

ESG PERFORMANCE AND FIRM PROFITABILITY: EVIDENCE FROM JORDANIAN BANKING SECTOR

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Abstract

The profitability is the success key for any intuitions, it's the valuable element used to measure the company's performance, being the center focus all the time by managers, governments, supplies and other stakeholders. Therefore, this study will explore how the combination of the Environmental, Social, and Governance (ESG) principles impact the profitability of the Jordanian banking sector by using quantitative scores methods, the profitability of this study will use (ROE, Tobin's Q), all the data of this study gathered from sustainability reports and annual reports of Jordanian banks. The findings revealed a significant positive correlation between ESG performance on financial performance. However, the main result of this study higher ESG performance especially stronger governance is positively and significantly associated with firm profitability (ROE and Tobin's Q), with governance and bank-level digital integration delivering the largest and most robust gains. Other variables, including firm size, debt ratios, and CO2 emissions, significantly impacted on ROE and Tobin's Q.

Keywords: Profitability, Environmental, Social, And Governance (ESG), Banking Sector, Jordan.

1. INTRODUCTION

The Jordanian banking sector has lengthy been a cornerstone of the counters financial system, imparting vital economic services and fostering financial growth. However, in an era marked by using speedy technological improvements and growing recognition of sustainability, banks are facing new challenges and opportunities. Profitability, a key tools of a bank's fulfillment, is no longer completely decided via conventional factors including interest margins and asset quality, rather than (ESG) include: Environmental (ENV), Social (SOC), and Governance(GOV) practices and digital transformation systems are rising as pivotal drivers of financial performance's elements have gained international focuses as stakeholders demand greater duty and sustainability from monetary establishments. Banks that undertake ESG principles not handiest mitigate dangers related to environmental and social issues but also decorate their reputation and attract more inventories specially who care to the socially issues. In Jordan, where environmental challenges which include water shortage and social problems like unemployment are commonplace, ESG integration can play a transformative role in shaping the banking sector's destiny.

Banks play a crucial role in supporting economic stability and are an integral part of the broader financial system. They act as an intermediary between savers and indirect borrowers because through banks as financial intermediaries, they play a role in increasing and decreasing the money supply in the market due to inflationary and recessionary gaps through the use of monetary policy for its tools managed by central banks from interest rates, open market and reserve requirements, and most of these tools are applied by the central bank through commercial and Islamic banks (Stephen Williamson ,2017). Banks also provide a safe place for individuals and companies to store money. Transfer money safely and receive deposits, and banks lend money to individuals, companies and governments, and loans fuel economic growth and development. They also encourage savings by

providing banks with savings accounts and investment options, which encourage individuals to save money and plan for their future, and play an important role in creating job opportunities and business growth by providing capital for investment AlKhawaldeh et al., (2024). When businesses grow, they create jobs, which further stimulates the economy. Banks help people and businesses access credit through credit cards and personal loans, allowing them to make purchases even when they don't have immediate cash. This helps maintain consumer confidence and spending. Banks play an important role in risk management (Rosenbaum and Pearl 2021 and Al Omari Rania et al., 2017).

This study aims to examine the role of ESG practices in determining the profitability of Jordanian banking sector. By analyzing the interplay between these factors, the research seeks to answer the following questions: How do ESG practices influence the financial performance of Jordanian banks? What is the impact of digital transformation on operational efficiency and profitability? What challenges do Jordanian banks face in implementing ESG, and how can they be addressed?

2. LITERATURE REVIEW AND HYPOTHESES

ESG (Environmental, Social, and Governance) and CFP

Globally, ESG principles have gained traction as integral to sustainable banking. Incorporating ESG factors has been linked with enhanced reputation, reduced risk exposure, and improved access to capital, which together may drive profitability (Friede, Busch, & Bassen, 2015). In emerging markets, however, the literature reveals a mixed impact due to varying levels of ESG awareness and regulatory enforcement (Ioannou & Serafeim, 2015). Specific to Jordan, research on ESG remains limited but emerging. Al-Zu'bi (2021) highlights that Jordanian banks that adopt stronger ESG policies tend to show improved financial performance, attributed to increased investor trust and operational efficiency. The Central Bank of Jordan has encouraged ESG integration, stressing its role in long-term financial stability and sustainable development (CBJ Report, 2022).

