show that total loans-to-total assets ratio, return on assets, growth in real GDP, the liquidity ratio and non-interest income ratio have positive coefficients indicating that as the percentage of total assets financed by debt, profitability, the real rate at which an economy grows, the ease with which a bank can pay off its current liabilities and income from transaction and deposit fees in comparison to its interest income for a bank increases, the stability of banks increases and their risk-taking declines for all types of banks. In contrast to the control variables mentioned, the real growth in total assets has a negative and significant coefficient at one or five percent level implying that as banks increase their assets, their stability is found to decline.

The bank size has a different effect on the stability of banks depending on the bank type. It does not affect the stability of deposit banks. Although as the size of development and investment banks increase, their stability increases.

Table 4.1. Regression Results for Hypothesis 1

VARIABLES	(1) IN_Z_Score	(2) IN_Z_Score	(3) w_NonPLoans	(4) w_NonPLoans	(5) ProvforLoans	(6) ProvforLoans	(7) σRoA	(8) σRoA
State	0.0108	0.00602	0.00992	-0.170	-0.458***	-0.426***	0.00851***	0.00912***
	(0.0926)	(0.0934)	(0.545)	(0.542)	(0.135)	(0.137)	(0.00252)	(0.00252)
Foreign	-0.535***	-0.511***	0.758**	0.949***	-0.166	-0.170	0.00309	0.00334
	(0.0752)	(0.0757)	(0.352)	(0.345)	(0.231)	(0.214)	(0.00292)	(0.00278)
DevInv	-0.167*	-0.107	-0.308	-0.287	-0.0754	-0.158	0.00944***	0.00855***
	(0.0895)	(0.0900)	(0.466)	(0.458)	(0.239)	(0.193)	(0.00320)	(0.00286)
LAG_In∏TA	0.0340	0.0424*	-0.143	-0.142	0.00362	-0.0251	-0.00445***	-0.00505***
	(0.0215)	(0.0225)	(0.112)	(0.117)	(0.0450)	(0.0469)	(0.000677)	(0.000683)
BI_Equity	-0.0717	-0.0806	1.005**	0.965**	0.177	0.206	0.00585***	0.00481**
	(0.0798)	(0.0803)	(0.413)	(0.421)	(0.167)	(0.147)	(0.00226)	(0.00213)
BI_Debt		0.0371		0.0997		0.284*		0.00803***
		(0.0980)		(0.377)		(0.168)		(0.00218)
LAG_TLtoTA	0.00606***	0.00994***	0.0242***	-0.0188	0.00145	5.70e-05	-0.000332***	-0.000426***
	(0.00155)	(0.00288)	(0.00792)	(0.0181)	(0.00304)	(0.00684)	(5.23e-05)	(0.000109)
LAG_RoA	3.039***	2.628***	-10.09*	-7.727	-10.18**	-9.262*	-0.171***	-0.161***
	(0.591)	(0.655)	(5.241)	(5.368)	(4.935)	(5.138)	(0.0521)	(0.0563)
LAG_Δ∏GDP	0.701***	0.683***	-0.520	-0.421	-0.0903	-0.118	-0.0214***	-0.0221***
	(0.0622)	(0.0646)	(0.406)	(0.413)	(0.141)	(0.138)	(0.00170)	(0.00175)
LAG_LiqAtoTA		0.00503*		-0.0441**		-0.000489		-0.000128
		(0.00294)		(0.0192)		(0.00931)		(0.000123)
LAG_NIInctoTOI		0.000534		-0.0205***		-0.00622		2.19e-05
		(0.00116)		(0.00487)		(0.00625)		(5.19e-05)
LAG_Δ∏TA		-0.00210***		-0.00728**		0.00373		3.86e-05
		(0.000501)		(0.00295)		(0.00500)		(3.30e-05)
Constant	13.06***	12.18***	-2.026	3.325	-0.201	0.220	-0.195***	-0.187***
	(1.116)	(1.195)	(6.782)	(6.961)	(2.650)	(2.560)	(0.0343)	(0.0357)
Observations	756	756	719	719	756	756	756	756
R-squared	0.408	0.419	0.091	0.143	0.110	0.131	0.497	0.507

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All models include year fixed-effects.

When non-performing loans ratio and loan loss provisions ratio are used as dependent variables, the results differ for state-owned and foreign banks in comparison to privately-owned banks according to the dependent variable used. When non-performing loans ratio is used as a dependent variable, foreign banks have positive and significant coefficients implying that foreign deposit banks exhibit higher levels of credit risk-taking behavior, irrespective of its type. As for other control variables, the results show that development and investment banks listed on Borsa Istanbul stock exchange have higher credit risk then the non-listed banks. Return on assets, non-interest income ratio, and growth in real assets have lower levels of effect on the credit risk of development and investment banks. Moreover, as real total assets of development and investment banks increases, their credit risk decreases for both Model (3) and Model (4). When all control variables are inserted in Model (4), as total loans-to-total assets ratio and the liquidity ratio increases, credit risk declines for deposit banks, and increases for development and investment banks.

When loan loss provisions ratio is used as a dependent variable, state-owned banks have lower levels of credit risk-taking than privately-owned deposit banks. As for return on assets and growth in real GDP, they both have negative and not significant coefficients, except for return on assets of deposit banks which are significant at one percent level, indicating that as the amount of profit a bank can generate from its assets and the real rate at which an economy grows increases, then the risk-taking behavior of both types of banks declines. Other variables not mentioned differ in their coefficient signs for deposit banks vs. development and investment banks.

