THE DETERMINANTS OF CREDIT CRUNCH IN TURKISH BANKING
SECTOR: EVIDENCE FROM GRANULAR BANK-LEVEL DATA

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ABSTRACT

THE DETERMINANTS OF CREDIT CRUNCH IN TURKISH BANKING SECTOR: EVIDENCE FROM GRANULAR BANK-LEVEL DATA

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Understanding pattern of the lending through macroeconomic indicators and financial fundamentals have an utmost significance to define and illustrate cycle of economic activity and supervision of financial stability. Both academicians and regulatory officials of countries widely involve the lending behaviors due to these factors in their works, globally. The studies conducting by central banks of advanced economies as well as emerging countries' central banks, international regulatory and supervisory institutions confirm the claims, properly. In this context, this paper evaluates the main determinants of lending contraction with three breakdowns as baseline crunch analysis, the pure crunch scenario and the period of further monetary policy tightening by implementing fixed panel logit methods for Turkish banking sector. The data covers from the beginning of 2007 to December 2019 at monthly intervals for the deposit banks situated in Turkey.

Keywords: Credit Crunch, Fixed Panel Logistic Regression, Turkish Banking Sector, Monetary Tightening

ÖZ

KREDİ DARALMASININ ANA BELİRLEYİCİLERİ: BANKA BAZINDA VERİLERLE TÜRKİYE ÖRNEĞİ

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Makroekonomik göstergeler ve finansal göstergeler yoluyla kredi gelişimlerini tanımlamak, iktisadi aktivite döngüsünü ve finansal istikrarın denetimini ve takip edilmesi açısından son derece önemlidir. Hem akademisyenler hem de ülkelerin düzenleme kurulunda yer alan yetkililer, bu faktörlerden kaynaklanan kredi verme davranışlarını küresel manada yaygın bir şekilde çalışmalarında ele almaktadır. Gelişmiş ülke merkez bankaları, gelişmekte olan ülke merkez bankaları, uluslararası düzenleyici ve denetleyici kurumlar tarafından yürütülen çalışmalar bu iddiaları önemli bir biçimde doğrulamaktadır. Bu bağlamda, bu makale, Türk bankacılık sektörü için sabit panel lojistik kestirim yöntemini uygulayarak temel kredi daralması analizi, salt kredi daralması senaryosu ve para politikasında gözlenen daha yüksek ölçekte sıkılaşma dönemi olmak üzere üç kırılımda kredi daralmasının temel belirleyicilerini değerlendirmektedir. Örneklem, aylık verilerle, Türkiye'de yerleşik mevduat bankaları için 2007 yılı başından 2019 yılı sonuna kadar süreyi içine almaktadır.

Anahtar Kelimeler: Kredi Daralması, Sabit Panel Lojistik Kestirim, Türk Bankacılık Sektörü, Parasal Sıkılaşma

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BAT	Bank Association of Turkey
BIST	Istanbul Stock Exchange
BRSA	Bank Regulation and Supervision Authority of Turkey
BSBC	Basel Committee on Banking Supervision
CBRT	Central Bank Republic of Turkey
CCI	Credit Crunch Index
CPI	Consumer Price Index
DG	Deposit Growth
FTMP	Further Tightening in the Monetary Policy
GCB	Government Cash Balance
GDP	Gross Domestic Product
GFCRS	Global Financial Condition and Risk Sentiment
IBR	Internal Borrowing Ratio
KAP	Public Disclosure Program
LAR	Loan Activity Ratio
NCLR	Noncore Liabilities Ratio
NPL	Nonperforming Loans
OI	Other Investment
PBAT	Participation Bank Association of Turkey
PC	Pure Credit Crunch
PCA	Principle Component Analysis
PI	Portfolio Investment
RoA	Return on Asset
STIR	Short Term Interest Rate
VIX	Chicago Board Options Exchange Market Volatility Index
WACF	Weighted Average Cost of Funding

CHAPTER 1

INTRODUCTION

The pattern of lending behaviors has a significant impact on credit-driven economies. Considering their economic establishments, institutional background, and capital accumulations, emerging markets heavily rely on the lending facilities to boost their economic activities and enhance their societal development. Private consumption such as housing and purchasing cars and durable goods, and investment expenditure decrease during the credit crunch period. On the other hand, in the case of an unbalanced hike in credit volume or credit boom, financial instability, mispricing behaviors in the assets, the deterioration of external balance and a surge in general price level are evident. In this context, understanding the determinants of lending behaviors attracts both international and domestic regulatory authorities, institutions, and academic staff.

There are several strands of literature for understanding the mechanism of credit and evaluation the pattern of lending behavior analysis in the narrative. As the early studies widely focus on banking and balance of payment crisis (Pazarbaşioğlu, 1997; Demirguç-Kunt and Detragiache, 1998 and Kaminsky and Reinhart, 1999), the credit indicators also use as an early warning indicator for defining distressed periods of banking sector and financial environment in several works (Demirguç-Kunt and Detragiache, 2000; Bussiere and Fratzscher, 2006; Frankel and Saravelos, 2010; Babecký et al., 2014; Roulet, 2018; Geršl and Jašová, 2018 and Alessi and Detken,

2018). Besides, both international and domestic regulatory authorities take some actions to observe the lending patterns and to curb excessive credit movements from the onward global financial crisis. For this aim, international and local authorities introduced some macro-prudential policies world-widely. For instance, the Basel Committee on Banking Supervision (BSBS) declared a cluster of measures against the adverse impact of the global financial crisis on the financial intermediaries and economic system as a whole in 2010. Also known as Basel III, the BSBC coined the countercyclical capital buffer by aiming to eschew banks from excessive credit growth. From this point of view, Borio et al. (2010) define the credit to GDP gap, which is extracted from the amount of aggregate credit provided to the private sector with filtering techniques.

Moreover, in 2012, Turkey presents some macro-prudential measures to curb the surge in the current account deficit and credit boom as the economy grows highly above its potential. During the period, some restrictions were introduced such as the decreasing number of installments of credit cards for some sectors, higher minimum payments for credit card debts, loan to value ratio for housing credit, and lowering cap of time to maturity for private financing credits to smooth the consumption and alleviate the imbalances of lending patterns. Due to these several macro-prudential policies enacted in 2012, a slowdown in credit allocation was achieved by Turkish authorities to appease financial stability concerns over the overheating economy.

Studies generally focus on cyclical credit movements, the credit boom episodes, and the determinant of lending growth in the narratives, as seen in the literature review section. However, there exist a few studies that examine the credit shrink, specifically.

One of the earliest prominent studies, Bernanke and Lown (1991), analyze the credit crunch. Pazarbaşioğlu (1997) also suggests that banks can sever the credit facility resulting from the worsening asset quality and profitability issues in the disequilibrium model of the commercial credit market. The author claims that the rationale behind this crunch is to eschew the adverse selection problem in excess credit demand and the concern of profitability. According to the author's definition, the credit crunch can be illustrated as a shrink of credit facility due to banks' unwillingness to finance consumption or investment. Besides, Barone et al. (2018) drive an index for the supply side of the landing behaviors by aggregating bank-level credit supply and weighting accordingly market share. They evaluate credit shrink with this index in the context of economic activity for Italian provinces. Moreover, Naceur and Kandil (2013) assess the credit crunch in the MENA region within Basel III requirements. According to their categorization, credit crunch expresses as a decline in the lending facility relative to a benchmark or leftward shift in the credit supply curve.

In this study, I exploit the bank-level panel data set between 2007 and 2019 at the monthly frequency as well as several macro-economic controls. Initially, to test the drivers of credit crunch, I handle the issue with three central breakdowns: general baseline specification, pure credit crunch era, and further tightening stance in monetary policy. I conduct a fixed effect panel logit model where the credit crunch index regresses on bank-specific indicators embodied for the supply side of the lending behaviors, factoring into the change in general price level and GDP growth rate representing demand-side lending as a proxy for baseline pillar of the analysis. To analyze exogenous impacts on the credit crunch, global financial condition and risk sentiments, capital flow movements from abroad, fiscal expenditures, and monetary

policy effect are included in the study, becomingly. The study aims to understand and illustrate the credit crunch's leading drivers and the impact of several exogenous factors abovementioned on the credit crunch index.

The outline of the paper separates into six sections in which, in Section 2, literature review by focusing on the cyclicality of lending with credit boom-bust, filtering techniques and some additional measures for extracting cyclicality, the narrative related to drivers of lending behaviors, the equilibrium level of credit indicators and credit behaviors in terms of bank ownership structure. In Section 3, the data concerning bank-level credit indicators and macroeconomic variables are used for credit crunch index estimations with three breakdowns. In section 4, the methodology is explained step by step, starting with the baseline scenario comprising baseline scenarios through further monetary tightening. In the following section, the empirical results on baseline scenario, pure credit crunch period with factoring in exogenous factors, and tightened monetary policy environment are explained. In the final area, I wrap up the paper by briefly reporting the overall findings.

CHAPTER 2

LITERATURE REVIEW

Considering credit literature concerning lending behaviors, there exist broad spectrums of studying area. As some of the works focus on extracting cyclical movements of lending, the others analyze the determinants of credit growth with regard to macroeconomic and bank-specific indicators. Alongside cyclicality literature, credit gap analysis by exploiting filtering technique proposes at some studies. Additionally, another cluster of works probes into lending behaviors in the context of equilibrium level. In order to examine the excessive credit growth and its impact on the banking system, there is a group of research regarding credit boom-bust period and its implications on the financial and banking system as well. Moreover, credit is also handled in terms of early warning indicators by depicting banking crisis and financial distress periods. In literature, there are also several studies on the impact of bank ownership structure on lending behaviors. The main corpse of literature focuses on the cyclicality of credit growth and macroeconomic, financial, and bank-specific determinants of lending behaviors. In this section, as the extensive literature on credit is briefly represented under five sub-groups as cyclicality of credit pattern, the determinants of lending, credit boom-bust period studies, banks' lending behaviors under the ownership structure, and the equilibrium level of credit.

As mentioned above, the works concerning credit growth's cyclicality comprehend many studies such that rapid-excessive credit growth, credit boom-bust, and credit gap analysis can be included in this literature strand. Additionally, examining the credit

behaviors within the context of monitoring and assessing financial stability, credit cyclical analysis is of the significant implementing area as well. Several methods are to be conducted in the researches to extract the cyclical time series from its trends and define a threshold level for various credit indicators. Alongside econometric methodologies, filtering techniques are widely exploited for separating cyclical parts of the lending behaviors' movement. The most preferred filtering methodology is the Hodrick-Prescott (HP) filter coined by Hodrick and Presscott (1997) and HF filter variations. Moreover, the studies depicting and trying to attain credit boom periods benefit, to a great extent, from this technique as well. In the literature, the threshold level is obtained on the purpose of defining a credit boom. Initially, after variables are de-trended through the HP filtering technique, the remaining cyclical components are extracted from the series. If the cyclical component or the data used in a given period exceeds a threshold level, then one can say that a credit boom appears in that period. In addition to HP filtering techniques, Christiano-Fitzgerald, Baxter-King and Beveridge-Nelson approaches are the other filtering methodologies used in cyclical credit analysis as well.

Reigl and Uuskula (2019) propose new techniques to depict the credit gap dynamics in their study. They use four additional ratios such as, over a two-year period, change in the credit/GDP ratio, nominal credit growth minus % five annually, the difference of eight-year average of nominal credit growth-nominal GDP growth and standard HP filtering methods but with different smoothing parameter to measure credit cycle in addition for the Basel III framework that is suggested to use standard HP filter. Ottens et al. (2005) analyze excessive credit expansion as a sign of the banking crisis in Asian and Latin American emerging economies in the context of a credit boom. They suggest

considerably upward diversification of credit growth from its trend may lead to a banking crisis. They use a backward-looking rolling HP filter using country-level credit/GDP data to determine country-specific deviation from its long-term trend. Moreover, they assign a noise-to-signal ratio introduced by Gourinchas, Valdés and Landerretche (2001) and Kaminsky and Reinhart (1999) and by minimizing this ratio, the threshold level of a credit boom is created. Determining the right threshold level discussion, they address Demirgüç-Kunt and Detragiache (2000). Besides, they propose two pillars to choose the appropriate threshold level.

As one of the prominent contributions to literature, Arena et al. (2015) evaluate the dynamic of excessive credit growth with macroeconomic fundamentals and its attribution to the financial distress era. They focus mainly on Mendoza and Terrones (2008, 2012) approach by identifying excessive credit growth as a deviation in real GDP per capita from its trend that is computed with the HP-filter. As threshold variable, 1.65 standard deviations of real credit per capita from its cycle is adjusted. Before adding macro aggregates on the regression, they extract the cyclical components of these variables such as real exchange rate, a broad definition of money, the weighted average of GDP growth of trading partners being used as proxy for external demand, current account to GDP ratio, and capital inflows to GDP ratio with a lagged term of them. Their results suggest that having a less flexible exchange rate regime increases the vulnerability in the case of reversal of capital inflows. The OLS method with a binary dependent variable is applied for the model. Moreover, to determine credit growth as an excessive credit expansion, Hansen and Sulla (2013) implement two different approaches that are credit (credit/GDP) and equity price gap by using standard HP-Filtering methods suggested by Borio and Drehmann (2009) as

well and panel co-integration techniques to show a long-run relationship with macro fundamentals and credit/GDP ratio for Latin American Countries. The study exploits aggregate deposits, equity, security, and net foreign assets to GDP ratio for banks alongside government debt, capital inflow, and stock market capitalization to GDP ratios. Moreover, the real interest rate, banking sector regulations, and sector concentration are incorporated into the model. According to their findings, there appears a strong lung-run relation between credit and deposit growth. In addition, by factoring in economic activity extracting the deviation of log of real output with HP filter, credit developments, the current account balance, external leverage which is embodied by the ratio of total asset to gross equity liabilities, the real interest rate, the real exchange rate, international reserves and indicators concerning public finance to model, Gourinchas and Obstfeld (2012) try to predict different types of crises that are currency, banking, and sovereign. According to their findings, the current account balance of emerging economies deteriorates through the crises. Furthermore, depreciation of the real exchange rate is another sign for preceding crises while external factors such as foreign exchange reserves and short-term external debt ratios to output are prominent in the context of crisis determinants. Lastly, Bouvatier et al. (2012) find that the credit growth responds to the demand shock in the context of credit cyclicality while the structure of the banking sector is not prominent considering the cyclicality of credit within the framework of financial fragility.

Alongside the studies being implemented HP filtering techniques, there also exist several studies that utilize the other filtering techniques and some other different statistical methods to define threshold level and extract cyclicality. Coudert and Pouvelle (2010) define rapid credit growth with filtering technique and econometric

model for Central and Eastern European emerging and transition countries. They assess cyclical movement in lending growth with HP and Baxter-King filtering technique in terms of credit/GDP ratio as well as real credit growth. Moreover, alongside filtering methods, macroeconomic fundamentals such as net capital inflows to GDP ratio and legal system, GDP per capita, stock market capitalization/GDP ratio, exchange rate regime, real interest rate, and transition country dummy are factored in to the model to express credit boom and bust period. In addition to the filtering technique, fixed effect panel and pooled OLS estimation and panel ECM are applied for the analysis. According to their results, GDP per capita, real interest rate, exchange rate regime, and net capital inflows have an influence on lending behavior. Furthermore, Dell'Ariccia et al. (2016) propose two different absolute threshold levels and country-level of credit growth for depicting the positive diversification of credit/GDP ratio from its trend. They employ backward-looking, rolling, and cubic trend estimates. According to their classification, if the estimated (calculated) data exceeds 1.5 standard deviations from its trend, and annual growth rate of credit/GDP ratio surpasses 10 %, or annual credit/GDP growth exceeds 20 %, these cases count on as credit boom. They started to use macro variables from one year before the boom period begins to the first year the boom. They utilize a simple OLS model with establishing boom as a dummy dependent variable in the study to find the likelihood of excessive credit surge. In addition to aggregate credit boom, they separately analyze household credit, household price, and firm credit boom period. By adding GDP growth, per capita GDP in log form, capital inflow, inflation, current account balance, trade openness, and exchange rate regime, they aim at covering macro conditions of the model.

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Igan and Pinheiro (2011) discuss the detrimental effect of excessive credit expansions on a bank's soundness. Their empirical model consists of bank-specific such as net interest margin as bank profitability, log of total assets as for bank size and liquidity due to covering supply-side of credits additively to macro fundamentals that are GDP per capita, real GDP growth, real interest rates, and real exchange rate depreciation to cover demand–side of credit determinants. They define excessive credit expansion periods as the threshold at which the credit/GDP ratio exceeds its backward-looking cubic time trend. Gonzales et al. (2015) use Bayesian Structural Time Series Model (STM) to estimate credit to GDP gap as an alternative approach for BIS computation of credit to GDP gap.

Briefly, the initial comprehensive study for credit boom-bust period was the one by Gourinchas, Valdes, and Landerretche (1999) that measures a threshold level as the upper points for credit to GDP indicator for defining excessive credit growth by exploiting panel regression. Another study of the same authors also designates lending boom episodes for Latin American countries using the same methodology as (Gourinchas et al. 2001). This threshold approach was further utilized in other studies. Barajas, Dell'ariccia and Levchenko (2007), Hilbers et al. (2005), Ottens et al. (2005), Utari et al. (2013) find the boom-bust periods for the credit to GDP ratios for different countries using the trend-threshold method. Also, Elekdag and Wu (2011); and Tornell and Westermann (2002) determine the boom-bust episodes for real credit variable (Nominal credit / GDP), Mendoza and Terrones (2008) for per capita real credit. They assert that real appreciation of non-tradable sectors exceeds the tradable sectors during the lending boom process, contrary to the aftermath of the crisis for middle-income countries. Moreover, the credit boom seems to be as a cause of financial liberalization.

Arena et al. (2015) assess the credit boom with macro indicators by probit model estimation for low-income countries. Their results show that capital inflows are linked to a credit boom, and macro-economic dynamics differ across the countries. In the paper, it is suggested to low-income countries to be more careful about financial liberalization, cross-border banking activities, and surge in credit growth.

In addition to these academic researches, international organizations also propose some thresholds for credit expansions to monitor financial stability and maintain the banking system's well-functioning. For instance, following Drehman and Borio (2012), the Bank of International Settlements (2013) specifies upper limits for credit-to-GDP ratios. It proposes prudential policies to its members to provide accordingly credit expansion within the optimal levels.

