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RESEARCH ARTICLE

EVALUATING THE FINANCIAL PERFORMANCE OF PUBLIC HOSPITALS: PANEL DATA ANALYSIS [1]

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ABSTRACT

Hospitals are the oldest and largest provider of healthcare services. Health technology is both expensive and constantly evolving and changing. In addition, factors such as increases in the proportion of aging population, in the number of immigrants, and relevant factors such as pandemic diseases, etc. increase the number of patients and therefore the treatment costs. Hospitals have to meet all these costs with limited resources. In order to provide, and sustain high quality health services, hospitals need to measure, and enhance their financial performances. In this context, the purpose of this study is to determine both the relationship between current ratio, leverage ratio, net sales, size of the enterprise and active asset turnover rate with return on assets and return on equity, which are determined as financial performance indicators, and to specify the direction of the relevant effects. This study was conducted between 2017 and 2021with the data obtained from the income and balance sheet statements of 52 hospitals affiliated to the Ministry of Health. The data of the study were analyzed with panel data analysis. As a result, active asset turnover rate has a significant positive relationship with financial performance. However, leverage ratio has a significant negative relationship with financial performance. Size of the enterprise, net sales and current ratio have no significant relationship with financial performance.

Keywords: *Financial performance of hospitals, return on assets, return on equity, panel data analysis*

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ARAŞTIRMA MAKALESİ

KAMU HASTANELERİNİN FİNANSAL PERFORMANSLARININ DEĞERLENDİRİLMESİ: PANEL VERİ ANALİZİ [1]

Berat ÜNÜVAR [*]
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ÖZ

Hastaneler en eski ve en büyük sağlık hizmet sunucusudur. Sağlık teknolojisi hem pahalı hem de sürekli gelişmekte ve değişmektedir. Bunlarla beraber yaşlanan nüfus oranın artması, göçmen sayısının artması, pandemik hastalıklar vb. etmenler hasta sayısını dolayısı ile giderleri artırmaktadır. Hastaneler bütün bu maliyetleri kısıtlı kaynaklarla karşılamak zorundadır. Sağlık hizmetlerinde kaliteli hizmet vermek ve bu hizmeti sürdürülebilmek için hastaneler finansal performanslarının ölçülmesi ve finansal performanslarını artırmaları gerekmektedir. Bu kapsamda araştırmanın amacı; cari oran, kaldıraç oranı, net satışlar, işletme büyüklüğü ve aktif devir hızının, finansal performans göstergesi olarak belirlenen aktif kârlılığı ve öz kaynak kârlılığı ile aralarındaki ilişkinin ortaya konulması ve etkilerin yönünün belirlenmesidir. Bu çalışma Sağlık Bakanlığı'na bağlı 52 hastanenin, 2017-2021 yılları arasındaki gelir ve bilanço tablolarından elde edilen verilerle yapılmıştır. Çalışmanın verileri panel veri analizi ile analiz edilmiştir. Sonuç olarak aktif devir hızının finansal performansla pozitif yönlü anlamlı bir ilişkisi vardır. Kaldıraç oranının ise finansal performansla negatif yönlü anlamlı bir ilişkisi vardır. İşletme büyüklüğü, net satışlar ve cari oranın finansal performansla arasında anlamlı ilişki görülmemiştir.

Anahtar Kelimeler: *Hastanelerin finansal performansı, aktif karlılık, özkaynak karlılığı, panel veri analizi.*

MAKALE HAKKINDA

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I. INTRODUCTION

The most important feature that distinguishes hospitals from other enterprises is that they have to fulfill many functions at the same time (Çil Koçyiğit et al., 2022). Hospitals are one of the oldest organizations in terms of organizational structure (Ak, 1997). According to the World Health Organization, hospitals have an important place in achieving sustainable development goals. Adequate and reliable infrastructure, technologies and medical supplies form the backbone of the hospital. Hospitals should have a specialized health workforce to meet the needs of the population, and appropriate and high quality medical and technological equipment should be available for these personnel to respond to the needs of the patients (WHO, 2023).