When the variability of banks' profits is used as a dependent variable, state-owned and foreign banks exhibit different risk-taking behavior with respect to their bank type such that state-owned and foreign deposit banks have negative and significant (except for foreign deposit banks) coefficients at five percent level whereas state-owned and foreign development and investment banks have positive and significant coefficients at one and five percent levels indicating that state-owned and foreign deposit banks exhibit lower levels of risk-taking behavior, asset risk in particular; and state-owned and foreign development and investment banks exhibit higher levels of risk-taking behavior in comparison to their privately-owned counterparts. As for banks listed in the debt securities market, deposit banks listed in the debt securities market have positive and significant coefficients at one percent level whereas development and investment banks listed in the debt securities market have negative and again, significant coefficients at one percent level. Overall, banks listed in the equities markets exhibit similar asset risk-taking behavior whereas banks listed in debt securities market exhibit the exact opposite. Furthermore, the empirical results show that deposit, and development and investment banks with higher levels of real total assets, total loans-to-total assets ratio, return on assets and growth in real GDP exhibit lower levels of volatility in return on assets, thus lower levels of asset risk-taking behavior.

In Table 4.4, Table 4.5 and Table 4.6 below, the empirical results for Hypothesis 3 for all, deposit, and development and investment banks are presented in respective order. In Table 4.4., when the natural logarithm of the Z-score is used as a dependent variable, the CGF has a positive and significant coefficient at one percent level indicating that the overall stability of banks increased with the expansion of the CGF since 2017.

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Table 4.2. Regression Results of Hypothesis 2 for Deposit Banks

VARIABLES	(1) IN_Z_Score	(2) IN_Z_Score	(3) w_NonPLoans	(4) w_NonPLoans	(5) ProvforLoans	(6) ProvforLoans	(7) σRoA	(8) σRoA
State	0.0586	0.0656	0.811	0.379	-0.639***	-0.657***	-0.00600**	-0.00571**
	(0.117)	(0.120)	(0.559)	(0.522)	(0.184)	(0.187)	(0.00249)	(0.00274)
Foreign	-0.450***	-0.413***	0.884***	1.076***	-0.330	-0.161	-0.00169	-0.000199
	(0.0875)	(0.0914)	(0.309)	(0.346)	(0.209)	(0.160)	(0.00271)	(0.00227)
LAG_ln∏TA	-0.00124	-0.000626	0.0319	0.0235	0.0866**	0.127***	-0.000745	-0.000652
	(0.0278)	(0.0313)	(0.127)	(0.143)	(0.0388)	(0.0430)	(0.000550)	(0.000616)
BI_Equity	0.0231	-0.000676	0.527	0.539	0.0964	0.0587	-0.000868	-0.00172
	(0.0950)	(0.0956)	(0.397)	(0.392)	(0.155)	(0.159)	(0.00173)	(0.00179)
BI_Debt		0.108		-0.396		0.379*		0.00748***
		(0.128)		(0.494)		(0.219)		(0.00271)
LAG_TLtoTA	0.00654**	0.00779*	0.0193*	-0.0321	-0.00867	0.000982	-0.000505***	-0.000378***
	(0.00261)	(0.00451)	(0.0100)	(0.0219)	(0.00557)	(0.00658)	(7.84e-05)	(0.000106)
LAG_RoA	3.784***	3.544***	-4.921	-1.366	-19.89**	-19.35***	-0.233**	-0.231***
	(1.037)	(1.123)	(5.780)	(5.566)	(8.088)	(6.895)	(0.0930)	(0.0887)
LAG_Δ∏GDP	0.767***	0.742***	-0.310	-0.126	0.00488	-0.106	-0.0213***	-0.0230***
	(0.0738)	(0.0784)	(0.470)	(0.488)	(0.174)	(0.171)	(0.00148)	(0.00139)
LAG_LiqAtoTA		0.00162		-0.0577***		0.0153		0.000183
		(0.00426)		(0.0221)		(0.0106)		(0.000128)
LAG_NIInctoTOI		0.000525		-0.0134*		-0.0141		-0.000103
		(0.00198)		(0.00750)		(0.0108)		(8.37e-05)
LAG_Δ∏TA		-0.00276**		-0.00949**		-0.00772**		-4.01e-05
		(0.00108)		(0.00387)		(0.00305)		(4.21e-05)
Constant	14.72***	14.09***	-2.100	5.517	0.0417	-3.439	-0.261***	-0.302***
	(1.280)	(1.486)	(7.836)	(8.312)	(3.132)	(3.004)	(0.0303)	(0.0269)
Observations	522	522	498	498	522	522	522	522
R-squared	0.402	0.411	0.091	0.143	0.226	0.296	0.524	0.543

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All models include year fixed-effetcs.

Table 4.3. Regression Results of Hypothesis 2 for Development and Investment Banks