Some empirical literature focuses widely on the concept of the distressing period. Graciela et al. (1999) examine the banking and balance-of-payments problems for selected emerging economies. They suggest that the banking and currency crisis is considerably related and financial liberation precedes the banking distress by easily accessing international capital markets that are led to activate boom-bust credit cycle. Moreover, Baraja et al. (2007) estimate a multivariate logit model to assess emerging economies' banking stress. Their paper identified that high inflation and bad quality banking supervision have coincided with credit boom episodes. As another contribution, Davis et al. (2016) find that the marginal effect of credit GDP growth affects the probability of a banking crisis. They provoke both panel logit and linear probability model to estimate the likelihood of a banking crisis. As current account balance GDP ratio, output gap indicator, inflation rate and exchange rate regime factor

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into the model as explanatory variables additively excess growth rate assigned as a dependent variable by measuring its cyclicality with HP filtering method. Moreover, Krishnamurthy and Muir (2017) describe the financial distress period with two quantitative techniques and descriptive methods within the framework of credit spread behavior and its relations with the economic activity during the financial distress era. The authors define this period as the time span that occurred bank run, bankruptcy, and a surge in defaults due to extensive capital degradation. According to the results, the credit GDP ratio can capture the fragility of the financial sector. Lastly, Castro and Martins (2018) use multinomial and sequential logit panel estimations to analyze the credit boom dynamics as good or bad for selected developed and developing countries. Their findings claim that credit boom is likely ended with a banking crisis when it is driven by high-level capital inflow, higher credit lending ratio and lower interest rates, while sound economic activity and openness to trade contribute to credit boom in the right manner.

Another significant fragment of the literature on credit is the studies concerning the main drivers of lending behaviors. In assessing main drivers of bank lending and rapid credit growth, external factors such as capital flows, global liquidity conditions, the pace of international economic activity, and global risk sentiments are factored into the studies. In addition to this factor, domestic indicators are the other significant controlling group for defining the drivers of lending patterns. The varieties of gross domestic product and industrial production as determinants reflecting the impact of economic activity, consumer price index, indicators regarding financial conditions, public expenditure and monetary policies of central banks appear in literature for this

aim. Besides, in literature, the common use of variables is the bank-specific data to depict the issue.

There also exist several studies examining lending behaviors within demand-side and supply-side effects breakdown. Elekdağ and Han (2015) analyze the determinants of credit growth in Asian emerging economies applying two-block structural VAR technique. They found that domestic factors, especially domestic monetary policy, are more prominent than external factors considering rapid credit growth. Another study by Elekdağ and Wu (2011) explains credit movement's determinant with three main drivers linked with the bank's balance sheet soundness, external liquidity gluts, and monetary policy tightening. They utilize real credit, nominal credit, and the credit-to-GDP ratio to extract deviation from trends. They also define a threshold to show a credit boom period. The beginning of boom is defined as the period from which cyclical standard deviation surpasses one standard deviation. According to their findings, loose monetary policy and accommodative global liquidity underpin credit growth. Kiss et al. (2006) examine country-level credit dynamics with the context of macro fundamentals by applying the pooled mean group panel estimation. In their analysis, instead of banking sector indicators, macroeconomic variables such as the PPP-based GDP per capita, real interest rate to cover the cost of credit and inflation is used for the model. Additionally, Gozgor (2014) investigate the determinants of lending with external versus internal breakdown by implementing a dynamic panel estimation technique. He uses real output growth per capita, inflation rate, deposit rate with their lagged values, real interest rate, broad money to output, and nonperforming ratio to contain credit movements' internal demand factor. Moreover, as for external supply conditions, nominal exchange rate, domestic versus global interest rate spread

Magud et al. (2012), capital flow ratio (Kim and Wu, 2008; Lane and McQuade, 2013) are taken into account. In addition, current account balance ratio used as proxy for external balance, the indicators concerning global financial market condition and openness to trade are factored into the model. According to the results proposed, while domestically loose monetary policy as suggested by Aisen and Franken (2010), Guo, and Stepanyan (2011), Elekdag and Wu (2011), Elekdag and Han (2012), and Magud et al. (2012), lending rate spread domestic versus international markets and openness-to-trade contribute to domestic credit facility significantly, worsening external balance, and deteriorating sentiment of global financial conditions harm domestic lending pattern. Furthermore, Awdeh (2016) analyses the determinant of lending growth by exploiting bank-level data and macroeconomic fundamentals using the fixed effect panel estimation technique. According to their result, while bank-level data except for deposit growth explains less for credit growth, macroeconomic variables and monetary fundamentals such as GDP growth, inflation rate, money supply, which have a influence on lending, lending rate, T-bill yield, public debt and remittance inflow, which are of adverse effects on it, play a leading role for depicting it. Moreover, they assert that using one year lag of explanatory variable uncovers their delayed impact, which offset the immediate effect in some instances on credit growth.

There are also several pieces of researches analyzing credit growth through foreign capital inflow and external financial conditions. For instance, Furceri et al. (2012) examine the impacts of a surge in capital flows within the context of domestic credit and financial fragility. They find that large capital flows foster domestic credit levels in the short run. However, in the medium run, the affirmative effect of the surge is reversed. Moreover, according to their results, debt capital inflows impact domestic

credit rather than FDI or equity investments. What's more, Montoro and Rojas-Suarez (2012) identify the factors such as macroeconomic fundamentals, institutional structure, and financial system efficiency concerning Latin American countries' lending behavior during distressed financial time via bank-level and country-specific data. The results demonstrate that adverse external financial shocks, macroeconomic indicators, and financial variables have an overwhelmingly influential on credit behaviors during the distressed time period. Moreover, external debt, liquidity and bank efficiency play a significant role in depicting credit growth at this period. Furthermore, Cottarelli et al. (2003) use a random effect panel estimation method for 24 developed and non-transition emerging countries. In their findings, rapid credit growth shows mainly due to financial deepening, the privatization process, and the progress of countries institutions for Balkan, Central and Eastern Europe countries. Moreover, some works are trying to capture external factors with the help of a cluster of data instead of one indicator. In addition to the study by Kose et al. (2003) implementing to a version of multi-factor models that is the single dynamic unobserved factor, Shirota (2015) extracts common factors by performing on a large dataset concerning financial variables and credit flow to compose common factors by using factor models as well. Shirota suggests that the global common factor that is established by him is closely linked with the investors' risk sentiments and could be an indicator to monitor the credit flows across the country.

In addition to these factors, there appears a vast amount of studies, alongside bank-specific indicators, including supply and demand-side effects in their analysis. When considering the demand side of credit, it is generally implemented a proxy such as GDP. However, one of the remarkable research conducted by Jiménez et al. (2012)

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directly emphasizes the demand-side of the credit growth with the data-driven from the loan application form. They assert that banks with weaker balance sheets tend to provide less credit when the financial condition is rigid and economic activity is slow. Moreover, they underline that banks' lack of adequate bank capital and liquidity squeeze under a strict financial condition environment implies a credit crunch. Their analysis benefits from the primarily linear probability model that can be depicted as a binary dependent variable. For robustness, the fixed effect panel logit model is studied as well. They exploit interbank ratio, real GDP growth and inflation rate to control the macroeconomic condition while lags of capital ratio, liquidity ratio, return on asset, the logarithm of total asset and bank concentration ratio attach to the model contain bank-level determinants. Another study conducted by Jiménez et al. (2017) asserts that the loan activity differentiates economic condition by using bank and firm-level data. During financial distress era, they found that supply-side of lending plays a significant role whereas both supply and demand side of credit holds a crucial place in explaining lending behaviors. While they use the fixed effect panel model, they exploit interbank ratio, real GDP growth and inflation rate to control for the macroeconomic condition while lags of capital ratio, liquidity ratio, return on asset, the logarithm of total asset and bank concentration ratio attach to the model to contain bank-level determinants.

Focusing on precisely the supply side of credit growth, Stepanyan and Guo (2011) use a combination of banking sector data and macro-economic variables. They suggest that having a sound banking sector, domestic deposit growth, and non-resident liabilities, in addition to a loose monetary condition which is embodied by deposit rate, positively contributes to credit growth in the context of banking sector determinants while high inflation has an adverse effect on the real credit growth. Moreover, they

express an acceleration in economic activities helps the surge in credit growth. In this context, the real GDP growth factors into the model. Furthermore, exchange rate, US policy rate and US M2 and NPL ratios were also controlled in the analysis. Besides, Barone et al. (2018) drive an index for the supply side of the landing behaviors by aggregating bank-level credit supply and weighting accordingly market share. They evaluate credit shrink with this index in the context of economic activity for Italian provinces. They establish two different estimation steps, which are firstly conducted for a lending pattern by implementing a fixed effect panel regression, then the ratio is estimated on the real growth rate of value-added using firm-level data. Apart from these studies, some researches focus on the liquidity of banks in explaining lending growth determinants. Kim and Sohn (2017) suggest that the increase in bank capital positively impacts credit growth in the liquidity framework. During low liquidity ratios, the impacts are significantly negative for large banks, whereas they do not find evidence concerning medium and small banks. In other words, the interaction relation of bank capital and liquidity on lending growth matters. Imran and Nishat (2013) propose that economic activity, Exchange rate, foreign liabilities, bank deposit, and monetary policy have an influence on the lending behaviors contrary to inflation and Money market conditions, which is not significant for the credit. Moreover, the liquidity and financial strength of the banks underpin credit growth.

There are extensive studies concerning the effects of bank ownership structure on credit in literature. As some of them categorize the ownership structure of banks as domestic and foreign affiliated (Reinhart and Vazquez 2007; Escribano 2013), there appear some studies handling the issue with the breakdown of state-owned banks and private banks (Allen et al. 2017, Behr et al. 2017; and Zins and Weill 2018). There are

also some studies that examine the lending growth within the operational banking area of banks as Cull et al. (2013) and Bertay et al. (2015) handled with the issue accordingly banks' activities. In addition to these discussions regarding the categorization of ownership types, cross-country and one country-based case studies occur in literature. As similar to Igan and Pinheiro (2011), Cull et al. (2013) and Meriläinen (2016), Chen et al. (2017) investigate lending behavior of foreign banks covering bank-level data from 32 emerging economies in terms of the riskiness of bank structure. Bank-level specific data, macroeconomic indicators, and information about regulatory developments are divided into three main sub-categories in their research. They exhibit that banks' riskiness with a foreign affiliate is higher in comparing the banks having domestic ownership due to asymmetric information, spillover effects of parent banks' financial conditions, and the difference between home and host country. Comparing their domestic counterparts, they propose the foreign-affiliated banks have more tendency to risk-taking in the era of financial distress.

As for country-case studies, Fungáčová et al. (2013) analyze the bank's credit supply within the country-level framework. In their study, the pattern of banks' credit supply is examined in the context of bank ownership structure for Russia's case during the crisis period. According to their results, they assert that the bank ownership structure directly affects banks' credit facilities. During the crisis, as the overall credit supply diminishes, contrary to the foreign counterparts, the state-owned banks shrink less the credit facility. Moreover, Bertay et al. (2015) found that state-owned banks' lending behaviors are less pro-cyclical than private banks' actions. According to results arisen from the study, lending behavior is more pro-cyclical in the case of foreign banks. The

results are more prominent in the case of examining the banking sector that is in a well-governed country.

Considering the cyclicality of credit movements accordingly the ownership structure, there cannot be asserted that a consensus regarding the pro-cyclicality of foreign banks or counter-cyclicality of state-owned banks is established. Whereas some studies underline the significance of the pro-cyclicality movement of foreign-affiliated banks, other works do not propose a sound argument to bolster banks' cyclicality within the context of ownership structure. Cull et al. (2013) probe into banks' lending behaviors according to their ownership structure for Latin America and Eastern Europe countries at bank-level analysis. Their findings propose the divergence of state-owned banks lending behavior across countries during financial distress time. While the state-owned banks act more counter-cyclically in Latin America, this is not the case for government-oriented banks situated in Eastern Europe. However, Contrary to the pro-cyclicality of foreign banks literature as a comparison against their domestic counterparts, Chen et al. (2017) propose the foreign-affiliated banks have more tendency to risk-taking in the era of financial distress.

Another cluster of studies focuses on lending from the perspective of equilibrium level of credit. Kiss et al. (2006) examine country-level credit dynamics with the context of macro fundamentals by applying the pooled mean group panel estimation method. In their analysis, instead of banking sector indicators, macroeconomic variables such as the PPP-based GDP per capita, real interest rate to cover the cost of credit and inflation is used for the model. Moreover, Gersl and Seidler (2010) approach the issue within the financial stability framework. By appointing an out-of-sample pooled mean group

panel estimation model, the authors seek to uncover short-run and long-run relation between credit/GDP ratio and macroeconomic variables to demonstrate the equilibrium level of credit growth. Wosko (2015) inquiries about lending growth with a country-based model for the long-run short-run analysis of credit patterns. He suggests the dynamic panel and dynamic ordered-choice panel models to examine short-term dynamics of the loan growth at banking(microeconomic) and the overall sectoral(macro) levels for the Polish banking sector by using survey data.

As similar to these studies, while Buncic and Meleceky (2013) implement the ARDL model to depict the equilibrium level of credit by focusing on precisely supply side of credit growth, Stepanyan and Guo (2011) use a combination of banking sector data and macro-economic variables with fixed effect panel regression. Several works define the optimal credit growth rate for the banking sector and the financial system as a general. Utari et al. (2012) calculate the credit growth rate, not having a negative impact on the economic activity banking system as a whole. They utilize Markov Switching (MS) univariate approach and MS VECM model in their analysis. Their results present the three regime models as a best-fitted threshold level for credit growth with lower, moderate, and upper breakdowns. As another study using the Markov switching model, Eller et al. (2010) apply the MS error correction model to determine and disaggregate short-run and long-run dynamics of private sector credit for Central Eastern and Southeastern European countries. Considering long-run dynamics, they suggest that economic activity is the leading determinant of lending growth and, for most countries, inflation shows a negative relation. In the short-run, credit supply factors substantially explain the credit growth cycle. While Calza et al. (2006) suggest multivariate cointegration methods to estimate a model that is based on aggregate bank

landing in Euro area, in addition to Shijaku and Kalluci (2013), Drehmann et al. (2010)

propose VECM model to measure the credit to GDP gap by using bank lending, real

GDP, consumer price index, average lending rate and monetary policy interest rate.

CHAPTER 3

DATA

The deposit banks are one of the main participants of the intermediary system in the emerging market. In Turkey, 34 deposit banks, 14 investment and development banks including Turkish Eximbank, Iller Banks and Istanbul Settlement and Custody Bank, and six Islamic & participation banks contain the banking sector structure.[1] Figure 3.1 exhibits some selected variables related to the structure of the banking system. While deposit banks carry 92.79 percent of total assets, 91.83 percent of total credit and 92.79 percent of total deposits, the development and investment banks contain only 7.21 percent of assets, 8.17 percent of credit and 7.21 percent of total deposits. Additionally, comparing with aggregate data on the participation banking sector[2] of which they are comprised 6.41 percent of assets and 4.86 percent of aggregate credit of total banking system, the overwhelming weight of the deposit banks in the banking system is evident. Moreover, as shown in figure 3.2, the deposit banks encounter fewer constraints when reaching the customers by comparison with the rest of the sector. From this point of view, investment and development banks, participation banks, and one bank under Deposit Insurance Fund were omitted from the sample due to two precise reasons: having different lending attitudes vis-à-vis deposit banks and their non-deposit taker environment in this study.

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[1]In addition to the obligatory reporting, the bank's financial statements can also be available in the Bank Association of Turkey (BAT). The banking sector data is taken from the BAT website, and it expresses by the end of May 2020.

[2] The Participation Bank Association of Turkey's data covers as of September 2019.

Figure 3.1. Selected Aggregate Variables of Balance Sheet for Banking Sector in Turkey
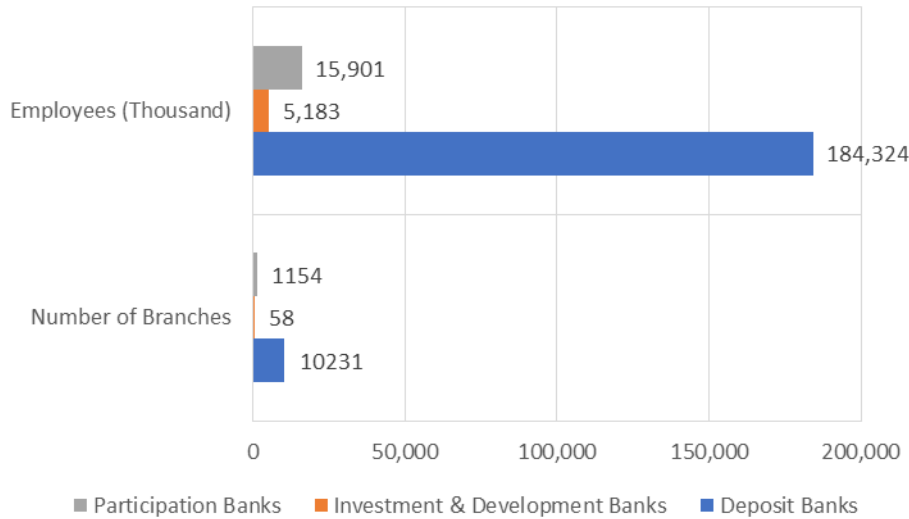
Figure 3.2. Operational Features of Banking Sector in Turkey

In addition to excluding several banks mentioned above, further adjustments were implemented for deposit banks, such as excluding banks that have branches lesser than three and omitting banks not having observation at least three consecutive years as well. After all the processes, the banking sector's data sample started with 21 banks in 2007 and it lasts with 23 banks in 2019. Furthermore, as of the end of 2019, the sample used for this study covers approximately 87 percent of aggregate credit stock, 93 percent of total non-performing loan volume, 87 percent of total assets, and 92 percent of aggregate deposits for the banking system. Figures 3.3 and 3.4 depict the historical patterns of selected banks' ratios against the whole banking sector. These figures also confirm the utmost involvement of selected banks' data to embody the entire banking sector through the period for the analysis.
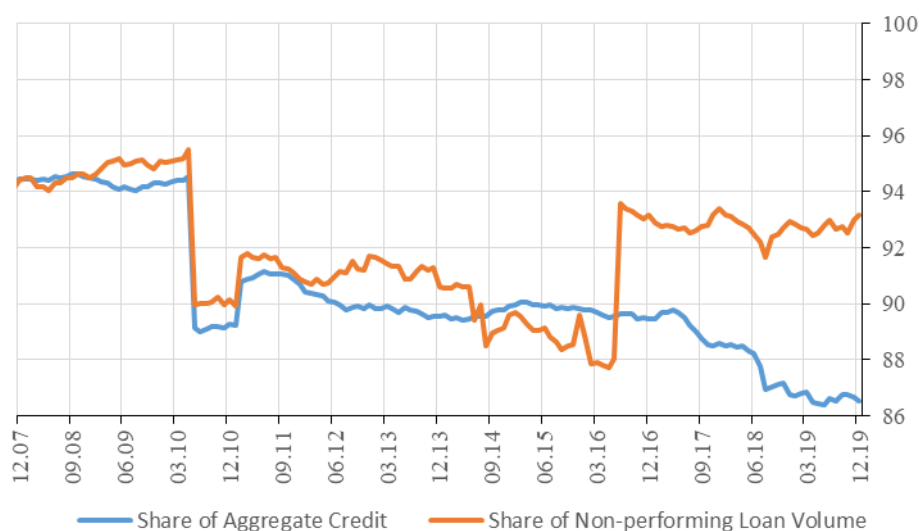
Source: BRSA, Author's Calculations

Figure 3.3. Share of Selected Banks Indicators comparing the Aggregate Banking Sector in Turkey-I

Figure 3.4. Share of Selected Bank Indicators comparing the Aggregate Banking Sector in Turkey-II

Banks operating in Turkey report their activities regularly to Banking Regulation and Supervision Authority (BRSA) and Central Bank of Turkey (CBRT) due to legislative obligations. Alongside these two legislative reporting mechanisms, banks present their financial statements quarterly to the Banking Association of Turkey (BAT). Additionally, 17 of 23 banks traded in the Istanbul Stock Exchange (BIST) also report their financial statements to the Public Disclosure Program (KAP) in the sample. In the context of accountability and transparency, considering the condition of data, its reliability is credible to exploit the reason why the selected data sample is boosted and cross-checked with each of the reporting documents.