In healthcare services, chronic diseases, aging population, immigrants, disasters such as earthquakes, pandemic diseases, etc. increase the demand for healthcare services. Demand is one of the many factors that affect the hospital costs. The development and change of medical technology used in hospitals, the high prices of medical supplies and medicines, and other goods and services purchased from outside can increase costs. Increasing costs cause serious financial problems for hospitals. Despite the scarcity of resources, countries want to provide more sophisticated healthcare services for their patients (Uğurluoğlu and Çelik, 2005). For these reasons, it is of great importance for hospitals to have a good financial performance in order to continue to provide better healthcare services (Çil Koçyiğit et al., 2022).

1.1. Literature Review

Various methods are employed to measure and evaluate the financial performance of hospitals and other healthcare facilities. These methods, widely used in financial assessments, have been explored in numerous studies (Bozdemir and Güley, 2022; Çil Koçyiğit et al., 2022; Işıkçelik et al., 2022; Karataş and Çınaroğlu, 2023; Turgut et al., 2019). The following studies highlight key findings on the factors influencing hospital financial performance.

Demirtaş and Gider (2023) analyzed data from a university hospital and a Ministry of Health hospital between 2011 and 2014, focusing on 12 income and balance sheet items. Their study evaluated metrics such as the number of surgeries, emergency room patients, births, and non-physician healthcare personnel, revealing a significant positive correlation between these parameters and net profit margin, return on assets (ROA), and return on equity (ROE). Similarly, Panigrahi and Vachhani (2021) used ROA and ROE as dependent variables, finding that leverage ratio negatively impacts these metrics, while the equity multiplier has a positive effect.

Erkılıç and Aksoy (2020) examined financial data from 92 public hospitals in Istanbul, Ankara, and Izmir from 2014 to 2016. Their findings indicate that an increase in the current asset-to-total asset ratio negatively affects financial performance, and a higher trade payables-to-total debt ratio does not contribute positively. However, a high cash ratio and maintaining appropriate inventory levels were found to enhance financial success in public hospitals. Similarly, Öner (2020) emphasized the critical role of the net profit margin ratio in driving financial performance in Ministry of Health-affiliated hospitals, with the inventory dependency ratio also serving as a significant determinant.

Other studies have identified additional factors affecting hospital financial outcomes. Karadeniz and Koşan (2017) noted that increased net sales in the hospital services sector can lead to financial losses. In contrast, Turner et al. (2015) found that reducing leverage, or indebtedness, boosts ROE. Mankyu and Keon Hyung (2008), analyzing 142 South Korean hospitals between 1998 and 2001, identified inventory turnover, labor costs, administrative expenses, and borrowing ratios as negative influences on profitability. Tarcan (2006) ranked factors impacting hospital financial performance, prioritizing the ratio of cash to total assets, net working capital to sales, total assets to total expenses, average collection period of receivables, disponibility ratio, net profit to total liabilities, and short-term debt turnover to equity.

Cleverley's (1990) study of 50 non-profit hospitals, using ROA as the dependent variable, identified several positive contributors to financial performance. These include a fast turnover rate of receivables, a high equity-to-total resources ratio, and effective cost control measures, all of which significantly enhance financial outcomes.

In other studies conducted on the financial performance analysis of healthcare enterprises, it was observed that during the COVID-19 pandemic, there was a reduction in current assets and short-term liabilities. Micro-scale enterprises experienced declines in cash, receivables, and debts, while other scales saw decreases in securities and trade payables. Micro-enterprises faced difficulties in debt repayment in 2018, though the associated risk diminished in subsequent years, with fixed assets being financed through permanent capital (Çelik and Korkmaz, 2023; Aydemir, 2024). In 2019, inventories and sales revenues increased but subsequently declined during the pandemic, with profitability being influenced by sales costs and changes in reimbursement policies. Despite high inventory levels and favorable turnover rates, public hospitals exhibited low profitability, with financing primarily supported by short-term loans and revenues from the Social Security Institution (Babacan and Akca, 2024). In the BIST Healthcare Services sector, cash assets increased, and assets were financed through equity; however, while asset and equity turnover rates decreased, inventory and receivable turnover rates, along with profitability, improved (Dayı, 2024). Between 2017 and 2020, public university hospitals experienced a decline in liquid assets and issues with inventory management, but financial conditions improved in 2021. Although high cash and financing ratios enhanced financial performance, earnings quality remained low, leading to recommendations for measures to improve liquidity and asset management (Durmuş and Durmuş, 2023; Yurttadur and Kabak, 2023; Karadeniz and İskenderoğlu, 2024; Akın and Aktan, 2024).

