Determinants of Bank Credit in Turkey: An Autoregressive Distributed Lag (ARDL) Approach

Türkiye'de Banka Kredisinin Belirleyicileri: Bir Otoregresif Dağıtılmış Gecikme (ARDL) Yaklaşımı

Yüksel Akay Ünvan *

Abstract: This paper examines the key factors determining bank credit allocation in Turkey for the period 2000Q1-2016Q4. Employing the Autoregressive Distributed Lag (ARDL) Approach, the study reveals that bank deposits and bank assets are significant drivers of bank credit supply in both short and long-run. Broad money supply, bank efficiency, financial access, and inflation exert a significant impact on bank credit only in the long-run. The study offers some recommendations for policy. To enhance growth in bank lending and stimulate credit demand, there is the need to implement strategies to strengthen bank deposit base. Lowering the reserve requirement to increase cash holdings in banks vault is essential for bank credit supply. In addition, there is a necessity to design feasible policies to maintain the inflation rate at the optimum grade to provide domestic economic stability. Consequently, this paper intends to bridge the gap in the literature by scrutinizing the short and long-run determinants of bank credit in Turkey. The paper contributes to literature in two ways. First, it applies the autoregressive distributed lag (ARDL) approach to investigate both demand and supply-side factors affecting bank credit. Second, unlike other studies that used bank-level data, this paper employs aggregate data from the World Bank which encapsulates the overall banking sector.

Structured Abstract: Purpose

Following the domestic banking crisis in 2000-01, the Turkish banking sector has undergone significant structural reforms with stringent policies in stabilizing the financial system. These reforms have led to the growth in banking sector activities including bank credit. Banking sector credit as a percentage of GDP has been moderate after the banking crises though with sluggish growth from 2000 to 2003 attributable to the economic shrinking in the year 2000- 01 which saw a decline in GDP per capita, bank takeovers, and increased public debt (Brinke, 2013). Between 2004-2016, the sector witnessed a consistent growth in credit resulting from the intervention strategies of the Central Bank of the Republic of Turkey (TCMB) and the International Monetary Fund (Brinke, 2013).

As part of the Turkish banking sector reforms, the Banking Regulation and Supervision Agency was established, which played a key role in restoring confidence in the banking sector through effective regulatory

* Doç. Dr. Ankara Yıldırım Beyazıt Üniversitesi, İşletme Fakültesi, Bankacılık ve Finans Bölümü

Assoc. Prof. Dr. Ankara Yıldırım Beyazıt University, Faculty of Business Administration, Department of Banking and Finance

ORCID 0000-0002-0983-1455

akay.unvan@gmail.com, aunvan@ybu.edu.tr

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and supervisory frameworks. The banking sector restructuring led to the growth of banks with improvements in banks' total assets and credits (Abbasoglu et al., 2015).

This paper aims to assess the determinants of bank credit in Turkey. The drivers of bank credit are worth examining given banks' credit growth after the crises, and its impact on economic growth. In literature, few empirical studies (for example, Imran & Nishat, 2013; Shijaku & Kalluci, 2013; Boako et al., 2017) have investigated the factors influencing bank credit with mixed findings. Studies in the context of Turkey are scanty and therefore require further research. Among the limited studies in Turkey is the work Abbasoglu et al. (2015). By employing the GMM approach with bank-level data, the authors analyzed the relationship between credit growth and macroprudential and monetary policies. However, the study failed to predict the short-run factors affecting bank credit. Consequently, this paper intends to bridge this gap in the literature by scrutinizing the short and long-run determinants of bank credit in Turkey. The paper contributes to the literature in two ways. First, it applies the autoregressive distributed lag (ARDL) approach to investigate both demand and supply-side factors affecting bank credit. Second, unlike other studies that used bank-level data, this paper employs aggregate data from the World Bank which encapsulates the overall banking sector.

Methodology

To achieve the purpose of the study, we employed data spanning 2000Q1-2016Q4 from the World Development Indicators (WDI) of the World Bank. This period is selected based on complete data availability. Following prior studies, bank asset (BAS), deposit (BD), broad money supply (BM), bank efficiency (BEF), access to financial services (ACC), and inflation (INF) are used as independent variables.

