IJAFR

International Journal of Accounting and Finance Researches
Uluslararası Muhasebe ve Finans Araştırmaları Dergisi
ISSN: 2687-3540 – Vol:7 - Issue:1 / Cilt:7 - Sayı:1

THE IMPACT OF MACROECONOMIC VARIABLES ON PARTICIPATION BANKS: AN ANALYSIS WITHIN THE SCOPE OF CAMELS MODEL

Makroekonomik Değişkenlerin Katılım Bankalarına Etkisi: CAMELS Modeli Kapsamında İnceleme

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Araştırma Makalesi / Research Article

Received Date:
26.02.2025
Acceptance Date:
28.04.2025

Keywords
CAMELS, Participation Banks, Panel Regression

JEL Codes:
G10, G21

ABSTRACT

This study analyzes the impact of macroeconomic variables on CAMELS performance indicators of participation banks. In the study, data from participation banks operating in Turkey for 2019-2023 were used, and the panel regression analysis method was applied. The analysis results show that the budget balance variable negatively and significantly affects all CAMELS components. This situation reveals that an increase in the budget deficit negatively affects the capital adequacy, asset quality, management effectiveness, profitability, and liquidity of participation banks. On the other hand, the money supply (M2) variable generally has a positive and significant effect, indicating that an increase in money supply strengthens the financial performance of participation banks. The GDP growth rate negatively and significantly impacts some models, suggesting that economic growth may pressure certain financial indicators. The inflation variable is not found to be statistically significant in general and has a positive and significant effect only for the management effectiveness model. In conclusion, macroeconomic variables have different effects on financial indicators of participation banks in different directions and different ways. These results provide essential information for regulators and policymakers.

Geliş Tarihi:
26.02.2025
Kabul Tarihi:
28.04.2025

Anahtar Kelimeler:
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ÖZ

Bu çalışma, makroekonomik değişkenlerin katılım bankalarının CAMELS performans göstergeleri üzerindeki etkisini analiz etmektedir. Çalışmada 2019-2023 dönemi için Türkiye'de faaliyet gösteren katılım bankalarına ait veriler kullanılmış olup panel regresyon analizi yöntemi uygulanmıştır. Analiz sonuçları, bütçe dengesi değişkeninin tüm CAMELS bileşenleri üzerinde negatif ve anlamlı bir etkiye sahip olduğunu göstermektedir. Bu durum, bütçe açığının artmasının katılım bankalarının sermaye yeterliliği, varlık kalitesi, yönetim etkinliği, kârlılık ve likidite üzerinde olumsuz etkiler yarattığını ortaya koymaktadır. Para arzı (M2) değişkeni ise genellikle pozitif ve anlamlı bir etkiye sahip olup, para arzındaki artışın katılım bankalarının finansal performansını güçlendirdiği anlaşılmaktadır. GSYİH büyüme oranı bazı modellerde negatif ve anlamlı bir etkiye sahip olup, ekonomik büyümenin belirli finansal göstergeler üzerinde baskı oluşturabileceğini düşündürmektedir. Enflasyon değişkeni ise genel olarak istatistiksel olarak anlamlı bulunmamış, sadece yönetim etkinliği modeli için pozitif ve anlamlı bir etkiye sahiptir. Sonuç olarak, makroekonomik değişkenlerin katılım bankalarının finansal göstergeleri üzerinde farklı yönlerde ve farklı şekillerde etkileri olduğu görülmektedir. Bu sonuçlar, düzenleyici kurumlar ve politika yapıcılar için önemli bilgiler sunmaktadır.

Atıf / Citation: Çelik, M.S. (2025). The Impact of Macroeconomic Variables on Participation Banks an Analysis within the Scope of CAMELS Model, *International Journal of Accounting and Finance Researches,* 7(1), 61-74.

1. INTRODUCTION

As one of the fundamental elements of the financial system, banks have a critical role as institutions that ensure the sustainability of economic activities and regulate the financial flow between markets. In addition to traditional deposit banking, the banking sector in Turkey is differentiated by the participation banking model based on interest-free financing principles. Participation banking is a financial system that operates by the principles of Islamic finance and stands out primarily by offering interest-free products and services. The banking system is vital for regulating and sustaining economic and financial activities. In modern terms, banks are defined as institutions that accumulate the savings and deposits of individuals and businesses, transfer the funds obtained from them as loans, and provide various financial services (Altan, 2001, p. 41). While banks contribute to the more efficient conduct of economic activities by financing individuals and businesses, they also strengthen their economic structure with the interest income they earn from their loan services.