II. METHOD

2.1. Study Aim

The purpose of this study is to determine both the relationship between current ratio, leverage ratio, net sales, size of the enterprise and asset turnover rate with return on assets and return on equity, which are specified as financial performance indicators, and the direction of the relevant effects.

2.2. Source of Data

All public hospitals in Turkey affiliated to the Ministry of Health constituted the research population. In order to cover the entire population, the sample selection was made according to The Ministry of Health Health Statistics Yearbook (2020). Thus, the provinces in our country were first divided into 12 upper regions and then into 26 sub-regions. In order to generalize the results of the study to the whole country, two hospitals were selected from each region. While selecting the hospitals in these sub-regions, B-group hospitals with the highest number of beds were taken into consideration. In this way, the sample consisted of 52 hospitals affiliated to the Ministry of Health.

The data set of the study was composed of the data obtained from the financial statements of 52 hospitals issued between 2017-2021. Ethical approval for this study was obtained from the Kayseri University Ethics Committee, and permissions for the use of the data in the study were obtained from the Ministry of Health.

Panel data analysis was performed using Stata 14.2 statistical data analysis program.

2.3. Hypotheses of the Research

The dependent variables of the study are return on assets and return on equity, while the independent variables are current ratio, leverage ratio, net sales, size of the enterprise and asset turnover. See e-component in section 2.3 for the model of the study.

The hypotheses to be tested in this research are given below:

H1: Current ratios of hospitals have an impact on the financial performance of hospitals.
H2: Leverage ratios of hospitals have an impact on the financial performance of hospitals.
H3: Net sales of hospitals have an impact on the financial performance of hospitals.
H4: Size of the enterprise of the hospitals has an effect on the financial performance of hospitals.
H5: Asset turnover rates of hospitals have an impact on the financial performance of hospitals.

III. RESULTS

Balanced panel data analysis was used in this study. Models 1 and 2 were subjected to Pearson Correlation Test and the correlation coefficient between all variables was below 0.90. which showed that the correlation between variables was not highly significant (Tabachnick and Fidell 2001).

Table 1. **Descriptive Statistics**

	ROA	ROE	CR	LR	NS	EP	AT
Mean	-0.3141	0.1720	0.3531	4.4929	6.84e+07	7838292	13.4010
Standard Error	1.5116	2.0403	0.37815	2.4009	3.93e+07	1.31e+07	5.7201
Min	-4.124	-4.761	0.07	0.35	7206520	567330.1	0.94
Max	6.534	29.656	3.305	12.716	2.10e+08	1.29e+08	36.561

ROA: Return on assets, ROE: Return on Equity, EP: Size of the enterprise, NS: Net Sales, CR: Current Ratio, AT: Asset Turnover Rate, LR: Leverage Ratio.
Number of Observations= 260, N=52, T=5
(6.84e+07=7501, 3.93e+07=4310, 1.31e+07=1437, 2.10e+08=6260, 1.29e+08=3845)

As seen in Table 1, while the average return on assets is negative, the average return on equity is positive. While the average current ratio is (0.3531), the average leverage ratio (4.4929), net sales (75001), size of the enterprise (7838292) and asset turnover rate (13.4010) are as indicated in parentheses.

A current ratio (CR) of 2:1 in developed and 1.5:1 in developing countries is considered sufficient (Akgüç, 1994). The fact that the average current ratio of the hospitals analyzed in Table 1 is 0.3531 indicates that CRs are much lower than the ideal level. A low average current ratio indicates that the hospitals have less current assets than the required amount. A leverage ratio of 50% is sufficient (Kaya, 2015). As seen in Table 1, the average leverage ratio is 4.4929. The high level of this ratio indicates that hospitals are weak in terms of equity capital.

Homogeneity Test:

According to Pesaran and Yamagata (2008) slope homogeneity test results, the variables have a heterogeneous structure.

Hausman Test :

The Hausman Test results are as follows. For both both models, the assumptions of the random effect model are rejected and the estimation process of the fixed effect model continues.