To explore the determinants of bank credit, the Autoregressive Distributed Lag (ARDL) model is employed. The ARDL technique has advantages over the other cointegration methods (for example Fully Modified OLS, Johansen, etc.). For instance, whether the underlying variables are stationary at level $I(0)$, first difference $I(1)$ or both, the ARDL technique is applicable. Variables can take different number of lags under the ARDL. It is also a perfect model for small sample size studies. ARDL produces unbiased long-run estimates.

A bound test is also conducted to examine the long-run relationship among the variables using F-test. To achieve this, the null hypothesis specifying that there is no long-run relationship among the variable is tested against the alternative hypothesis.

Findings

In general, the findings indicate that bank credit supply to the private sector in the short-run is significantly influenced by bank assets and deposits. With different coefficient signs, all the variables are statistically significant in the long-run suggesting that they are important in motivating bank lending. While bank assets, broad money supply, and financial accessibility portrayed a positive association, bank deposit, efficiency, and inflation tend to influence credit growth negatively in the long-run.

Conclusion

The results present some suggestions for policy. First, to enhance growth in bank lending and stimulate credit demand, there is the need to implement strategies to strengthen banks' deposit base. Banks can engage in deposit mobilization campaigns such as offering attractive interest rates on deposits. Second, the Central Bank of the Republic of Turkey (TCMB) needs to keep the reserve requirement at a lower rate to increase cash holdings in banks vault. This will help upsurge banks' credit supply. Further, at the macro level, there is a necessity to design feasible policies to maintain the inflation rate at the optimum grade to provide domestic economic stability.

Keywords: Determinants, Bank Credit, ARDL Framework, Broad Money Supply, Turkey.

Öz: Bu makale, 2000 yılının birinci çeyreği ile 2016 yılının dördüncü çeyreğini içine alan dönem için, Türkiye'de banka kredisi tahsisini belirleyen temel faktörleri incelemektedir. Otoregressif Dağıtılmış Gecikme (ARDL) Yaklaşımı kullanılarak yapılan çalışma, banka mevduatları ve banka varlıklarının hem kısa hem de uzun vadede önemli bir banka kredisi tedarik kaynağı olduğunu ortaya koymaktadır. Geniş para arzı, banka verimliliği, finansal erişim ve enflasyon, yalnızca uzun vadede banka kredisi üzerinde önemli bir etkiye

sahiptir. Çalışma, konuyla ilgili izlenecek politika için de bazı öneriler sunmaktadır. Banka kredilerinde büyümeyi artırmak ve kredi talebini teşvik etmek için, banka mevduat tabanını güçlendirecek stratejilerin uygulanması gereklidir. Bununla birlikte, banka kasasındaki nakit varlıklarını artırmak için rezerv gereksinimini azaltmak, banka kredisi arzı için şarttır. Ayrıca, iç ekonomik istikrarı tesis etmek için enflasyonun optimal seviyede tutulmasını sağlayacak uygulanabilir politikaların oluşturulmasına ihtiyaç vardır. Sonuç olarak, bu makale Türkiye'deki banka kredisinin kısa ve uzun vadeli belirleyicilerini irdeleyerek literatürdeki bu açığı kapatmayı amaçlamaktadır. Makale literatüre iki şekilde katkıda bulunmaktadır. İlk olarak, çalışmada banka kredisini etkileyen hem talep hem de arz yönlü faktörleri araştırmak için otoregresif dağıtılmış gecikme (ARDL) yaklaşımı uygulanmıştır. İkinci olarak ise, banka düzeyindeki verileri kullanan diğer çalışmaların aksine, bu makale Dünya Bankası'ndan elde edilen ve genel bankacılık sektörünü içine alan toplu verileri kullanmaktadır.

Anahtar Kelimeler: Belirleyiciler, Banka Kredisi, ARDL Çerçevesi, Geniş Para Arzı, Türkiye

1. Introduction

Finance is the backbone of corporate growth. For companies expanding, more capital is required to stimulate different operations (Imran and Nishat, 2013). Whether internal or externally, these operations are funded. Bank loans are typically the most sorted external finance source for companies, particularly small and young companies (Angela, 2011). Bank lending can generally be seen in two ways: the supply side (banks or financial institutions prospect) and the demand side (in the sense of individual or corporate prospects). Banking credit growth was a primary indicator of financial stability (Abbasoglu et al., 2015). Extensive literature detailed in the related section indicates the role played by bank lending in economic growth for emerging economies in which Turkey is a member (Imran and Nishat, 2013).