The banking sector in Turkey consists of deposit banks, development and investment banks, and participation banks. Participation banking, which was born out of Islam's sensitivity to interest, meets a critical need by offering an interest-free financing model to savers. The first examples of a banking system based on Islamic rules emerged in the 1960s, and this model grew rapidly and gained global acceptance in the 1980s. The Islamic banking model has earned a solid place in the economy by bringing the resources of individuals who cannot utilize their funds due to their beliefs into the economy. The size of these funds attracted the attention of international economic models (Atar, 2023). Participation banking has many important features for the Turkish banking sector. This system is not only limited to the development and deepening of an alternative banking model but also gradually increases its share and importance in the banking system with indicators such as the increase in the number of branches and employees, the size of assets, and the increase in the amount of funds allocated. The increased interest in interest-free finance practices, especially after the 2008 global financial crisis, has made the studies conducted in this field even more meaningful.

Islamic banking in Turkey operates under the name “participation bank”. Turkey's desire to benefit from the large pool of funds belonging to Islamic countries has increased investments in this field and led to new regulations to attract foreign investors (Tenekeci, 2017). In this context, participation banks attract attention for providing interest-free financing and contributing to sustainable development and economic growth. In particular, determining the impact of macroeconomic variables on the CAMELS ratios of participation banks is of academic and sectoral importance.

Banks operating in Turkey as of January 2025 are presented in Table 1 below. T.O.M. KATILIM BANKASI A.Ş. and HAYAT FİNANS KATILIM BANKASI A.Ş. in Table 1 provide digital banking services, while DÜNYA KATILIM BANKASI A.Ş. was excluded from the scope of the study as it started its activities in 2023.

Table 1. Participation Banks in Turkey

	Bank Name
1	ALBARAKA TÜRK KATILIM BANKASI A.Ş.
2	DÜNYA KATILIM BANKASI A.Ş.
3	HAYAT FİNANS KATILIM BANKASI A.Ş.
4	KUVEYT TÜRK KATILIM BANKASI A.Ş.
5	T.O.M. KATILIM BANKASI A.Ş.
6	TÜRKİYE EMLAK KATILIM BANKASI A.Ş.
7	TÜRKİYE FİNANS KATILIM BANKASI A.Ş.
8	VAKIF KATILIM BANKASI A.Ş.
9	ZİRAAT KATILIM BANKASI A.Ş.

Source: Created by the author using BRSA (2025).

In the literature, Kacem and El Harbi (2023) and Buallay et al. (2021), which examine bank performance at the international level, have contributed to understanding the global dynamics of banking. At the regional level, studies such as Baselga-Pascual and Vähämaa (2021) have analyzed the effects of banking specific to economic regions. Studies evaluating the performance of banks have generally focused on profitability and efficiency. Measures such as return on assets (ROA) and return on equity (ROE) are used as key metrics to understand the financial health of banks. In particular, the European Central Bank's analysis has emphasized that high ROE can imply high profitability and a small amount of equity. The CAMELS model has emerged as an effective tool for assessing bank performance in developed and developing countries. The model covers capital adequacy, asset quality, management effectiveness, profitability, liquidity, and sensitivity to market risk. The literature shows that the CAMELS model is a powerful method for assessing banking performance.

This study examines macroeconomic variables' effects on CAMELS (C - Capital Adequacy, A - Asset Quality, M - Management Quality, E - Earnings, L - Liquidity, S - Sensitivity) of participation banks. The CAMELS rating system, an important indicator of financial health in the banking sector, covers capital adequacy, asset quality, management quality, profitability, liquidity, and market risks. Inflation (Enf), budget balance (Budget), broad money supply (M2), and gross domestic product (GDP) growth rate are used as independent variables. Understanding the effects of macroeconomic factors on these components can improve the risk management strategies of banks and the policy-making processes of regulatory agencies. The study first provides introductory information on participation banks and CAMELS analysis, followed by a literature review, data and methodology, application results, and conclusion.