VARIABLES	(1) IN_Z_Score	(2) IN_Z_Score	(3) w_NonPLoans	(4) w_NonPLoans	(5) ProvforLoans	(6) ProvforLoans	(7) σRoA	(8) σRoA
State	-0.155	-0.200	-1.164	-0.949	-0.382	-0.284	0.0315***	0.0300***
	(0.161)	(0.165)	(0.977)	(0.994)	(0.293)	(0.325)	(0.00511)	(0.00511)
Foreign	-0.774***	-0.727***	0.313	0.594	0.685	0.472	0.0148**	0.0142***
	(0.164)	(0.166)	(1.054)	(1.020)	(0.433)	(0.421)	(0.00573)	(0.00539)
LAG_In∏TA	0.123***	0.137***	-0.493**	-0.641***	-0.0943	-0.103	-0.0116***	-0.0107***
	(0.0377)	(0.0407)	(0.224)	(0.215)	(0.104)	(0.104)	(0.00135)	(0.00133)
BI_Equity	-0.141	-0.140	1.943*	1.944*	0.308	0.313	0.00848*	0.00653
	(0.145)	(0.155)	(0.989)	(1.068)	(0.214)	(0.228)	(0.00486)	(0.00504)
BI_Debt		0.239		-1.501		-0.471		-0.0191***
		(0.210)		(1.202)		(0.378)		(0.00562)
LAG_TLtoTA	0.00461**	0.00599	0.0380***	0.0576	0.00955***	0.00185	-0.000233***	-0.000289
	(0.00222)	(0.00436)	(0.0137)	(0.0380)	(0.00366)	(0.0137)	(6.91e-05)	(0.000219)
LAG_RoA	2.257***	2.005***	-14.06*	-15.45*	-2.410	-1.231	-0.107**	-0.106**
	(0.688)	(0.739)	(7.682)	(7.989)	(1.571)	(1.900)	(0.0428)	(0.0436)
LAG_Δ∏GDP	0.549***	0.521***	-1.014	-0.748	-0.255	-0.192	-0.0176***	-0.0162***
	(0.103)	(0.105)	(0.798)	(0.738)	(0.249)	(0.251)	(0.00365)	(0.00370)
LAG_LiqAtoTA		0.00156		0.0315		-0.0118		-0.000167
		(0.00432)		(0.0384)		(0.0143)		(0.000223)
LAG_NIInctoTOI		0.00140		-0.0237***		0.00265		0.000133***
		(0.000989)		(0.00715)		(0.00345)		(3.99e-05)
LAG_Δ∏TA		-0.00181***		-0.00891**		0.00952**		9.22e-05***
		(0.000465)		(0.00406)		(0.00407)		(1.87e-05)
Constant	9.045***	8.108***	-3.899	2.110	-1.568	0.376	0.00363	0.0155
	(1.974)	(1.998)	(13.68)	(12.42)	(4.396)	(4.815)	(0.0711)	(0.0730)
Observations	234	234	221	221	234	234	234	234
R-squared	0.487	0.505	0.189	0.254	0.134	0.255	0.580	0.636

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All models include year fixed-effetcs.

Furthermore, when the variability of profitability is used as a dependent variable, the CGF has a negative and significant coefficient at one percent level indicating that the overall variability of profitability declined with the expansion of the CGF since 2017. When the non-performing loans ratio is used as a dependent variable, state-owned banks have negative and significant coefficients at the one percent level and therefore, exhibit lower levels of credit risk in comparison to privately-owned banks since the expansion of the CGF in 2017.

In Table 4.5, when the natural logarithm of the Z-score is used as a dependent variable, the CGF has a positive and significant coefficient at one percent level indicating that the stability of deposit banks increased with the expansion of the CGF since 2017. Furthermore, when the variability of profitability is used as a dependent variable, the CGF has a negative and significant coefficient at one percent level indicating that the variability of profitability declined for deposit banks since the expansion of the CGF in 2017. When the non-performing loans ratio is used as a dependent variable, state-owned deposit banks have negative and significant coefficients at the one percent level and therefore, exhibit lower levels of credit risk in comparison to privately-owned deposit banks since the expansion of the CGF in 2017. State-owned deposit banks have positive and significant coefficients at one percent level for the variability of profitability indicating an increase in asset risk for state-owned deposit banks since the expansion of the CGF in 2017 in comparison to privately-owned deposit banks.

Since the expansion of the CGF in 2017, when the non-performing loans ratio is used as a dependent variable, foreign deposit banks have negative and significant coefficients at one percent level indicating a decline in the credit risk behavior of foreign deposit banks

in comparison to privately-owned banks. Additionally, when the variability of profitability is used as a dependent variable, foreign deposit banks have a positive and significant coefficient at ten percent level for Model (8) indicating that foreign deposit banks have higher levels of asset risk when all control variables are considered in the model in comparison to privately-owned deposit banks.

Since the expansion of the CGF in 2017, development and investment banks exhibit higher levels of stability and lower levels of variability of profitability. As for state-owned development and investment banks, they also exhibit lower levels of variability of profitability in comparison to privately-owned development and investment banks. Foreign development and investment banks present no significant results in comparison to privately-owned development and investment banks.

In Table 4.7, Table 4.8 and Table 4.9 below, the empirical results for Hypothesis 4 for all, deposit, and development and investment banks are presented in respective order.

In Table 4.7, for the overall sample, when the natural logarithm of the Z-score is used as a dependent variable, the global financial crisis of 2008 has a positive and significant coefficient at one percent level indicating an increase in the stability of banks after the global financial crisis of 2008. When the variability of profitability is used as a dependent variable, the global financial crisis of 2008 has a negative and significant coefficient at one percent level indicating a decline in the asset risk of banks after the global financial crisis of 2008. When the non-performing loans ratio is used as a dependent variable, state-owned banks have negative and significant coefficient at one percent level indicating a decline in the credit risk of state-owned banks after the global financial crisis of 2008 in comparison to privately-owned banks.

