SETTING OPTIMAL NUMERIC TARGETS IN BANKING: A PRACTICAL APPLICATION ON PARTICIPATION BANKING CREDITS

Bankacılıkta En Uygun Sayısal Hedeflerin Belirlenmesi: Katılım Bankacılığı Kredilerinde Bir Uygulama

Yasemin KAMANLI*

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ABSTRACT

The aim of this study is to work out a practical numeric performance appraisal methodology application on a whole group that contains sub-units, and for the example of the model; Islamic Banking Credits for Türkiye is used. The quarterly data for between 2005: Q1 to 2023: Q3 is used for the analysis. Pedroni Cointegration Test, its pre and post-tests: Augmented Dickey Fuller Tests, Pesaran CD Tests, Swamy S Tests, Dumitrescu & Hurlin, Granger Non-Causality Test and finally Augmented Mean Group Estimator are used to set out the targets and analyzing the performance. The application results have significant pre-estimation and post-estimation test results for 90% significance level for Agriculture, Industry, Construction, Service, Communication, Finance, Real Estate and Health sub-sectors and for the whole aggregate group. The empirical results show that Türkiye Islamic Banking Credits may decrease in all significant sectors for the fourth quartile of 2023. Further research on the Total Amount for Islamic Banks Credits for Türkiye can be estimated.

Anahtar Kelimeler:
Artırılmış Ortalama Grup Tahmincisi,
Hedefleme,
Performans Değerlendirmesi,
Katılım Bankacılığı,
Eşbütünleşme
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ÖZ

Bu çalışmanın amacı, alt birimleri içeren bütün bir grup üzerinde pratik bir sayısal performans değerlendirme metodolojisi uygulaması yapmaktır ve model örneği için; Türkiye İslami Bankacılık Kredileri kullanılmaktadır. Analiz için 2005: 1.Ç ile 2023: 3.Ç arasındaki üç aylık veriler kullanılmıştır. Pedroni Eşbütünleşme Testi, ön testleri ve son testleri: Hedefleri belirlemek ve performansı analiz etmek için Augmented Dickey Fuller Testleri, Pesaran CD Testleri, Swamy S Testleri, Dumitrescu & Hurlin, Granger Nedensellik Testi ve son olarak Artırılmış Ortalama Grup Tahmincisi kullanılmıştır. Uygulama sonuçları, Tarım, Sanayi, İnşaat, Hizmet, İletişim, Finans, Gayrimenkul ve Sağlık alt sektörleri ve tüm toplulaştırılmış grup için 90% Anlamlılık Düzeyi için anlamlı ön tahmin ve tahmin sonrası test sonuçlarına sahiptir. Ampirik sonuçlar, Türkiye İslami Bankacılık Kredileri' nin 2023 yılının dördüncü çeyreğinde tüm anlamlı sektörlerde azalabileceğini göstermektedir. Türkiye İslami Bankacılık Kredilerinin tahminlenmesi bundan sonraki çalışmalar için önerilebilir.

* Dr., Independent Researcher, dr.ykamanli@gmail.com, ORCID: 0000-0002-8585-7606

1.INTRODUCTION

Today, according to BRSA (2024); as of October 2024, their credit capacity reached 1,1 trillion TL This is 1/15 of total banking sector credits (BRSA; 2024). Islamic Banking history dates back to 40 years, back to 1983 with the law numbered 5411.

They will continue to improve in line with Turkiye Banking Sector in the future due to general expectations. In order them to improve more; they have to set out empirical targets and they have to measure the performance of those targets. For setting out numeric targets a question has to be answered: "How to set an optimal numeric target in banking?"

For the answer of this question, many methodologies are investigated with their advantages and disadvantages. With the changing needs of the banking system, the methodology of performance appraisals has a wide spread spectrum; from hard to use data envelopment methodologies to more purpose-tailored methodologies during the time.

According to Data Envelopment Analysis (DEA), productive efficiency of decision-making units can be calculated. It is also known as best practice frontier. It has many disadvantages; such as sensitivity to outliers, complexity and scale and scope problems.

The purpose-tailored methodologies contain, a wide-spread spectrum; from hand-made excel solutions to specific software. The disadvantages of these methods contain both the non-flexibility and difficulty problems.

On the other hand; Augmented Mean Group Estimator solves these problems; through taking into consideration of outliers, its simplicity, scope easiness, flexibility and easiness.