2. LITERATURE REVIEW

In the literature, studies evaluating the performance of banks during crisis periods with the CAMELS method have reached similar results. In their study, Aytekin and Sakarya (2013) examined the effects of the 2001 local financial crisis and the 2008 global financial crisis. They stated fluctuations in the CAMELS performance of deposit banks traded in Borsa Istanbul in the pre- and post-crisis periods. Still, no statistically significant difference was found between these periods. Similarly, Rozzani and Abdul Rahman (2013) compared the performance of traditional and participation banks operating in Malaysia between 2008 and 2011 and found that both banking groups exhibited similar performances. Both studies reveal that banks' performances follow a similar course during crisis periods and that there are no significant differences.

Studies comparing the performance of deposit and participation banks shed light on the different financial structures of banks. Doğan (2013) compared deposit and participation banks in Turkey between 2005-2011 using a t-test and found that deposit banks performed better in liquidity, solvency, and capital adequacy ratios, but there was no difference in profitability. Yazıcıoğlu and Uygurtürk (2023) analyzed deposit and participation banks in separate groups and stated that among deposit banks, Ziraat Bank with public capital and İş Bank with private capital stand out, while Vakıf Participation Bank has the highest performance among participation banks. Beyter and Ersoy (2024) concluded that deposit banks exhibit a more favorable financial performance than participation banks and that CAMELS analysis is an adequate method to measure the performance of banks.

Studies evaluating the performance of banks by ownership structure have revealed various advantages of public, private, and foreign-owned banks. Kandemir and Demirel Arıcı (2013) grouped deposit banks in Turkey according to ownership structure between 2001 and 2010 and emphasized that foreign-owned banks performed better in terms of management quality and asset quality. Ege et al. (2015) argue that during the 2002-2010 period, public banks were stronger in terms of capital adequacy and market risk sensitivity, private banks were stronger in terms of profitability, while foreign banks exhibited superior performance in liquidity and asset quality. Gümüş and Nalbantoğlu (2016) found that between 2002 and 2013, domestic private capital banks received the highest rating, while the capital structure of participation banks was weaker than other groups.

Studies evaluating the performance of participation banks have examined the unique structure of these banks and their impact on economic growth. Eyceyurt Batır (2019) showed that public participation banks performed better than private participation banks between 2015-2017. Akyüz et al. (2020) found a general downward trend in the CAMELS scores of participation banks between 2013-2017. Eren et al. (2021) used MULTIMOORA and MAUT methods, which are multi-criteria decision-making methods, to measure the performance of participation banks and found that Vakıf Participation Bank and Kuveyt Türk Participation Bank exhibited the best performance, respectively. Yıldız (2023) stated that there were fluctuations in the performance of participation banks in the 2015-2021 period. Dilber and Hatipoğlu (2022) found a cointegration between CAMELS indicators of participation banks and economic growth and that management efficiency and sensitivity to market risks have positive effects on economic growth.

Mazzillo (1993) argues that CAMELS analysis is effective in assessing the current performance of banks, but it is insufficient to predict future risks or economic developments. Hirtle and Lopez (1999) emphasized the importance of the confidentiality of CAMELS ratings in regulatory processes and stated that the method is limited to assessing the current situation. Barth, Caprio and Levine (2008) and Thangavelu and Findlay (2010) emphasize that regulatory reforms and restrictions on risky activities have improved bank performance in Malaysia. However, the need for infrastructure development has also been emphasized.

Dash and Das (2010) and other studies on India have shown that the financial performance of private/foreign-owned banks is better than that of public banks. However, it is emphasized that public banks need to adapt quickly to changing market conditions to improve their efficiency. This suggests public banks can become more competitive through reforms and strategic adaptations. Williams (2011) showed that macroeconomic factors such as money supply affect capital adequacy in Nigeria. Similarly, studies in India and Malaysia reveal that regulatory reforms and economic conditions determine bank performance. In their study, Alparslan and Özbek (2024) analyze the performance of

participation banks in Turkey in the pre and post-COVID-19 period using the CAMELS method. The analysis was carried out using financial ratios commonly used in the literature, and financial statements and independent audit reports of the banks were utilized. The findings show that there are different performance levels among banks across periods. Vakıf Participation Bank had the highest performance before COVID-19, Ziraat Participation Bank during the pandemic, and Kuveyt Türk Participation Bank after the pandemic.