In general, the dataset in the study is categorized three break-downs, namely bank-level variables to factor in the supply side of credit behaviors, the indicators concerning domestic financial data and economic activities to cover the demand side

of the lending pattern and lastly global financial condition & risk sentiments to control for global cash flow movement and accommodative-restrictive effects of global macroeconomic indicators on credit. Firstly, individual bank-level data is derived from monthly balance sheets and banks' income statements reported CBRT and BRSA. Then, local financial & macroeconomic indicators and global macro & financial variables are obtained from Bloomberg LT terminal, Treasury and Finance Ministry, CBRT Statistical Data and Turkish Statistical Institute. The data horizon for analysis covers from January 2007 to December 2019 on a monthly basis.

In explaining the lending facility's supply side, bank-level indicators are the essential body of credit literature. Funding condition, asset quality, bank profitability, bank size, and bank soundness are the primary benchmarks to define and understand lending behaviors within the supply-side context. Banks' funding conditions can be examined under two parts: core and non-core funding or liabilities. Hahm et al. (2013) define core liabilities as retail deposits in their study. Indeed, deposits carry the essential body of total liabilities, and they are traditional -as Shin and Shin claimed (2011) it as more stable- used as a funding source. Therefore, deposits are employed in this analysis to factor in core funding conditions. Furthermore, Shin and Shin (2011) exhibit two distinctive characteristics for non-core liabilities held by the other intermediaries and/or purchased by foreign creditors. According to their classification, borrowing from abroad such as syndication credits, bank debt securities, short repo agreements with other counterparts and central bank include non-core liabilities. I also add the non-core liabilities ratio calculated by contracting deposits and bank equities from the total liabilities to total liabilities to the model in line with Shin and Shin.

Another suggested factor monitoring the lending behavior of banks is to control for asset quality. Not only being in literature but also financial and banking sector's regulatory authorities[3] pursue non-performing loans, restructured loans and write-offs that are widely used indicators within the context of credit and asset quality of banking sector. In this study, due to reaching the data timely and carrying current information concerning credit quality, non-performing loan ratio is exploited. In addition to bringing in the deposit, non-core liabilities and non-performing loans as for funding conditions and asset quality, the proxy for bank willingness to provide credit to market and bank profitability are incorporated into the model. As return on asset includes model to capture the impact of profitability on the lending behaviors of banks, loan activity ratio which is measured by total credit banks over the total asset is included in the study to control for bank willingness to credit.

After including bank-level indicators for the supply side of credit behavior, now demand side of lending growth is introduced within the context of domestic determinants and indicators concerning the global financial condition, risk sentiment, economic activities, and cash flow in the model. The studies related to credit growth, the varieties of gross domestic product such as GDP per capita and its growth, nominal GDP growth, real GDP growth with the break-down of quarterly and annual basis are commonly used to illustrate the impact of the demand side of the credit. Alongside GDP growth, the industrial data is another variable utilized as a proxy for demand side of the credit. However, industrial production usage to cover the demand-side of a lending pattern has one drawback to which it does not properly embody the impact of

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[3] Central Banks of emerging and developed economies release their financial stability reports. The asset/credit quality is one of focal point of these reports.

household consumption behavior comprehensively within the context of housing loans and personal finance credits. Hence, I exploited the annual growth of quarterly real GDP at a monthly interval by exploiting the Fernandez model (1981) for interpolation[4] in this analysis. Then, I employ the internal borrowing and cash balance to GDP ratio so as to demonstrate the effect of public borrowing within the context of fiscal policy. Moreover, the impact of the central bank's general monetary policy stance on the lending pattern is also included in the model accordingly in line with the concept of both demand and supply-side effect. For that reason, I utilize a 3-month money market rate in accordance with the studies such as Farinha and Marques (2001), Frühwirth-Schnatter and Kaufmann (2006), Khwaja and Mian (2008) and Matemiola et al. (2015), which is suggested short term interest rate as a proxy for policy rate of a central bank to demonstrate monetary policy effect on the lending behavior, in general. Furthermore, I control for cash flow effects from abroad with the other investment, which is obtained from current account data scaled with USD nominated nominal GDP volume. At last, I extracted common factor indicator as an explanatory variable from a cluster[5] of global financial variable and the data attributed to global risk sentiment for investment and macro-economy by implementing principle component analysis (PCA) as used by Back and Weigend (1998), Cha and Chan (2000), Chalup and Mitschele (2008), Barber and Copper (2012) Naghshpour and Iii (2018) and Colak et al. (2019).

After introducing the explanatory variable for the model, the time dummies that are the era of the surge of ex-ante real interest and the pure credit crunch period extracting

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[4] Seasonally adjusted real gross domestic product volume is employed.
[5] The whole list utilized for constructing the common factor and its results is in appendix A table 4.

from the data are handled in this part. At first, further tightening monetary policy effect on lending behavior is analyzed in the study in section 5.3, specifically. Weighted average funding cost rate of CBT from which adjusted 12-month forward-looking inflation expectation is utilized as the benchmark. As seen in figure 3.5, from the beginning of May 2018 to October 2019, the ex-ante real interest rate mentioned above diverges considerably from the historical trend. So, a dummy variable is assigned to this period. Doing so aims to understand the result of further monetary tightening on the credit crunch. Lastly, I appoint another dummy variable for the pure credit crunch. A pure credit crunch is coined to explain the credit crunch period when there is no downward pressure arisen from the domestic economic activity. In accordance with the concept, the dummy is attributed to the time span where it is seen simultaneously positive real GDP growth and the credit crunch.
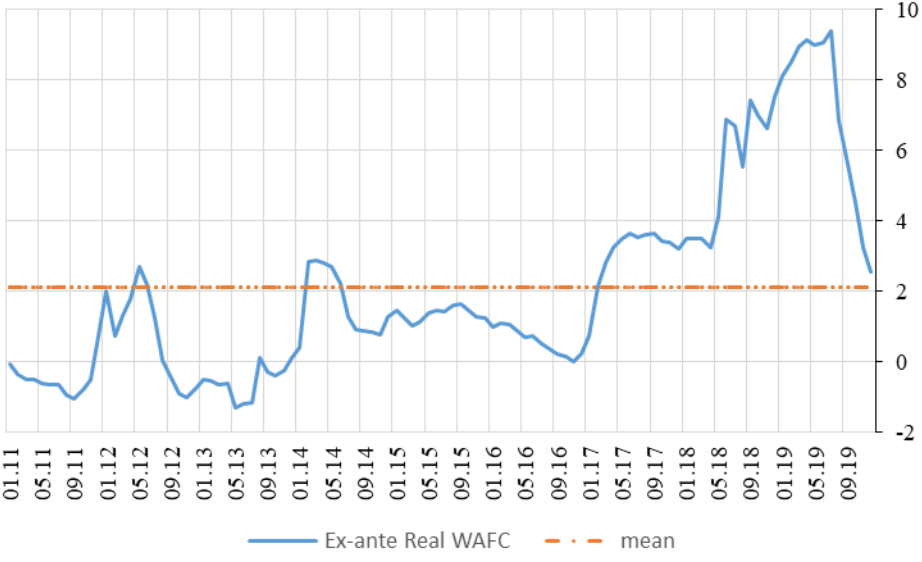
Source: CBRT, Author's Calculation

Figure 3.5. The Pattern of Real Weighted Average Cost of Funding for CBRT

Additionally, further adjustment processes were implemented for the data sample. For instance, raw credit data and deposit volume are adjusted[6] from foreign exchange rate by using FX basket accordingly, while the impact of inflation on lending behavior is controlled by presenting consumer price index to the model.

When examining the dependent variable used for the study that is binomial credit crunch data, the nominal credit growth is employed as suggested by Stepanyan and Guo (2011) and in line with the findings proposed by Geršl and Jašová (2018) with a foreign exchange rate adjustment. The initial benchmark variable is constructed by extracting the cyclical movement of nominal credit growth from its trend. To do so, the Hodrick Prescott (HP) filtering technique formed by Hodrick and Presscott (1997) is exploited in the analysis as proposed by Arena et al. (2015), Barajas et al. (2007), Drehman et al. (2010), Elekdağ and Wu (2011) and Hilbers et al. (2005) Reigl and Uuskula (2019) in the literature. After the benchmark is produced, both nominal credit growth and downwardly three-fourths standard deviation from the initial benchmark's historical trend are calculated. Then, each observation is assigned to one when two criteria are met simultaneously that nominal credit growth is below the minus five and that initial benchmark downwardly deviates from the three-fourths standard deviation in order to bring out the final binomial credit crunch indicator similar to Dell'Ariccia et al. (2012) and Igan and Tan (2017) with regards to their methodology.

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[6] The FX basket for credit is calculated by giving 0.3 weight for Euro/TRY and 0.7 weight for USD/TRY while FX basket for deposits is measured by weighting 0.4 for Euro/TRY and 0.6 for USD/TRY.

CHAPTER 4

METHODOLOGY

I exploit fixed effect panel logit methods where the dependent variable indicating a probability of credit crunch takes the value between 0 and 1 in this study as used by Barajas et al. (2007), Davis et al. (2016), Demirgüç-Kunt and Detragiache (1998), Gozgor (2018), Igan and Tan (2017) and Jiménez et al. (2012). From its nature, as Çapacığolu (2015) explains as well, while fixed-effect models factor in the varieties between groups, it implies a fixed slope within the group indicators. When considering the characteristic of my dataset, the varieties of bank structure and the similarities of their exposure by means of domestic and global macro-financial stimulators are noteworthy. Moreover, aiming to contrast the model with fixed and random effects, the Hausman test is utilized. Consequently, the random effect does not appear in the model. In this regard, this method and its varieties allow us to explain the unobserved heterogeneity in the bank-specific data in line with the literature as Awdeh (2016), Barone et al. (2018), Coudert and Pouvelle (2010), Ghosh (2010), Gozgor (2014), Kiss et al. (2006), Labonne and Lamé (2014), Montoro and Rojas-Suarez (2012), Roulet (2018), Stepanyan & Guo (2011) and Tornell and Westermann (2002).

In addition to the discussion concerning the structure of the data, to extract an index or an indicator from this sample is another phase of the analysis. As examining the literature, while some works focus on the multinomial model, some of them like Arena et al. (2015), Alessi and Detken (2018), Furceri et al. (2012) exploit binomial models

and derivatives of signal extracting approaches such as Christensen and Li (2014) Gourinchas, Valdés and Landerretche (2001), Kaminsky & Reinhart (1999) and Ottens et al.(2005). Specifically, works handling with envisaging the early warning indicators, e.g., Alessi and Detken (2018), Babecký et al. (2014), Bussiere and Fratzscher (2006), Frankel and Saravelos (2010), Geršl and Jašová (2018) utilize binomial models intensely. In this context, binomial panel logit estimation model is employed in this study.

Endogeneity is a severe problem when studying lending data with macro and bank-level explanatory variables. While Roulette (2018) utilizes one lag for annual basis bank-level variables, Bruno and Shin (2013), Çapacığolu (2015), Labonne & Lamé (2014) and Vithessonthi (2016) also employ the first lag of explanatory variables on a quarterly basis. In addition to implementing one lag of explanatory variable into the model, there are several studies such as Unger (2017) and Montoro & Rojas-Suarez (2012) that use an instrumental variable to avert endogeneity problem. In this study, the model is constructed by implementing three monthly lagged for bank-specific variables to mitigate endogeneity concerns. Moreover, alongside the literature's compatibility, many specifications have been made to define optimal lag length selection of bank-specific indicators. Consequently, the optimal lag length is determined accordingly to the significance of coefficients. Hence, I employ three month lag of bank-specific variables into the model after checking the statistical significance of one, two, and six months lag.

Since the time coverage of the study is long, autocorrelation and non-stationarity may have arisen as a concern for each of the variables. Thus, some indicators are used with

growth rate, difference, or flow format to include stationary series. So, it is provided that all the variables are stationary, which all was satisfied by unit root test. In addition, the Shin-Pesaran panel unit root test verified no panel unit root in these series. I use robust standard errors in all estimations, and errors are clustered at the bank-level to correct possible heterogeneity and autocorrelation. Moreover, as seen at the Table 2, the possible multicollinearity problem between explanatory variable was checked with covariance-correlation matrix for the dataset. In addition, table 3 exhibits the residuals behaviors aiming at to monitor whether random errors demonstrate a pattern or not. The robustness check of baseline specification and baseline scenario analysis with random effect panel logit regressions are also controlled in the study as seen appendix[7].

I represent several different specifications to measure the probability of a credit crunch with different exogenous impacts. In the first part of the analysis, I handle the credit crunch index's baseline specification and analyze the credit crunch index within global funding and risk sentiment conditions, foreign exchange capital flow, the impact of government expenditure, and the change of monetary policy rate in a general form. Then, I probe into the determinant of credit crunch with the pure crunch dummy variable abovementioned in data section under four sub-branches that are, in addition to the global condition and foreign exchange capital flows, the impact of government expenditure and monetary policy. Lastly, I investigate the crunch index with the dummy variable of further tightening in monetary policy.

The dependent variable is the binary variable that is credit crunch index, which abovementioned how it is extracted. Considering the supply-side of lending behavior,

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[7] Appendix B.

I employ bank-level indicators covering core and noncore bank funding conditions, willingness to facilitate credit, asset quality of banks, and bank profitability. The specification of the supply side of the credit is as follow:

$$CCI_{i,t} = \alpha_{i,t} + \beta_1(DG_{t-1}) + \beta_2(\Delta NCLR_{t-1}) + \beta_3(\Delta LAR_{t-1}) + \beta_4 \Delta NPL_{i,t-1} + \beta_5 \Delta RoA_{i,t-1} + \varepsilon_{i,t} \tag{1}$$

While CCI exhibits credit crunch index, DG and NCLR denote yearly deposit growth and the yearly change of share of noncore liabilities ratio over the total liabilities; LAR depicts the yearly change of loan activity ratio, which is measured by the total credit given by bank i over its total asset, NPL demonstrates yearly change of nonperforming loans scaled by the active credit volume of bank i and RoA illustrates the yearly change of the rate of return on asset.

After introducing the supply side of lending behaviors, the demand side of it is also added to the specification. Alongside including demand side impact, the general price effect was adjusted into the model. The specification that is covered both supply and demand side of the credit behavior is as:

$$CCI_{i,t} = \alpha_{i,t} + \beta_1(DG_{t-1}) + \beta_2(\Delta NCLR_{t-1}) + \beta_3(\Delta LAR_{t-1}) + \beta_4 \Delta NPL_{i,t-1} + \beta_5 \Delta RoA_{i,t-1} + \beta_6 GDP_{t-1} + \beta_7 \Delta CPI_t + \varepsilon_{i,t} \tag{2}$$

As GDP shows the yearly real gross domestic growth rate on a quarterly basis, CPI embodies the yearly change of consumer price inflation. So, the baseline specification is constructed as a result of adding demand side of lending and inflation into bank-level indicators aiming at covering supply side of credit.

I estimate the model with four different specifications in the first part of the study. I first analyze the relationship between global funding conditions and risk sentiment on the credit crunch probability index. In doing so, I use 18 indicators by applying principle component analysis. As seen in the appendix, the first common factor has adequate results to represent my index for the global condition. So I regress the credit crunch index with baseline specification adding the impact of global condition into the model. As depicted below the model, GFCRS shows yearly change of the first common factor of global financial condition and risk sentiments.

$$CCI_{i,t} = \alpha_{i,t} + \beta_1(DG_{t-1}) + \beta_2(\Delta NCLR_{t-1}) + \beta_3(\Delta LAR_{t-1}) + \beta_4 \Delta NPL_{i,t-1} +$$
$$\beta_5 \Delta RoA_{i,t-1} + \beta_6 GDP_{t-1} + \beta_7 \Delta CPI_t + \beta_8 \Delta GFCRS_t + \varepsilon_{i,t}$$
(3)

In addition to global impact on the credit crunch, foreign exchange capital flow is examined in the model secondly. Looking at the impact of capital flows on lending behaviors is a useful experiment since some banking sectors can adjust their behaviors accordingly to the direction of flows. Furthermore, this question will enable us to quantify the shock-absorbing role of a sudden stop of capital flows or the effect of the surge of capital inflows as happened after the global financial crisis in emerging economies due to widely implementing monetary easing policies in the developed economies' central banks. The specification below defines the model as:

$$CCI_{i,t} = \alpha_{i,t} + \beta_1(DG_{t-1}) + \beta_2(\Delta NCLR_{t-1}) + \beta_3(\Delta LAR_{t-1}) + \beta_4 \Delta NPL_{i,t-1} +$$
$$\beta_5 \Delta RoA_{i,t-1} + \beta_6 GDP_{t-1} + \beta_7 \Delta CPI_t + \beta_8 \Delta PI_{t-1} + \beta_9 \Delta OI_{t-1} + \varepsilon_{i,t}$$
(4)

While PI denotes the yearly change of portfolio investment ratio scaled with the gross domestic product in USD dollar terms, OI depicts adjusted other investment ratio with the excluding CBRT swap transaction via abroad and scaled with the volume of gross domestic product in nominated USD dollar.