The Turkish banking industry underwent significant structural changes, with strict policies to stabilize the financial system, following the domestic banking crisis in 2000-01. These reforms led to growth of activities in the banking sector, including bank loans. The percentage of GDP borrowed from the sector was modest following the bank crises but, as Figure 1 shows, with low growth from 2000 to 2003. A decrease of the GDP per capita, banking takeovers and increasing government debt could be attributed to the slow growth in 2000-01 (Brinke, 2013). Since 2004 to 2016, there was a steady growth in credit as a result of the Central Bank of the Republic of Turkey's intervention policies (TCMB) and the International Monetary Fund (Brinke, 2013).

Figure 1: Banking Sector Credit 2000 – 2016 (Source: World Bank (2018))

The Banking Regulation and Supervision Agency, a key role in restoring trust in the banking sector by means of effective regulatory and supervisory structure, was formed as part of the Turkish banking sector reforms. The restructuring of the banking sector led to banks expanding with increases in overall bank assets and loans (Abbasoglu et al., 2015).

The purpose of this paper is to evaluate bank credit determinants in Turkey. Bank credit drivers are worth examining in the light of the credit growth and its effect on economic growth that banks have seen after crises. Literature has shown that few empirical studies have examined factors influencing bank loans with mixed results (i.e., Imran and Nishat, 2013; Shijaku and Kalluci, 2013 and Boako et al., 2017). There are few studies in Turkey and further study is therefore needed. The work Abbasoglu et al. (2015) is one of the limited studies in Turkey. The authors analyzed the link between loan growth and macroprudential and monetary policies using the GMM approach with bank-level data.

This paper therefore aims at overcoming this literature gap by examining the short-term, long-term determinants of bank credit in Turkey. The text contributes in two ways to literature. The first approach to analyzing both demand and supply-side factors affecting bank credit is the self-regressive distributed lagging (ARDL). Second, this paper uses aggregate data from the World Bank encapsulating the banking sector as a whole, unlike other studies using banking-level information. ARDL evidence shows that short-term credit is largely motivated by bank assets and bank deposits, while the long-run explanatory factors are all important.

The remaining paper is organized as follows: Section 2 presents a summary and the analytical methodology is outlined in Section 3. The experimental results are discussed in Section 4. Paragraph 5 finishes with a variety of policy suggestions.

2. Literature Review

Due to boom cycles and bust cycles in most countries following the global financial crises, bank credit determinants were an interesting topic for discussion. The factors that affect banks' credit are generally identified as factors on the demand or supply side. Balazs et al. (2006) argued that the provision of bank lending based on the financial power of the banks. The linked bank credit supply to regulatory framework of banks was Cotarelli et al. (2003). Credit supplies are also identified as key factors in monetary policy and macroeconomic conditions (Pruteanu-Podpeira, 2007; Baum, et al., 2009). Mixed results have been further reviewed in literature to research the effect of demand and supply-side factors on Bank loans.

Cotarelli et al. (2003) for example examined the impact on private sector bank lending of structural factors with 27 (non-transitional and industrial) economies in a panel for the 1973-1996 period. Although public debt is reducing bank loans, the study found that an increase in GDP per capita is rising private-sector credit availability. The non-linear relation to bank loans has been inflation, meaning that inflation increases bank loans positively if it falls short of a certain level and reduces credit supply at a fixed level. Further, the results found that accountability transparency increases bank credit.

In order to assess bank credit factors in 11 Central and Eastern European countries (CEE), Balazs et al. (2006) applied panel techniques (fixed results, OLSA and medium-size group). In Baltic and South-East Europe, the study identified GDP per capita as having a positive impact on credit for banks, while inflation, nominee interest rates and loans and deposits are spread across CEE-5 credit. The Rosenberg and Tirpák studies (2009) showed that the interest rate and foreign deposit shares of the Member States' foreign currency credit for the CEE are significantly and positively impelled. Nonetheless, the results showed that foreign assets of the banks, regulatory frameworks and exchange instability are damaging for the borrowing of foreign currency.

Guo and Stepanyan (2011) used a dataset of 38 emerging economies from 2002 to 2010 to assess the effect of demand and supply-side factors on bank credit. They noted that growth in bank credit is related to non-resident debt and domestic deposits. The macro-economic factors (GDP growth and inflation) have also directly affected credit growth. The study also reported increases in deposit rates (which indicate a strict monetary policy) with a negative impact on credit provision.