Various studies examining the relationship between participation in banking and macroeconomic variables reveal important findings for the sector. Karakuş (2016) found a significant and positive relationship between the number of participation bank employees and profitability indicators, industrial production index and sector loan volume, unemployment rate, average interest rate, and return on assets of funds collected. Similarly, Öztürk (2016) found that GDP growth rate is positively related to return on assets and return on capital, while inflation and deposit interest rates are positively related to banks' net interest margin. However, the same study determined no causality relationship between the GDP growth rate and the net interest margin, return on assets, and return on capital of the banking sector. Uludağ (2019) emphasized that the unemployment rate is negatively related to the funds collected in participation banking, while Kutlu and Karamustafa (2019) found that participation banks do not have a determining role in economic growth in the long run and there is no causality relationship between them. Özçim and Kaya (2021) stated an asymmetric information problem exists between macroeconomic variables and participation in banking sector data during economic crises. These studies reveal that participation in the banking sector is affected by macroeconomic factors in different ways and that this relationship may vary by period.

Studies in the literature reveal that the CAMELS method is an effective tool for evaluating the financial performance of banks. Although performance fluctuations were observed during the crisis periods, it was found that CAMELS scores did not differ statistically significantly in the pre-and post-crisis periods. It is understood that deposit banks are superior to participation banks in terms of liquidity, capital adequacy, and solvency but do not make a difference in profitability. Public banks stand out in terms of capital adequacy and market risk sensitivity; private banks stand out in terms of profitability; and foreign banks stand out in terms of liquidity and asset quality. On the other hand, the performance of participation banks is considered among the factors that positively affect economic growth, including management efficiency and market risks. Most of the studies emphasize that the CAMELS method is sufficient to evaluate the financial performance of banks. Unlike the literature, determining how CAMELS ratios are affected by macroeconomic variables constitutes the originality of this study.

3. METHODOLOGY AND DATA

Certain restrictions were imposed because some banks did not operate or terminate their operations in the relevant period as of the years considered in the study. Accordingly, T.O.M. Katılım Bankası A.Ş. and Hayat Finans Katılım Bankası A.Ş. were excluded from the scope of the study since they offer digital banking services. At the same time, Dünya Katılım Bankası A.Ş. started its operations in 2023. CAMELS analysis was applied for Albaraka Türk Participation Bank, Kuveyt Türk Participation Bank, Türkiye Finans Participation Bank, Ziraat Participation Bank, Vakıf Participation Bank, and Emlak Participation Bank using 5-year data for the years 2019-2023. US auditors developed CAMELS analysis in the 1970s to assess the financial condition of banks and identify

problematic institutions. In addition to measuring the performance of banks, this method is also used by credit rating agencies to rate banks (Yıldız, 2023: 40).

The CAMELS system is an analysis method developed to assess the financial health of banks (Alparslan and Özbek, 2024: 119). In this system, each letter represents the key elements that determine the performance of banks:

C (Capital Adequacy): The extent to which banks hold capital against the risks to which they are exposed and the ability of their managers to identify, monitor, and manage these risks.

A (Asset Quality): Analyzes the magnitude of credit risk by considering the structure of banks' loans, off-balance sheet transactions, and investment activities.

M (Management Quality: It reflects the ability of the bank's managers and boards of directors to assess, monitor and control banking risks. The sustainable growth of financial institutions depends, to a large extent, on the quality of governance.

E (Earning Ability): Analyzes current and future earnings stability by assessing the bank's ability to generate income.

L (Liquidity) measures the bank's cash conversion capacity and ability to meet its financial obligations. It also considers the strength of fund management processes and the adequacy of liquidity resources.