Modified WALD Test:

Since the probability value of the Wald statistic is prob = 0.000 for both models, there is a problem of varying variance. However, since the time series is short, the results were considered to be within normal limits (Yerdelen Tatoğlu, 2020).

BNF-Durbin-Watson Test and Baltagi Wu LBI Test (Autocorrelation Test):

Table 2. BNF-Durbin-Watson Test and Baltagi Wu LBI Test (Autocorrelation Test)

Independent variables		Return on assets	Return on Equity
Current ratio	Coefficient	0.8408741	0.21905
	Test statistic	1.70	2.86
	p- value	0.091	0.005
Leverage ratio	Coefficient	-0.6271598	-0.1929117
	Test statistic	-8.79	-6.56
	p- value	0.000	0.000
Net sales	Coefficient	-1.51e-08	-3.08e-07
	Test statistic	-2.74	-14.00
	p- value	0.007	0.000
Size of the enterprise	Coefficient	9.80e-09	5.85e-09
	Test statistic	1.67	0.89
	p- value	0.097	0.375
Asset Turnover Rate	Coefficient	0.0281212	0.6912425
	Test statistic	9.55	1.33
	p- value	0.213	0.184
Fixed effects	Coefficient	-0.329907	3.963331
	Test statistic	-0.67	9.05
	p- value	0.505	0.000
p value		0.000	0.000
F		1.88	7.68
Durbin-Watson		1.7394738	1.3822629
Baltagi-Wu LBI		2.067568	2.067568

H_0: There is no autocorrelation.
H_1: There exists an autocorrelation.

As seen in Table 2, If Durbin-Watson = 1.7394738 Baltagi-Wu LBI = 2.067568 values are close to 2, which means that there is no 1st order autocorrelation, in other words, the null hypothesis cannot be rejected (Yerdelen Tatoğlu, 2020). In other words, there is no autocorrelation in both models.

Table 3. Variance Inflation Factor (VIF)

	Model 1		Model 2	
	VIF	**1/VIF**	**VIF**	**1/VIF**
EP	2.68	0.372442	2.68	0.372442
CR	2.61	0.382748	2.61	0.382748
LR	1.79	0.559873	1.79	0.559873
AT	1.63	0.613475	1.63	0.613475
NS	1.38	0.724536	1.38	0.724536
Mean VIF	2.02		2.02	

a. Dependent Variables: ROA for Model 1: Return on assets, ROE for Model 2: Return on Equity,
b. Independent Variables: EP: Size of the enterprise NS: Net Sales, CR: Current Ratio, AT: Asset Turnover Rate, LR: Leverage Ratio.

As seen in Table 3, for Models 1 and 2, CR VIF:2.61; LR VIF: 1.79; NS VIF: 1.38; EP VIF: 2.68; AT VIF: 1.63.

As seen in Table 3, Since Mean VIF value= 2.02 < 5 for both Models, there is no multicollinearity problem. Since VIF value < 5 for all variables, there is no multicollinearity problem in any variable. In other words, there is no correlation between independent variables.

Table 4. Pesaran CD Test Results

		Dependent Variables	CR	LR	NS	EP	AT
Model 1	CD-test	42.495	43.216	23.811	77.901	47.354	30.8
	p-value	0.000	0.000	0.000	0.000	0.000	0.000
Model 2	CD-test	45.958	43.216	23.811	77.901	47.354	30.8
	p-value	0.000	0.000	0.000	0.000	0.000	0.000

a. Dependent Variables: ROA for Model 1: Return on assets, ROE for Model 2: Return on Equity,
b. Independent Variables: EP: Size of the enterprise, NS: Net Sales, CR: Current Ratio, AT: Asset Turnover Rate, LR: Leverage Ratio.
Pesaran cross-sectional independence test for Model 1 = 25.349, Pr = 0.0000
Pesaran cross-section independence test for Model 2 = 14.18, Pr = 0.0000

CD test values for Model 1; ROA CD-test 42.495, CR CD-test 43.216, LR CD-test 23.811, NS CD-test 77.901, EP CD-test 47.354, AT CD-test 30.8. P-values for Model 1: ROA p= 0, CR p= 0, LR p= 0, NS p= 0, EP p= 0, AT p= 0.