The Vector Error Correction System for determining Albania's long-term bank credit motivators, Shijaku and Kullaci (2013) implemented. The researchers have found that long-term factors on bank lending are exchange rates, bank deposits and financial intermediations. Nevertheless, credit development is hampered by higher loan rates and government debt.

Imran and Nishat (2013) examined the effects on bank credit from the supplier side in Pakistan with annual data covering 1971-2010 using the ARDL estimation technique. In a long-term sense, the researchers revealed that bank credit is affected by national deposit, foreign liability, and macroeconomic factors (exchange rate, economic growth and monetary conditions) in Pakistan substantially. Nevertheless, for bank credit supply, inflation and monetary market rates do not matter.

Amidu (2014) employed 264 banks operating in 24 sub-Saharan African countries in 2000-2007 to analyze the micro-and macroeconomic factors that determine bank lending. Empirical analyzes show that micro-level borrowing is driven by banking volume, growth and bank performance. At the macroeconomic stage, on the other hand, the interest rate negatively induces bank loans, while business is important to credit provision.

Determinants of bank lending with data from 1978 to 2011 were critically assessed in Ethiopia by Assefa (2014). The study showed that GDP, real lending rates and domestic deposits are key factors in the determination of bank credit, especially in the long term by using the ARDL econometric analysis. Yet, regardless of the time, the money supply dictates significantly bank loans.

The key drivers of bank credit growth have been investigated for the 1980-2010 period by Akinlo and Oni (2015). The Error Correction Model is a long-term model in which Bank credit, broad monetary provision, the cyclical risk premiums and inflation are positive and significantly motivated by bank assets and inflation while the credit ratio and reserved ratio impact the credit increase negatively.

Rabab'ah (2015) has analyzed the dominant determinants of bank loans for 2005–2013, using banking-level statistics from commercial banks in Jordan. The author has revealed that bank loans were adversely affected by non-performing loans. The size of the economy and the level of economic activity have shown a positive effect on bank loans. The study also showed a negative negative effect on credit supplies of inflation and the lending rate.

The effect of monetary and macro-prudential regulation on credit growth in Turkey during the period 2004Q4-2015Q2 was analyzed by Abbasoglu et al. (2015), who classified banks as large and small. Using the GMM (Generalized Moments) methodology, a study has found a major adverse effect on bank credit growth in central bank policy levels and macroprudential policies.

In Ghana, for the period 1970-2011 Baoko et al. (2017) analyzed the private sector bank credit determinants. The study found that bank credit is affected significantly by bank assets, bank deposits, large cash supplies and real lending rates in Ghana, both in the short-term and long-term periods. Short-term inflation is pushing credit supply dramatically and positively.

Both banking and macro-economic factors are recognized as key drivers of bank credit through the extensive literature review. However, studies in Turkey require little further research. In addition to work Abbasoglu et al. (2015), the key determinants of bank loans in Turkey are not explained by any relevant study. In theory, this research adds to the minimal literature by analyzing bank credit drivers in Turkey using the ARDL method.

3. Methodology

3.1 Data Description And Variables

This research assesses the core determinants of bank credit in Turkey using the World Development Indicators (WDI) of the World Bank quarterly data spanning 2000Q1-2016Q4. Based on full availability of data, this time is selected. The following prior studies are used as dependent variables that are clearly defined in Table 1, Bank assets (BAS), deposits (BD) and large-scale money supply, Bank performance (BEF), Access to Financial Services (ACC) and Inflation (INF).

Table 1: Description of Variables

<i>Variable</i>	<i>Acronym</i>	<i>Proxy</i>
Bank Credit	BCP	Bank credit to the private sector (% of GDP)
Bank Asset	BAS	Total assets held by deposit money banks (% of GDP)
Bank Deposit	BD	Total value of demand, time and saving deposit (% of GDP)
Broad Money	BM	Broad money supply (% of GDP)
Bank Efficiency	BEF	Proxied by bank net interest margin
Financial Access	ACC	Number of commercial bank branches per 100,000 adults
Inflation	INF	Consumer Prices (annual %)

3.2 Model Specification

The empirical model for examining the relation between banking loan and the explanatory variables is expressed as below by Yakubu (2016):

$$BCP_t = \alpha_0 + \beta_1 BAS_t + \beta_2 BD_t + \beta_3 BM_t + \beta_4 BEF_t + \beta_5 ACC_t + \beta_6 INF_t + \varepsilon_t \dots \dots \dots (1)$$

where the proxies of all the explanatory factors are previously defined except ε , which is the error term. t represents the sample period and α_0 refers to the intercept. β_1 to β_6 are the coefficients.