Table 4.4. Regression Results of Hypothesis 3 for All Bank Types

VARIABLES	(1) IN_Z_Score	(2) IN_Z_Score	(3) w_NonPLoans	(4) w_NonPLoans	(5) ProvforLoans	(6) ProvforLoans	(7) σRoA	(8) σRoA
State	0.0409	0.0352	0.774	0.523	-0.421***	-0.368**	0.00896***	0.00996***
	(0.103)	(0.105)	(0.631)	(0.632)	(0.158)	(0.164)	(0.00296)	(0.00301)
Foreign	-0.483***	-0.456***	0.875**	1.039***	-0.252	-0.303	0.00142	0.00129
	(0.0856)	(0.0857)	(0.419)	(0.397)	(0.278)	(0.267)	(0.00338)	(0.00328)
DevInv	-0.168*	-0.107	-0.302	-0.276	-0.0739	-0.154	0.00947***	0.00861***
	(0.0893)	(0.0898)	(0.464)	(0.455)	(0.238)	(0.192)	(0.00318)	(0.00284)
CGF	2.145***	2.099***	-0.325	-0.248	-0.223	-0.394	-0.0625***	-0.0655***
	(0.178)	(0.183)	(1.059)	(1.073)	(0.382)	(0.388)	(0.00427)	(0.00447)
CGF_SOB	-0.141	-0.144	-3.491***	-3.098***	-0.173	-0.233	-0.00208	-0.00337
	(0.204)	(0.203)	(0.769)	(0.761)	(0.221)	(0.234)	(0.00419)	(0.00413)
CGF_FB	-0.226	-0.247	-0.522	-0.380	0.366	0.583*	0.00708	0.00901*
	(0.176)	(0.176)	(0.733)	(0.731)	(0.306)	(0.344)	(0.00468)	(0.00484)
LAG_In∏TA	0.0332	0.0426*	-0.144	-0.149	0.00490	-0.0275	-0.00443***	-0.00509***
	(0.0215)	(0.0226)	(0.111)	(0.116)	(0.0449)	(0.0469)	(0.000676)	(0.000684)
BI_Equity	-0.0604	-0.0671	1.052***	0.996**	0.161	0.175	0.00553**	0.00433**
	(0.0807)	(0.0810)	(0.403)	(0.414)	(0.176)	(0.157)	(0.00230)	(0.00217)
BI_Debt		0.0153		0.238		0.371**		0.00937***
		(0.0977)		(0.368)		(0.166)		(0.00229)
LAG_TLtoTA	0.00599***	0.00979***	0.0253***	-0.0153	0.00169	0.00106	-0.000328***	-0.000411***
	(0.00156)	(0.00287)	(0.00798)	(0.0181)	(0.00305)	(0.00698)	(5.17e-05)	(0.000109)
LAG_RoA	3.058***	2.637***	-10.75**	-8.364	-10.28**	-9.386*	-0.172***	-0.162***
	(0.592)	(0.654)	(5.298)	(5.423)	(4.947)	(5.138)	(0.0519)	(0.0560)
LAG_Δ∏GDP	-0.0257	-0.0213	-0.155	-0.147	-0.0599	-0.0698*	5.56e-05	-3.11e-05
	(0.0272)	(0.0272)	(0.118)	(0.121)	(0.0372)	(0.0380)	(0.000670)	(0.000657)
LAG_LiqAtoTA		0.00491*		-0.0411**		0.000372		-0.000115
		(0.00294)		(0.0191)		(0.00945)		(0.000123)
LAG_NIInctoTOI		0.000630		-0.0204***		-0.00646		1.84e-05
		(0.00118)		(0.00487)		(0.00633)		(5.23e-05)
LAG_Δ∏TA		-0.00213***		-0.00701**		0.00385		4.04e-05
		(0.000502)		(0.00291)		(0.00499)		(3.28e-05)
Constant	0.0800	-0.416	4.343	8.014**	0.334	1.109	0.188***	0.208***
	(0.663)	(0.709)	(3.196)	(3.653)	(1.211)	(1.437)	(0.0188)	(0.0208)
Observations	756	756	719	719	756	756	756	756
R-squared	0.409	0.421	0.104	0.153	0.112	0.134	0.499	0.510

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All models include year fixed-effetcs.

Table 4.5. Regression Results of Hypothesis 3 for Deposit Banks

VARIABLES	(1) IN_Z_Score	(2) IN_Z_Score	(3) w_NonPLoans	(4) w_NonPLoans	(5) ProvforLoans	(6) ProvforLoans	(7) σRoA	(8) σRoA
State	0.158	0.172	1.671**	1.067*	-0.688***	-0.668***	-0.00865***	-0.00761**
	(0.129)	(0.135)	(0.676)	(0.637)	(0.230)	(0.222)	(0.00314)	(0.00340)
Foreign	-0.375***	-0.341***	1.314***	1.551***	-0.386	-0.247	-0.00274	-0.00191
	(0.101)	(0.103)	(0.364)	(0.377)	(0.249)	(0.203)	(0.00326)	(0.00285)
CGF	2.457***	2.382***	0.878	1.486	0.130	-0.324	-0.0634***	-0.0700***
	(0.222)	(0.233)	(1.230)	(1.264)	(0.457)	(0.516)	(0.00352)	(0.00396)
CGF_SOB	-0.486*	-0.501*	-3.773***	-3.029***	0.251	0.113	0.0122***	0.00928**
	(0.255)	(0.262)	(0.799)	(0.784)	(0.311)	(0.280)	(0.00385)	(0.00376)
CGF_FB	-0.324	-0.327	-1.734**	-2.028***	0.241	0.396	0.00462	0.00784**
	(0.212)	(0.211)	(0.722)	(0.731)	(0.313)	(0.360)	(0.00342)	(0.00399)
LAG_In∏TA	-0.00108	0.00156	0.0223	0.0337	0.0859**	0.119***	-0.000715	-0.000730
	(0.0278)	(0.0315)	(0.126)	(0.143)	(0.0390)	(0.0421)	(0.000549)	(0.000623)
BI_Equity	0.0473	0.0269	0.691*	0.729*	0.0801	0.0277	-0.00130	-0.00237
	(0.0966)	(0.0974)	(0.388)	(0.385)	(0.166)	(0.173)	(0.00182)	(0.00192)
BI_Debt		0.0815		-0.568		0.453*		0.00836***
		(0.129)		(0.491)		(0.252)		(0.00298)
LAG_TLtoTA	0.00627**	0.00790*	0.0196*	-0.0306	-0.00839	0.00164	-0.000505***	-0.000376***
	(0.00264)	(0.00452)	(0.0102)	(0.0216)	(0.00555)	(0.00678)	(7.80e-05)	(0.000107)
LAG_RoA	3.733***	3.464***	-5.582	-2.248	-19.85**	-19.26***	-0.233**	-0.229***
	(1.022)	(1.107)	(5.896)	(5.730)	(8.084)	(6.874)	(0.0927)	(0.0884)
LAG_∆∏GDP	-0.0354	-0.0303	-0.185	-0.157	-0.0975**	-0.0838*	0.000141	0.000189
	(0.0336)	(0.0340)	(0.140)	(0.144)	(0.0482)	(0.0451)	(0.000418)	(0.000410)
LAG_LiqAtoTA		0.00204		-0.0551**		0.0153		0.000176
		(0.00425)		(0.0219)		(0.0106)		(0.000128)
LAG_NIInctoTOI		0.000604		-0.0129*		-0.0143		-0.000105
		(0.00201)		(0.00738)		(0.0109)		(8.42e-05)
LAG_∆∏TA		-0.00281**		-0.00972**		-0.00760**		-3.87e-05
		(0.00109)		(0.00391)		(0.00301)		(4.20e-05)
Constant	0.345	0.189	0.0951	4.290	-1.746	-2.843**	0.122***	0.115***
	(0.831)	(0.967)	(3.673)	(4.596)	(1.232)	(1.297)	(0.0149)	(0.0183)
Observations	522	522	498	498	522	522	522	522
R-squared	0.406	0.416	0.108	0.157	0.226	0.297	0.526	0.545

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All models include year fixed-effetcs.