CD test values for Model 2: ROE CD-test 45.958, CR CD-test 43.216, LR CD-test 23.811, NS CD-test 77.901, EP CD-test 47.354, AT CD-test 30.8. P-values for Model 2: ROE p= 0, CR p= 0, LR p= 0, NS p= 0, EP p= 0, AT p= 0.

H_0: Lack of any horizontal cross-sectional dependence.

H_1: Presence of a horizontal cross-sectional dependence.

As seen in Table 4, for return on assets, size of the enterprise, net sales, current ratio, asset turnover rate, leverage ratio, p value=0 < 0.05, then H_0 was rejected,and there is horizontal cross-section dependence.

As seen in Table 4, when p value=0 < 0.05 for return on equity, size of the enterprise, net sales, current ratio, asset turnover rate, leverage ratio, H_0 was rejected and there is horizontal cross-sectional dependence.

Since the correlation between cross-sections is strong, first generation unit tests did not give sufficient results and 2nd generation tests should be performed (Yerdelen Tatoğlu, 2020; Güriş, 2018).

Table 5. **Second Generation First Group Panel Unit Root Tests**

	Levin-Lin-Chu Testi	*Harris-Tzavalis Testi*	*Im-Pesaran-Shin Testi*
		p-değerleri	
ROA	0.000	0.0000	0.000
ROE	0.000	0.0000	0.000
CR	0.000	0.0000	0.000
LR	0.000	0.0143	0.000
NS	0.000	0.0015	0.000
EP	0.000	0.0000	0.000
AT	0.000	0.0000	0.000

a. Dependent Variables: ROA for Model 1: Return on assets, ROE for Model 2: Return on Equity,
b. Independent Variables: EP: Size of the enterprise, NS: Net Sales, CR: Current Ratio, AT: Asset Turnover Rate, LR: Leverage Ratio.
H_0: Contains unit root.
H_1: Lack of unit root.

As seen in Table 5, for Models 1 and 2, p value=0 < 0.05 for all variables, i.e. the variables did not contain unit root and the series was stationary.

Second Generation First Group Panel Unit Root Tests:

Table 6. Regression Models and Deviations from Basic Assumptions

Panel Regression Models	Dependent Variable	Varying Variance	Autocorrelation	Inrer-unit Correlation	Multiple Linear Correlation
Model 1	Return on assets	Yes	No	Yes	No
Model 2	Retorn on Equıty	Yes	No	Yes	No

As seen in Table 6, it is observed that both models suffer from the problem of varying variance and inter-unit autocorrelation, i.e. horizontal cross-sectional dependence. When faced with situations these situations, robust forecasting models are needed.

It is a test for obtaining robust standard errors in case of autocorrelation, cross-sectional dependence and varying variance in the fixed effect model (Yerdelen Tatoğlu, 2020).

Testing Hypotheses with Driscoll-Kraay Estimator

Table 7. Driscoll- Kraay Estimator

Independent Variables		Return on assets	Return on Equity
Current Ratio	Coefficient	0.2437037	0.2270807
	Test Statistic	0.49	1.59
	p- values	0.653	0.187
Leverage Ratio	Coefficient	-0.5140854	-0.1753092
	Test Statistic	-5.65	11.27
	p- values	0.005**	0.000***
Net Sales	Coefficient	-0.0005665	-0.0028907
	Test Statistic	-0.87	23.87
	p-values	0.431	0.000***
Size of the Enterprise	Coefficient	0.0011003	-0.0008051
	Test Statistic	1.75	-3.84
	p- values	0.154	0.018**
Asset Turnover Rate	Coefficient	0.2076092	1.67796
	Test Statistic	3.69	-13.26
	p- values	0.021**	0.000***
Fixed Effects	Coefficient	-0.8162926	1.751364
	Test Statistic	-2.16	2.53
	p- value	0.097*	0.065*
	R^2	0.5332	0.5363
	p values	0.000***	0.000***
	F	67.56	3474

Not:***0.01 / ** 0.05 / * 0.10
NS coefficient = -4.59e-09 = (-0.0005665), EP coefficient = 3.28e-08= (0.0011003).

Table 7 shows that both of the tested models are significant (p < 0.05). Models 1 and 2, which were established to investigate the hypotheses of the study, show the effects of independent variables on the

dependent variables, return on assets and return on equity, which are used as financial performance indicators of hospitals.