Many methodologies are considered to study with the Islamic Banks data. As a result, Pedroni Cointegration tests with pre and posttest and for target setting and performance appraisal, Augmented Mean Group Estimator methodology is decided to be used with Islamic Banks credit data covering 2005: Q1 to 2023: Q3. The Islamic Banks data is used to be independent variable and Sectoral GDP is used as dependent variable. There is found to be cointegration between dependent & independent variable sets of the panel data.

2. LITERATURE REVIEW

There have been many works about banking sector. But when the subject comes to target setting and performance appraisal, there are many works done by the methodology of data envelopment analysis. To investigate in more detail, it can easily be said that this is the only work that has been performed with Augmented Mean Group Estimator.

Karas, Z (2024); used data for the period 2015-2022, for Turkish Banking Sector, Deposit Banks. The author used CRITIC and COPRAS methods and used ten financial indicators: Equity/Total Assets, Liabilities/Total Assets, Liquid Assets/Short-Term Liabilities, Return on Equity, Return on Assets, Non-Interest Income (Net)/Total Assets, Interest Income/Interest Expense, Interest Expenses/Total Assets, Personnel Expenses/Other Operating Expenses, and Other Operating Expenses/Total Assets. They discovered that while Citibank and Deutsche Bank have the highest score; the Turkish Banks have the lowest score.

Ragab Amhana, Z. B. and Thomas A. B. (2024) worked with USA data; with random sampling technique; selected 15 management staff, 45 senior staff and 60 junior staff; a total of 120 employees for the study. They used a structured questionnaire; they concluded that there is a significant effect on employees' productivity in financial institution for United States.

Nugroho, A.P. (2024) proved that there are significant disparities in the efficiency systems of Islamic Banks and Conventional Banks with a literature review of Financial Management. The author added that they have different advantages.

Farahbakhsh, K. et alias (2024); used the Iran data for evaluating the banking system performance key factors. They used the Balanced Scorecard (BSC) and Fuzzy Analytic Network Process (FANP)

approaches. They calculated weights that show the maximum importance of the learning and growth dimensions and the minimum importance of the financial dimension. They calculated that while on-time service has the greatest importance, customer retention has the minimal importance of the financial dimension.

As the needs improve and change, works also change their target needs. Nowadays, there are other measures than data envelopment analysis (DEA) in the literature. An et alia (2021); used network closest target (NCT) model, instead of data envelopment analysis model (DEA) for sixteen commercial banks in China. They concluded their work; that network closest target (NCT) is more feasible, economical and optimistic than data envelopment analysis model (DEA).

Liu et al. (2019); used a two-stage data envelopment analysis (DEA) to output goal setting for twenty-eight commercial banks in China. They concluded that commercial banks deposit sub-system is not high in terms of efficiency and in terms of deposit sub-system, there is a gap between state banks and commercial banks.

According to the work of Yanikkaya and Pabuçcu (2017); Islamic Banking of Turkey diverged into a national bank level. The reason for this, might be coming from Islamic Banking rationale; they work similar conditions as conventional banks in Turkiye. As a result of this, for Tuna & Sekkeli (2020), the relationship between Islamic Banking and real sector has been strengthening for the past ten years, but the real sector expectations are very high. In order to meet these expectations of real sector the productivity of Islamic Banking has to increase. For the productivity increase, Islamic Banks have to use higher level target systems for their performance.

Ahn and Le (2015); used German banks to assess their performance in terms of financial services and to support regional economies. They used data for between 2006 and 2011. They observed a stable scale efficiency pattern.

Amirteimoori and Tabar (2010); worked on a DEA-based method for allocation of costs and fixed resources across a set of decision-making units. In addition, they used how output targets can be set at the same time as decisions are made about allocating input resources.

Yang et al. (2010); discussed data envelopment analysis of a hybrid minimax reference point (HMRP-DEA) approach to judge values judgements of branch managers and head-office directors and they tried to find out the most preferred solution along the efficient frontier for each bank branch.

Yang et al. (2009); used data envelopment analysis (DEA) and multiple objective linear programming (MOLP) for management control and targeting. They used data envelopment analysis (DEA) for past performance and multiple objective linear programming (MOLP) for future targeting. They discussed the advantages of these models in the

Portela et al. (2004); worked on a Portuguese bank to manage performance of its branches. They set targets for the branches for the variables; as growth in number of clients, growth in funds deposited.