3.3 Cointegration- ARDL Bounds Testing Procedure

To order to investigate bank credit determinants, Pesaran and Shin (1999) and Pesaran et al. (2001) have used the Autoregressive Distributed Lag (ARDL) method. The ARDL software offers benefits over other forms of cointegration (for example Totally Revised OLS, Johansen, etc.). Whether, for example, whether at level $I(0)$, first difference $I(1)$ or both the underlying variables are stationary, the ARDL technique is valid. Under the ARDL, variable will take various lags. It's also an ideal model for studies of small samples. ARDL also offers objective long-term forecasts (Odhiambo, 2008).

The ARDL model is presented as follows when evaluating the long-term relationship and the short-run parameter dynamics:

$$BCP_t = \alpha_0 + \sum_{i=1}^n \alpha_{1i} \Delta BCP_{t-i} + \sum_{i=1}^n \alpha_{2i} \Delta BAS_{t-i} + \sum_{i=1}^n \alpha_{3i} \Delta BD_{t-i} + \sum_{i=1}^n \alpha_{4i} \Delta BM_{t-i} + \sum_{i=1}^n \alpha_{5i} \Delta BEF_{t-i} + \sum_{i=1}^n \alpha_{6i} \Delta ACC_{t-i} + \sum_{i=1}^n \alpha_{7i} \Delta INF_{t-i} + \delta_1 BCP_{t-1} + \delta_2 BAS_{t-1} + \delta_3 BD_{t-1} + \delta_4 BM_{t-1} + \delta_5 BEF_{t-1} + \delta_6 ACC_{t-1} + \delta_7 INF_{t-1} + \rho ECM_{t-1} + \varepsilon_t \dots \dots \dots (2)$$

where Δ is the difference operator; α_0 is the intercept; $\alpha_1 - \alpha_7$ and $\delta_1 - \delta_7$ are short-run and long-run coefficients respectively; ε is the error term; n is the lag length; ρ is the coefficient of ECM; and ECM_{t-1} denotes the error correction term lagged by one period.

The long-term relationship between the variables is evaluated using the F-test with a bond test. To do so, the null hypothesis that there is no long-lasting relationship between the parameter is considered as follows:

$$H_0: \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = \delta_7 = 0 \quad (3)$$

$$H_1: \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq \delta_6 \neq \delta_7 \neq 0 \quad (4)$$

For the analysis of co-integration, both critical boundaries: upper bound I(1) and lower bound I(0). I(1) indicates a long-lasting relationship exceeding the upper critical bound. However, F data shows no co-integration less than the lower bound critical value I(0). The F numbers are drawn between the top and bottom of the vital line. A final result is drawn.

4. Empirical results

4.1 Descriptive Statistics

In Table 2, all variables included in the analysis are listed in the descriptive statistics. Credits to privates (percentages of GDP) are reported to be 37,09 on average and to have a standard deviation of 19,69, and maximum and low respectively 69,85 and 14,14. Bank loans have the highest standard deviation, which shows high volatility, in comparison with independent variables. With the exception of deposits and large money, all the parameter is positive. It is also observed that the leptokurtic distribution of bank efficiency and inflation is larger than their Kurtosis values. In addition, the probability values for Jarque-Bera suggest that variables are typically not distributed at 5%.

Table 2: Descriptive Statistics

	BCP	BAS	BD	BM	BEF	ACC	INF
Mean	37.087	50.543	38.270	45.438	5.407	16.441	16.672
Median	33.644	47.454	39.376	46.479	4.995	17.156	8.756
Maximum	69.853	73.267	46.335	55.605	9.015	19.671	54.915
Minimum	14.135	31.818	27.625	33.537	3.761	12.943	6.251
Std. Dev.	19.690	14.414	6.7135	7.445	1.370	2.263	16.651
Skewness	0.332	0.149	-0.214	-0.334	0.951	0.004	1.619
Kurtosis	1.627	1.474	1.411	1.652	3.582	1.440	3.845
Jarque-Bera	6.589	6.846	7.673	6.416	11.215	6.900	31.739
Probability	0.037	0.033	0.022	0.040	0.004	0.032	0.000
Sum	2521.931	3436.901	2602.349	3089.793	367.653	1118.004	1133.726
Sum Sq. Dev.	25976.510	13919.740	3019.745	3713.569	125.812	343.052	18575.810
Observations	68	68	68	68	68	68	68