As seen in Table 7, the result of F test for Model 1 is significant with a p value less than 0.05 ie. p<0.000. In terms of the ratio of independent variables explaining the dependent variables, R2=0.5363 for Model 1, which signifies that Model 1 has an explanatory power of 53.32 percent.

As seen in Table 7, Model 2 is significant as a model since the p value of F test is p<0.000. In terms of the ratio of independent variables explaining the dependent variables, it is seen that R2=0.5363 for Model 2, i.e. Model 2 has an explanatory power of 53.63%.

In this case, Table 7 shows whether a significant effect is exerted on the dependent variables as a result of the Driscoll-Kraay Estimator and the coefficients related to the direction and severity of the fixed effect are given. The resulting models and their relationship status are indicated below.

The coefficients of Models 1 and 2 calculated using Driscoll-Kraay estimator are given below.

Model 1: "ROA= (0.2437037)CR + (-0.5140854)LR + (-0.0005665)NS + (0.0011003)EP + (0.2076092)AT + (-0.8162926)".

Model 2: "ROE = (0.2270807)CR + (-0.1753092)LR + (-0.0028907)NS + (-0.0008051)EP + (1.67796)AT + (1.751364)".

Model 1: Under the ceteris paribus condition, where the current ratio, leverage ratio, firm size, net sales, and asset turnover ratio are all zero, each hospital's return on assets is expected to be negative by "-0.8162926" units (P<0.000). In a scenario where hospitals do not treat any patients, i.e., cease operations, the return on assets is projected to be negative (-0.8162926). Consequently, hospitals must first offset this loss before achieving profitability in terms of financial performance.

Model 2: Under the ceteris paribus condition, where the current ratio, leverage ratio, firm size, net sales, and asset turnover ratio are all zero, each hospital's return on equity is expected to yield a profit of "1.751364" units (P<0.000). As observed in Model 2, in a scenario where hospitals do not treat any patients, i.e., cease operations, they are projected to start with a positive return on equity of 1.751364.

Model 1 Coefficients: A one-unit increase in the current ratio index, holding all other variables constant, is expected to result in a "0.2437037" unit increase in hospitals' return on assets. A one-unit increase in the leverage ratio index, holding all other variables constant, is expected to lead to a "-0.5140854" unit decrease in hospitals' return on assets. A one-unit increase in the asset turnover ratio index, holding all other variables constant, is expected to result in a "0.2076092" unit increase in hospitals' return on assets.

Model 2 Coefficients: A one-unit increase in the current ratio index, holding all other variables constant, is expected to result in a "0.2270807" unit increase in hospitals' return on equity. A one-unit increase in the leverage ratio index, holding all other variables constant, is expected to lead to a "-0.1753092" unit decrease in hospitals' return on equity. A one-unit increase in the asset turnover ratio index, holding all other variables constant, is expected to result in a "1.67796" unit increase in hospitals' return on equity.

The results of testing the hypotheses for the items that have an impact on return on assets and return on equity as performance indicators of hospitals are given below.

- **H_1**: Current ratios of hospitals have an impact on their financial performances.

According to the results of Driscoll-Kraay Estimator shown in Table 7, current ratio exerted a positive effect on both return on assets (0.2270807) and return on equity (0.2270807) in terms of relevant coefficients. However, statistically, p-values of current ratios for Models 1, and 2 are p

=0.653>0.1, and p =0.187>0.1, respectively. In other words, there is no significant relationship between current ratio and return on assets and equity.

o H_1 was rejected.

●**H_2**: Leverage ratios of hospitals have an impact on the financial performance of hospitals.

According to the results of Driscoll-Kraay Estimator in Table 7, leverage ratio had a negative effect on both return on assets (-0.5140854) and return on equity (-0.1753092) in terms of relevant coefficients.

Statistically, the p-value of leverage ratio for model 1= 0.005 < 0.01. In other words, leverage ratio and return on assets have a significant relationship at the 99% confidence level. For model 2, the p-value of leverage ratio = 0.000 < 0.01. In other words, a significant relationship existed between leverage ratio and return on equity at 99% confidence level.