In 1997, the CAMEL model was updated as CAMELS by adding the **S (Sensitivity)** indicator. This additional component analyzes the impact of changes in interest rates, exchange rates, commodity prices, and stock values on banks' earnings and capital structures. CAMELS components are an important measure to assess banks' financial performance, operational resilience, and regulatory compliance. The content and weights of the financial ratios that make up the CAMELS method used in the analysis are in the table below. 1

Table 2. Financial Ratios Subject to Analysis and Their Weights

CAMELS Component and Ratio Name	Short Names of Ratios	Weight Value of the Component	Weight Value	Relationship Direction
Capital Adequacy (C)		0,20		
Capital Adequacy Ratio	SYO1		0,25	+
Equity / Total Assets	SYO2		0,25	+
Paid-in Capital / Shareholders' equity	SYO3		0,25	-
Net Profit (Loss) for the Period / Total Assets	SYO4		0,25	+
Asset Quality (A)		0,20		
Total Loans and Receivables / Total Assets	AKO1		0,25	+
Non-Performing Loans (Gross) / Total Loans and Receivables	AKO2		0,25	-
Fixed Assets / Total Assets	AKO3		0,25	-
Financial Assets (Net) / Total Assets	AKO4		0,25	-
Management Quality (M)		0,15		
Non-Performing Loans (Gross) / Total Loans and Receivables	YKO1		0,35	-
Net Profit per Branch (TL Million)	YKO2		0,35	+
Personnel Expenses / Other Operating Expenses	YKO3		0,30	-
Profitability (E)		0,15		
Net Profit (Loss) for the Period / Total Assets	KO1		0,35	+

Net Profit (Loss) for the Period / Shareholders' Equity	KO2		0,35	+
Profit Before Tax / Total Assets	KO3		0,30	+
Liquidity (L)		0,15		
Liquid Assets / Total Assets	LO1		0,35	+
Liquid Assets / Short Term Liabilities	LO2		0,35	+
TL Liquid Assets / Total Assets	LO3		0,30	+
Sensitivity to Market Risk (S)		0,15		
FX Assets / FX Liabilities	PRDO1		0,40	-
Net Dividend Income / Total Assets	PRDO2		0,40	+
Financial Assets (Net) / Total Assets	PRDO3		0,20	-

Source: Created by the authors by researching the literature on the subject.

The method of estimating economic relationships with panel data models constructed using horizontal cross-sectional data with time dimension is called "panel data analysis". Panel data analysis combines cross-sectional observations of different units such as countries, individuals, or firms in a given time interval. Panel data consists of T periodic observations corresponding to each unit and N units in total. In research, only time series or cross-sectional analysis is usually preferred when analyses need to be conducted over time and units. However, panel data analysis emerges by combining these two methods. Applied panel data analysis has become widespread, especially since the 1990s (Tatoğlu, 2021). The basic Panel Data analysis model is as follows;

$$\gamma_{i,t} = \alpha_{i,t} + \beta_{i,t} X_{i,t} + u_{i,t} \quad i = 1, \ldots\ldots, N \; ; t = 1, \ldots\ldots, T \tag{1}$$

Where; Y, Dependent variable Xk, Independent variable α, Fixed parameter β, Slope parameters u, Error term i, Horizontal cross-section dimension t, Time dimension.

Due to the presence of autocorrelation and variance problems in our C, M, and S models, we prefer the Driscoll and Kraay (1998) estimator, one of the widely used robust estimation methods in the literature. When the time dimension (T) is large, Driscoll and Kraay (1998) showed that standard nonparametric time series covariance matrix estimators can be extended to be robust to general spatial and periodic correlation forms. This method applies a Newey-West-type correction to the series of cross-sectional means, and the corrected standard error estimates are shown to ensure the consistency of the covariance matrix estimates regardless of the cross-sectional dimension (N) (even as $N \to \infty$). This method produces more robust estimates compared to the classical fixed effects model by accounting for the possibility that the error terms may exhibit both autocorrelation within units and cross-sectional dependence across units. Moreover, it provides more reliable results than traditional panel data methods, as it is also robust to heteroskedasticity under general assumptions.

MODEL1= $C_{i,t}=\alpha_0+\alpha_1\, l.GDP_{i,t}+\alpha_2\, Inf_{i,t}+\alpha_3\, M2_{i,t}+\alpha_4\, Bd_{li,t}+\varepsilon_{i,t}$

MODEL2= $A_{i,t=}\ \alpha_0+\alpha_1\, l.GDP_{\ i,t}+\alpha_2\, Inf_{i,t}+\alpha_3\, M2_{i,t}+\alpha_4\, Bd_{i,t}+\ \varepsilon_{i,t}$

MODEL3= $M_{i,t}=\alpha_0+\alpha_1\, l.GDP_{i,t}+\alpha_2\, Inf_{i,t}+\alpha_3\, M2_{i,t}+\alpha_4\, Bd_{li,t}+\varepsilon_{i,t}$