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Table 4.6. Regression Results of Hypothesis 3 for Development and Investment Banks

VARIABLES	(1) IN_Z_Score	(2) IN_Z_Score	(3) w_NonPLoans	(4) w_NonPLoans	(5) ProvforLoans	(6) ProvforLoans	(7) σRoA	(8) σRoA
State	-0.211	-0.256	-0.752	-0.621	-0.304	-0.175	0.0345***	0.0335***
	(0.178)	(0.183)	(1.115)	(1.143)	(0.326)	(0.352)	(0.00557)	(0.00554)
Foreign	-0.748***	-0.669***	-0.408	-0.548	0.695	0.474	0.0126*	0.0127*
	(0.191)	(0.194)	(1.227)	(1.066)	(0.562)	(0.531)	(0.00676)	(0.00656)
CGF	1.492***	1.421***	-2.430	-1.919	-0.678	-0.423	-0.0468***	-0.0417***
	(0.280)	(0.282)	(2.079)	(1.894)	(0.706)	(0.693)	(0.00957)	(0.00956)
CGF_SOB	0.286	0.282	-2.439**	-1.975	-0.375	-0.522*	-0.0158**	-0.0173**
	(0.321)	(0.323)	(1.192)	(1.326)	(0.297)	(0.315)	(0.00780)	(0.00809)
CGF_FB	-0.0871	-0.206	2.309	3.692*	-0.0631	-0.0429	0.00786	0.00484
	(0.326)	(0.325)	(2.067)	(1.990)	(0.769)	(0.805)	(0.0141)	(0.0131)
LAG_In∏TA	0.119***	0.133***	-0.432*	-0.579***	-0.0928	-0.101	-0.0114***	-0.0106***
	(0.0385)	(0.0413)	(0.223)	(0.215)	(0.110)	(0.109)	(0.00138)	(0.00137)
BI_Equity	-0.134	-0.131	1.818*	1.783*	0.303	0.308	0.00800*	0.00617
	(0.147)	(0.156)	(0.970)	(1.068)	(0.219)	(0.233)	(0.00478)	(0.00496)
BI_Debt		0.250		-1.804		-0.457		-0.0191***
		(0.217)		(1.345)		(0.401)		(0.00666)
LAG_TLtoTA	0.00462**	0.00591	0.0378***	0.0563	0.00961***	0.00198	-0.000235***	-0.000284
	(0.00223)	(0.00430)	(0.0132)	(0.0360)	(0.00362)	(0.0138)	(7.11e-05)	(0.000218)
LAG_RoA	2.437***	2.255***	-17.28**	-19.35**	-2.532	-1.422	-0.119***	-0.116***
	(0.727)	(0.768)	(8.309)	(8.409)	(1.709)	(2.060)	(0.0424)	(0.0438)
LAG_Δ∏GDP	-0.00432	0.00150	-0.0841	-0.0933	0.0277	0.00924	-1.29e-05	-8.63e-05
	(0.0405)	(0.0408)	(0.192)	(0.198)	(0.0411)	(0.0482)	(0.00142)	(0.00129)
LAG_LiqAtoTA		0.00134		0.0315		-0.0117		-0.000160
		(0.00426)		(0.0373)		(0.0144)		(0.000220)
LAG_NIInctoTOI		0.00158		-0.0270***		0.00264		0.000128***
		(0.00101)		(0.00682)		(0.00348)		(4.08e-05)
LAG_Δ∏TA		-0.00186***		-0.00790*		0.00956**		9.45e-05***
		(0.000471)		(0.00408)		(0.00408)		(1.86e-05)
Constant	-0.765	-1.083	11.50*	12.74**	3.427	3.897	0.312***	0.300***
	(1.019)	(1.020)	(5.838)	(6.006)	(2.315)	(2.682)	(0.0363)	(0.0362)
Observations	234	234	221	221	234	234	234	234
R-squared	0.490	0.509	0.205	0.277	0.134	0.256	0.587	0.642

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All models include year fixed-effetcs.

In Table 4.8 and Table 4.9, when the natural logarithm of the Z-score is used as a dependent variable for deposit, and development and investment banks, the global financial crisis of 2008 has a positive and significant coefficient at one percent level indicating an increase in the stability of deposit banks. Furthermore, when the variability of profitability is used as a dependent variable for deposit, and development and investment banks, the global financial crisis of 2008 has a negative and significant coefficient at one percent level indicating a decline in the asset risk of deposit banks in comparison to development and investment banks.

In Table 4.8, after the global financial crisis of 2008, state-owned deposit banks have negative and significant coefficients at one percent level when the non-performing loans ratio is used as a dependent variable indicating a decline in their credit risk in comparison to privately-owned deposit banks. Furthermore, state-owned deposit banks have positive and significant coefficients at one percent level when the variability of profitability is used as a dependent variable indicating an increase in their asset risk in comparison to privately-owned deposit banks. As for foreign deposit banks, they do not exhibit any difference in their risk-taking behavior in comparison to privately-owned deposit banks.

