

# THE RELATIONSHIPS BETWEEN G7 COUNTRIES BANKS CAPITAL ADEQUACY RATIOS AND PROFITABILITIES

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## Abstract

Research topic is about the relationship between G7 countries' banks capital adequacy ratios and return on asset ratios. By using panel data analysis techniques, the short-term relationship G7 countries' banks capital adequacy ratios and return on asset ratios will be found. In addition, by using ARDL model, the long-term relationship between capital adequacy and return on asset ratios will be found. By using Hausman test, it has been found that there is random effect in the model. Since random effect model is used, specific country effect and specific time effect is included in the model. By looking at lowest AIC scores, optimum ARDL model was chosen.

When analysis is done for G7 countries' banks panel data, it was observed that capital adequacy ratio has significant negative impact on return on asset ratios for the period between 2000-2015. UK and years of 2004, 2005, 2006 has significant impact in the model. In addition to that, it was observed that capital adequacy ratios have significant and negative impact on return on asset ratios for the long term.

**Keywords:** Random Effect, Panel EGLS Method, ARDL (4,4), Capital Adequacy Ratios, Return on Asset Ratios

**JEL Codes:** G21, B23

## G7 ÜLKELERİNİN BANKALARININ SERMAYE YETERLİLİK RASYOLARI İLE KARLILIKLARI ARASINDAKİ İLİŞKİLER

### Özet

Bu çalışmanın konusu G7 ülkelerinin bankalarının sermaye yeterlilik rasyolarının aktif getiri oranları arasındaki kısa ve uzun vadeli ilişki ile ilgilidir. Çalışmanın amacı panel veri analiz teknikleri ile G7 ülkelerinin bankalarının sermaye yeterlilik rasyolarının aktif getiri oranları ile arasındaki kısa vadeli ilişkiyi bulmak ve ARDL yöntemi ile uzun vadeli ilişkiyi bulmaktır. Hausman testi kullanılarak modelde rassal etki olduğu tespit edilmiştir. Rassal etki modeli kullanıldığı için modele spesifik ülke etkisi ve spesifik zaman etkisi dahil edilmiştir. En düşük Akaike bilgi kriterine bakılarak en ideal ARDL modeli seçilmiştir.

G7 ülkelerinin bankalarının panel veri setleri için analiz yapıldığında sermaye yeterlilik rasyosunun bankaların aktif getiri oranlarına 2000-2015 yılları arasında anlamlı ve negatif şekilde etki ettiği görülmüştür. Birleşik Krallığın ve 2004, 2005, 2006 yıllarının modelde önemli bir etkiye sahip olduğu bulunmuştur. Buna ek olarak, sermaye yeterlilik rasyosunun uzun vadede aktif getiri oranlarına anlamlı ve negatif şekilde etki ettiği gözlemlenmiştir.

**Anahtar Kelimeler:** Rassal Etki, Panel EGLS Metodu, ARDL (4,4), Sermaye Yeterlilik Rasyoları, Aktif Getiri Oranları

**JEL Kodu:** G21, B23

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## INTRODUCTION

Banks and regulators have adopted international banking regulations based on recommendations of the Basel Committee to promote the soundness of the global banking system (Agarwal and Jacques, 2001).

According to Fungacova et al. (2014), to construct strong financial system, regulators require banks to have adequate amount of capital to absorb losses and limit moral hazard behavior.

There is no certain outcome whether sustaining regulatory capital requirements reduces excessive risk taking by banks and diminishes the probability of bank default.

In that article, G7 countries will be analyzed. G7 countries is known to have significant impact on world economy. In the literature, there are mixed results for the relationship between capital adequacy and banks' return on asset ratios. The objective of that article is to unearth impact of capital adequacy ratios on G7 countries banks' return on asset ratios.

### 1. LITERATURE REVIEW

Via using USA bank sample and the Generalized Methods of Moments (GMM) estimation technique, Berger and Patti (2006) researched about the influence of bank regulations on profitability, and unearthed that lower capital ratios increase the operating efficiency of banks.