Camanho and Dyson (1999); used data envelopment analysis (DEA) for Portuguese Banks for performance assessment. They showed DEA can complement the profitability measure used in the banks.

Lovell and Pastor (1997) evaluated the performance of target setting for a bank branch network in Spain. They concluded that there is overlapping in target setting.

3. DATA AND METHODOLOGY

For the aim of the work; two types of data are used. The first type of data is obtained from Turkish Statistical Institute (TURKSTAT - December 8th, 2023); the data name is Gross domestic product at current prices - by income approach value and percentage change, Quarter III. The second data is obtained from Banking Regulation and Supervision Agency (BRSA- December 8th, 2023), the name of the data is Monthly Islamic Bank Sectoral Loan Distribution.

For the next part of the work, Augmented Mean Group Estimator is used to find out head-to-head points of each sectoral groups for the Islamic Banks. Moreover, it is clearly shown and discussed when a sub-unit outperforms and underperforms with the example.

The Augmented Mean Group Estimator methodology is suitable for any kind of system, that contains a unity with some sub-units. The banking credit data, especially Islamic Banking data is selected as an example for the data set.

There two aims of the chosen dataset; first one is to put out an old but sustainable methodology that can be used to set targets for any bank sector unit, that contains sub-units.

Another aim of this work is to use a Islamic Banking data and the second one is to use a data set composed of a clearly dependent variable and its dependents. Monte Carlo simulation is used to find the next set of dependents and their contribution coefficient.

The AMG estimator was developed by Eberhardt and Teal (2010) as an alternative to the Pesaran (2006) CCEMG estimator. In this paper; the practical side of the work Eberhardt & Bond (2009) is used to set numeric sectoral targets for the Islamic Banking. The methodology can also be used in any type of segmentation targeting such as setting targets for employees.

For the analyses, Stata Statistical Program is used. The panel data is for 2005: Q1 and 2023: Q3. The abbreviations for the variables are as Table 1.

Table 1. Abbreviations of the Variables

Description	**Abbr.**
Gross Domestic Product	GDP
Gross Domestic Product at First Level	DGDP
Islamic Bank Credits in Sectoral Level	ISL
Islamic Bank Credits in Sectoral Level at First Difference	DISL
Agriculture, Forestry and Fishing Sector	AGRIC
Agriculture, Forestry and Fishing Sector at First Difference	D.AGRIC
Industry Sector	INDUS
Industry Sector at First Difference	D.INDUS
Construction Sector	CONST
Construction Sector at First Difference	D.CONST
Services Sector	SERVI
Services Sector at First Difference	D.SERVI
Transportation, Storage and Communication Sector	COMMU
Transportation, Storage and Communication Sector at First Difference	D.COMMU
Finance and Insurance Activities Sector	FINAN
Finance and Insurance Activities Sector at First Difference	D.FINAN
Real Estate Activities Sector	ESTAT
Real Estate Activities Sector at First Difference	D.ESTAT
Professional, Administrative and Support Service Activities Sector	SUPPO
Professional, Administrative and Support Service Activities Sector at First Difference	D.SUPPO
Public Administration, Education, Human Health and Social Service Activities Sector	HEALT
Public Adm. Education, Human Health and Social Service Activities Sector at First Difference	D.HEALT
Differences Between the Amounts of Two Dates	D
The Differences of Differences	TREND
Realized Amounts	R

To begin with, the unit root tests are performed for both of the variables. The variables are stationary at first level (Table 2).

Table 2. Unit Root Test

lag (0)		Aug. Dickey-Fuller Test		
		None	Cons.	Trend & Cons.
GDP	Z(t)	-	-	-
	p(t)	-	-	-
d. GDP *	Z(t)	-13.7007	-10.2463	-15.5246
	p(t)	0.0000	0.0000	0.0000
ISL	Z(t)	2.0320	0.8805	-1.8583
	p(t)	0.9789	0.8107	0.0316
d. ISL *	Z(t)	-14.7679	-16.3638	-15.5206
	p(t)	0.0000	0.0000	0.0000
Stationary at *99% Confidence Interval.				

Next, Pesaran Cross Sectional Dependence Test is applied as Table 3. The results show that there is cross sectional dependence.