After including global conditions and foreign exchange capital flows into the analysis, the change of government expenditure is also included in the model. In fact, government expenditure is a significant exogenous factor for the lending facility. During a surge in the fiscal expansion, it expected that outstanding available fund for borrowing flows into government financing. So, the available funds diminish in the market, and the cost of funding in the borrowing markets rises. In other words, we observe crowding out effects in the economy against the private sector. Formula 5 exhibits the model aiming to explain government expenditure effects on the credit crunch. As GCB embodies the cast balance of government over the GDP, IBR represents the ratio of the amount of government internal borrowing scaled with GDP.

$$CCI_{i,t} = \alpha_{i,t} + \beta_1(DG_{t-1}) + \beta_2(\Delta NCLR_{t-1}) + \beta_3(\Delta LAR_{t-1}) + \beta_4 \Delta NPL_{i,t-1} +$$
$$\beta_5 \Delta RoA_{i,t-1} + \beta_6 GDP_{t-1} + \beta_7 \Delta CPI_t + \beta_8 \Delta GCB_{t-1} + \beta_9 \Delta IBR_{t-1} + \varepsilon_{i,t}$$

(5)

Lastly, as another exogenous impact, the change in monetary policy is incorporated into the model in the first phase of the study. The hike in the policy rate can alter the cost of funding in many ways, such as increasing banks' cost of funding and the rise of the general market interest rate with respect to debtors. So, the hike may dissuade both creditors and debtors from lending or borrowing from the market. In this context, formula 6 shows the relationship between the credit crunch and the central bank's monetary policy stance in general to comprehend the abovementioned assumptions

into the model. As discussed in the data section, there are specific ways to factor in monetary policy impact into the regression. 3-month interest rate is widely exploited in the literature abovementioned as a proxy for monetary policy. Therefore, in this study, a short-term interest rate is involved in the model. STIR demonstrates a yearly change in the 3-month interest rate.

$$CCI_{i,t} = \alpha_{i,t} + \beta_1(DG_{t-1}) + \beta_2(\Delta NCLR_{t-1}) + \beta_3(\Delta LAR_{t-1}) + \beta_4 \Delta NPL_{i,t-1} +$$
$$\beta_5 \Delta RoA_{i,t-1} + \beta_6 GDP_{t-1} + \beta_7 \Delta CPI_t + \beta_8 \Delta STIR_{t-1} + \varepsilon_{i,t}$$

(6)

In the second part of the analysis, the pure credit crunch period is focused on precisely. After assessing the general stance of the credit crunch index, the credit crunch era when the economic activity is on the positive side of the business cycle is defined as a pure credit crunch era. The pure credit crunch dummy is established accordingly this dummy, and interaction terms are added on the regression. In doing so, the control variables and exogenous impacts are explicitly examined in accordance with the baseline specification. At first, the bank-specific time-variant variable and their interaction are handled. Formula 7 expresses the regression of credit crunch on the bank-specific indicators with their interaction. As PC denotes pure credit crunch dummy variable, it depicts coefficients of bank-level indicators' additional impact during the pure lending slowdown period. In this part, it is noteworthy that demand side of lending is excluded from the analysis due to concern of randomness of the sample after adjustment of pure crunch.

$$CCI_{i,t} = \alpha_{i,t} + \beta_1(DG_{i,t-1}) + \beta_2(\Delta NCLR_{i,t-1}) + \beta_3(\Delta LAR_{i,t-1}) + \beta_4 \Delta NPL_{i,t-1} + \quad (7)$$

$$\beta_5 \Delta RoA_{i,t-1} + \beta_6 \Delta CPI_t + \alpha_1(PC*DG)_{i,t-1} + \alpha_2(PC*NCLR)_{i,t-1} + \alpha_3(PC*$$

$$LAR)_{i,t-1} + \alpha_4(PC*DG)_{i,t-1} + \alpha_5(PC*RoA)_{i,t-1} + \varepsilon_{i,t}$$

After establishing baseline specification, the change of global financial global environment by means of risk sentiment and liquidity condition, foreign exchange capital flows from abroad, public expenditure and monetary policy stance are assessed accordingly and in line with the first part of the analysis. In this framework, in case of the period experiencing pure crunch, while the impact of global financial condition and risk sentiments which is embodied as GFCRS on the credit crunch is exhibited in formula 8, formula 9 demonstrates the regression concerning capital flows from abroad represented OI and PI as mentioned earlier in the first phase of the analysis.

$$CCI_{i,t} = \alpha_{i,t} + \beta\, Bank\ Specific\ variables + \gamma \Delta CPI_t + \sigma \Delta GFCRS_t + \quad (8)$$

$$\alpha Bank\ Specific\ interactions + \vartheta(PC*GFCRS)_{i,t} + \varepsilon_{i,t}$$

$$CCI_{i,t} = \alpha_{i,t} + \beta\, Bank\ Specific\ variables + \gamma \Delta CPI_t + \delta_1 \Delta PI_{t-1} + \delta_2 \Delta OI_{t-1} + \quad (9)$$

$$\alpha Bank\ Specific\ interactions + \tau_1(PC*\Delta PI)_{i,t-1} + \tau_2(PC*\Delta OI)_{i,t-1} + \varepsilon_{i,t}$$

In addition to global condition and foreign exchange capital inflow, similar to the first phase of the study, the exogenous effects of public spending and general monetary policy stance are also examined in the pure credit crunch period. Formula 10 shows the model regarding the additional effect of public expenditure during the pure credit shrink period. Internal borrowing ratio and its interaction are exploited to cover public spending. Adding interaction into the model aims to understand the impact of a hike in public spending on the shrink in lending probability during a pure credit crunch

period. Finally, the change of general monetary policy stance is involved in the model by implementing a 3-month interest rate as a proxy for monetary policy and interaction with the pure credit crunch dummy to analyze its impact during the aforecited period. Formula 11 exhibits the model regarding the incremental impact of change in the monetary policy stance on the credit crunch during the pure crunch era.

$$CCI_{i,t} = \alpha_{i,t} + \beta\,Bank\ Specific\ variables + \gamma\Delta CPI_t + \rho Public\ expenditure + \tag{10}$$
$$\alpha Bank\ Specific\ interactions + \pi Public\ expenditure\ interaction + \varepsilon_{i,t}$$

$$CCI_{i,t} = \alpha_{i,t} + \beta\,Bank\ Specific\ variables + \gamma\Delta CPI_t + \emptyset Monetary\ policy + \tag{11}$$
$$\alpha Bank\ Specific\ interactions + \varphi Monetary\ policy\ interaction + \varepsilon_{i,t}$$

Lastly, in order to analyze the ultimate tightening in the monetary policy on the credit crunch, I form the third part of the study. In this section, I coined a further tightening time-variant dummy and constitute interaction variables with it accordingly. The dummy variable takes one when the real weighted average cost of funding exceeds three percentage points. It is noteworthy that the historical pattern of inflation expectation adjusted policy rate hovers around 0.5 - 1.00 percentage point through the horizon of the sample in Turkey. Additionally, apart from the previous section, GDP growth rate as a demand-side of lending behavior is also included in the model. In doing so, the model to examine the focal point of the credit crunch within the context of excessive tightening in monetary policy rate was comprised. Equation 12 formulates the relationship of further monetary tightening period and credit crunch index. FTMP denotes the time-variant dummy variable that embodies the excess monetary tightening process.

$$CCI_{i,t} = \alpha_{i,t} + \beta_1(DG_{i,t-1}) + \beta_2\left(\Delta NCLR_{i,t-1}\right) + \beta_3\left(\Delta LAR_{i,t-1}\right) + \beta_4\Delta NPL_{i,t-1} +$$

$$\beta_5\Delta RoA_{i,t-1} + \beta_6\Delta CPI_t + \beta_7 GDP_{t-1} + \omega_1(FTMP * DG)_{i,t-1} + \omega_2(FTMP *$$

$$NCLR)_{i,t-1} + \omega_3(FTMP * LAR)_{i,t-1} + \omega_4(FTMP * DG)_{i,t-1} + \omega_5(FTMP * RoA)_{i,t-1}$$

$$+ \varepsilon_{i,t}$$

(11)

CHAPTER 5

EMPIRICAL RESULTS

In this section, lending behavior is handled within three breakdowns such as baseline analysis of credit crunch determinants of pure credit crunch period and credit crunch during further monetary tightening era in line with the process explained in section 4. Firstly, after evaluating baseline specification as explain in the methodology, exogenous factors such as global and financial condition, capital flows, monetary and fiscal policy are controlled in the baseline analysis. Then, during the pure credit crunch part, lending behavior is analyzed within the context of the just supply side of credit dynamics to depict bank-specific factors in understanding credit crunch as the same was implemented in the baseline analysis with exogenous factors but including also their incremental effects. Lastly, the effect of further tightening in monetary policy is studied by implementing incremental impact of CBRT's weighted average cost of funding as time-variant dummy on baseline specification.

1. Baseline Analysis

To define the determinants of the behaviors of credit crunch, the baseline regression is constructed by regressing credit crunch index on, alongside controlling bank fixed effects, bank-level indicators, lagged GDP growth, and CPI inflation provided the dataset with adjustment of a price change on lending. According to results, when considering the supply side of lending behaviors, the funding facility, the varieties of funding channels, bank willingness, and asset quality impact the credit crunch index. So, deposit growth, noncore liabilities share of total liabilities, loan activity ratio, and

nonperforming ratio demonstrate the significance of bank-level variable on the credit crunch. However, bank profitability does not affect lending behaviors pointedly. Model 1 in table 6 depicts the impact of bank-level indicators on the credit crunch. While deposit growth, noncore liabilities share, and loan activity ratio have pressure downwardly on the credit crunch probability, nonperforming loans positively impact it. However, despite the fact that the sign of the coefficient of return on assets is compatible with the literature, it is evident that there has no statistically significant effect of return on assets considering credit crunch as regard to results. In table 6, the demand side of the credit behaviors and inflation are included in accordance with the literature in the model 2. The results confirm that the real GDP growth rate increase diminishes the credit crunch index's probability. Whereas unit hike of deposit growth, noncore liabilities, loan activity ratio and GDP shrink the credit crunch probability by 0.018, 0.093, 0.195 and 0.194 respectively, a unit of increase in the nonperforming loan caused a rise in the credit crunch probabilities by 0.144

Table 8 examines the impact of global financial condition and risk sentiment on the credit crunch index in addition to the supply and demand side of lending behaviors as the core benchmark. Global financial condition and risk sentiment index are of positive influence on the lending behaviors of banks. When the index goes up one unit, the credit crunch probability decreases by 0.084 point. Another noteworthy argument for baseline analysis is whether acceleration or deceleration of capital flows from abroad have the power of stimulating the lending behaviors of a bank within the context of the credit crunch. For depicting these impacts, other and portfolio investments are represented in the baseline specification. Banks can raise their funding condition by borrowing abroad with syndication loans and issuing debt securities. These

transactions are covered under the financial account that is separated direct, portfolio and other investment at balance of payment account. Model 1 and 2 in table 7 exhibit that both portfolio and other investments are supportive in curbing the credit crunch probability of banks. While one percent rise in the portfolio and other investment ratio, the probability of a credit crunch index is shrunk by 4 percent and 5.1 percent, respectively.

Table 9 and Table 10 evaluate the fiscal and monetary policy's general stance on the lending behaviors after assessing capital inflow on the credit crunch index. As explained in detail in section 4, internal borrowing and cash balance are regressed on the credit crunch variable. Whereas the government's cash balance does not contain valuable information, the surge in internal borrowing ratio leads to a hike in the credit crunch probability. Indeed, the crowding-out effect of government internal borrowing is evident. When a government increases borrowing from domestic financial market, the composition of the allocable source of funding alters severely and the available funds for the private sector such as firms and households drain. Hence, the financial system starts to finance government expenditure directly by facilitating credits or indirectly issuing debt securities, leading to decreasing the available funds in the domestic market. As model 2 in Table 9 suggests, one unit increase in the internal borrowing ratio boosts the crunch probabilities by 0.369 points. Alongside the fiscal policy stance, the credit crunch's monetary policy effect is assessed in Table 9. As suggested by the literature, the positive coefficient shows that the higher the policy rate, the higher the credit crunch probability. As the short-term interest rate used as a proxy for policy rate of central banks rises one percentage point, the probability of crunch is up by 8.6 percent.

2. Pure Credit Crunch

In the first part of the analysis, the determinants of credit crunch probability were held as a holistic approach. Being based on the core supply and demand side of lending behaviors, alongside the global financial condition and risk sentiments, the FX inflows, public spending and monetary policy stance in a general manner were discussed from the viewpoint of the credit crunch. Apart from the first section, in this part, the crunch probability assesses with a specific occasion when the pace of economic activity maintains its standard. Still, the credit crunch index implies the occurrence of credit shrink. So, the pure credit crunch dummy represents the incremental effect of the supply-side of bank lending on the credit crunch. Hence, the baseline specification is constructed by excluding demand side of the credit crunch and it solely contains supply side of bank lending. Moreover, bank-level indicators are intersected with the pure credit crunch dummy in which is abovementioned the methodology. According to results, while funding facility and asset quality have an influence on the credit shrink, the varieties of funding composition and willingness to facilitate loans do not exhibit any support during pure credit crunch period contrary to baseline analysis. Table 11 shows that deceleration in the deposit surges the credit crunch probability. One percentage decrease in the deposit growth brings the credit crunch probability below by 5.8 percent as a whole. However, the impact of asset quality in the pure crunch time posits a bit different pattern. As model 3 in table 11 demonstrates, banks are less concerned about their asset quality in order to facilitate credit during the era that economic activity keeps well. As a percentage increase in nonperforming loans ratio is seen, the probability of credit crunch will show a hike by 19.1 percent, and contrarily, during pure crunch period, its impact dilutes by 4.2

percent. Table 12 examines the incremental impact of global financial condition and risk sentiment on the credit crunch index. On incremental basis, it has positive influence on the lending behaviors of banks. So the hike in the index, the interaction term diminishes the credit crunch probability.

When examining the impact of capital inflow from abroad on the credit crunch probability during the pure credit crunch period, the drain of capital inflow from cross-border has an adverse effect on banks' lending behavior in general terms. However, while the coefficient of interaction terms of capital inflow indicators are in line with the expectation, they statistically point to insignificant result. Table 13 exhibits the coefficients of other investment and portfolio investment ratios on credit crunch probability. As other investment to GDP ratio of banks increases, the credit crunch probability shows the 7.1 percentage decrease. However, keeping in mind the statistical insignificance of the data, while economic activity keeps its pace, banks' concern on the capital inflow abroad can be overlooked within the context of bank's lending behaviors during the pure crunch period.

In the regression in table 14, it is apparent that an increase in public expenditure has the tendency to increase credit crunch probability. On the other hand, when considering the pure credit crunch period, the impact of government expenditure is less remarkable comparing the general sense. While a one percent increase in the internal borrowing to GDP ratio is led to an increase of credit crunch probability by 1.345, the crunch probability poses a hike by 0.388 after interaction of internal borrowing ratio with the pure crunch dummy taken into account in the model. One must note that the statistical importance of the interaction variable of government

expenditure with the pure crunch dummy is not seen as a reliable indicator. Hence, during the pure credit crunch period, it can be concluded that there does not appear an incremental effect of government expenditure on the lending behavior on banks' credit crunch. In addition to analyzing the fiscal stance, general monetary policy is handled within the context of credit crunch during the era that is continuing positive economic activity but experienced a credit crunch. In table 15, the short-term interest rate as a proxy for CBRT monetary policy rate to factor in CBRT's monetary policy stance is exploited into the model and was regressed on the credit crunch indicator with its interaction term. According to the result, monetary policy stance affects the credit crunch probability negatively. While easing pattern in the monetary policy stance decreases the crunch probability, the tightening tendency in the monetary policy stance impacts the credit crunch upwardly in the general analysis. On the other hand, in the pure credit crunch era, monetary policy's general stance has less impact on the banks' credit behavior. However, adding pure crunch interaction to the model does not statistically alter the results. In this respect, table 14 illustrates having no significance of the interaction term of general monetary policy rate with the pure credit crunch time dummy.

The inference from these results is that, under the periods of regular economic activity and experiencing credit crunch simultaneously seen, funding condition considerably affects bank lending behaviors. Hence, within this context, the deposit growth has a diminishing impact on the credit crunch in this period. Moreover, during these periods, banks are less concerned with their asset quality in facilitating loans. The negative sign of the interaction dummy's coefficient implies that nonperforming loans, during this era, is not the main concern for banks.

3. Period of Further Monetary Tightening

Firstly, in previous sections, baseline analysis was held with the breakdown of global financial condition and risk sentiments, capital flow from abroad, public expenditure, and general monetary policy stance. Then, the pure credit crunch condition was examined within the context of capital inflow from abroad, public spending, and general monetary policy stance. In this part, the further monetary tightening effect is reviewed from the perspective of banks' lending behaviors and the probability of credit crunch.

The shift in monetary policy has an impact on the financial system and economic activity via monetary transmission mechanism. From this perspective, the operational mechanism of monetary policy transmission can be observed in the interest rate and credit channels to a large extent. There are a vast amount of studies to assess monetary transmission mechanism within interest rate and credit channels in the narrative. Interest rate mechanism plays a significant role to intervene in financial market and economic activity. Altering the policy rate by central banks, the aggregate demand is stimulated through the interest rate sensitive sectors such as housing and automobile by shifting bank credit interest rates. In addition to Aydin (2007), Yıldırım (2012) analyses interest rate pass-through of the CBRT policy rate on the bank rate. The author underlines the impact of policy rate on the lending rate with asymmetric adjustments (referring to it in the study as asymmetric pass-through) accordingly the type of lending facilities. Also, Cottarelli and Kourelis (1994), de Bondt (2005), Payne and Waters (2008) also studies interest rate pass-through channel in term of the monetary policy transmission mechanism. Besides, Binici et al. (2016) approach the issue the more holistic manner such that the operational framework of monetary policy

and the divergence of policy rate and market rate are included in their studies apart from de Bondt (2002) and Karagiannis et al. (2010).