4.2 Unit root tests

The research tested for unit root as shown in Table 3 by Augmented Dicke-Fuller (ADF). The experiment is performed at both I(0) and I(1) level. The experiment is carried out in three phases: constant, trend-continuous, and trend-free. The results show that at constant rates, all of the variables are stable, except inflation. Including a trend, bank credit and bank productivity stabilize at the point. Therefore, inflation alone remains stationary at rate without a constant or trend. Given the stationary degree and initial difference of the variables, the ARDL approach can be used.

Table 3: Unit Root Test Results: Augmented Dickey-Fuller (ADF)

Variables	Constant		Constant and Trend		Without Constant and Trend	
	<i>t</i> -statistics	Order	<i>t</i> -statistics	Order	<i>t</i> -statistics	Order
BCP	-2.634*	I(1)	-3.176*	I(0)	-4.509***	I(1)
BAS	-2.837*	I(1)	-6.831***	I(1)	-1.882***	I(1)
BD	-8.425***	I(1)	-8.391***	I(1)	-8.062***	I(1)
BM	-4.838***	I(1)	-4.774***	I(1)	-4.842***	I(1)
BEF	-5.949***	I(1)	-3.229*	I(0)	-5.924***	I(1)
ACC	-8.184***	I(1)	-8.140***	I(1)	-8.062***	I(1)
INF	-3.321**	I(0)	-5.711***	I(1)	-3.083***	I(0)

*, **, *** denotes stationary at 10%, 5% and 1% significance level respectively.

4.3 Bounds-Testing For Co-Integration

The border check examines how bank credit and its drivers are long-lastingly linked. As shown in Table 4, the results for border tests show that the average F-statistics (16.143) are greater than the highest critical border value of 3.99 at 1% of significance. This means that the selected variables are co-integrated. The long-term relationship between bank loans and the explanatory factors is therefore estimated. The ARDL (3,4,4,3,3,4,4) is chosen on the basis of Akaike information criterion (AIC).

Table 4: Bounds Test for Cointegration Relationship

Test Statistics	Value	Level	Critical values	
			I(0)	I(1)
F-Statistics	16.143***	1%	2.88	3.99
<i>k</i>	6	5%	2.27	3.28
		10%	1.99	2.94

Notes: *k* is the number of the explanatory variables and *** denote 1% level of statistical significance.

4.4 Long-run Estimation

Table 5 below shows the empirical estimate of long-lasting factors influencing bank loans.

Table 5: Estimated Long-run Coefficient Using the ARDL Approach

ARDL (3, 4, 4, 3, 3, 4, 4) Selected based on AIC			Dependent Variable = BCP		
Variable	Coefficient	Std. Error	<i>t</i> -Statistic	Prob. Value	
BAS_t	1.661	0.049	33.785	0.000***	
BD_t	-1.684	0.137	-12.314	0.000***	
BM_t	0.401	0.132	3.048	0.005***	
BEF_t	-0.409	0.197	-2.075	0.046**	
ACC_t	1.604	0.193	8.312	0.000***	
INF_t	-0.098	0.020	-4.843	0.000***	
Constant	-22.561	2.451	-9.207	0.000***	

Notes: ***, **, * denotes significance at the 1%, 5% and 10% levels respectively.

The analysis shows that bank assets have a substantial positive 1 percent credit effect. It indicates that a rise in bank assets leads to increased lending by banks to the private sector. This confirms Baoko et al. (2017)'s view that improving bank asset performance improves private sector lending.

Bank deposit coefficient are negative (1 percent) and statistically significant, meaning banks can channel their growing deposits into other business instead of lending to the private sector for

productive activities. The results are similar to Kwakye (2012) and Baoko et al. (2017), which indicate that the increased deposits of banks don't necessarily mean increased credit supplies.

In keeping with earlier studies (e.g., Amidu, 2014; Enisan and Oluwafeni, 2015; Baoko et al., 2017), the wide supplies of financial resources have significantly positive effects on bank lending. An increase in the large amount of money causes an increase in the supply of banking credit. This result reflects the hypothesis that money provision measures currency conditions and that that bank loans represent a rise in cash supply (Imran and Nishat, 2013; Salmanov et al., 2015).