Using Kenyan commercial banks sample, Odunga (2016) researched about the determinants of bank operating efficiency and found bank capital adequacy as one of the most important factors which influence bank operating efficiency. According to Odunga (2016), in order to manage operating cost, banks have to increase their capital.

Vong and Chan (2006) researched about the determinants of bank performance of Macao banking industry for a 15-year period via utilizing small sample of banks and unearthed a positive relationship between capital adequacy and bank profit.

Ali, S.A. (2016) researched about the important determinants of profitability in the case of Jordanian commercial banks. A balanced panel data for these banks (2005-2014) was utilized to reach the objective and ROA and ROE were used as banks' profitability ratios. Findings unearthed that there is a positive relationship between capital adequacy, capital and leverage and banks' profitability,

Torbira and Zaagha (2016) researched about the impact of capital adequacy indicators on bank financial performance measures in Nigeria. The analysis unearthed the existence of important long run relationship between bank financial performance variables and capital adequacy indicators in the Nigerian banking industry.

Ikpefan (2013) researched about the extent of the impact of capital adequacy, management and performance of the commercial banks in Nigeria (1986-2006). It was found that capital adequacy ratio was found to have an adverse influence on the probability Nigerian banks.

David and Osemwegie (2016) analyzed the significance of capital adequacy and its influence Nigerian banks via GLS estimator technique. It was found that capital adequacy ratio has dominant influence on financial operations of Nigerian banks.

Via applying the Engle and Granger two steps procedure in co-integration, Ejoh and Iwara (2014) researched about the influence of capital adequacy on deposit money banks' profitability in Nigeria for the period 1981-2011 on five selected banks. The study indicates that capital adequacy has a important function for explaining bank returns on assets (ROA).

Mendoza and Rivera (2017) found that capital adequacy has no important influence on the profitability of 567 rural banks in the Philippines.

## 2. THEORETICAL FRAMEWORK

Charter value is based upon the future assets of a business. The charter value theory indicates that the banks future profit diminishes if default occurs and the impact of this loss also influences stakeholders (Diamond and Rajan, 2000). For that reason, banks endeavour to have a substantial amount of capital than fixed by regulation (Keeley and Furlong, 1990). That leads banks to increase their capital adequacy ratio beyond the threshold level of statutory capital adequacy ratios. Since banks uses more capital for future risks, more capital will be used for operations. That circumstance will diminish operating efficiency and that circumstance can reduce the profitability of the banks.

## 3. METHODOLOGY

In that research, it is hypothesized that the impact of capital adequacy ratio has negative impact on banks' profitability. Panel data analysis was used to find the impact of capital adequacy ratio on G7 countries' banks return on asset ratios. Banks Z scores were used as control variable. The panel data analysis was conducted for the periods between 2000-2015.

### 3.1. Hausman Test

In order to decide whether to use fixed effect or not, Hausman test (Table 1) will be used. Since null hypothesis is accepted, random effect will be used in the model.

**Table 1: Hausman Test Result**

Hausman Test	Chi Square	Probability
Null Hypothesis: There is Random Effect	3.13	0.20

### 3.2. Panel EGLS Test with Random Effect

The Panel EGLS model is given as follows.

$$Y = \sum B_k X_{kit} + u_{it} \quad (1)$$

X is vector of explanatory variables and  $u_{it}$  is error term.

According to Panel EGLS method (Table 2), capital adequacy ratio has significant negative impact on G7 countries' banks return on asset ratios.

**Table 2: Panel EGLS Result**

Variable	Coefficient	Probability
C	0.046038	0.8836
Z Score	0.071010	0.0000
Capital Adequacy Ratio	-0.051850	0.0113

### 3.3. Panel EGLS Result with Country Specific Effect

$$Y_{it} = B_0 + \sum B_k X_{kit} + v_{it} \quad (2)$$

$$v_{it} = \mu_i + u_{it} \quad (3)$$

The previous Panel EGLS model was extended by including country specific effect.  $\mu_i$  is used as country specific effect. In the model, G7 countries were used as dummy variables. According to Panel EGLS method with country specific effect, capital adequacy ratio has significant negative impact on G7 countries' banks return on asset ratios. Moreover, it has been found that UK has significant impact on panel data set. It can be interpreted that UK has significant influence on overall result.