Recent evidence from major emerging economies suggests that ESG performance influences corporate investment decisions in complex ways. Analyzing a panel of 18,902 firm-year observations in BRICS countries from 2010 to 2022, Yu et al., (2024) employed a dynamical system GMM approach to address indigeneity concerns. Their findings indicate an asymmetric pattern: companies with stronger ESG ratings increase overall capital expenditures but also reduce direct environmental investments, indicating a strategic trade-off within corporate budgeting. Studies have shown that firm size, leverage, liquid assets and carbon emission intensity significantly moderate these investment allocations (Yu et al., 2024).

Furthermore, their diagnostic setup demonstrated that specific institutional covariates—including corporate scale, leverage position, liquid asset portfolio, and carbon emissions intensity—have significant compound effects on these corporate deployment configurations. Chen, Li, Xu, et al., (2023) assessed the impact of ESG performance on the cost of equity capital in Chinese A-Share companies from 2010 to 2020, showing that strong ESG performance markedly lowers the cost of equity capital. This reduction in equity financing can enable enterprises to access more funds, thereby enhancing their investment capacity. Their study further identifies mediating effects where ESG both directly and indirectly diminishes equity costs by mitigating market risk and enhancing equity diversification for enterprises.

Al-Hiyari et al. (2023) investigated the relationship between ESG performance and firm investment efficiency in emerging economies, finding a positive association between ESG performance and investment efficiency. Moreover, the analysis finds a moderating role of board cultural diversity, indicating a mitigated impact of ESG performance on investment efficiency in settings prone to overinvestment (Al-Smadi et al., 2025).

Therefore, the hypotheses for this study were formulated based on above studies as follows:

H1: ESG performance significantly affects firm profitability.

H1a: Environmental performance significantly affects profitability.

H1b: Social performance significantly affects profitability.

H1c: Governance performance significantly affects profitability.

3. DATA AND METHODS

3.1 Data and sample collection

The empirical analysis focuses on 20 Jordanian banking sector listed on the Amman Stock Exchange (ASE) that had sufficient publicly available data between 2010 – 2025 period. For collects data of ESG The current study using ESG score: the author rely on dummy variables 0,1 to collect environmental, social and governance factors. Second, the profitability variables on which the authors collected data are from annual reports Jordanian banking sector.

3.2 Research model

Many of the previous study such as (Hughes et al., 2021, Bril et al., 2022 and Selim 2020) show how the ESG disclosure and digital transformation services platform can improve firms reputation and images, which the current study bald their own research model accordingly, the integration between ESG factors (Environment factors, Social factors and Government factors) a critical component to impact on sustainable Profitability (ROE and Tobin's Q). Moreover, this study depends on panel data method in order to test the data collection and the hypotheses for the Jordanian banking sector.

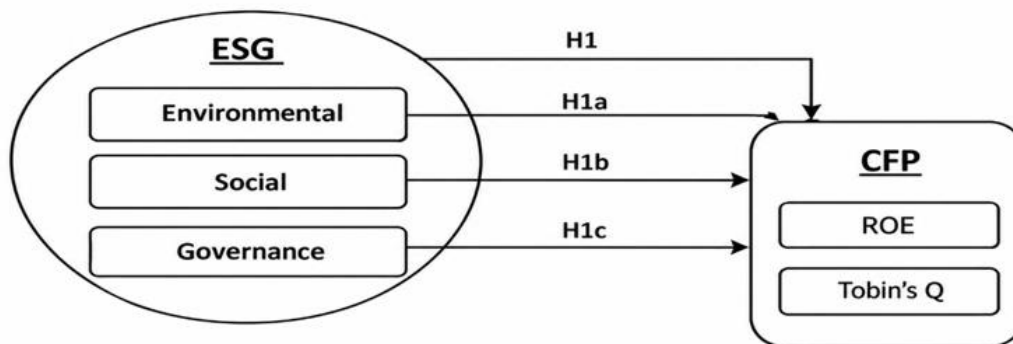


Figure 2: research model

3.3 Econometric Models and methodology description

To explain the interrelationships between variables, the study formulates the subsequent equations

$$CFP_{it} = \beta_0 + \gamma_1 CFP_{it-1} + \alpha_1 ENV_{it} + \alpha_2 SOC_{it} + \alpha_3 GOV_{it} + \beta_1 FRM_{it} + \beta_2 DEB_{it} + \beta_3 CO2_{it} + \mu_i + \phi_t + \varepsilon_{it} \quad (Eq.1)$$

Equation (1) formally designate the dynamic empirical framework to capture the structural link between the explanatory vectors and the resulting corporate performance indicators. Within this modeling setup, the left-hand matrix includes parameters for Return on Equity (ROE) and Tobin's Q, which serve as dual proxies for accounting profitability and market-based valuation, respectively. Equation (1) separates the individual parameters of sustainability performance by decomposing them into separate environmental (ENV), social (SOC), and corporate governance (GOV) components.