Another important channel for monetary transmission mechanism is the credit channel, separated into balance sheet and bank lending as characterized by Bernanke and Gertler (1995). This channel depicts as the mechanism that is manipulated by the central banks by altering the level of aggregate deposit with money multiplier (Bernanke and Blinder, 1988; Disyatat, 2011; Kashyap and Stein 1995; Walsh 2003). In addition to the traditional bank lending channel, Bernanke and Gertler (1995) propose balance sheet channel of bank lending. According to their study, the balance sheet channel's theoretical background is that the borrower's financial position significantly impacts the external financing issue. Thence, having a stronger balance sheet position for banks leads to manage the fluctuation of market interest rate or the surge in the monetary policy rate. Moreover, as Bernanke et al. (1994) cited, the asymmetry of the credit market differs from the obtaining of credit facility with the breakdown of small and large firms during the monetary tightening period. Furthermore, Heryán et al. (2017) also study bank lending channels of monetary policy for European Union members. They find that the bank lending channel performs better for the older members of monetary union.

As mentioned in section 4, the period of further tightening in monetary policy defines as the time span when the real rate of the weighted average cost of funding exceeds three percentage points. This analysis's coverage period contains a lesser era, whereas the baseline specification's coefficients exhibit similar results as the previous section of the results. Considering the data sample for this part, credit expansion is widely

seen during the coverage time period. During a high credit growth environment, it seems that asset quality are not the major concern for banks. Moreover, the nonperforming loans ratio that is the indicator used for depicting asset quality is scaled with outstanding credit volume. So, the case of a hike in the credit observed might bring the nonperforming loans ratio down even an increase in the volume of nonperforming loans seen. Therefore, apart from the previous results, the nonperforming loan does not imply any significance in terms of credit crunch during this specific time sample. However, after the end of the credit boom period and the beginning of the distressed era taken into account, it appears a surge in the volume of nonperforming loans in Turkey. Besides, the severe credit slowdown was experienced during the period started with August 2018 and onwards. Table 16 depicts the incremental impact of nonperforming loans on the credit crunch probability. While neither nonperforming loans are not statistically significant nor its coefficient sign is compatible theoretically during a normal period, the severe impact of the deterioration of asset quality on the lending behaviors are explicitly seen during the further monetary tightening period. Notably, together with the asset quality, banks' profitability also shows diverged movements during further tightening path in monetary policy vis-à-vis previous analysis in this study. In a general sense of this study, banks' profitability does not precisely matter for banks within the credit crunch context. After the outbreak of the 2001 banking crisis, some rigid reforms were imposed on the banking sector in Turkey. Owing to these reforms, as Çolak and Şenol (2021) explain as well, capital structure and profitability were not the main obstacle and determinant for the lending behaviors of banks. Moreover, as seen in Figure 5.3.1, Turkey's banking sector follows a relatively stable pattern in profitability during normal times. However, after further

tightening process in monetary policy in 2018, a remarkable decrease is observed in banks profitability. As table 15 illustrates, a drop in the return on asset ratio endorses the credit crunch when examining this period. A one percent decrease in the return on asset causes a 1.348 point hike to crunch indicators. .
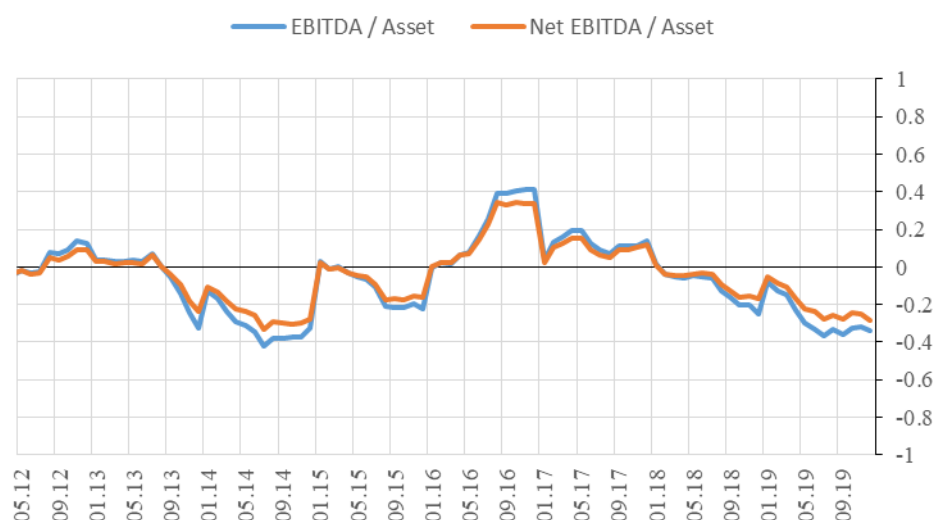
Source: BRSA, Author's Calculation

Figure 5.3.1 Historical Pattern of Bank Profitability

In addition to the distinctive features of nonperforming loans ratio with regard to credit crunch probability and the impact of profitability, comparing the previous analysis, noncore liabilities ratio also demonstrates the notable difference when examining the period of further tightening in the monetary policy. As mentioned before, the share of noncore liabilities over total liabilities contains interbank borrowing from the rest of the bank at the over-the-counter and BIST overnight repo, borrowing from Central Bank and syndication loans obtaining from abroad. Hence, the ratio can be exploited as a useful proxy for short-term interest rate differences on terms of alternative funding mechanism. When a central bank changes the policy rate, it stimulates short-term

interest rates and aims to affects the long part of the yield curve by stimulating short-terms. Interbank money market and BİST repo borrowing are the markets being exposed majorly to the CBRT's interest rate changes. As the CBRT changes policy rate, the banks using these markets intensively should alter their funding compositions or manage their portfolios according to the funding cost shift. In this context, while CBRT increases its policy rate, it is expected that the banks are unwilling to facilitate lending due to the increasing cost of funding. However, during the normal time, noncore liabilities offer banks to vary their funding composition and underpin the lending growth. Moreover, syndication loans and directly borrowing from abroad by issuing debt securities also provide banks with an additional credit facility. So, it can be concluded that noncore liabilities boost the bank lending growth during the normal time and they might curb the lending behaviors during the period observed further tightening in the monetary policy. Table 15 factors in the effects of the indicators on the credit crunch probability with respect to both the normal period and the era of the additional tightened monetary policy stance. As a one percent increase in the share of noncore liabilities reduces the credit crunch probability by 0.163 during the normal period, considering further tightening in the monetary policy, the ratio intensifies the pressure on the lending facility and it augments credit crunch probability by 0.157.

CONCLUSION

This study investigates the basic drivers of credit crunch factoring in supply and demand side of lending behaviors and some exogenous factors on lending shrinkage such as government expenses, global conditions concerning risk appetite and financial indicators, foreign exchange capital flows and monetary policy stance in Turkey evidence from bank-level data. By analyzing the phenomena of a credit crunch, the paper provides distinctive and leading features. It carries out the preliminary studies example for the Turkish banking sector with bank-level statistics. According to results, as for bank-level indicators and supply-side of lending behaviors, whereas asset quality, core and noncore funding of banks, bank willingness to provide lending play a leading role in explaining credit crunch, the bank profitability is statistically ignorable considering baseline scenario of the credit crunch. Therefore, as the deterioration in the asset quality increases the credit crunch index, alongside the willingness to facilitate credit, banks' core and noncore funding diminishes the credit crunch index. Additionally, in taking into account for demand-size of lending, real GDP growth is exploited into the specification as a proxy. So, it can be concluded that the demand-side of lending matters in the context of credit crunch such that a hike in the economic activity leads to some certain amount decrease of the credit crunch. When considering exogenous factors for baseline analysis, the results of the study confirm the significance of global financial conditions and risk appetites on the credit crunch. While the credit crunch negatively impacts other and portfolio investment inflows, an increase of the government's internal borrowing underpins the credit crunch. Moreover, according to results, the short term interest rate used as a proxy

affects the credit crunch index positively from a monetary policy perspective. Besides, whereas some of the explanatory variables exhibit similar behaviors as the baseline scenario, some of them follow different patter during the pure credit crunch period. While the NPL ratio that is now less concerned for banks and global condition boosts fewer credit behaviors, there does not appear additional impacts of foreign exchange capital inflow, fiscal expenditure, and monetary policy. However, the results imply the additional effect of deposit growth during this period. Finally, when examining the credit crunch index in the era of the further tightened stance in monetary policy, it is noteworthy that banks' noncore funding has an increasing impact on the credit crunch due to the fact that increasing noncore financing cost dissuades banks to facilitate credit to the private sector.

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Table 1: Summary Statistics

VARIABLES	Observation	Mean	Standard Dv.	Minimum	Maximum
BIST 100 Index	4,193	63,923	25,911	16,998	116,729
Real Effective Exchange Rate	4,193	104.0	14.05	62.49	127.7
USDTRY	4,193	2.374	1.333	1.170	6.367
EUROTRY	4,193	2.896	1.407	1.579	7.425
FX Rate Basket	4,193	2.531	1.353	1.334	6.684
Consumer Inflation Rate	4,392	9.408	3.394	3.986	25.24
CDS 5 Years	4,193	246.7	91.83	119.2	592.3
BIST ON Interest Rate	4,193	12.46	5.426	0.322	25.19
Global Financial Condition Index	3,689	-0.0124	2.966	-8.645	11.18
Foreign Direct Investment to GDP Ratio	4,193	3.360	1.659	0.398	8.420
Portfolio Investment to GDP Ratio	4,193	3.292	4.199	-5.773	16.87
Foreign Direct Investment to GDP Ratio	4,193	5.005	4.921	-10.31	15.06
Capital Flow to GDP Ratio	4,193	11.66	7.871	-7.356	31.14
Government Expenditure to GDP Ratio	3,710	22.66	1.147	20.53	26.23
Cash Balance to GDP Ratio	3,710	-1.819	1.044	-5.657	-0.0701
Government Internal Borrowing to GDP Ratio	3,710	1.552	1.026	-0.0663	5.335
Credit level	4,466	42120	81730	0	610500
Deposit	4,466	42830	81600	0	695500
Non Performing Loan Ratio	4,465	5.387	7.957	0	95.29
Return on Asset	4,466	0.723	1.240	-21.09	5.851
Return on Equity	4,466	6.216	10.97	-398.6	61.76
Non Core Liabilities Ratio	4,466	30.54	14.40	0.513	92.78
Loan Activity	4,466	53.49	14.97	0	83.11
Loan Deposit Ratio	4,466	130.4	344.5	0	17,815
logarithm of Asset	4,466	16.66	1.819	10.11	20.29
Equity to Asset Ratio	4,466	0.123	0.0558	0.0288	0.995

Table 2: Correlation Matrix (Wide Cluster of Variables)

	REER	FX Basket	CPI	CDS 5y	BIST ON Rate	Internal Borrowing Ratio	Credit	Deposit	NPL Ratio	Return on Asset	Return on Equity	Noncore Liabilities Ratio	Loan Activity Ratio	Loan Deposit Ratio	Log Asset	GDP Growth	Direct Investment Ratio	Portfolio Investment Ratio	Other Investment Ratio	Government Expend Ratio	Government Balance
REER	1.000																				
FX Basket	-0.949	1.000																			
CPI	-0.666	0.715	1.000																		
CDS 5y	-0.556	0.560	0.577	1.000																	
BIST ON Rate	-0.418	0.484	0.726	0.561	1.000																
Internal Borrowing Ratio	0.061	0.033	-0.049	-0.078	-0.069	1.000															
Credit	-0.466	0.493	0.339	0.255	0.214	-0.001	1.000														
Deposit	-0.461	0.497	0.347	0.274	0.240	0.030	0.986	1.000													
NPL Ratio	-0.129	0.174	0.124	0.127	0.118	0.184	-0.075	-0.065	1.000												
Return on Asset	0.160	-0.136	-0.061	-0.049	0.025	0.114	0.048	0.063	-0.380	1.000											
Return on Equity	0.110	-0.107	-0.027	-0.026	0.028	0.040	0.073	0.085	-0.454	0.830	1.000										
Noncore Liabilities Ratio	-0.184	0.163	0.079	0.066	0.007	-0.133	0.025	-0.019	-0.202	-0.012	0.011	1.000									
Loan Activity Ratio	-0.082	0.073	-0.020	-0.050	-0.135	-0.135	0.178	0.120	-0.173	-0.110	-0.020	-0.233	1.000								
Loan Deposit Ratio	-0.063	0.050	0.006	0.012	-0.045	-0.045	-0.049	-0.060	-0.099	-0.034	-0.019	0.344	-0.139	1.000							
Log Asset	-0.335	0.340	0.171	0.142	0.025	-0.060	0.698	0.696	-0.087	0.182	0.219	-0.086	0.190	-0.124	1.000						
GDP Growth	0.181	-0.228	-0.254	-0.641	-0.428	-0.187	-0.090	-0.110	-0.126	-0.064	-0.036	0.037	0.099	0.023	-0.016	1.000					
Direct Investment Ratio	0.145	-0.197	0.023	-0.021	0.205	-0.147	-0.110	-0.106	-0.050	0.043	0.050	-0.052	-0.097	-0.025	-0.132	0.080	1.000				
Portfolio Investment Ratio	0.171	-0.162	-0.114	-0.392	-0.222	-0.044	-0.075	-0.081	-0.028	-0.028	-0.029	-0.032	0.035	-0.011	-0.023	0.201	-0.054	1.000			
Other Investment Ratio	0.419	-0.353	-0.339	-0.424	-0.203	0.052	-0.169	-0.163	-0.034	0.023	-0.003	-0.072	0.000	-0.041	-0.109	0.280	-0.172	-0.037	1.000		
Government Expenditure Ratio	-0.886	0.940	0.593	0.444	0.344	0.000	0.470	0.469	0.152	-0.125	-0.112	0.168	0.116	0.060	0.354	-0.162	-0.231	-0.118	-0.313	1.000	
Government Balance Ratio	0.261	-0.282	-0.189	-0.189	-0.132	-0.111	-0.135	-0.147	-0.079	-0.039	0.005	-0.013	0.004	-0.005	-0.084	0.152	0.014	0.134	0.261	-0.435	1.000

Table 3: the Distribution of Residuals
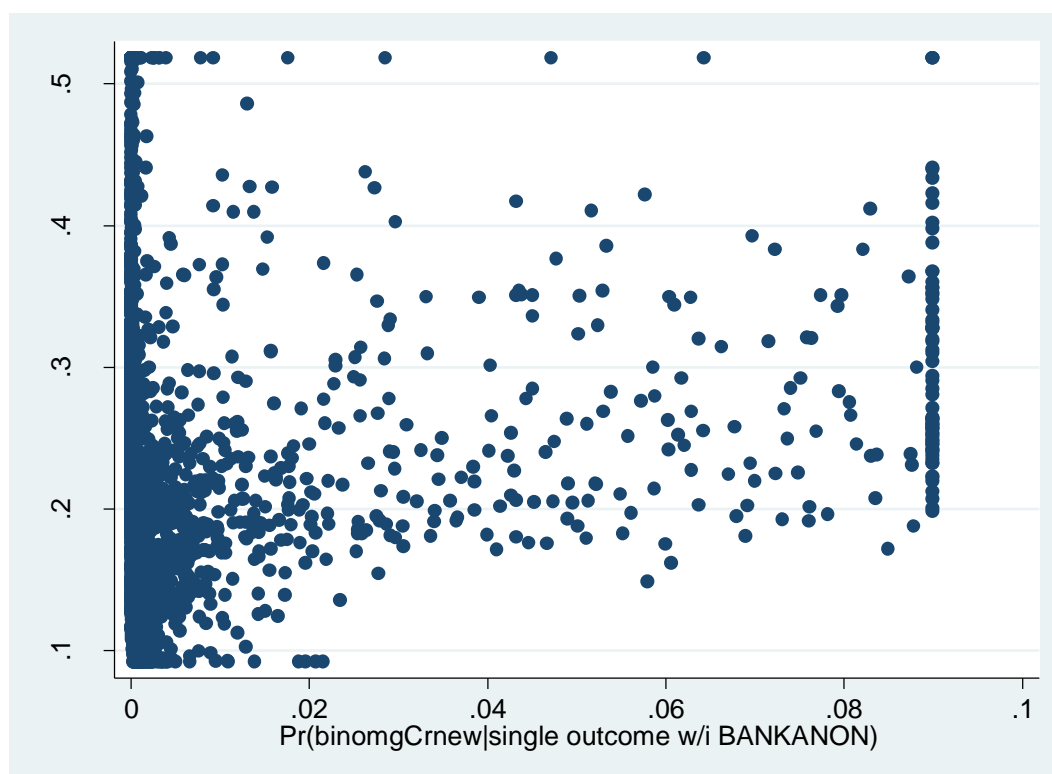
Table 4: Variables Used for the Extraction of First Component of Global Financial Conditions and Risk Sentiments

NDX Index	NASDAQ 100 Stock Index
SPX Index	S&P 500 Index
V2X Index	Euro Stoxx 50 Volatility Index
BICLOISS Index	US LIBOR-OIS Spread
CSI BBB Index	US Corporate BBB/10 Year Spread
SX5E Index	Euro Stoxx 50 Index
ECSURPEA Index	Bloomberg ECO Euro Area Surprise Index
JPEIGLSP Index	J.P. Morgan EMBI Global Spread
EMCFPROX Index	Bloomberg Emerging Markets Capital Flows Proxy Index
SPGSCI Index	S&P GSCI Spot Index
VIX Index	Chicago Board Options Exchange Market Volatility Index
MOVE Index	MOVE Index
JPEGSOSD Index	J.P. Morgan Emerging Bond Index Global Sovereign Spread
EUR003M Index	EURIBOR 3m
EUR012M Index	EURIBOR 12m
C0822Y Index	US 2 Year Government Bond
C0825Y Index	US 5 Year Government Bond
C08210Y Index	US 10 Year Government Bond
DXY INDEX	USD Dollar Index
10y-2y Slope	The Slope of US Treasury Yield Curve

Table 5: Bank Level Indicators

VARIABLES	(1) Credit Crunch	(2) Credit Crunch	(3) Credit Crunch
Deposit Growth$_{(t-1)}$	-0.031***	-0.026***	-0.026***
	(0.003)	(0.003)	(0.003)
Noncore Liabilities Ratio$_{(t-1)}$	-0.147***	-0.130***	-0.131***
	(0.011)	(0.012)	(0.012)
Loan Activity Ratio$_{(t-1)}$	-0.262***	-0.241***	-0.241***
	(0.015)	(0.015)	(0.015)
Non-Performing Loans$_{(t-1)}$		0.143***	0.140***
		(0.038)	(0.038)
Return on Asset$_{(t-1)}$			-0.059
			(0.135)
Observations	2,731	2,731	2,731
Bank FE	YES	YES	YES
Adj. R^2	0.358	0.366	0.366

Notes: Dependent variable in all specifications is credit crunch index taken the value 0 and 1 respectively. The description of all independent variables are provided in methodology. All bank-level and macroeconomic explanatory variables except inflation are lagged 3 period to remove possible endogeneity issue. We use fixed effects panel logit regressions methodology in all specifications. *** Significant at 1%, ** significant at 5%, and * significant at 10%.