**Table 3: Panel EGLS Result with Country Specific Effect**

Variable	Coefficient	Probability
C	0.046038	0.8836
Z Score	0.071010	0.0000
Capital Adequacy Ratio	-0.051850	0.0113
UK	0.771635	0.0000

### 3.4. Panel EGLS Result with Country and Time Specific Effect

$$Y_{it} = B_0 + \sum B_k X_{kit} + v_{it} \quad (4)$$

$$v_{it} = \mu_i + \lambda_t + u_{it} \quad (5)$$

The previous Panel EGLS model with country specific effect was extended by including time specific effect. Years between 2000 and 2015 were used as dummy variables.

**Table 4: Panel EGLS Result with Country and Time Specific Effect**

Variable	Coefficient	Probability
C	-0.349772	0.2551
Z Score	0.072720	0.0000
Capital Adequacy Ratio	-0.036595	0.0741
UK	0.703066	0.0152
2004	0.354195	0.0222
2005	0.331703	0.0302
2006	0.345697	0.0231

According to Panel EGLS method with country and time specific effect, there is significant year specific effect of 2004, 2005 and 2006. In that model, capital adequacy ratio is within 90% confidence interval and it can be indicated that capital adequacy ratio has significant negative impact on G7 countries' banks' ROA ratios.

### 3.5. Residual Cross Section Dependence Test

Moreover, residual cross section dependence test was conducted. Since T is larger than N, Breusch-Pagan LM test was chosen. According to Breusch Pagan LM test (Table 5), there is heteroskedasticity in the model. Normally, homoscedasticity assumption is used in regression models. Nevertheless, in that model, random shocks sometimes can lead residuals to be cross sectionally dependent.

**Table 5: Cross Section Dependence Tests**

Test	Probability
Breusch-Pagan LM	0.0001
Peseran Scaled LM	0.0001
Peseran CD	0.4629

### 3.6. Generalized Least Square Model

Since Panel EGLS model has heteroskedasticity problem, the model has to be verified with Generalized Least Square model.

**Table 6: Generalized Least Square Model with Cross Section Weights**

Variable	Coefficient	Probability
C	-0.080727	0.6004
CAR	-0.058007	0.0000
Z Score	0.075765	0.0000
UK	0.787624	0.0000

According to Generalized Least Square Model with Cross Section Weights (Table 6), capital adequacy ratio has significant negative impact on G7 countries' banks return on asset ratios.

**Table 7: Generalized Least Square Model with Period Weights**

Variable	Coefficient	Probability
C	0.127357	0.5692
CAR	-0.061085	0.0006
Z Score	0.067826	0.0000
UK	0.700337	0.0000

According to Generalized Least Square Model with Period Weights (Table 7), capital adequacy ratio has significant negative impact on G7 countries' banks return on asset ratios. It can be indicated that Panel EGLS Tests did not give biased results.

### 3.7. Panel Unit Root Tests

In addition to that, long term relationship return on asset ratios and capital adequacy ratio was measured. Panel unit root test was conducted for return on asset ratios and capital adequacy ratios.

**Table 8: Panel Unit Root Tests of Return on Asset Ratios**

Unit Root Tests	Probability
Levin, Lin& Chu t*	0.0085
Im, Pesaran and Shin W-stat	0.0332
ADF-Fisher Chi-square	0.0509
PP-Fisher Chi-square	0.0280

According to Table 8, it can be indicated that there is no unit root problem of return on asset ratios.