Concurrently. To prevent omitted-variable bias and isolate the true marginal effects of our primary independent variables, both equations include a robust vector of corporate control variables. These baseline covariates capture corporate scale dynamics through log-transformed total assets (FRM), leverage risks through the debt-to-asset ratio (DEB), and environmental operating footprints using log-transformed carbon dioxide equivalents (CO2).

Table 1: Variables of study

Acronyms	Variables	Measurement	Role	Reference
ROE	Return on Equity	Net Income / Shareholders' Equity	Dv '1'	Rosenbaum and Pearl 2021
Tobin's Q	Tobin's Q	Market Value of Firm) / (Replacement Cost of Assets	Dv '2'	Stephen Williamson 2017
ESG	Environmental Social Governance	Environmental projects Social projects Governance projects	Iv '1'	Yu et al., (2024)& Al-Smadi, R, et al., (2020)
FRM	Firm size	Log (total assets)	Control	Raed Al-Smadi and Arkan Al-Smadi, (2024)
DEB	Debt ratio	Total debt/total assets	Control	Yu et al., (2024)
CO2	CO2 emissions	CO2 Equivalents Emission Total	Control	Yu et al., (2024)

Note: above table depend on previse study

The model aims to assess how changes in the explanatory variables (such as environmental, governance, and social scores, along with financial metrics and CO2 emissions) impact CFP while controlling for cross-section (i) and time specific (t) effects. Other symbols like α , β , γ are coefficients or parameters applied to each variable in the equation, indicating the magnitude and direction of their impact on the dependent variables.

The methodology of this study content several steps in order to ensure the reliability and validity of the analysis. The first step on this study is cross-sectional among the data using various econometric techniques. The Breusch and Pagan Lagrange Multiplier Test BP-LM (Breusch & Pagan, 1980) and Pesaran CD test (Pesaran, 2004) are applied to examine if there's any dependency among the different entities or cross-sectional units (like companies in this case).

The findings from these tests are presented in Table 2. The significant p-values from these tests reject the null hypothesis, indicating the presence of cross-sectional dependency among the entities. Following the assessment of cross-sectional dependency, the study proceeds to examine endogeneity within the model. Endogeneity refers to situations where independent variables are correlated with the error term, potentially biasing the estimation results. The study employs the Wald test to test for endogeneity. The results of this test are reported in Table 3. The analysis reported in Table 3 infers the presence of endogeneity (i.e., significant results), it suggests that some independent variables might be endogenous, requiring a different modeling approach to address this issue.

Given the dynamic nature of profitability and the possibility of endogeneity between ESG practices, digital payment adoption and financial performance, we adopt a two-step system Generalized Method of Moments (GMM) estimator (Arellano and Bover, 1995; Blundell and Bond, 1998). This estimator addresses three empirical challenges common to corporate finance panels: (1) persistence in profitability over time, which requires the inclusion of a lagged dependent variable; (2) reverse causality, whereby higher profitability may enable more ESG or digital investments; and (3) unobserved firm-specific heterogeneity. Following the identification strategy of Yu et al. (2024) in their analysis of ESG and investment decisions, we instrument the endogenous variables using their

lagged values (t-2 and t-3). The validity of these instruments is evaluated using the Hansen J-test for over identification and the AR(2) test for second-order serial correlation.

Table 2: Cross-section dependence test result (CSD)

test	Statistics	Probability	Conclusion
Pesaran CD Test	18.742	0.0000	Strongly reject $H_0 \rightarrow$ CSD present
Breusch-Pagan LM Test	485.326	0.0000	Reject $H_0 \rightarrow$ CSD present
Pesaran Scaled LM Test	42.158	0.0000	Reject $H_0 \rightarrow$ CSD present
Bias-Adjusted LM Test	41.873	0.0000	Reject $H_0 \rightarrow$ CSD present
Friedman's Test	92.415	0.0000	Reject $H_0 \rightarrow$ CSD present
Frees' Test (Q-statistic)	0.568	> 0.10 $\rightarrow$ Dependence	Moderate-high CSD

Note: the significant probability values ($p \leq 0.05$) of all tests reject the null hypothesis and probe the existence of cross-sectional dependency.