Table 3. Pesaran CD Test

Var.	CD	P-Value	Corr	Abs (Corr)
DGDP*	43.17	0.0000	0.836	0.836
DISL*	27.31	0.0000	0.529	0.561
Significant at *99% Confidence Interval.				

Swamy Model is used to test random coefficients (Homoscedasticity) in Table 4.

Table 4. Homoscedasticity Test

DGDP	Coeff.	Std.Err.	P-Value	Z-Value
DISL	7.875097	10.78544	0.73	0.465
Coeff.	1271466	827033.5	1.54	0.124
$Chi^2(16) = 154.21$			Prob> chi2 = 0.0000 *	
Significant at *99% Confidence Interval.				

Pedroni Cointegration Test results show that there is cointegration between DGDP and DISL (Table 5).

Table 5. Pedroni Cointegration Test

	Stat	P-Value
Aug. Dickey Fuller*	-20.5186	0.0000
Significant at *99% Confidence Interval.		

Granger causality test results show that DISL Granger Cause DGDP in Table 6.

Table 6. Dumitrescu & Hurlin, Granger Non-Causality Test

	Z-bar	Z-bar Tilde
DISL => DGDP	66.0213	14.7717
	0.0000	0.0000

Augmented Mean Group estimator (Bond & Eberhardt, 2009; Eberhardt & Teal, 2010) show the optimal values for the next term (Table 7).

Table 7. Augmented Mean Group Estimator

	Coeff.	Std. Err.	Z	P-Value
Islamic Banks Results				
DISL* **	-1.540621	.8966934	-1.72	0.086
Trend* **	-94557.5	34046.95	-2.78	0.005
Cons.* **	2318512	696436.5	3.33	0.001
Agriculture, Forestry and Fishing				
D.AGRIC* **	-12.55962	2.146355	-5.85	0.000
Trend* **	-94852.12	41141.41	-2.31	0.021
Cons.	2295429	1588388	1.45	0.148
Industry				
D.INDUS	-1.187391	.7825294	-1.52	0.129
Trend* **	-156903.6	40815.5	-3.84	0.000
Cons.* **	3521220	1624234	2.17	0.030
Construction				
D.CONST* **	-.8922853	.2372783	-3.76	0.000
Trend* **	-85674.36	30403.1	-2.82	0.005
Cons.* **	2253077	1186394	1.90	0.058
Services				
D.SERVI* **	-2.944.119	.7334158	-4.01	0.000
Trend* **	-143319.4	43713.84	-3.28	0.001
Cons.* **	3315474	1725444	1.92	0.055
Transportation, Storage and Communication				
D.COMMU* **	-4.925126	1.151238	-4.28	0.000
Trend* **	-129437.5	33536.43	-3.86	0.000
Cons.* **	3078031	1368205	2.25	0.024
Finance and Insurance Activities				
D.FINAN* **	26.47023	15.03162	1.76	0.078
Trend* **	168867	45873.4	3.68	0.000
Cons.* **	-3298369	1926915	-1.71	0.087
Real Estate Activities				
D.ESTAT* **	.6707038	.3173673	2.11	0.035
Trend* **	363620	137896.8	2.64	0.008
Cons.	-7340649	5412291	-1.36	0.175
Professional, Administrative and Support Service Activities				
D.SUPPO* **	.4749192	.1453011	3.27	0.001
Trend* **	75898.25	36493.73	2.08	0.038
Cons.	-1362756	1407608	-0.97	0.333
Public Administration, Education, Human Health and Social Service Activities				
D.HEALT* **	-1.891198	.8742918	-2.16	0.031
Trend* **	-98994.33	28273.97	-3.50	0.000
Cons.* **	2331642	1134342	2.06	0.040
Significant at ***90% Confidence Interval.				

4. FINDINGS

The analysis is made in the difference mode, so when the trend is added to the last difference, the difference of the last term is obtained. When the last difference is added to the last terms totals, the results for 2023.Q4 can be obtained. It must also be considered that; trend of the all-sub-units is significant at 90% (Table 8).

Another point is how to differentiate underperformers and overperformers. If the sub-unit performs over the calculated next term amount; it is an over-performer. Moreover, if the sub-unit has an amount under the calculated next term amount, it is an under-performer.