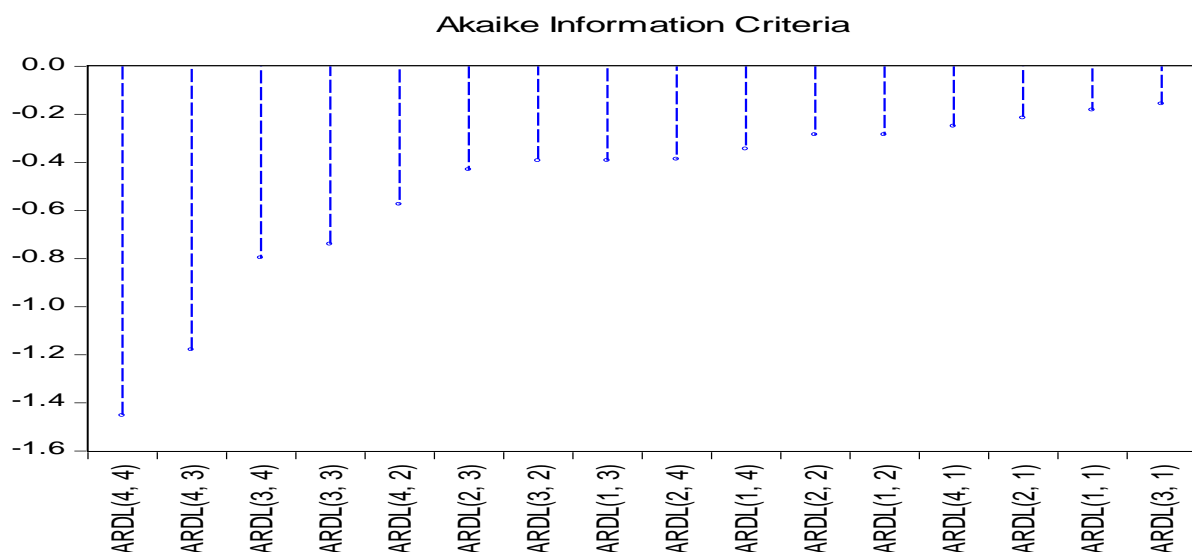
**Table 9: Panel Unit Root Tests of Capital Adequacy Ratios**

Unit Root Tests	Probability
Levin, Lin& Chu t*	0.8780
Im, Pesaran and Shin W-stat	0.9915
ADF-Fisher Chi-square	0.9843
PP-Fisher Chi-square	0.9851

According to Table 9, capital adequacy ratio has unit root problem.

### 3.8. ARDL Analysis

Since one data has unit root problem and another data does not have unit root problem, ARDL analysis can be conducted. Before applying ARDL analysis, ideal ARDL method should be chosen with lowest Akaike information criteria. According to Figure 1, ARDL(4,4) has smallest Akaike information criteria.



**Figure 1. Optimal ARDL Model Selection**

**Table 10: ARDL(4,4) Model Result**

Variable	Coefficient	Probability
CAR	-0.180062	0.0000

According to Table 10, there is long term negative significant impact of capital adequacy ratio on G7 countries' banks return on asset ratios. Not only there is significant short-term negative relationship between capital adequacy ratios and return on assets, but also there is significant long-term relationship between capital adequacy ratios and G7 countries' banks return on asset ratios.

## CONCLUSION

In that research, panel data analysis was implemented. For panel data set, it was found that capital adequacy ratio has significant negative impact on G7 countries' banks return on asset ratios for the periods between 2000-2015. The research result corresponds with charter value theory. Moreover, the research results also corresponds with Berger and Patti (2006)' finding for USA and Odunga (2016)' finding for Kenya. According to those scholars, banks have to increase capital adequacy ratios for their operating costs. That policy lead banks' profits to diminish. In addition to that, it was found that UK has important country effect and years of 2004, 2005, 2006 has significant year effect in Panel EGLS method with random effect. Moreover, long term relationship between return on asset ratios and capital adequacy ratio of G7 countries' banks were measured. It was found that capital adequacy ratio has significant negative long-term impact on G7 countries' banks panel data of ROA ratios.

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