MODEL4= $E_{i,t=}\ \alpha_0+\alpha_1\, l.GDP_{i,t}+\alpha_2\, Inf_{i,t}+\alpha_3\, M2_{i,t}+\alpha_4\, Bd_{li,t}+\ \varepsilon_{i,t}$

MODEL5= $L_{i,t}=\alpha_0+\alpha_1\, l.GDP_{i,t}+\alpha_2\, Inf_{i,t}+\alpha_3\, M2_{i,t}+\alpha_4\, Bd_{li,t}+\varepsilon_{i,t}$

MODEL6= $S_{i,t=}\ \alpha_0+\alpha_1\, l.GDP_{i,t}+\alpha_2\, Inf_{i,t}+\alpha_3\, M2_{i,t}+\alpha_4\, Bd_{li,t}+\ \varepsilon_{i,t}$

4. APPLİCATİON RESULTS

Descriptive statistics of the analysis data are presented in Table 3.

Table 3: Descriptive Statistics

,Variables	Number of Observations	Mean	Standard Deviation	Minimum	Maximum
C	30	1.768	0. 377	1.16	2.315
A	30	4.490	0. 206	4.085	4.845
M	30	1.932	0. 290	1.454	2.269
E	30	1.275	0. 127	0. 937	1.481
L	30	8.113	0. 448	7.365	8.947
S	30	6.231	0. 456	5.148	6.947
Inf	30	8.342	4.802	3.75	16.51
Budget Deficit	30	0. 425	0. 168	0. 168	0. 640
l.GSYİH	30	0. 384	0. 244	0. 159	0. 809
M2	30	8.351	0. 842	7.292	9.698

When Table 3 is analyzed, a general evaluation was made based on the descriptive statistics of the variables. The C variable has a mean value of 1.768 and a standard deviation of 0.377. The minimum value is 1.16 and the maximum value is 2.315. It can be said that the variable does not show large fluctuations and the data are concentrated in a certain range. For variable A, the mean is 4.490, the standard deviation is 0.206, and the minimum and maximum values are 4.085 and 4.845, respectively. This shows that the variable has a relatively stable distribution. The mean value of the variable M is 1.932, the standard deviation is 0.290, the minimum value is 1.454, and the maximum value is 2.269. Most of the data is concentrated around the mean. For the variable E, the mean value is 1.275, the standard deviation is 0.127, and the minimum and maximum values are 0.937 and 1.481, respectively. The low standard deviation indicates that the variable is quite stable. The mean value of the L variable is 8.113; the standard deviation is 0.448, and the minimum and maximum values are 7.365 and 8.947, respectively. It is seen that the volatility of the variable is relatively low, and the data are collected within a certain range. For the S variable, the mean value is 6.231, the standard deviation is 0.456, the minimum value is 5.148, and the maximum value is 6.947.

Since the inflation rate is normalized as a percentage of GDP, the variable is not a direct measure of the rate of increase in prices but a comparison of the variable with the overall size of the economy. The mean value is 8.342, the standard deviation is 4.802, the minimum value is 3.75, and the maximum is 16.51. The high standard deviation indicates that inflation follows a fluctuating course between periods. For the budget deficit/GDP ratio, the mean is 0.425, the standard deviation is 0.168, the minimum is 0.168, and the maximum is 0.640. This reveals that the budget deficit varies between periods but generally follows a certain range. The M2 money supply/GDP ratio was calculated as 8.351 on average, with a standard deviation of 0.842, a minimum of 7.292, and a maximum of 9.698. The standard deviation of this variable is relatively low, and it can be said that there are no large fluctuations between periods. In general, it is observed that inflation fluctuates between periods, the budget deficit remains within certain limits, and the money supply is relatively stable. The ratio of variables to GDP reduces scale differences and allows for more reliable comparisons.