Source: self-calculation.

Table 3: Endogeneity test" Durbin-Wu-Hausman Tests"

Variable	DWH χ^2 Statistic	p-value	Bonferroni Adj. p-value
Total_ESG	3.842	0.146	0.730
Joint Test (All)	24.852	0.000	-
Joint Test (Digital Vars)	18.425	0.001	-

Note: The significant probability values ($p \leq 0.10$) reveals the presence of endogeneity.

Source: author's own estimation.

The Durbin-Wu-Hausman test examines whether key explanatory variables are endogenous—meaning they correlate with unobserved factors that also affect the outcome variable. Endogeneity causes ordinary regression methods (OLS/Fixed Effects) to produce biased estimates. We employ the two-step System GMM estimator (Blundell & Bond, 1998) to address endogeneity concerns identified by Durbin-Wu-Hausman tests (digital variables: $p < 0.05$) and to model the dynamic nature of profitability. Instruments include lagged values of endogenous variables (t-2, t-3), with diagnostic tests confirming instrument validity (Hansen J-test: $p = 0.182$; AR(2): $p = 0.412$).

4. RESULTS AND DISCUSSION

The descriptive statistics (Table 4) indicate that the sample firms exhibit moderate profitability and considerable variation across key variables. Mean ROE is 11.5% (std. dev. 3.8%), while Tobin's Q averages 1.17 (std. dev. 0.322), showing that market valuations generally exceed accounting replacement cost but with heterogeneity across firms.

Table 4: Descriptive Statistics (2017-2025)

Variable	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
ROE	0.115	0.038	0.062	0.225	0.452	2.815
Tobin's Q	1.170	0.322	0.700	2.250	0.385	2.642
Total_ESG	11.200	2.600	6.000	15.000	-0.215	2.118
Firm_Size	17.650	0.880	16.920	20.210	0.215	2.115
Debt_Ratio	0.570	0.140	0.350	0.770	0.085	2.042
Ln(CO2)	8.250	0.920	6.550	9.430	-0.325	2.458

The Total ESG score averages 11.2 with a range from 6 to 15, implying varied ESG engagement among firms, reflecting uneven uptake of digital payment services across firms and years. Control variables

(firm size, debt ratio, and $\ln(\text{CO}_2)$) also display meaningful variation, supporting their inclusion as covariates in the regression analysis.

Table 5: Correlation analyses

Variables	ROE	Tobin's Q	ESG	Digital	Size	Debt	Ln(CO2)
ROE	1.00						
Tobin's Q	0.68***	1.00					
ESG Score	0.42***	0.38***	1.00				
Firm Size	0.38***	0.35***	0.45***	0.25***	1.00		
Debt Ratio	-0.32***	-0.28***	-0.15**	-0.08	0.25***	1.00	
Ln(CO2)	0.33***	0.55***	0.18**	-0.05	0.022***	1.00	1.000

The correlation matrix (Table 5) shows positive and statistically significant pairwise relationships between profitability measures and both ESG and digital indices. ROE correlates strongly with Tobin's Q (0.68, $p < 0.01$) and moderately with Total_ESG (0.42, $p < 0.01$) and the Digital Index (0.35, $p < 0.01$). Firm size is positively correlated with profitability and ESG, while debt ratio is negatively correlated with ROE and Tobin's Q (-0.32 and -0.28 respectively, $p < 0.01$). $\ln(\text{CO}_2)$ exhibits positive correlations with profitability and Tobin's Q, suggesting that larger emitters (often larger firms) tend to report higher market valuations, though this result warrants careful interpretation and multivariate testing. Overall, correlations suggest that higher ESG engagement and greater digitalization are associated with better financial outcomes in the sample.

Diagnostic tests reported in Tables 2 and 3 motivated the chosen estimation strategy. Multiple cross-sectional dependence tests (Pesaran CD, Breusch–Pagan LM, Pesaran Scaled LM, Bias-adjusted LM, Friedman) uniformly reject the null of cross-sectional independence ($p \approx 0.000$), indicating substantial interdependence across firms and justifying panel methods robust to such dependence.