In Table 4.9, after the global financial crisis of 2008, state-owned development and investment banks have positive and significant coefficients at ten percent level when the natural logarithm of the Z-score is used as a dependent variable indicating an increase in their stability in comparison to privately-owned development and investment banks. Furthermore, state-owned development and investment banks have negative and significant coefficients at one percent level when the variability of profitability is used as a dependent variable indicating a decline in their asset risk in

comparison to privately-owned development and investment banks. As for foreign development and investment banks, they do not exhibit any difference in their risk-taking behavior in comparison to privately-owned development and investment banks.

Overall, for each hypothesis tested, depending on the risk measure used, we get different empirical results.

For Hypothesis 1, state-owned banks exhibit higher variability in profitability, however lower levels of provisions for loan loss are provided by managers of state-owned banks in comparison to privately-owned banks. Furthermore, foreign banks exhibit lower levels of stability but higher levels of credit risk in comparison to privately-owned banks.

For Hypothesis 2, state-owned deposit banks have lower loan loss provisions as well as lower variability of profitability than privately-owned deposit banks. In contrast, foreign deposit banks exhibit lower levels of stability, higher levels of risk-taking behavior and higher levels of credit risk in comparison to privately-owned deposit banks. As for development and investment banks, state-owned banks have higher variability in profitability, and foreign banks exhibit lower levels of stability, higher levels of risk-taking behavior and variability in profitability in comparison to privately-owned development and investment banks.

For Hypothesis 3, during the period with the Credit Guarantee Fund, state-owned banks exhibited higher levels of stability, and lower levels of risk-taking behavior and provisions for loan loss for both types of banks in comparison to privately-owned banks. State-owned deposit banks have lower levels of credit risk following the expansion of the Credit Guarantee Fund in 2017 in comparison to privately-owned deposit banks. This shows that privately-owned deposit banks

provided loans with higher credit risk. Furthermore, the impact of the Credit Guarantee Fund on the risk-taking behavior of state-owned deposit, and development and investment banks are similar except for variability for profitability. As for foreign development and investment banks, they are not significantly different from privately-owned banks in terms of credit risk following expansion of the Credit Guarantee Fund in 2017. Lastly, when not all bank characteristics are controlled, state-owned development and investment banks issued loans with lower credit risk since 2017 in comparison to privately-owned development and investment banks.

For Hypothesis 4, after the global financial crisis of 2008 stability of banks increases whereas their variability of profitability declines for the overall sample. After the global financial crisis of 2008, there is no change in risk-taking behavior for foreign banks. Furthermore, the risk-taking behavior of state-owned deposit, and development and investment banks are different from each other after the global financial crisis of 2008. After the global financial crisis of 2008, state-owned deposit banks exhibit lower levels of credit risk but higher levels of credit risk for the overall sample period. After the global financial crisis of 2008, state-owned development and investment banks exhibit higher levels of stability but lower levels of stability for the overall sample period.

Table 4.7. Regression Results of Hypothesis 4 for All Bank Types

VARIABLES	(1) IN_Z_Score	(2) IN_Z_Score	(3) w_NonPLoans	(4) w_NonPLoans	(5) ProvforLoans	(6) ProvforLoans	(7) σRoA	(8) σRoA
State	-0.0300	-0.0437	2.934**	2.657**	-0.508	-0.419	0.00982*	0.0109*
	(0.169)	(0.173)	(1.172)	(1.179)	(0.318)	(0.321)	(0.00593)	(0.00603)
Foreign	-0.465***	-0.412***	0.00325	0.477	-0.533	-0.670	-0.00222	-0.00442
	(0.139)	(0.142)	(0.754)	(0.699)	(0.513)	(0.474)	(0.00636)	(0.00610)
DevInv	-0.165*	-0.104	-0.351	-0.330	-0.0828	-0.170	0.00931***	0.00836***
	(0.0897)	(0.0901)	(0.470)	(0.456)	(0.242)	(0.193)	(0.00321)	(0.00284)
GFC2008	2.054***	2.016***	-0.890	-0.606	-0.293	-0.451	-0.0622***	-0.0660***
	(0.165)	(0.175)	(1.037)	(1.050)	(0.408)	(0.411)	(0.00428)	(0.00453)
GFC_SOB	0.0577	0.0650	-4.271***	-4.095***	0.0954	0.0366	-0.00168	-0.00198
	(0.188)	(0.189)	(1.186)	(1.186)	(0.356)	(0.353)	(0.00633)	(0.00639)
GFC_FB	-0.101	-0.143	1.042	0.640	0.535	0.730*	0.00769	0.0113*
	(0.162)	(0.164)	(0.837)	(0.804)	(0.463)	(0.434)	(0.00591)	(0.00576)
LAG_In∏TA	0.0350	0.0450**	-0.166	-0.175	0.000411	-0.0360	-0.00451***	-0.00524***
	(0.0216)	(0.0227)	(0.109)	(0.115)	(0.0452)	(0.0455)	(0.000678)	(0.000683)
BI_Equity	-0.0719	-0.0788	1.091***	1.046***	0.167	0.187	0.00579**	0.00458**
	(0.0805)	(0.0808)	(0.372)	(0.385)	(0.177)	(0.158)	(0.00234)	(0.00222)
BI_Debt		0.0129		0.334		0.392**		0.00982***
		(0.0987)		(0.380)		(0.156)		(0.00226)
LAG_TLtoTA	0.00596***	0.00948***	0.0261***	-0.0130	0.00186	0.00191	-0.000325***	-0.000394***
	(0.00157)	(0.00293)	(0.00802)	(0.0176)	(0.00313)	(0.00740)	(5.20e-05)	(0.000111)
LAG_RoA	3.061***	2.661***	-11.19**	-8.712*	-10.23**	-9.360*	-0.172***	-0.163***
	(0.592)	(0.653)	(5.126)	(5.242)	(4.911)	(5.103)	(0.0517)	(0.0557)
LAG_Δ∏GDP	-0.0256	-0.0212	-0.156	-0.150	-0.0599	-0.0702*	5.47e-05	-3.91e-05
	(0.0271)	(0.0271)	(0.119)	(0.122)	(0.0373)	(0.0383)	(0.000670)	(0.000659)
LAG_LiqAtoTA		0.00466		-0.0393**		0.000991		-0.000102
		(0.00296)		(0.0185)		(0.00973)		(0.000125)
LAG_NIInctoTOI		0.000497		-0.0201***		-0.00606		2.47e-05
		(0.00119)		(0.00516)		(0.00614)		(5.01e-05)
LAG_Δ∏TA		-0.00218***		-0.00613**		0.00406		4.42e-05
		(0.000511)		(0.00285)		(0.00498)		(3.25e-05)
Constant	0.0499	-0.443	4.811	8.329**	0.519	1.338	0.190***	0.211***
	(0.660)	(0.704)	(3.183)	(3.625)	(1.250)	(1.419)	(0.0191)	(0.0208)
Observations	756	756	719	719	756	756	756	756
R-squared	0.408	0.420	0.126	0.171	0.113	0.136	0.499	0.511