The efficiency of banks measuring cost savings is adversely related to the credit of banks. The conclusion is consistent with that highly efficient banking companies can reduce costs through higher interest rates on borrowing (Shamshur and Weill 2019) by transferring those costs to lenders. It avoids the credit processing for banks from lenders.

Access to financial services shows a significant positive effect (at 1% significance) on bank credit. While banks broaden their operations with innovative products that can easily be accessed by a broader audience, the finding suggests that bank loans increase.

With regard to inflation, there is a significant adverse effect on bank loans. This is in keeping with the notion that increasing inflation leads to macroeconomic instability, which disrupts banks from advancing private-sector loans. The results are consistent with earlier research (Cotarelli et al., 2003; akinlo and Gounder, 2012).

4.5 Short-run Estimation

The short-term result of banking credit and explanatory factors is presented in Table 6. Some similarities can be observed compared to the long-term estimates, although differences exist, particularly in relation to the statistical relevance.

Table 6: Results of Short-Run Dynamic Model

ARDL (3, 4, 4, 3, 3, 4, 4) Selected based on AIC		Dependent Variable = BCP		
<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob. Value</i>
ΔBCP_{t-2}	0.113	0.072	1.568	0.127
ΔBAS_{t-3}	-0.868	0.099	-8.789	0.000***
ΔBD_{t-3}	0.960	0.121	7.932	0.000***
ΔBM_{t-2}	-0.083	0.053	-1.560	0.129
ΔBEF_{t-2}	-0.117	0.111	-1.059	0.297
ΔACC_{t-3}	0.218	0.171	1.275	0.212
ΔINF_{t-3}	-0.030	0.021	-1.431	0.162
ECM_{t-1}	-0.914	0.073	-12.546	0.000***
R^2		0.950		
Adjusted R^2		0.919		
Durbin-Watson stat		1.513		
F-Statistic		2072.316		
Prob.(F-Statistic)		0.000		

Notes: ***, **, * denotes significance at the 1%, 5% and 10% levels respectively.

The short-term calculation indicates a negative and highly significant coefficient of late error correction (ECM_{t-1}). The coefficient of -0.914 means a high speed of balancing adjustment, which shows a 91.4 percent reduction in the model's disturbance to balance. Banking assets have a significant negative impact on bank loans. The small size of banks in the short run can be attributed to this. Small banks have poor credit performance because they funnel more of their funds to spend more in growth rather than credit. Bank deposits remain a significant determining factor for bank loans and a positive relationship. This means banks are turning their deposits into loans quickly in

the short run. Unlike in the long-term, a large supply of money does not boost short-term credit supplies. In short-term decisions on bank lending are detrimental to bank efficiency and inflation. The results are similar to long term results, although in the short run statistically insignificant. Although insignificant in the short-range, access to financial services drives bank credit demand positively.

4.6 Diagnostic Tests Results

Finally, various diagnostic tests are carried out in order to ensure that the results are valid. As shown in Table 7. The results reported that the model is free from and normally distributed through serial correlation and heteroscedasticity.

Table 7: Diagnostic Tests

<i>Specification</i>	<i>F-statistics</i>	<i>Prob. Value</i>
Breusch–Godfrey (Serial Correlation LM test)	1.911	0.166
Breusch-Pagan (Heteroscedasticity)	1.004	0.494
Jarque–Bera (Normality)	0.963	0.618
Ramsey RESET	5.742	0.023

CUSUM and CUSUMSQ tests also show that the model is robust because the CUSUM lines are at 5% significance points within important boundaries.

Figure 2: Plot of CUSUM Test

Figure 3: Plot of CUSUMSQ Test

5. Conclusion and Recommendations

This study looks at bank credit determinants in Turkey. The ARDL approach was applied in respect of three-month time series data for 2000Q1-2016Q4 to achieve this target. The results generally show that short-term lending to the private sector is affected considerably by bank assets and deposits. All variables are statistically significant in the long term with different coefficient signs, indicating that they are important to motivate bank credit. Although banking capital, large money supplies, and financial stability represent a positive association, long-run credit growth tends to be negatively affected by bank deposits, efficiency and inflation.