Table 6: Bank Level Indicators and Demand Factor of Lending (Baseline Specification)

VARIABLES	(1) Credit Crunch	(2) Credit Crunch
Bank Level Indicators		
Deposit Growth$_{(t-1)}$	-0.020***	-0.018***
	(0.003)	(0.003)
Noncore Liabilities Ratio$_{(t-1)}$	-0.091***	-0.093***
	(0.012)	(0.013)
Loan Activity Ratio$_{(t-1)}$	-0.198***	-0.195***
	(0.016)	(0.017)
Non-Performing Loans$_{(t-1)}$	0.050	0.144***
	(0.036)	(0.042)
Return on Asset$_{(t-1)}$	-0.099	-0.008
	(0.130)	(0.139)
Domestic Factors		
GDP Growth$_{(t-1)}$	-0.161***	-0.194***
	(0.018)	(0.020)
Inflation		0.214***
		(0.019)
Observations	2,731	2,731
Bank FE	YES	YES
Adj. R^2	0.407	0.485

Notes: Dependent variable in all specifications is credit crunch index taken the value 0 and 1 respectively. The description of all independent variables are provided in methodology. All bank-level and macroeconomic explanatory variables except inflation are lagged 3 period to remove possible endogeneity issue. We use fixed effects panel logit regressions methodology in all specifications. *** Significant at 1%, ** significant at 5%, and * significant at 10%.

Table 7: The Impact of Capital Inflow

VARIABLES	(1) Credit Crunch	(2) Credit Crunch
Bank Level Indicators		
Deposit Growth$_{(t-1)}$	-0.019***	-0.018***
	(0.003)	(0.003)
Noncore Liabilities Ratio$_{(t-1)}$	-0.095***	-0.096***
	(0.014)	(0.014)
Loan Activity Ratio$_{(t-1)}$	-0.194***	-0.194***
	(0.017)	(0.017)
Non-Performing Loans$_{(t-1)}$	0.177***	0.175***
	(0.045)	(0.045)
Return on Assets$_{(t-1)}$	0.037	0.063
	(0.141)	(0.142)
Domestic Factors		
GDP Growth$_{(t-1)}$	-0.205***	-0.203***
	(0.023)	(0.023)
Inflation	0.184***	0.197***
	(0.021)	(0.022)
Global Financial Condition & Risk Sentiments	-0.079**	-0.050*
	(0.035)	(0.037)
Capital Inflow from Abroad		
Other Investment	-0.041**	-0.040**
	(0.016)	(0.016)
Portfolio Investments		-0.051***
		(0.019)
Observations	2,731	2,731
Bank FE	YES	YES
Adj. R^2	0.491	0.495

Notes: Dependent variable in all specifications is credit crunch index taken the value 0 and 1 respectively. The description of all independent variables are provided in methodology. All bank-level and macroeconomic explanatory variables except inflation are lagged 3 period to remove possible endogeneity issue. We use fixed effects panel logit regressions methodology in all specifications. *** Significant at 1%, ** significant at 5%, and * significant at 10%.

Table 8: The Impact of Global Financial Condition and Risk Sentiment

VARIABLES	Credit Crunch
Bank Level Indicators	
Deposit Growth$_{(t-1)}$	-0.019***
	(0.003)
Noncore Liabilities Ratio$_{(t-1)}$	-0.093***
	(0.014)
Loan Activity Ratio$_{(t-1)}$	-0.194***
	(0.017)
Non-Performing Loans$_{(t-1)}$	0.163***
	(0.044)
Return on Asset$_{(t-1)}$	0.012
	(0.140)
Domestic Factors	
GDP Growth$_{(t-1)}$	-0.217***
	(0.022)
Inflation	0.190***
	(0.021)
Global Financial Condition & Risk Sentiments	-0.084**
	(0.034)
Observations	2,731
Bank FE	YES
Adj. R^2	0.488

Notes: Dependent variable in all specifications is credit crunch index taken the value 0 and 1 respectively. The description of all independent variables are provided in methodology. All bank-level and macroeconomic explanatory variables except inflation are lagged 3 period to remove possible endogeneity issue. We use fixed effects panel logit regressions methodology in all specifications. *** Significant at 1%, ** significant at 5%, and * significant at 10%.

Table 9: The Government Expenditure Effects on the Credit Crunch Index

VARIABLES	Credit Crunch
Bank Level Indicators	
Deposit Growth$_{(t-1)}$	-0.019***
	(0.003)
Noncore Liabilities Ratio$_{(t-1)}$	-0.094***
	(0.014)
Loan Activity Ratio$_{(t-1)}$	-0.193***
	(0.017)
Non-Performing Loans$_{(t-1)}$	0.149***
	(0.042)
Return on Asset$_{(t-1)}$	-0.014
	(0.138)
Domestic Factors	
GDP Growth$_{(t-1)}$	-0.177***
	(0.021)
Inflation	0.227***
	(0.020)
Government Expenditures	
Internal Borrowing to GDP Ratio$_{(t-1)}$	0.805**
	(0.405)
Cash Balance to GDP Ratio$_{(t-1)}$	-0.001
	(0.003)
Observations	2,731
Adj. R^2	0.487

Notes: Dependent variable in all specifications is credit crunch index taken the value 0 and 1 respectively. The description of all independent variables are provided in methodology. All bank-level and macroeconomic explanatory variables except inflation are lagged 3 period to remove possible endogeneity issue. We use fixed effects panel logit regressions methodology in all specifications. *** Significant at 1%, ** significant at 5%, and * significant at 10%.

Table 10: The Impact of General Monetary Policy Stance on the Credit Crunch

VARIABLES	Credit Crunch
Bank Level Indicators	
Deposit Growth$_{(t-1)}$	-0.018***
	(0.003)
Noncore Liabilities Ratio$_{(t-1)}$	-0.095***
	(0.014)
Loan Activity Ratio$_{(t-1)}$	-0.193***
	(0.017)
Non-Performing Loans$_{(t-1)}$	0.147***
	(0.043)
Return on Asset$_{(t-1)}$	0.016
	(0.141)
Domestic Factors	
GDP Growth$_{(t-1)}$	-0.239***
	(0.024)
Inflation	0.154***
	(0.025)
Monetary Policy Effect	
Short Term Interest Rate	0.086***
	(0.024)
Observations	2,731
Bank FE	YES
Adj. R^2	0.492

Notes: Dependent variable in all specifications is credit crunch index taken the value 0 and 1 respectively. The description of all independent variables are provided in methodology. All bank-level and macroeconomic explanatory variables except inflation are lagged 3 period to remove possible endogeneity issue. We use fixed effects panel logit regressions methodology in all specifications. *** Significant at 1%, ** significant at 5%, and * significant at 10%.

Table 11: Bank Level Indicators with Interaction of Pure Crunch Dummy

VARIABLES	(1) Credit Crunch	(2) Credit Crunch	(3) Credit Crunch
Deposit Growth$_{(t-1)}$	-0.026***	-0.020***	-0.020***
	(0.003)	(0.004)	(0.004)
Noncore Liabilities Ratio$_{(t-1)}$	-0.153***	-0.131***	-0.133***
	(0.012)	(0.013)	(0.013)
Loan Activity Ratio$_{(t-1)}$	-0.260***	-0.234***	-0.234***
	(0.015)	(0.016)	(0.016)
Non-Performing Loans$_{(t-1)}$		0.194***	0.191***
		(0.045)	(0.045)
Return on Asset$_{(t-1)}$			-0.080
			(0.146)
Pure Crunch*Deposit Growth$_{(t-1)}$	-0.030***	-0.037***	-0.038***
	(0.012)	(0.013)	(0.013)
Pure Crunch*Noncore Liabilities Ratio$_{(t-1)}$	0.023	0.003	0.003
	(0.037)	(0.040)	(0.040)
Pure Crunch*Loan Activity Ratio$_{(t-1)}$	-0.031	-0.059	-0.064
	(0.036)	(0.042)	(0.042)
Pure Crunch*Non-Performing Loans$_{(t-1)}$		-0.152**	-0.168**
		(0.075)	(0.079)
Pure Crunch*Return on Asset$_{(t-1)}$			-0.128
			(0.392)
Observations	2,732	2,731	2,731
Bank FE	YES	YES	YES
Adj. R^2	0.364	0.375	0.375

Notes: Dependent variable in all specifications is credit crunch index taken the value 0 and 1 respectively. The description of all independent variables are provided in methodology. All bank-level and macroeconomic explanatory variables except inflation are lagged 3 period to remove possible endogeneity issue. We use fixed effects panel logit regressions methodology in all specifications. *** Significant at 1%, ** significant at 5%, and * significant at 10%.

Table 12: Factoring in the Global Financial Condition and Risk Sentiments with Interaction of Pure Crunch Dummy

VARIABLES	Credit Crunch
Deposit Growth$_{(t-1)}$	-0.018***
	(0.003)
Noncore Liabilities Ratio$_{(t-1)}$	-0.142***
	(0.014)
Loan Activity Ratio$_{(t-1)}$	-0.233***
	(0.017)
Non-Performing Loans$_{(t-1)}$	0.256***
	(0.049)
Return on Asset$_{(t-1)}$	0.097
	(0.147)
Inflation	0.116***
	(0.015)
GFCRS$_{(t-1)}$	0.186***
	(0.024)
Pure Crunch*Deposit Growth$_{(t-1)}$	-0.040***
	(0.013)
Pure Crunch*Noncore Liabilities Ratio$_{(t-1)}$	-0.023
	(0.041)
Pure Crunch*Loan Activity Ratio$_{(t-1)}$	-0.074*
	(0.043)
Pure Crunch*Non-Performing Loans$_{(t-1)}$	-0.223***
	(0.078)
Pure Crunch*Return on Asset$_{(t-1)}$	-0.251
	(0.407)
Pure Crunch*GFCRS$_{(t-1)}$	-0.153**
	(0.077)
Observations	2,731
Bank FE	YES
Adj. R^2	0.424

Notes: Dependent variable in all specifications is credit crunch index taken the value 0 and 1 respectively. The description of all independent variables are provided in methodology. All bank-level and macroeconomic explanatory variables except inflation are lagged 3 period to remove possible endogeneity issue. We use fixed effects panel logit regressions methodology in all specifications. *** Significant at 1%, ** significant at 5%, and * significant at 10%.

Table 13: The Impact of Capital Flow with Interaction of Pure Crunch Dummy

VARIABLES	(1) Credit Crunch	(2) Credit Crunch
Deposit Growth$_{(t-1)}$	-0.020***	-0.020***
	(0.004)	(0.004)
Noncore Liabilities Ratio$_{(t-1)}$	-0.143***	-0.143***
	(0.014)	(0.014)
Loan Activity Ratio$_{(t-1)}$	-0.239***	-0.239***
	(0.017)	(0.017)
Non-Performing Loans$_{(t-1)}$	0.267***	0.266***
	(0.049)	(0.049)
Return on Asset$_{(t-1)}$	-0.033	-0.036
	(0.152)	(0.153)
Inflation	0.072***	0.072***
	(0.015)	(0.015)
Other Investment Ratio	-0.071***	-0.071***
	(0.016)	(0.016)
Portfolio Investment Ratio		0.006
		(0.018)
Pure Crunch*Deposit Growth$_{(t-1)}$	-0.035***	-0.035***
	(0.012)	(0.012)
Pure Crunch*Noncore Liabilities Ratio$_{(t-1)}$	-0.004	-0.003
	(0.041)	(0.041)
Pure Crunch*Loan Activity Ratio$_{(t-1)}$	-0.056	-0.055
	(0.043)	(0.043)
Pure Crunch*Non-Performing Loans$_{(t-1)}$	-0.230***	-0.228***
	(0.078)	(0.078)
Pure Crunch*Return on Asset$_{(t-1)}$	-0.099	-0.101
	(0.403)	(0.404)
Pure Crunch*Other Investment Ratio	0.057	0.057
	(0.038)	(0.038)
Pure Crunch*Portfolio Investment Ratio		-0.006
		(0.048)
Observations	2,715	2,715
Bank FE	YES	YES
Adj. R^2	0.399	0.399

Notes: Dependent variable in all specifications is credit crunch index taken the value 0 and 1 respectively. The description of all independent variables are provided in methodology. All bank-level and macroeconomic explanatory variables except inflation are lagged 3 period to remove possible endogeneity issue. We use fixed effects panel logit regressions methodology in all specifications. *** Significant at 1%, ** significant at 5%, and * significant at 10%.

Table 14: The Government Expenditure Effects with Interaction of Pure Crunch Dummy on the Credit Crunch

VARIABLES	Credit Crunch
Deposit Growth$_{(t-1)}$	-0.020***
	(0.004)
Noncore Liabilities Ratio$_{(t-1)}$	-0.140***
	(0.014)
Loan Activity Ratio$_{(t-1)}$	-0.236***
	(0.017)
Non-Performing Loans$_{(t-1)}$	0.225***
	(0.048)
Return on Asset$_{(t-1)}$	-0.105
	(0.151)
Inflation	0.098***
	(0.015)
Internal Borrowing to GDP Ratio$_{(t-1)}$	1.345***
	(0.367)
Pure Crunch*Deposit Growth$_{(t-1)}$	-0.035***
	(0.012)
Pure Crunch*Noncore Liabilities Ratio$_{(t-1)}$	-0.009
	(0.040)
Pure Crunch*Loan Activity Ratio$_{(t-1)}$	-0.054
	(0.042)
Pure Crunch*Non-Performing Loans$_{(t-1)}$	-0.198***
	(0.074)
Pure Crunch*Return on Asset$_{(t-1)}$	-0.079
	(0.397)
Pure Crunch* Internal Borrowing to GDP Ratio$_{(t-1)}$	-0.957
	(1.308)
Observations	2,731
Bank FE	YES
Adj. R^2	0.400

Notes: Dependent variable in all specifications is credit crunch index taken the value 0 and 1 respectively. The description of all independent variables are provided in methodology. All bank-level and macroeconomic explanatory variables except inflation are lagged 3 period to remove possible endogeneity issue. We use fixed effects panel logit regressions methodology in all specifications. *** Significant at 1%, ** significant at 5%, and * significant at 10%.

Table 15: The Impact of General Monetary Policy Stance with Interaction of Pure Crunch Dummy on the Credit Crunch

VARIABLES	Credit Crunch
Deposit Growth$_{(t-1)}$	-0.021***
	(0.004)
Noncore Liabilities Ratio$_{(t-1)}$	-0.146***
	(0.014)
Loan Activity Ratio$_{(t-1)}$	-0.244***
	(0.017)
Non-Performing Loans$_{(t-1)}$	0.280***
	(0.051)
Return on Asset$_{(t-1)}$	-0.057
	(0.155)
Inflation	0.048*
	(0.027)
Short Term Interest Rate	0.048*
	(0.027)
Pure Crunch*Deposit Growth$_{(t-1)}$	-0.034***
	(0.012)
Pure Crunch*Noncore Liabilities Ratio$_{(t-1)}$	-0.001
	(0.040)
Pure Crunch*Loan Activity Ratio$_{(t-1)}$	-0.044
	(0.042)
Pure Crunch*Non-Performing Loans$_{(t-1)}$	-0.245***
	(0.076)
Pure Crunch*Return on Asset$_{(t-1)}$	-0.088
	(0.400)
Pure Crunch*Short Term Interest Rate	-0.014
	(0.038)
Observations	2,731
Bank FE	YES
Adj. R^2	0.395

Notes: Dependent variable in all specifications is credit crunch index taken the value 0 and 1 respectively. The description of all independent variables are provided in methodology. All bank-level and macroeconomic explanatory variables except inflation are lagged 3 period to remove possible endogeneity issue. We use fixed effects panel logit regressions methodology in all specifications. *** Significant at 1%, ** significant at 5%, and * significant at 10%.

Table 16: The Period of Very Tightened Monetary Policy Stance on the Credit Crunch

VARIABLES	Credit Crunch
Deposit Growth$_{(t-1)}$	-0.045***
	(0.008)
Noncore Liabilities Ratio$_{(t-1)}$	-0.163***
	(0.031)
Loan Activity Ratio$_{(t-1)}$	-0.217***
	(0.035)
Non-Performing Loans$_{(t-1)}$	-0.178
	(0.112)
Return on Asset$_{(t-1)}$	0.667
	(0.387)
GDP Growth$_{(t-1)}$	-0.428***
	(0.050)
Inflation	0.110***
	(0.018)
Further Tight Monetary Policy*Deposit Growth$_{(t-1)}$	0.044**
	(0.008)
Further Tight Monetary Policy *Noncore Liabilities Ratio$_{(t-1)}$	0.157***
	(0.042)
Further Tight Monetary Policy *Loan Activity Ratio$_{(t-1)}$	-0.005
	(0.050)
Further Tight Monetary Policy* Non-Performing Loans$_{(t-1)}$	0.254**
	(0.127)
Further Tight Monetary Policy *Return on Asset$_{(t-1)}$	-1.348***
	(0.506)
Observations	1,711
Bank FE	YES
Adj. R^2	0.525

Notes: Dependent variable in all specifications is credit crunch index taken the value 0 and 1 respectively. The description of all independent variables are provided in methodology. All bank-level and macroeconomic explanatory variables except inflation are lagged 3 period to remove possible endogeneity issue. We use fixed effects panel logit regressions methodology in all specifications. *** Significant at 1%, ** significant at 5%, and * significant at 10%.