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All models include year fixed-effetcs.

Table 4.8. Regression Results of Hypothesis 4 for Deposit Banks

VARIABLES	(1) IN_Z_Score	(2) IN_Z_Score	(3) w_NonPLoans	(4) w_NonPLoans	(5) ProvforLoans	(6) ProvforLoans	(7) σRoA	(8) σRoA
State	0.280	0.313	4.502***	3.659***	-1.086**	-0.999**	-0.0218***	-0.0198***
	(0.204)	(0.219)	(1.321)	(1.261)	(0.472)	(0.442)	(0.00609)	(0.00632)
Foreign	-0.323**	-0.280*	-0.0215	0.417	-0.890*	-0.487*	-0.00752	-0.00590
	(0.162)	(0.167)	(0.658)	(0.673)	(0.460)	(0.291)	(0.00641)	(0.00571)
GFC2008	2.347***	2.275***	-0.882	-0.583	-0.152	-0.360	-0.0655***	-0.0701***
	(0.193)	(0.213)	(1.162)	(1.227)	(0.481)	(0.509)	(0.00353)	(0.00405)
GFC_SOB	-0.340	-0.373	-4.999***	-4.391***	0.735	0.539	0.0237***	0.0210***
	(0.227)	(0.235)	(1.325)	(1.267)	(0.515)	(0.433)	(0.00661)	(0.00638)
GFC_FB	-0.187	-0.202	1.314*	1.028	0.821*	0.494	0.00864	0.00867
	(0.189)	(0.200)	(0.777)	(0.800)	(0.428)	(0.306)	(0.00594)	(0.00590)
LAG_In∏TA	-0.00194	0.00175	-0.0548	-0.0850	0.0792**	0.115***	-0.000600	-0.000673
	(0.0282)	(0.0326)	(0.123)	(0.143)	(0.0394)	(0.0435)	(0.000541)	(0.000628)
BI_Equity	0.0387	0.0199	0.718**	0.637*	0.0627	0.0214	-0.00195	-0.00278
	(0.0950)	(0.0958)	(0.363)	(0.362)	(0.169)	(0.168)	(0.00185)	(0.00199)
BI_Debt		0.0810		0.210		0.476**		0.00828***
		(0.136)		(0.484)		(0.213)		(0.00312)
LAG_TLtoTA	0.00657**	0.00853*	0.0279***	-0.0191	-0.00789	0.000231	-0.000516***	-0.000423***
	(0.00267)	(0.00463)	(0.00987)	(0.0207)	(0.00558)	(0.00647)	(7.65e-05)	(0.000109)
LAG_RoA	3.743***	3.478***	-4.660	-1.582	-19.68**	-19.20***	-0.232**	-0.228***
	(1.021)	(1.095)	(5.487)	(5.454)	(7.959)	(6.868)	(0.0905)	(0.0869)
LAG_Δ∏GDP	-0.0354	-0.0304	-0.187	-0.164	-0.0977**	-0.0839*	0.000142	0.000193
	(0.0336)	(0.0340)	(0.143)	(0.146)	(0.0484)	(0.0450)	(0.000416)	(0.000414)
LAG_LiqAtoTA		0.00249		-0.0514**		0.0139		0.000136
		(0.00432)		(0.0206)		(0.0102)		(0.000127)
LAG_NIInctoTOI		0.000362		-0.0111		-0.0137		-9.66e-05
		(0.00200)		(0.00802)		(0.0109)		(8.31e-05)
LAG_Δ∏TA		-0.00283**		-0.00836**		-0.00753**		-3.79e-05
		(0.00109)		(0.00386)		(0.00305)		(4.17e-05)
Constant	0.328	0.123	1.956	6.662	-1.394	-2.547*	0.123***	0.119***
	(0.831)	(0.982)	(3.661)	(4.605)	(1.279)	(1.322)	(0.0152)	(0.0194)
Observations	522	522	498	498	522	522	522	522
R-squared	0.405	0.414	0.140	0.176	0.233	0.299	0.534	0.551

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
All models include year fixed-effects.