Table 8. Findings and Estimation

Thousand TL	2023.Q2	2023.Q3	D. 2023.Q3	TREND	D. 2023.Q4	2023.Q4	R.2023.Q4	%
AGRIC	11.262.040	11.155.510	-106.530	-94.852	-201.382	10.954.127	14.782.861	35%
INDUS	266.542.787	238.585.453	-27.957.334	-156.904	-28.114.238	238.428.549	294.634.185	24%
CONST	86.341.461	81.125.571	-5.215.890	-85.674	-5.301.564	81.039.897	98.156.476	21%
SERVI	166.211.527	152.212.493	-13.999.034	-143.319	-14.142.354	152.069.174	203.811.129	34%
COMMU	31.674.997	26.668.113	-5.006.884	-129.438	-5.136.322	26.538.675	36.623.849	38%
FINAN	12.036.958	12.051.472	14.514	168.867	183.381	12.220.339	21.278.829	74%
ESTAT	34.815.377	31.281.571	-3.533.806	363.620	-3.170.186	31.645.191	42.389.468	34%
HEALT	1.285.393	1.094.119	-191.274	-98.994	-290.269	995.125	1.416.625	42%

The results for 2023.Q4, show the head-to-head point for each of the segmentation. If, for example AGRIC (Agriculture, Forestry and Fishing Sector) has Islamic Banks total credits amount of over; 10.954.127; it can easily be commented that; the AGRIC (Agriculture, Forestry and Fishing Sector) sub-unit outperformed its target. For the same sector, it can easily be commented that, sub-unit underperformed, if it has a total amount less than 10.954.127.

In terms of realization; AGRIC sector has a value of 14.782.861 thousand TL. The target for the same sector is 10.954.127 thousand TL. The AGRIC sector outperformed the target by approximately 35%. There might be two different approaches on what kind of policy to obey, when a sector outperforms its target. The first approach is to invest more, because the sector is a profitable one. The second approach is to invest less, because the sector is a saturated one, also vice versa is true.

Second result for the work are about INDUS sector. The sector; has a realized value of 294.634.185 thousand TL. The calculated sum for the sector for Islamic Banking is 238.428.549 thousand TL. The INDUS sector outperformed the expectations by 24%.

Next result is about CONST sector. The sector has a realized value of 98.156.476 thousand TL but calculated 81.039.897 thousand TL. It has outperformed the expectations by 21%. The SERVI sector, has a realized value of 203.811.129 thousand TL and outperformed the expectations of 152.069.174 thousand TL by 34%.

The fifth; The COMMU sector, outperformed the expectations of 26.538.675 thousand TL to 36.623.849 thousand TL by 38%.

The next one, FINAN sector, has an expectation of 12.220.339 thousand TL to 21.278.829 thousand TL by 74% at most. ESTAT sector outperformed to 42.389.468 thousand TL by 34%. The expectations is 31.645.191 thousand TL.

And lastly, HEALT sector is expected to be 995.125 thousand TL and outperformed to be 1.416.625, which is a difference of 42%.

CONCLUSION

For the purpose of the analyses; Augmented Dickey Fuller Tests, Pesaran CD Tests, Swamy S Tests, Pedroni Cointegration Tests, Dumitrescu & Hurlin, Granger Non-Causality Test and Augmented Mean Group Estimator Tests are used. There is found to be cointegration between dependent & independent variable sets of the panel data.

To sum up; from the Table 7, it can easily be understood that, the Islamic Banks will decrease their Total Credit amount, because 2023.Q4 amounts are smaller than 2023.Q3 amounts. This conclusion can be supported by Total GDP of Turkiye will decrease in the next two quarters, including 2023.Q4, according to the work of Alicioglu (2023), because GDP and Islamic Banks Total Credit amount are cointegrated. Further research on the Total Amount for Islamic Banks Credit can be estimated, which can strongly be advised for future works.

Another conclusion is the model itself. The model can be used for any aggerate totals that has sub-units, only if it has significant results. If the sub-unit has a real result more than the calculated (model result) value, it is over-performed. If the sub-unit has a real result less than the model result (calculated) value, it is under-performed.

The last conclusion for the work is that; at general; Islamic Banking outperformed the expectations for the last quartile of 2023. The reason behind this might be; widening monetary policies of Turkiye. Any economic policy attempt, done in this period might have leveraged effects on generally Banking Sector and specially Islamic Banking sector.

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