According to the results of the Driscoll- Kraay Estimator shown in Table 7, apparently leverage ratio significantly and adversely effected both return on assets and return on equity.

o H_2 was accepted.

To mitigate the adverse impact of the leverage ratio on financial performance, businesses should primarily increase the proportion of equity within total resources and reduce the interest burden. However, for enterprises unable to achieve this, opting for supplier credits instead of obtaining loans under stringent conditions can be a viable alternative. This approach enables hospitals to procure goods and services while accessing more favorable borrowing terms. The cost of such borrowing is expected to be lower and more flexible in terms of repayment periods compared to financial debt. Consequently, an increase in the commercial debt-to-total debt ratio is indicated to positively contribute to financial performance.

●**H_3**: Net sales of hospitals have an impact on the financial performance of hospitals.

According to the results of Driscoll-Kraay Estimator shown in Table 7, net sales had negative effects of on both return on assets (-0.0005665) and return on equity (-0.0028907) in terms of their coefficients.

Statistically, the p-value of net sales for Model 1 = 0.431 > 0.1. In other words, there is no significant relationship between net sales and return on assets. For Model 2, the p-value of net sales = 0.000 < 0.01. In other words, a significant relationship existed between net sales and return on equity at 99% confidence level.

According to the results of the Driscoll- Kraay Estimator shown in Table 7, net sales demonstrated a negative ocorrelation with both return on assets and return on equity. In terms of their coefficients net sales significantly effected return on equity but not return on assets.

o H_3 was rejected.

Net sales, the primary revenue-generating component of a business, represent the most significant item in the income statement. However, in cases where an increase in net sales leads to a decline in return on assets and return on equity, an investigation into subordinate expense items is warranted. Due to the Ministry of Health restricting access to this data, definitive conclusions regarding subordinate expense items cannot be reached.

● **H_4:** The size of hospital enterprise has an impact on the financial performance of hospitals.

According to the results of Driscoll- Kraay Estimator shown in Table 7, size of the hospital enterprise has a positive the effect of on return on assets (0.0011003), and a negative effect on return on equity (-0.0008051) in terms of their coefficients.

Statistically, the p-value of size of the enterprise for model 1 = 0.154 > 0.1. In other words, there is no significant relationship between size of the enterprise and return on assets. For model 2, the p-value of enterprise size = 0.018 < 0.05. In other words, there exists a significant relationship between size of the enterprise and return on equity at 95% confidence level.

According to the results of the Driscoll- Kraay Estimator shown in Table 7, the effect of size of the enterprise on return on assets in terms of coefficient is positive, but no significant interrelationship is found. A negative but significant correlation existed between the size of the hospital enterprise and return on equity terms of its coefficient and the effect of the enterprise size on return on equity is significant.

o H4 was rejected.

The firm size has a statistically minimal impact on financial performance. This indicates that hospital administrators should reassess the efficiency and effectiveness of their hospitals. It is necessary to prioritize investments and practices that have a greater impact on enhancing financial performance while utilizing scarce resources.

●**H_5:** Asset turnover rates of hospitals have an impact on the financial performance of hospitals.

According to the results of the Driscoll- Kraay Estimator displayed in Table 7, asset turnover had a positive effect on return on assets (0.2076092) and return on equity (1.67796) in terms of its coefficient.

Statistically, the p-value of asset turnover for Model 1 = 0.097 < 0.1. In other words, a significant relationship was detected between asset turnover and return on assets at 90% confidence level. For Model 2, the p-value of asset turnover = 0.065 < 0.1. In other words, asset turnover and return on equity have a significant relationship at 90% confidence level.

According to the results of the Driscoll- Kraay Estimator displayed in Table 7, a significantly positive relationship existed between asset turnover and both return on assets and return on equity

o H_5 was accepted.

The asset turnover ratio serves as an indicator of the intensive utilization of assets or capital. It reflects the relative importance of fixed assets within the firm's asset structure. It is expected to positively contribute to return on equity. Additionally, it determines the risk level of businesses.

IV. DISCUSSION

The analysis reveals that the leverage ratio negatively impacts the financial performance of hospitals, aligning with findings in the literature that higher debt levels increase financial risk due to interest burdens (Turgut et al., 2019). Public hospitals, which predominantly rely on short-term borrowing due to limited long-term debt options, face heightened financial strain when leverage ratios rise. Reducing leverage through increased equity financing can alleviate interest costs, thereby enhancing financial performance, as measured by return on assets (ROA) and return on equity (ROE).