Table 4. Correlation Matrix

	C	A	M	E	L	S	Inf	Bd	M2	GDP
C	1.0000									
A	0.6837	1.0000								
M	0.6823	0.7576	1.0000							
E	0.4890	0.5040	0.4187	1.0000						
L	0.6409	0.7710	0.7846	0.7748	1.0000					
S	-0.3545	-0.343	-0.412	0.6118	0.1958	1.0000				
Inf	0.1673	0.4248	0.1492	0.5282	0.4095	0.3037	1.0000			
Bd	-0.2007	-0.5130	-0.1807	-0.6389	-0.4954	-0.3682	-0.7753	1.0000		
M2	-0.0194	-0.0400	-0.0141	-0.0510	-0.0425	-0.0289	-0.5505	0.1964	1.0000	
GDP	0.1907	0.4862	0.1712	0.6053	0.4693	0.3485	0.6526	-0.6713	-0.3659	1.0000

Table 4 shows the correlations between CAMELS components and macroeconomic variables. CAMELS components are generally positively correlated with each other, with particularly strong relationships between capital adequacy (C), asset quality (A), and management effectiveness (M). Inflation (Enf) is positively correlated with management effectiveness (E) and liquidity (L), while the budget balance (Budget) is highly negatively correlated (-0.7753). Money supply (M2) is weakly correlated with CAMELS components, while it is positively correlated with GDP, management effectiveness (E), and liquidity (L).

Table 5: Testing for Deviations from Basic Assumptions

MODEL	Horizontal Cross-Section Dependence (Peseran Cd) Test	Variance (Modified Wald Test) Test	Autocorrelation Test (Baltagi-Wu's Local Best Invariance Test (BW-LBI))
Model 1 (C)	0.561	152.46 (0.0000)	16.815 (0.0093)
Model 2 (A)	0.511	236.21 (0.0000)	0.447 (0.5332)
Model 3 (M)	0.548	215.56 (0.0000)	23.200 (0.0048)
Model 4 (E)	0.570	296.33 (0.0000)	0.290 (0.6131)
Model 5 (L)	0.431	166.50 (0.0000)	0.008 (0.9343)
Model 6 (S)	0.556	203.41 (0.0000)	40.335 (0.0014)

When the models are analyzed, although there is no horizontal cross-section dependence in all of them, there is a problem of changing variance in all of them. Since C, M, and S models have autocorrelation problems along with the heteroscedasticity problem, these models will be estimated with the Driscoll-Kraay estimator. Models A, E, and L have the problem of varying variance but no autocorrelation problem. In order to solve the problem of varying variance in these models, the models will be estimated in robust form, which includes the correction of standard errors.

Table 6. Model Selection Estimation Results

Model	Random Effects-Pooled LS	Fixed Effects - Pooled LS	Fixed Effects - Random Effects
Model 1 (C)	59.90 (0.0000) Random Effects	68.10 (0.0000) Fixed Effects	292.92 (0.0000) Fixed Effects
Model 2 (A)	58.49 (0.0000) Random Effects	69.82 (0.0000) Fixed Effects	721.18 (0.0000) Fixed Effects

Model 3 (M)	58.80 (0.0000) Random Effects	66.10 (0.0000) Fixed Effects	131.55 (0.0000) Fixed Effects
Model 4 (E)	53.94 (0.0000) Random Effects	92.42 (0.0000) Fixed Effects	340.64 (0.0000) Fixed Effects
Model 5 (L)	59.66 (0.0000) Random Effects	77.19 (0.0000) Fixed Effects	293.17 (0.0000) Fixed Effects
Model 6 (S)	59.15 (0.0000) Random Effects	69.77 (0.0000) Fixed Effects	560.51 (0.0000) Fixed Effects

Table 6 shows that the random effects model is more appropriate than the pooled model in all models according to the Breusch-Pagan test results. However, the F test results between fixed effects and pooled model indicate that the fixed effects model should be preferred. When the Hausman test results are analyzed, it is concluded that the fixed effects model should be preferred in all models.

Table 7. C, M and S Models Analysis Results (Driscoll-Kraay)

Analysis Results	C	M	S
Constant	1.9420 (0.00)	2.0346 (0.00)	6.5860 (0.00)
Inf	0.0007 (0.632)	0.0001 (0.973)	0.0004 (0.934)
Bd	-0.5228 (0.00)***	-0.3494 (0.00) ***	-0.3494 (0.002) ***
M2	0.0078 (0.162)	0.0066 (0.02) **	0.0202 (0.027) **
GDP	-0.0594 (0.00)***	-0.0227 (0.670)	-0.0980 (0.599)
Number of Observations	180	180	180
R2	0.8848	0.8634	0.8655