Some policy suggestions are presented in the results. Initially, the need to implement strategies to strengthen the banks' deposit base is to boost growth in bank lending and to stimulate credit demand. Banks will engage in deposit mobilization initiatives such as competitive deposit interest rates. Second, in order for cash holdings to be increased in the vault banks the Central Bank of the Republic of Turkey (TCMB) must keep the reserve requirement lower. This will help to boost the credit generation of banks. Therefore, at the macro-level, workable policies need to be implemented in order to ensure an optimum inflation rate to ensure domestic economic stability.

References

- Abbasoglu, O. F., Ileri, S. G., and Mimir, Y. (2015). *Determinants of Credit Growth in Turkey: Does Size Matter?*. [Online] Available at: http://erf.org.eg/wp-content/uploads/2016/03/ERF_22nd-AC_Finance_Abbasog-Gen-Mimir.pdf. [Accessed: 29 November 2019].
- Akinlo, A. E., and Oni, I. O. (2015). Determinants of Bank Credit Growth In Nigeria 1980-2010. *European Journal of Sustainable Development*, 4(1), 23-30.
- Angela, R. (2011). SMEs' sector access to finance: An overview. *Annals of the University of Oradea, Economic Science Series*, 20(1), 431-437.

- Assefa, M. (2014). Determinants of growth in bank credit to the private sector in Ethiopia: A supply side approach. *Research Journal of Finance and Accounting*, 5(17), 90-102.
- Balazs, E., Back, P., and Zumer, T. (2006). Private-sector credit in Central and Eastern Europe: New (over) shooting stars?, *Working Paper* No. 852. William Davidson Institute.
- Baoko, G., Acheampong, I. A., and Ibrahim, M. (2017). Determinants of bank credit in Ghana: A bounds-testing cointegration approach. *African Review of Economics and Finance*, 9(1), 33-61.
- Baum, C. F., Caglayan, M., and Ozkan, N. (2009). The second moments matter: The impact of macroeconomic uncertainty on the allocation of loanable funds. *Economics Letters*, 102(2), 87-89.
- Brinke, K. (2013). *The Turkish 2000-01 banking crisis*. [Online] Available at: <https://economics.rabobank.com/publications/2013/september/the-turkish-2000-01-banking-crisis/>. [Accessed: 29 November 2019].
- Cottarelli, C., Dell'Araccia, G., and Vladkova-Hollar, I. (2005). Early birds, late risers, and sleeping beauties: Bank credit growth to the private sector in Central and Eastern Europe and in the Balkans. *Journal of banking & Finance*, 29(1), 83-104.
- Guo, K., and Stepanyan, V. (2011). *Determinants of Bank Credit in Emerging Market Economies*, 11-51. International Monetary Fund.
- Imran, K., and Nishat, M. (2013). Determinants of bank credit in Pakistan: A supply side approach. *Economic Modelling*, 35, 384-390.
- Odhiambo, N. M. (2008). Financial depth, savings and economic growth in Kenya: A dynamic causal linkage. *Economic Modelling*, 25(4), 704-713.
- Pesaran, M. H., and Shin, Y. (1998). An autoregressive distributed-lag modelling approach to cointegration analysis. *Econometric Society Monographs*, 31, 371-413.
- Pesaran, M. H., Shin, Y., and Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289-326.
- Pruteanu-Podpiera, A. M. (2007). The role of banks in the Czech monetary policy transmission mechanism. *Economics of Transition*, 15(2), 393-428.
- Rabab'ah, M. (2015). Factors affecting the bank credit: An empirical study on the Jordanian commercial banks. *International journal of Economics and Finance*, 7(5), 166-178.
- Rosenberg, C., and Tirpák, M. (2009). Determinants of foreign currency borrowing in the new member states of the EU. *Czech Journal of Economics and Finance (Finance a uver)*, 59(3), 216-228.
- Salmanov, O., Zayernyuk, V., and Lopatina, O. (2015). An Analysis of the impact of monetary policy on bank lending in Russia. *Asian Social Science*, 11(6).
- Shamshur, A., and Weill, L. (2019). Does bank efficiency influence the cost of credit?. *Journal of Banking & Finance*, 105, 62-73.
- Shijaku, G., and Kalluci, I. (2013). Determinants of bank credit to the private sector: the case of Albania. *Bank of Albania Working Paper*, 09(48), 1-36.
- World Bank (2014). *World Development Indicators*, World Bank, Washington DC.
- Yakubu, I. N. (2016). Bank-Specific and Macroeconomic Determinants of Commercial Banks Profitability in Ghana. *International Finance and Banking*, 3(2), 89-99.