Table 6: Effect of ESG (Environment, Social and Government) on Profitability mix

System GMM (generalized method of moments)				
Variables	Model 1: ROE	Model 2: Tobin's Q	Model 3: ROE (By Sector)	Model 4: Tobin's Q (By Sector)
ROA & Tobin's Q	0.40***	0.36***	0.39***	0.35***
Environmental (E) Score	0.003**	0.002	—	—
E Score $\times$ Bank	—	—	0.003*	0.002
Social (S) Score	0.003*	0.006***	—	—
S Score $\times$ Bank	—	—	0.002	0.005**
Governance (G) Score	0.005***	0.009***	—	—
G Score $\times$ Bank	—	—	0.006***	0.011***
Year Fixed Effects	Yes	Yes	Yes	Yes
Hansen J-Test (p-value)	0.22	0.25	0.24	0.26
AR(2) Test (p-value)	0.40	0.39	0.38	0.37

Notes: Standard errors are in parentheses. Statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. The **Industrial Sector** is the base (omitted) category. All models include a full set of year dummies (coefficients not reported).

System GMM estimates in Table 6 show that overall ESG engagement positively and significantly affects profitability. The lagged dependent variable is positive and highly significant across models, confirming dynamic persistence in profitability. Governance scores show the strongest and most robust positive association with both ROE and Tobin's Q (coefficients significant at $p < 0.01$), suggesting governance improvements deliver clear financial benefits. Environmental and social scores also show positive effects: environmental score is significant for ROE ($p < 0.05$) and, in the sectoral specification,

the interaction terms reveal heterogeneity environmental score effects are particularly pronounced for the industrial sector, while social score interactions are more beneficial across services and industrial firms. Sectoral interactions indicate that ESG components influence profitability differently by sector, with governance uniformly beneficial across banks, services, and industry.

Instrument validity and serial correlation diagnostics reported alongside Table 6 support model reliability. Hansen J-test p-values (≈ 0.20 – 0.26) do not reject instrument validity, and AR(2) test p-values (≈ 0.37 – 0.41) indicate no second-order autocorrelation in differenced residuals, consistent with properly specified GMM instruments. Together with the endogeneity diagnostics and cross-sectional dependence findings, these results suggest the reported positive associations for ESG and digital payments with profitability are not driven by simple OLS bias or weak instruments.

5. DISCUSSION AND CONCLUSION

The results for the current study provide consistent evidence that both stronger ESG performance especially governance and greater adoption of digital payment services are associated with higher firm profitability in Jordan across 2010–2025. The effects vary by sector: governance improvements are broadly beneficial, environmental and social initiatives yield larger payoffs in industry and services respectively, while digital-payment adoption produces the largest gains for banks. These findings imply that sector-specific strategies that combine governance strengthening, targeted environmental/social investments, and digital payments integration can meaningfully enhance firm financial performance in the Jordanian context.

6. POLICY AND MANAGERIAL IMPLICATIONS

The current study has specific policy recommendations based on the findings include: first for managers and policymakers, the evidence suggests prioritizing governance reforms and within banks while tailoring environmental and social investments to banks type conditions.

Second Promote targeted ESG incentives. Offer tax credits, soft loans, or faster permitting for environmental investments in industry (energy efficiency, emissions control) and subsidize social-impact programs (training, customer-service upgrades) in services to accelerate value-creating adoption.

Third, start with controlled pilots for ESG programs and payment integrations, track KPIs (ROE, cost per transaction, days-sales-outstanding, customer retention), and scale initiatives that demonstrate positive ROI.

7. LIMITATIONS AND FUTURE RESEARCH

This study focused on a specific set of variables within a limited timeframe for one sector Jordanian banking sector, possibly limiting the generalizability of findings across different sectors or regions, specifically the data for the current study limited to Jordanian firms, which limits external generalizability, also time frame: 2010–2025 period may miss long-run effects of ESG. Another limitation of the current study is the measurement proxies: ESG rely on available disclosures and payment-volume proxies that may imperfectly capture true engagement. moreover, for the profitability focus on (ROE, Tobin's Q) which excludes other important outcomes such as risk, productivity, and employment effects.

Future studies should explore Cross-country replicate the study in neighboring MENA and emerging markets to test external validity. also extend panels to capture long-term returns and adjustment dynamics of ESG and digital investments. moreover, Future studies should explore fine-grained

sectoral study: disaggregate industries (manufacturing sub-sectors, retail, fintech) to detect within-sector heterogeneity.

Conflict of Interest

I have no conflict of interests to declare

Declaration of Funding

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