B. ROBUSTNESS CHECK

When considering robustness of the results, industrial production is exploited to cover demand-side of credit behaviors instead of real GDP growth in the baseline specification. The table 16 exhibits the impact of Chicago Board Options Exchange Market Volatility Index and Industrial production on the baseline specification of credit crunch index. Their results underpin the significant effects of credit behaviors in explaining demand-side of lending. Moreover, the impact of VIX also posits the similar results as global financial condition and risk sentiment index for the baseline analysis.

Table 17: Robustness Check

VARIABLES	Robustness.ip	Robusness.vix
Deposit Growth$_{(t-1)}$	-0.019***	-0.026***
	(0.003)	(0.003)
Noncore Liabilities Ratio$_{(t-1)}$	-0.108***	-0.140***
	(0.013)	(0.013)
Loan Activity Ratio$_{(t-1)}$	-0.205***	-0.245***
	(0.016)	(0.016)
Non-Performing Loans$_{(t-1)}$	0.114***	0.185***
	(0.041)	(0.041)
Return on Asset$_{(t-1)}$	-0.032	0.043
	(0.137)	(0.137)
Inflation	0.115***	0.082***
	(0.015)	(0.014)
Industrial Production Growth$_{(t-1)}$	-0.117***	
	(0.011)	
VIX Growth Rate		0.008***
		(0.001)
Observations	2,731	2,731
Bank FE	YES	YES
Adj. R^2	0.449	0.400

Notes: Dependent variable in all specifications is credit crunch index taken the value 0 and 1 respectively. The description of all independent variables are provided in methodology. All bank-level and macroeconomic explanatory variables except inflation are lagged 3 period to remove possible endogeneity issue. We use fixed effects panel logit regressions methodology in all specifications. *** Significant at 1%, ** significant at 5%, and * significant at 10%.

Table 18: Baseline Scenario with Random Effect Panel Logit Model

VARIABLES	(1) Baseline_spec	(3) GFCRS	(5) FX_inflow	(7) Fiscal	(9) Monetary
Deposit Growth$_{(t-1)}$	-0.020***	-0.020***	-0.017***	-0.019***	-0.019***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Noncore Liabilities Ratio$_{(t-1)}$	-0.102***	-0.105***	-0.101***	-0.104***	-0.097***
	(0.013)	(0.014)	(0.013)	(0.013)	(0.013)
Loan Activity Ratio$_{(t-1)}$	-0.209***	-0.210***	-0.210***	-0.211***	-0.195***
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Non-Performing Loans$_{(t-1)}$	0.074*	0.083**	0.082**	0.084**	0.132***
	(0.038)	(0.041)	(0.039)	(0.039)	(0.044)
Return on Asset$_{(t-1)}$	-0.068	-0.043	-0.035	-0.054	0.026
	(0.134)	(0.138)	(0.135)	(0.135)	(0.140)
GDP Growth$_{(t-1)}$	-0.213***	-0.201***	-0.202***	-0.195***	-0.289***
	(0.020)	(0.026)	(0.020)	(0.022)	(0.024)
Inflation	0.132***	0.134***	0.120***	0.138***	-0.054*
	(0.015)	(0.015)	(0.016)	(0.016)	(0.030)
GFCRS$_{(t-1)}$		0.021			
		(0.028)			
Other Investment Ratio			-0.024		
			(0.016)		
Internal Borrowing to GDP Ratio$_{(t-1)}$				0.694*	
				(0.375)	
Short Term Interest Rate					0.229***
					(0.032)
Constant	-2.331***	-2.382***	-2.350***	-2.433***	-2.113***
	(0.409)	(0.413)	(0.407)	(0.412)	(0.427)
Observations	3,343	3,343	3,138	3,343	3,343
Number of BANKANON	23	23	23	23	23
Likelihood-ratio test of rho=0	224.959	219.801	226.114	223.243	230.826

Notes: Dependent variable in all specifications is credit crunch index taken the value 0 and 1 respectively. The description of all independent variables are provided in methodology. All bank-level and macroeconomic explanatory variables except inflation are lagged 3 period to remove possible endogeneity issue. The results implies no random effect model for the study. We use fixed effects panel logit regressions methodology in all specifications. *** Significant at 1%, ** significant at 5%, and * significant at 10%.

C. TURKISH SUMMARY / TÜRKÇE ÖZET

Makroekonomik veriler ve finansal göstergeler yoluyla bankaların kredi verme davranışlarını tanımlamak, iktisadi aktivite döngüsü, finansal istikrarın denetimi ve takip edilmesi açısından son derece önemlidir. Bu açıdan, hem akademisyenler hem de ülkelerin düzenleme ve denetleme kurumlarında yer alan yetkililer, bu faktörlerden kaynaklanan kredi verme davranışlarını gerek küresel manada gerekse ülkeler özelinde yaygın bir şekilde çalışmalarında ele almaktadır. Gelişmiş ülke merkez bankaları, gelişmekte olan ülke merkez bankaları, uluslararası bankacılık ve finansal piyasaları düzenleyici ve denetleyici kurumları tarafından yürütülen kredi davranışlarını açıklayıcı çalışmaları bu ifadeleri önemli bir biçimde doğrulamaktadır. Bu bağlamda, bu makale, Türk bankacılık sektörü için sabit etki panel lojistik kestirim yöntemini uygulayarak, kredi daralmasının temel belirleyicilerini, temel kredi daralması analizi, salt kredi daralması senaryosu ve para politikasında gözlenen daha yüksek ölçekte parasal sıkılaşma dönemi olmak üzere üç kırılımda değerlendirmektedir. Örneklem, aylık verilerle, bankaların yayımladıkları bilanço ve gelir tablosu verilerinden faydalanarak, Türkiye'de yerleşik mevduat bankaları için 2007 yılı başından 2019 yılı sonuna kadar süreyi içine almaktadır.

Kredi tedarikinin seyri, kredilerin ana finansman olarak kullanıldığı ekonomiler üzerinde önemli bir etkiye sahiptir. Gelişmekte olan piyasalar, ekonomik kuruluşlarını, kurumlarını ve sermaye birikimlerini göz önünde bulundurulduğunda, ekonomik faaliyetlerini artırmak, geliştirmek ve toplumsal ve iktisadi kalkınmasını sağlamak için büyük ölçüde kredi olanaklarına güvenmektedir. Piyasada kredi sıkışıklığı gözlendiği dönemde konut, otomobil ve dayanıklı tüketim malları gibi özel tüketim için ayırılan

kaynaklar ve yatırım harcamaları azalmaktadır. Öte yandan, kredi hacminde dengesiz bir artış yaşandığında veya kredi patlaması durumunda, finansal istikrarsızlık, varlıklarda yanlış fiyatlandırma davranışlarından kaynaklı oluşan fiyat balonları, dış ticaret dengesi ve enflasyon görünümündeki bozulma riskleri artmaktadır. Bu bağlamda ele alındığında, bankaların kredi verme davranışlarının belirleyicilerini anlamak hem uluslararası hem de yerel düzenleyici otoriteleri, kurumları ve akademik personeli cezbeder. Literatürde bankaların kredi verme davranışları analizi açısından birkaç odak noktası vardır. İlk çalışmalar büyük ölçüde bankacılık krizi ve ödemeler dengesi krizine odaklanırken (Pazarbaşıoğlu, 1997; Demirguç-Kunt ve Detragiache, 1998 ve Kaminsky ve Reinhart, 1999), kredi göstergeleri aynı zamanda bankacılık ve mali açıdan sıkıntılı dönemleri tanımlamak için bir erken uyarı göstergesi olarak da kullanılmaktadır. Çeşitli eserlerde bunların örneklerine rastlanmaktadır. (Demirguç-Kunt ve Detragiache, 2000; Bussiere ve Fratzscher, 2006; Frankel ve Saravelos, 2010; Babecký vd., 2014; Roulet, 2018; Geršl ve Jašová, 2018 ve Alessi ve Detken, 2018).

Ayrıca, hem uluslararası hem de yerel düzenleyici ve denetleyici otoriteler, küresel mali krizden sonra kredi verme modellerini gözlemlemek ve denetlemek için bazı önlemler almış ve bir takım göstergeler türetmiştir. Bu amaçla, uluslararası kuruluşlar ve yerel yönetimlerin gerek dünya çapında gerekse ülke bazında bazı makro ihtiyati politikalar uygulamaya koyduğu ve takip ölçütleri belirlediği gözlenmiştir. Örneğin, Basel Bankacılık Denetim Komitesi (BSBS), küresel finansal krizin finansal aracılar ve bir bütün olarak ekonomik sistem üzerindeki olumsuz etkisine karşı 2010 yılında bir dizi önlem ilan etti. Basel III olarak da bilinen BSBC, bankaları aşırı kredi büyümesinden sakınmayı amaçlayan sermaye tamponu gibi konjonktür karşıtı politikalar önermiştir. Bu açıdan Borio ve ark. (2010), filtreleme teknikleri ile özel

sektöre sağlanan toplam kredi miktarından çıkarılan kredinin GSYH'ye oranı kullanılarak oluşturulan ve kredi çevrimlerinin takibi amacıyla bir gösterge önermiştir.

Ayrıca, 2012 yılında Türkiye, ekonomi aktivitesinin potansiyelinin oldukça üzerinde seyrettiği dönemde, cari açık ve kredi patlamasındaki artışı sınırlamak için bazı makro ihtiyati tedbirleri topluma sunmuştur. Mevcut dönem içinde kredi kartı taksit sayısının bazı sektörler için azaltılması, kredi kartı borçları için asgari ödemelerin artırılması, konut kredisi için kredi / değer oranı ve bireysel kredilerin maksimum vadesinin indirilmesi gibi kısıtlamalar getirildi. 2012'de yürürlüğe giren bu çeşitli makro ihtiyati politikalar sayesinde, aşırı ısınan ekonomiye ilişkin oluşan finansal istikrarda gözlenebilecek bozulma endişeleri giderilmiş, Türk makamları tarafından kredi dağıtımında bir yavaşlama sağlanmıştır.

Literatür taraması bölümünde görüldüğü gibi, çalışmalar genellikle döngüsel kredi hareketleri, kredi patlaması dönemleri ve anlatılardaki kredi büyümesinin temel belirleyicileri üzerine odaklanmaktadır. Bunula birlikte, hususi olarak kredi daralmasını inceleyen birkaç çalışmaya yazında rastlanmaktadır. En eski ve dikkat çekici çalışmalardan biri olan Bernanke ve Lown (1991), kredi sıkışıklığını analiz ederken, Pazarbaşıoğlu (1997), çalışmasında, ticari kredi piyasasının dengesizlik modelinde kötüleşen varlık kalitesi ve karlılık sorunları nedeniyle bankaların kredi imkânını kesebileceklerini ileri sürmektedir. Yazar, krizin arkasındaki ana dinamiğin, aşırı kredi talebinde ters seçim sorunundan ve karlılık endişesinden kaçınmak olduğunu iddia ediyor. Yazarın tanımına göre, kredi daralması, bankaların tüketimi veya yatırımı finanse etme konusundaki isteksizliği nedeniyle kredi imkânının küçülmesi olarak gösterilebilir. Ayrıca Barone ve ark. (2018), banka düzeyinde kredi

arzını bir araya getirerek ve buna göre pazar payını ağırlıklandırarak kredi daralması davranışlarının arz tarafı için bir endeks oluşturmuştur. Bu endeks ile kredi daralmasını İtalyan vilayetleri için ekonomik aktivite bağlamında değerlendiriyorlar. Ayrıca, Naceur ve Kandil (2013) Orta Doğu ve Kuzey Afrika bölgesi açısından kredi sıkışıklığını Basel III gereklilikleri kapsamında değerlendirmektedir. Çalışmalarında yaptıkları sınıflandırmaya göre, kredi sıkışıklığı, kredi arzında bir kıyas ölçütü veya kredi arz eğrisinin sola doğru kayması ile ilgili olarak kredi verme kolaylığında bir düşüş olarak ifade ediliyor.

Bu çalışmada, 2007 ile 2019 yılları arasında aylık sıklıkta banka düzeyinde panel veri setinden ve çeşitli makro-ekonomik kontrollerden yararlanıyorum. Başlangıçta, kredi daralmasının ana belirleyicilerini test etmek için, kredi sıkılığını üç temel kırılım ile ele alıyorum: kredi daralması genel senaryosu, saf kredi sıkışıklığı dönemi ve çok sıkı parasal duruş ortamı. Kredi daralması endeksinin, kredi verme davranışlarının arz tarafı için banka-bazında göstergeler üzerinde ifade edildiği, genel fiyat seviyesindeki değişikliği ve talep taraflı kredi davranışlarını temsil eden GSYİH büyüme oranını hesaba katarak, sabit etkili bir panel logit modeli yürütüyorum. Analizin baz regresyonu oluşturulduktan sonra, Kredi sıkışıklığını anlamak için, küresel finansal durum ve risk duyarlılığı, yurtdışı sermaye akım hareketleri, kamu mali harcamaları ve para politikası etkisi gibi dışsal faktörler çalışmaya dahil edilir. Çalışma, kredi sıkışıklığının önde gelen itici güçlerini ve yukarıda bahsedilen birkaç dışsal faktörün kredi sıkışıklığı endeksi üzerindeki etkisini anlamayı ve bu etkileri göstermeyi amaçlamaktadır. Makalenin ana hatları altı genel bölüme ayrılmakta. Bölüm 2'de, kredi patlaması ile borç vermenin döngüselliğine, filtreleme tekniklerine ve döngüsel hareketleri ayırmak için kullanılan bazı metotlara odaklanıyor. Ayrıca bu bölümde

kredi davranışlarının ana itici güçleriyle ilgili göstergelere ve ekonometri modellerine odaklanılan literatür özetleniyor. Bunların yanında, kredi davranışları, banka sahiplik yapısı açısından ve kredi göstergelerinin denge düzeyi kapsamında yazında yer alan çalışmalar özetleniyor. Bölüm 3'te, banka düzeyinde banka-bazlı kredi göstergelerine ve küresel ve yerel ekonomiye ilişkin finansal ve makro ekonomik değişkenlere ilişkin veriler, bağımlı ve bağımsız kukla değişkenler dört temel dağılımda ele alınmaktadır. Bölüm 4'te metodoloji, temel senaryoları içeren kestirim modelleri ile, temel senaryodan başlayarak çok sıkı parasal sıkılaştırma dönemine doğru adım adım açıklanmıştır. Ampirik bulgular bölümünde, temel senaryoya ilişkin ampirik sonuçlar, dışsal faktörler ile birlikte ele alınarak, baz senaryo, saf kredi sıkışıklığı dönemi ve sıkı para politikası ortamı alt bölümlerinde değerlendirilmektedir. Son bölümde, genel bulguları kısaca özetleyerek makaleyi tamamlıyorum.

Genel olarak kredi davranışlarına ilişkin literatüre bakıldığında, geniş bir çalışma alanı yelpazesi bulunmaktadır. Çalışmalardan bazıları kredinin döngüsel hareketlerini ortaya çıkarmaya odaklanırken, diğerleri kredi büyümesinin belirleyicilerini makroekonomik ve bankaya özgü göstergeler açısından analiz ediyor. Döngüsellik literatürünün yanı sıra, bazı çalışmalarda filtreleme tekniğinden yararlanılarak kredi açığı analizi önerilmektedir. Ek olarak, başka bir çalışma kümesi, denge düzeyi bağlamında ödünç verme davranışlarını araştırır. Aşırı kredi büyümesini ve bunun bankacılık sistemi üzerindeki etkisini incelemek için, kredi patlama-çöküş dönemi ve bunun finans ve bankacılık sistemi üzerindeki etkileri ile ilgili bir grup araştırma da kredi yazınında mevcuttur. Ayrıca kredi, bankacılık krizi ve finansal dengesizlik dönemlerinin önceden kestirmek amacıyla erken uyarı işareti olarak göstergelerin türetildiği ve bu kredi davranışlarının bu kapsamda ele alındığı çalışmalarda

mevcuttur. Literatürde, banka sahiplik yapısının kredi verme davranışları üzerindeki etkisine ilişkin çeşitli çalışmalar da bulunmaktadır. Genel olarak değerlendirmek gerekirse, literatürün ana gövdesini, kredi büyümesinin döngüselliği ve kredi verme davranışlarının makroekonomik, finansal ve bankaya özgü belirleyicileri ile açıklanmasına yönelik yürütülen çalışmalar oluşturmaktadır.

Yukarıda bahsedildiği gibi, kredi büyümesinin döngüselliği ile ilgili çalışmalar, bu literatür alanına hızlı-aşırı kredi büyümesi, kredi patlama-çöküşü ve kredi açığı analizlerinin dahil edilebileceği birçok çalışmayı kapsamaktadır. Ayrıca, finansal istikrarın izlenmesi ve değerlendirilmesi bağlamında kredi davranışlarının incelenmesi, kredi döngüsel analizi çalışmaları açısından önemli bir uygulama alanıdır. Araştırmalarda döngüsel zaman serilerini trendlerinden ayırarak döngüsel kısmını çıkarmak ve çeşitli kredi göstergeleri için bir eşik düzeyi belirlemek için çeşitli yöntemler uygulanmaktadır. Ekonometriye ilişkin metodolojilerin yanı sıra, filtreleme teknikleri, kredi davranışlarının hareketinin döngüsel kısımlarını ayırmak için yaygın olarak kullanılmaktadır. En çok tercih edilen filtreleme metodolojisi, Hodrick ve Presscott (1997) tarafından oluşturulan Hodrick-Prescott (HP) filtresi ve HP filtreleme varyasyonlarıdır. Ayrıca kredi patlaması dönemlerini anlatan ve bu dönemleri yakalamaya çalışan çalışmalar da bu teknikten büyük ölçüde yararlanmaktadır. Literatürde, eşik seviyesi bir kredi patlamasını tanımlamak amacıyla elde edilir. Başlangıçta, değişkenler HP filtreleme tekniğiyle trendinden ayrıldıktan sonra, kalan döngüsel bileşenler seriden çıkarılır. Döngüsel bileşen veya ekonometri kullanılarak belirli bir dönemde kullanılan veriler bir eşik seviyesini aşarsa, o zaman o dönemde bir kredi patlamasının ortaya çıktığı söylenebilir. HP filtreleme tekniklerine ek olarak,

Christiano-Fitzgerald, Baxter-King ve Beveridge-Nelson yaklaşımları da döngüsel kredi analizinde kullanılan diğer filtreleme metodolojileridir.