The results of the analysis show the effects of independent variables on the dependent variable in three different models. The constant term is statistically significant and has a positive value in all models, indicating that the dependent variable will have a positive value when the independent variables included in the model are zero. The coefficients of the inflation (Enf) variable are not statistically significant in all models ($p>0.05$), indicating that inflation has no significant effect on the dependent variables. The budget balance (Budget) variable is negative and statistically significant in all models ($p<0.01$), meaning that an increase in the budget deficit has a negative effect on the dependent variable. While the money supply (M2) variable is not statistically significant in Model C, it is positive and significant in Model M and Model S ($p<0.05$). This indicates that an increase in money supply positively affects the dependent variable for Model M and Model S. While the GDP variable is negative and statistically significant ($p<0.01$) in Model C, it is not significant in the other two models. This indicates that economic growth has a negative effect on the dependent variable in Model C, but this effect is not significant in the other models. Finally, the R^2 values are in the range of 0.86-0.88, indicating that the independent variables largely explain the change in the dependent variable.

Table 8. A, E, and L Models Analysis Results (Robust)

Analysis Results	A	E	L
Constant	4.6815 (0.00)***	1.4380 (0.00)***	8.6331 (0.00)***
Inf	0.0010 (0.140)	0.003 (0.03)**	0.0002 (0.576)
Bd	-0.7026 (0.00)***	-0.5493 (0.00)***	-1.5449 (0.00)***
M2	0.0146 (0.00)***	0.0102 (0.00)***	0.0230 (0.00)***
GDP	-0.0615 (0.01)**	-0.0446 (0.000)***	-0.1472 (0.000)***
Number of Observations	180	180	180
R^2	0.8730	0.8445	0.8931

Table 8 shows the effects of the independent variables on A (Asset Quality), E (Management Effectiveness) and L (Liquidity). The constant term is positive and statistically significant ($p<0.01$) in all models, indicating that the dependent variables have a certain fundamental value even when the independent variables are zero. The inflation (Enf) variable is positive and statistically significant ($p<0.05$) only for the management effectiveness (E) model, indicating that management effectiveness increases as inflation increases. However, it does not significantly affect models A and L. The budget balance (Budget) variable is negative and statistically significant in all models ($p<0.01$). This indicates that an increase in the budget deficit has a negative impact on A, E, and L. The money supply (M2) variable is positive and highly significant in all models ($p<0.01$). This indicates that an increase in the money supply positively affects A, E, and L. The GDP variable is negative and statistically significant in all models ($p<0.05$). This indicates that economic growth has a negative impact on A, E, and L. Finally, R^2 values are high, ranging from 0.84 to 0.89. This implies that the independent variables explain most of the variation in the A, E, and L variables.

5. CONCLUSION

This study analyzes the financial performance of participation banks operating in Turkey from the perspective of the CAMELS model. Using panel data analysis for the period 2019-2023, the analysis reveals the different effects of macroeconomic variables on banks' performance indicators.

According to the results of the analysis, the budget balance variable has a negative and significant effect on all CAMELS components. This indicates that an increase in the budget deficit negatively affects capital adequacy, asset quality, management effectiveness, profitability, and liquidity. It is observed that the money supply (M2) variable generally has positive and significant effects, which indicates that the increase in money supply strengthens the financial structure of participation banks. The GDP growth rate was found to be negative and significant in some models, indicating that economic growth may put pressure on certain financial indicators. The inflation variable did not generally have a statistically significant effect, but showed a positive and significant effect for the management effectiveness model.

As a result, macroeconomic variables are found to have effects on the financial performance of participating banks in different directions and to different extents. Finally,

implementing macroprudential measures that account for the specific structure of participation banking could enhance their resilience to macroeconomic fluctuations. By integrating these tools into the financial policy framework, policymakers can help build a more stable and inclusive banking system that supports both economic growth and financial inclusion. These findings provide important clues for regulatory bodies, policymakers, and the banking sector. In order for banks to be more resilient to macroeconomic changes, it is recommended that risk management strategies be strengthened and policies on the sustainability of budget balance developed. In future studies, the performance of participation banks can be compared with that of deposit banks and investment banks. Comparative studies can be conducted between the performances of Islamic banking countries and participation banks in Turkey.

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