The asset turnover ratio, which reflects the efficiency of asset utilization, positively affects financial performance. A low asset turnover ratio indicates underutilized resources, particularly in hospitals with excessive inventory accumulation. For instance, stockpiling medical supplies, while necessary for operational continuity, reduces ROA and ROE if not managed optimally (Turner et al., 2015). Hospitals with high inventory levels should aim for an optimal inventory threshold—balancing

operational needs with financial efficiency—to improve asset turnover and, consequently, financial performance. Moreover, excessive fixed asset investments, often comprising tangible assets like medical equipment, may lower short-term financial performance but contribute positively in the long term by enhancing service capacity and quality.

Contrary to expectations, the current ratio showed no significant effect on financial performance. A low current ratio suggests insufficient liquidity to cover short-term liabilities, potentially risking financial stability. Conversely, an excessively high current ratio may indicate idle cash or missed investment opportunities, which can also hinder profitability (Turgut et al., 2019). Hospitals should target an optimal current ratio—typically between 1.5 and 2.0, as suggested by industry benchmarks—to balance liquidity and profitability. This finding contrasts with some studies, such as Uğurluoğlu and Çelik (2005), which emphasize liquidity's role in operational efficiency, suggesting further investigation into hospital-specific liquidity dynamics.

Net sales were also found to have no significant impact on financial performance, a result potentially influenced by the Covid-19 pandemic (2020–2021), during which hospitals faced increased operational costs without proportional revenue growth. The heterogeneity in patient service costs, coupled with restricted pricing updates from reimbursers (e.g., Social Security Institution), likely contributed to this outcome. To enhance the impact of net sales on financial performance, hospitals should focus on improving operational efficiency, such as optimizing patient throughput, and advocate for updated reimbursement rates to reflect rising costs, as supported by Karadeniz and İskenderoğlu (2024).

Enterprise size, measured by total assets, showed no significant effect on financial performance. This may be attributed to the heavy reliance on current assets, particularly inventory, which increases costs without immediate profitability gains (Yurttadur and Kabak, 2023). Hospitals with low fixed asset investments—primarily tangible assets like infrastructure—may have missed opportunities to enhance long-term efficiency, contributing to this result. To improve financial performance, hospital managers should monitor efficiency metrics (e.g., bed occupancy rates) and prioritize investments that balance short-term costs with long-term gains, as suggested by Babacan and Akca (2024).

V. CONCLUSION

This study aimed to investigate the impact of leverage ratio, asset turnover ratio, current ratio, net sales, and enterprise size on the financial performance of hospitals, measured by ROA and ROE. Using panel data analysis on financial statements from 52 Ministry of Health-affiliated B-group hospitals over a five-year period (2017–2021), the study tested five hypotheses. The results confirmed that the leverage ratio negatively affects financial performance (H1 supported), while the asset turnover ratio has a positive effect (H2 supported). However, the current ratio, net sales, and enterprise size showed no significant impact (H3, H4, and H5 rejected).

This study contributes to the literature by employing panel data analysis a method that integrates cross-sectional and time-series data to minimize estimation errors to examine hospital financial performance in a Turkish context. Unlike prior studies, such as Aydemir (2024), which focused on broader healthcare sectors, this study specifically targets public hospitals, offering insights into their unique financial dynamics. The findings highlight the importance of optimizing leverage and asset utilization to enhance financial outcomes, particularly during challenging periods like the Covid-19 pandemic.

For future research, expanding the variable set to include operational metrics (e.g., bed occupancy rates, patient-specific cost structures) could provide deeper insights. Including A1 and A2 group hospitals or extending the analysis to private and university hospitals would enable broader generalizations. Additionally, incorporating longer time frames and advanced methodologies, such as machine learning-based financial forecasting, could enhance the robustness of findings. Policymakers and hospital managers should prioritize cost-efficient inventory management, advocate for updated

reimbursement policies, and strategically plan fixed asset investments to bolster financial performance.

Ethical Approval: Ethical Approval for this study was obtained from the Kayseri University Ethics Committee (32800 / 30.06.2022).

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