Yazının bir diğer önemli bölümü kredi verme davranışlarının temel itici güçlerine ilişkin çalışmalardır. Banka kredilerinin ve hızlı kredi büyümesinin ana itici güçlerinin değerlendirilmesinde, sermaye akımları, küresel likidite koşulları, uluslararası ekonomik faaliyetin hızı ve küresel risk duyarlılıkları gibi dış faktörler çalışmalara dahil edilmektedir. Bu faktöre ek olarak, yurtiçi göstergeler, kredi verme modellerinin itici güçlerini tanımlayan diğer önemli kontrol grubudur. Burada en önemli değişkenlerin bankaların bilanço, gelir tablolarına ilişkin veriler olduğu önemlidir. Literatürde diğer önemli alan, banka sahiplik yapısının kredi üzerindeki etkilerine ilişkin kapsamlı çalışmalar olarak öne çıkmaktadır. Bazı çalışmalar bankaların sahiplik yapısını yerli ve yabancı bağlantılı banka grupları olarak kategorize ederken, bazı çalışmalar da konuyu kamu bankaları ve özel bankalar olarak ele almaktadır. Bankaların operasyonel çerçevesinde bankacılık sektörü kredi büyümesini inceleyen çalışmalara yazında rastlanır. Sahiplik türlerinin sınıflandırılmasına ilişkin bu tartışmalara ek olarak, literatürde ülkeler arası ve bir ülke bazlı vaka çalışmalarında bankaların kredi verme davranışlarının, yerel-küresel kriz ortamında, sahiplik yapılarına göre döngüsellik veya döngüsel karşıtlığı göstermesi bağlamında gerçekleşen çalışmalara yer vermektedir.

Türkiye'de 2019 üçüncü çeyrek sonu itibarıyla, operasyonel olarak faaliyet gösteren 34 mevduat bankası, Türk Eximbank, İller Bankaları ve İstanbul Takas ve Saklama Bankası dahil 14 yatırım ve kalkınma bankası ile 6 İslami ve katılım bankası bankacılık sektörünü oluşturmaktadır. Mevduat bankaları toplam aktiflerin yüzde

92,79'unu, toplam kredilerin yüzde 91,83'ünü ve toplam mevduatın yüzde 92,79'unu barındırırken, kalkınma ve yatırım bankaları aktiflerin sadece yüzde 7,21'ini, kredilerin yüzde 8,17'sini ve toplam mevduatın yüzde 7,21'ini oluşturmaktadır. Ayrıca, toplam bankacılık sisteminin aktiflerinin yüzde 6,41'ini ve toplam kredilerinin yüzde 4,86'sını oluşturan katılım bankacılığı sektörüne ilişkin verilerle karşılaştırıldığında, mevduat bankalarının bankacılık sistemi içindeki ağırlığının çok yüksek olduğu görülmektedir. Ayrıca, mevduat bankaları, sektörün geri kalanına kıyasla müşterilere ulaşırken daha az kısıtlama ile karşılaşmaktadır. Bu açıdan, yatırım ve kalkınma bankaları, katılım bankaları ve Tasarruf Mevduat Sigorta Fonu kapsamında bulunan bir banka, örneklemden çıkarılmıştır. Bu durum iki etmenle açıklanabilir: mevduat bankalarına kıyasla farklı kredi verme motivasyonları ve mevduat toplama gibi bir önceliklerinin bulunmaması. Yukarıda bahsi geçen birkaç bankanın dışlanmasına ek olarak, mevduat bankaları için üçten az şubesi olan bankaların hariç tutulması ve en az üç yıl üst üste gözlemi olmayan bankaların örneklemden çıkarılması gibi örneklemde ek düzeltmeler yapılmıştır. Tüm süreçlerin ardından bankacılık sektörü veri örneklemi 2007 yılında 21 banka ile başlamış ve 2019 yılında 23 banka ile devam etmektedir. Ayrıca 2019 yılı sonu itibarıyla bu çalışmada kullanılan örneklem toplam kredi stokunun yaklaşık yüzde 87'sini toplam takipteki kredi hacminin yüzde 93'ünü, toplam aktiflerin yüzde 87'sini ve bankacılık sistemi için toplam mevduatın yüzde 92'sini kapsamaktadır. Bu rakamlar ayrıca, analiz dönemi boyunca tüm bankacılık sektörünü somutlaştırmak için seçilen banka verilerinin en üst düzeyde Türkiye'deki bankacılık sistemini temsil ettiğini doğrulamaktadır.

Çalışmada kullanılan banka-bazında değişkenler, kredi daralmasının arz yanının dâhil edilmesi amacıyla, mevduatlar, çekirdek dışı fonlamanın toplam yükümlülüklere

oranı, kredi aktivitesi oranı, takipteki alacaklar ve aktif karlılıkları olarak oluşturulmuştur. Reel gayri safi yurt içi hasıla (GSYİH) denkleme kredi davranışlarının talep yönlü etkilerini ele alınması için dahil edilmiştir. Enflasyon verisinin dâhil edilmesi ile birlikte, baz kestirim oluşturulmuştur. Dışsal etkenler incelendiğinde, sermaye akımlarının etkisi portföy ve diğer yatırımlar ile, maliye politikalarının etkisi kamu iç borçlanması ve genel nakit dengesi ile, parasal politikaların etkisi kısa vadeli para piyasası faiziyle ve küresel finansal piyasaların ve risk algısının durumu PCA ile oluşturulan ortak faktör ile çalışmada kontrol edilmektedir. Kukla açıklayıcı değişkenlere bakıldığında, saf kredi daralması zamanı kukla değişkeni ve çok sıkı para politikası zaman kukla değişkeni çalışmada kullanılmıştır. İlk olarak, para politikasının kredi verme davranışı üzerindeki daha fazla sıkılaştırıcı etkisi incelenmiştir. Gösterge olarak 12 aylık ileriye dönük enflasyon beklentisinden arındırılmış TCMB'nin ağırlıklı ortalama fonlama maliyeti oranı kullanılmıştır. 2018 Mayıs ayının başından Ekim 2019'a kadar ex-ante reel faiz oranı tarihsel eğilimden önemli ölçüde sapmaktadır. Bu nedenle, bu döneme bir kukla değişken atanmıştır. Bunu yaparak, kredi sıkışıklığındaki daha fazla parasal sıkılaşmanın sonucunu anlama amaçlamaktadır. Son olarak, saf kredi daralması için başka bir kukla değişken atadım. Yurt içi iktisadi faaliyetten kaynaklanan aşağı yönlü bir baskının olmadığı fakat kredi sıkışıklığı gözlendiği dönemi açıklamak için saf bir kredi sıkışıklığı zaman kukla değişkeni oluşturdum. Konsepte uygun olarak, kukla, aynı anda pozitif reel GSYİH büyümesi ve kredi daralmasının görüldüğü zaman aralığını ifade eder.

Çalışmada kullanılan kredi daralması bağımlı değişkenini incelerken, nominal kredi büyümesi döviz kuru etkisinden arındırılarak, Stepanyan ve Guo (2011) ve Geršl &

Jašová (2018) tarafından önerilen bulgular doğrultusunda binomial olarak kullanılmıştır. Başlangıçtaki gösterge değişkeni, nominal kredi büyümesinin döngüsel hareketini eğiliminden çıkararak oluşturulur. Bunun için, Hodrick ve Presscott (1997) tarafından oluşturulan Hodrick Prescott (HP) filtreleme tekniği kullanılmıştır8. Karşılaştırma ölçütü oluşturulduktan sonra, hem nominal kredi büyümesi hem de trendinden ayrılmış nominal kredi büyümesinin döngüsel kısmının tarihsel eğiliminden dörtte üçlük aşağı yönlü standart sapması hesaplanır. Ardından, nominal kredi büyümesinin eksi beşin altında olduğu ve dörtte üçlük standart sapmadan aşağı doğru saptığı her gözlem için bir atanır. Böylece kredi daralması endeksi hesaplanmış olur.

Çalışmanın metodoloji bölümünde, bazı dışsal etkilerin de ele alındığı bir kredi daralması olasılığını ölçmek için birkaç farklı spesifikasyon oluşturuluyor. İlk bölümde, kredi sıkışıklığı endeksinin temel spesifikasyonunu ele alıyorum ve küresel finansman ve risk duyarlılığı koşulları, yabancı para sermaye akışı, devlet harcamalarının etkisi ve para politikası oranındaki değişimin kredi daralması endeksi üzerindeki etkisini analiz ediyorum. Ardından, küresel finansal piyasaların ve risk algısının etkisi ve yabancı para sermaye akımlarının yanı sıra, devlet harcamalarının ve para politikasının etkisini dört alt dal altında salt kredi daralması kukla değişkeni ile kredi sıkışıklığı üzerindeki ilave belirleyicisini araştırıyorum. Son olarak, para politikasında daha fazla sıkılaşma kukla değişkeninin ek etkisini kredi daralma endeksi kapsamında incelemekteyim. Ayrıca, veri setinin karakteristiği göz önünde bulundurulduğunda, bankacılık sisteminde yer alan bankaların yapısal farklılıklar ve

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[8] HP filtrelemeye ilişkin diğer çalışmalar için Arena ve ark. (2015), Barajas vd. (2007), Drehman vd. (2010), Elekdağ ve Wu (2011) ve Hilbers vd. (2005) Reigl ve Uuskula (2019).

bankaların yurtiçi ve küresel makro-finansal uyarıcılar aracılığıyla maruz kaldıkları risklerin benzerlikleri dikkat çekicidir. Dahası, ampirik çalışmalar banka-bazlı ve ülke bazlı çalışmalarda sabit etki panel modelleri önermektedir. Ek olarak modeli sabit ve rastgele etkilerle karşılaştırmayı amaçlayan Hausman testi incelendiğinde sabit etki modeli öne çıkmaktadır. Sonuç olarak modelde sabit etki panel lojistik modelini kullandım.

Ampirik sonuçlar incelendiğinde, temel ana senaryo analizinde, mevduatlardaki büyüme, kredi aktivite rasyosundaki ve çekirdek dışı fonlamadaki artış kredi daralması olasılığını aşağıya çekerken, takipteki alacaklardaki yükseliş ise kredi daralması olasılığını artırmaktadır. Ekonomik aktivitedeki pozitif ortam de bankaların kredi verme eğilimini destekleyici bir nitelik arz etmektedir. Diğer yandan dışsal etkiler incelendiğinde küresel finansal piyasalardaki genel görünüm ve risk algısındaki düzelme kredi daralmasını azaltırken, portföy yatırımları ve diğer yatırımlardaki artış bankaların kredi sağlama konusundaki davranışlarını destekleyici bir hareket göstermektedir. Maliye politikaları ve para politikasının kredi daralması endeksine etkisi incelendiğinde, kamuda iç borç servisindeki artış kredi daralması endeksi üzerinde artırıcı bir etkisi varken 3 ay vadeli para piyasası faizi artışı da kredi daralması olasılığını desteklemektedir.

Analizin ikinci kısmında kredi daralması endeksi, salt kredi daralması periyodunun da denkleme dâhil edilmesiyle birlikte incelenmiştir. Ekonomik aktivitenin normal seyrinde devam ettiği dönemlerde gözlenen banka kredi daralmaları burada analiz konusudur. Bu açıdan bankaların kerdi sağlama davranışları temel olarak arz taraflı incelenmektedir. Salt kredi daralması etkileşim kukla değişkenini banka bazlı

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değişkenlerle incelediğimizde, genel anlamda mevduat büyümesi, kredi aktivite oranı ve çekirdek dışı yükümlülüklerdeki artış kredi daralması ihtimalini azaltırken takipteki alacaklardaki artış kredi daralması olasılığını yükseltmektedir. Etkileşim göstergelerine bakıldığında ise sadece mevduat büyümesi kredi daralması olasılığını azaltmaktadır. Yine salt kredi daralması izlendiği dönemde bankalar takipteki alacaklarındaki yükselişi genel zaman aralığına göre daha az önemsemektedir. Dışsal etkiler için incelendiğinde ise sadece küresel finansal koşulların kredi daralması olasılığı üzerinde baskılayıcı ilave etkisi bulunmaktadır. Yabancı sermaye fon akımları, maliye politikalarındaki aksiyonlar ve para politikası kredi daralması olasılığı üzerinde ilave bir etkiye sahip değildir.

Çalışmanın bulgularının üçüncü kısmında, çok sıkı para politikası döneminde arz yönlü kredi verme davranışlarının kredi daralması ihtimali üzerinde etkisi incelenmiştir. Sonuçlara göre normal dönemde temel senaryo ve salt kredi daralması dönemine ile benzer sonuçlar çıkmaktadır. İlave etki değerlendirmesi yapıldığında, takipteki alacakların kredi daralması olasılığını artırdığı gözlenmektedir. Ayrıca mevduat büyümesi, çok sıkı para politikasının izlendiği dönemde, ek etki olarak kredi daralmasını azaltan bir nitelik taşımaktadır. Son olarak çekirdek dışı fonlamanın toplam yükümlülüklere oranı incelendiğinde, normal dönemde bankaların fonlama kompozisyonunun kredi daralmasını azalttığını söyleyebiliriz. Bununla birlikte ek parasal sıkılaşma gözlendiğinde ise çekirdek dışı fonlamanın kredi daralma olasılığını artırıcı etkisi ortaya çıkmaktadır. Bunu şu şekilde özetlemek mümkündür. Bankaların çekirdek dışı yükümlülükleri sendikasyon kredileri, borçlanma araçları piyasasında ihraç ettikleri tahvil ve bonolar, Türkiye Cumhuriyet Merkez Bankası'ndan (TCMB) borçlanma, BİST borçlanma araçları piyasasından borçlanmalar ve bankaların kendi

arasında tezgâh üstü piyasada yaptıkları borçlanmaları kapsamaktadır. Burada bahsi geçen piyasaların genel özelliği ise kısa vadeli para piyasası faizleri üzerinden işlemlerin geçmesidir. Merkez bankalarının para politikası aktarım mekanizmasının işleyişi düşünüldüğünde, para politikasının değişimi ile kısa vadeli faizlerin değişmesi sağlanır. Kısaca, TCMB sıkı para politikası uyguladığında çekirdek dışı yükümlülüklerin maliyetini artırarak bankaların finansman maliyetini yükseltecektir. Bankalar daha az kredi verme eğilimi gösterecektir. Bu da, ilave etki düşünüldüğünde, kredi daralması olasılığını artırıcı etkiye sahip olacaktır.

Bu çalışmada, kredi daralması endeksinin temel belirleyicileri kredi verme davranışlarının arz ve talep yönlü belirleyicileri ile birlikte; küresel finansal koşul ve risk faktörlerin etkileri, yabancı para sermaye akımları, kamu harcamaları ve para politikası gibi dışsal etkilerden de faydalanarak incelenmiştir. Kredi sıkışıklığı fenomenini analiz ederek, bu çalışma kredi gelişmelerine ilişkin yazında bazı ayırt edici ve öncü özellikler barındırmaktadır. Banka düzeyinde istatistiklerle Türk bankacılık sektörüne yönelik kredi daralması açısından ilk çalışmalardan biri gerçekleştirilirken, aylık bazda banka verileri kullanılarak literatürde az bulunan bu alana katkı sağlanmaktadır. Çalışma sonuçlarına göre, temel kredi daralması senaryosu göz önünde bulundurulduğunda, kredi verme davranışlarının arz tarafına bakınca, banka düzeyindeki göstergeler etkili olmaktadır. Bankaların varlık kalitesi, çekirdek ve çekirdek olmayan fonlama, bankaların kredi sağlamadaki hevesi, kredi daralmasını açıklamada öncü rol oynarken, banka karlılığı istatistiksel olarak göz ardı edilebileceği saptanmıştır. Daha detaylı ifade edildiğinde, varlık kalitesindeki bozulma kredi sıkışıklığı endeksini artırırken, bankaların kredi verme iştahının yanı sıra, bankaların çekirdek ve çekirdek olmayan finansmanı kredi sıkışıklığı endeksini azaltır.

Ek olarak, kredi vermenin talep boyutu dikkate alındığında, reel GSYİH büyümesi bir vekil değişken olarak temel senaryoya dâhil edilmiştir. Dolayısıyla, kredi daralması endeksi bağlamında kredi davranışlarının talep tarafının önemli olduğu, öyle ki ekonomik faaliyetteki bir artışın kredi sıkışıklığında bir miktar azalmaya yol açtığı sonucundan çıkarılabilir. Temel analiz için dış faktörler dikkate alındığında, çalışmanın sonuçları küresel finansal koşulların ve risk iştahının kredi sıkışıklığı üzerindeki önemini doğrulamaktadır. Kredi daralması diğer ve portföy yatırımı girişlerini olumsuz etkilenirken, hükümetin iç borçlanmasındaki artış kredi sıkışıklığını artırıcı bir etkisi vardır. Ayrıca sonuçlara göre, vekil olarak kullanılan kısa vadeli faiz oranı, kredi sıkışıklığı endeksini para politikası açısından olumlu etkilemektedir. Ayrıca, salt kredi daralması açısından bazı açıklayıcı değişkenler temel senaryo ile benzer davranışlar sergilerken, bazıları saf kredi sıkışıklığı döneminde farklı kalıplar izlemektedir. Bankalar bu dönemde takipteki alacaklarındaki artıştan daha az kaygılanırken, küresel koşullardaki düzelme bankaların kredi verme davranışını desteklemektedir. Yurt dışı sermaye hareketleri, mali harcamalar ve para politikasının ek etkileri istatistiki olarak göz ardı edilebilir. Bunula birlikte sonuçlar, bu dönemde mevduat büyümesinin ek etkisini ima etmektedir. Son olarak, para politikasında daha da sıkılaştığı zaman dilimi kredi sıkışıklığı endeksi ile birlikte incelendiğinde, artan çekirdek dışı finansman maliyetinin bankaları krediyi sağlama konusunda caydırması nedeniyle bankaların çekirdek dışı finansmanının, çok sıkı parasal duruş döneminde kredi sıkışıklığı üzerinde artan bir etkiye sahip olması dikkat çekicidir.

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