Table 4.9. Regression Results of Hypothesis 4 for Development and Investment Banks

VARIABLES	(1) IN_Z_Score	(2) IN_Z_Score	(3) w_NonPLoans	(4) w_NonPLoans	(5) ProvforLoans	(6) ProvforLoans	(7) σRoA	(8) σRoA
State	-0.511*	-0.606**	0.929	1.128	-0.155	0.116	0.0481***	0.0488***
	(0.279)	(0.289)	(1.953)	(2.037)	(0.561)	(0.589)	(0.00861)	(0.00869)
Foreign	-0.839***	-0.573*	0.281	-1.385	1.527	1.187	0.0212	0.0246*
	(0.309)	(0.320)	(2.571)	(2.110)	(1.372)	(1.402)	(0.0148)	(0.0147)
GFC2008	1.383***	1.304***	-1.636	-0.981	-0.494	-0.228	-0.0407***	-0.0344***
	(0.263)	(0.268)	(2.085)	(1.959)	(0.801)	(0.780)	(0.00928)	(0.00955)
GFC_SOB	0.530*	0.596*	-3.124	-2.975	-0.287	-0.592	-0.0245***	-0.0277***
	(0.297)	(0.306)	(1.914)	(1.997)	(0.510)	(0.511)	(0.00881)	(0.00893)
GFC_FB	0.120	-0.171	-0.0903	2.487	-1.213	-1.048	-0.0104	-0.0166
	(0.346)	(0.368)	(2.703)	(2.376)	(1.474)	(1.606)	(0.0156)	(0.0164)
LAG_In∏TA	0.123***	0.138***	-0.487**	-0.671***	-0.109	-0.0936	-0.0117***	-0.0106***
	(0.0379)	(0.0401)	(0.216)	(0.210)	(0.110)	(0.0928)	(0.00135)	(0.00128)
BI_Equity	-0.137	-0.132	1.915**	1.902*	0.330	0.313	0.00840*	0.00630
	(0.141)	(0.147)	(0.923)	(0.993)	(0.219)	(0.223)	(0.00441)	(0.00442)
BI_Debt		0.270		-1.825		-0.375		-0.0180***
		(0.214)		(1.252)		(0.417)		(0.00580)
LAG_TLtoTA	0.00479**	0.00648	0.0370***	0.0586	0.00910**	-0.00330	-0.000243***	-0.000405*
	(0.00222)	(0.00460)	(0.0136)	(0.0383)	(0.00380)	(0.0151)	(6.85e-05)	(0.000232)
LAG_RoA	2.388***	2.274***	-15.21*	-17.99**	-1.779	-0.672	-0.110**	-0.102**
	(0.704)	(0.771)	(7.765)	(7.502)	(1.704)	(2.186)	(0.0439)	(0.0464)
LAG_Δ∏GDP	-0.00429	0.00273	-0.0822	-0.0977	0.0283	0.0103	-7.69e-06	-9.73e-05
	(0.0400)	(0.0408)	(0.216)	(0.227)	(0.0449)	(0.0518)	(0.00137)	(0.00120)
LAG_LiqAtoTA		0.00178		0.0353		-0.0175		-0.000287
		(0.00457)		(0.0376)		(0.0159)		(0.000240)
LAG_NIInctoTOI		0.00204*		-0.0298***		0.00359		0.000135***
		(0.00105)		(0.00661)		(0.00364)		(4.56e-05)
LAG_Δ∏TA		-0.00210***		-0.00647		0.00921**		9.37e-05***
		(0.000503)		(0.00415)		(0.00415)		(2.03e-05)
Constant	-0.766	-1.153	12.05**	13.83**	3.607	3.955	0.315***	0.303***
	(0.999)	(1.013)	(5.962)	(6.201)	(2.329)	(2.590)	(0.0355)	(0.0345)
Observations	234	234	221	221	234	234	234	234
R-squared	0.495	0.517	0.202	0.275	0.144	0.262	0.592	0.651

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
All models include year fixed-effects.

CONCLUSION

In this thesis, I examine the risk-taking behavior of banks operating in Turkey classified with respect to their ownership status and deposit collectability for the sample period 2004-2020 while taking the expansion of the CGF and the global financial crisis of 2008 into account. The research questions of my thesis are: (1) Are development and investment banks different from deposit banks in terms of risk-taking behavior? (2) Are state-owned and foreign banks different from privately-owned banks in terms of risk-taking behavior? Do deposit banks, development and investment banks, and banks overall change their risk-taking behavior (3) since the global financial crisis of 2008 as well as (4) the expansion of the Credit Guarantee Fund in 2017 in respective order?

In the literature, its reported that state-owned banks exhibit higher levels of risk-taking behavior and lower levels of stability (Anginer et al., 2014; Duchin and Sosyura, 2012; La Porta et al, 1998, 2002, 2008; Srairi, 2013) whereas Boubakri et al. (2013) document that foreign ownership status of firms is positively associated with risk-taking measures indicating more risk-taking behavior.

The risk-taking behavior of banks are measured by using the four measures that are used in the literature: the natural logarithm of the Z-score, the non-performing loans ratio, the loan loss provisions ratio, and the volatility of return on assets. Bank-level control variables employed are bank size, total loans-to-total assets ratio, return on assets, the liquidity ratio, non-interest income ratio, growth in real total assets, the listing status of banks in the equities and debt securities market of Borsa Istanbul. The macroeconomic control variable employed is the growth in real Gross Domestic Product (GDP).

With respect to the literature and the empirical results of my thesis, it was a given that state-owned banks would exhibit risk-taking behavior (for example, see La Porta et al. (1998, 1998, 2002, 2008). The employment of French-origin civil law and the presence of developmental view since the foundation of the Republic of Turkey implicated the risk-taking behavior of state-owned banks. However, depending on the risk measures employed, although state-owned banks exhibit higher levels of risk-taking behavior, interestingly also, in general, foreign banks exhibit higher levels of risk-taking behavior, similar to Boubakri et al. (2013), and experience no change in their risk-taking behavior after accounting for the global financial crisis of 2008 and the expansion of the Credit Guarantee Fund (CGF) in 2017 in comparison to privately-owned banks. Development and investment banks are found to have higher variability in their ROA but no significant difference is found between development and deposit banks in terms of other risk measures. It was interesting to see that deposit, and development and investment banks differed in terms of risk-taking behavior with respect to ownership status.

When all of these empirical results are considered together, it can be seen that although the risk-taking behavior of banks can be observed through one measure, the natural logarithm of the Z-score, there are other risk-taking measures indicating other types of risks such as asset risk, credit risk and the behavior of the manager when providing provisions for loan loss. Therefore, all of these should be taken into account when analyzing the risk-taking behavior of banks with respect to their type and ownership status.

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