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Research Article

Electronic Banking Services and Their Role in Enhancing Financial Performance of Commercial Banks in Ethiopia

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Abstract

Electronic banking has become an important component of financial-sector transformation, providing alternative channels for service delivery, reducing transaction costs, and expanding customer access. This study examines the effect of electronic banking services on the financial performance of commercial banks in Ethiopia. Specifically, it assesses the effects of automated teller machines (ATMs), debit cards, mobile banking, internet banking, and point-of-sale (POS) terminals on profit after tax (PAT) and return on equity (ROE), while considering inflation as a control variable. The study employed an explanatory quantitative research design using panel data from fifteen Ethiopian commercial banks covering the period 2017–2023. Secondary data were obtained from the National Bank of Ethiopia and audited annual reports of the selected Banks. Fixed-effect and random-effect panel-data models were estimated using STATA 17 supported by diagnostic tests for Multicollinearity, Heteroscedasticity, autocorrelation, and model specification. The findings indicate that debit cards, ATMs, and mobile banking have statistically significant positive effects on PAT, while ATMs and mobile banking have significant positive effects on ROE. In contrast, POS terminals have a significant negative effect on ROE, whereas internet banking has statistically insignificant effects on both PAT and ROE. Inflation is also found to undermine profitability and weaken the benefits associated with electronic banking adoption. The findings suggest that the financial performance effects of electronic banking vary across service types and depend on adoption, infrastructure, cost efficiency, and customer trust. The study highlights the importance of strengthening mobile banking and ATM services, improving the reliability and security of internet banking, and restructuring POS operations to enhance the contribution of electronic banking to the financial performance of Ethiopian commercial banks.

Keyword

Electronic Banking, Financial Performance, Ethiopia, Mobile Banking, Automated Teller Machines, Profit After Tax, Return on Equity

1. Introduction

1.1. Background of the Study

Electronic banking has become one of the most transformative innovations in the global financial sector [6, 10, 19]. Since the 1990s, banks worldwide have increasingly adopted technologies such as automated teller machines (ATMs), mobile banking, internet banking, debit cards, and point-of-sale (POS) systems to reduce transaction costs, improve efficiency,

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and expand financial inclusion [10, 16, 19]. In advanced economies, e-banking is now a standard delivery channel, while in many African countries it has emerged as a key driver of modernization and competitiveness [6, 11].

Comparative evidence from East Africa highlights the rapid rise of e-banking in countries such as Kenya and Tanzania, where mobile money platforms and ATM networks have reshaped customer experiences and significantly improved profitability. Kenya's M-Pesa system, for example, has become a global benchmark for mobile financial services, enabling millions of previously unbanked citizens to access formal banking. Tanzania has similarly expanded mobile and agent banking, supported by regulatory reforms and telecom partnerships [4, 6, 11, 15, 18].

In contrast, Ethiopia's adoption of e-banking has been slower and more recent [1-3, 13]. The first ATMs were introduced in the early 2000s, and mobile and internet banking services only began to expand after 2011, following the National Payment System Proclamation. Despite progress, infrastructural challenges, limited internet penetration, and customer trust issues have hindered widespread adoption. As a result, while e-banking has shown measurable positive impacts on profitability and return on equity in Ethiopian banks, its overall contribution remains less pronounced compared to regional peers.

1.2. Statement of the Problem

Electronic banking has become a global priority for banks due to its potential to reduce transaction costs, improve efficiency, and expand customer access. However, in Ethiopia, the evidence on its impact remains contradictory. Some studies report significant positive effects of mobile banking and ATMs on profitability, while others find limited or even negative outcomes for POS terminals and internet banking.

A major limitation of existing Ethiopian research is the reliance on small samples, often focusing only on public banks or a narrow set of institutions. This restricts the generalizability of findings across the broader banking sector.

Furthermore, many studies employ narrow indicators such as return on assets (ROA) alone, neglecting other critical measures like profit after tax (PAT) and return on equity (ROE). These methodological weaknesses create uncertainty about the true impact of electronic banking on financial performance.

Given the rapid expansion of e-banking technologies in Ethiopia since 2017, there is a pressing need for a more comprehensive study that uses broader samples, multiple performance indicators, and robust econometric methods. Addressing these gaps will provide clearer insights into how electronic banking contributes to profitability and stability in Ethiopian commercial banks.

1.3. Objective of the Article

The general objective of this study is to assess the impact of electronic banking services on the financial performance of commercial banks in Ethiopia, with particular focus on profitability and return on equity (ROE).

1.4. Research Questions

1) What is the effect of ATMs, mobile banking, debit cards, internet banking, and POS on PAT and ROE?
2) How does inflation influence these relationships?

2. Literature Review

2.1. Theoretical Review

Electronic banking is defined as the delivery of banking services through electronic channels, enabling customers to access accounts, conduct transactions, and obtain financial information without visiting physical branches. A scholar such as Bhattacharya & Thakor (1993) and Drigă & Isac (2014) [19] emphasize that e-banking reduces transaction costs, enhances efficiency, and expands financial inclusion. In Ethiopia, however, adoption has been slower, constrained by infrastructure and regulatory limitations [10, 16].

2.1.1. Conceptualizing Electronic Banking

E-banking encompasses ATMs, mobile banking, internet banking, debit cards, and POS systems. These technologies are designed to improve customer convenience and bank profitability [5, 17].

2.1.2. Role of E-Banking Services

Studies in Nigeria, Ghana, and Kenya consistently show positive impacts of ATMs and mobile banking on profitability and shareholder returns. Mobile money platforms, particularly Kenya's M-Pesa, demonstrate how e-banking can transform financial inclusion.

2.1.3. Disadvantages of E-Banking Products

Despite benefits, challenges include high infrastructure costs, cyber security risks, and low customer trust in online platforms. POS terminals in Ethiopia, for example, often impose costs that outweigh benefits [8, 12, 14].

2.2. Empirical Literature Review

Positive findings: ATMs and mobile banking significantly improve profitability [7, 9]. Negative/insignificant findings: POS and internet banking often show weak or adverse effects [8, 14]. Therefore methodological gaps, and many studies rely on small samples, focus only on public banks, or use narrow indicators such as ROA, limiting generalizability.

3. Methodology

3.1. Research Design and Approach

This study employed an explanatory research design with a quantitative approach to examine the relationship between electronic banking services and the financial performance of commercial banks in Ethiopia.

3.2. Target Population and Sample

The target population consisted of all licensed commercial banks operating under the National Bank of Ethiopia. From this population, fifteen banks were purposively selected because they had adopted electronic banking services and maintained consistent audited financial statements. The study period covered 2017–2023, chosen to capture the rapid expansion of e-banking technologies in Ethiopia.

3.3. Sources and Types of Data

The study relied on secondary data obtained from the National Bank of Ethiopia and the audited annual reports of the selected banks.

3.4. Variables

Dependent Variables:

Profit after tax (PAT) and Return on equity (ROE)

Independent Variables:

1) Debit card usage
2) ATM transactions
3) Mobile banking services
4) Internet banking services
5) Point-of-sale (POS) terminals

Control Variable:

Inflation rate

3.5. Methods of Data Analysis

Panel data econometric techniques were applied using both fixed effect and random effect models. The analysis was conducted with STATA 17 software, incorporating diagnostic tests for:

1) Multicollinearity
2) Normality of residuals
3) Heteroscedasticity
4) Autocorrelation
5) Model specification (Hausman test for fixed vs. random effects)

4. Results

4.1. Profits After Tax (PAT)

The regression analysis shows that debit cards, ATMs, and mobile banking exert a statistically significant and positive effect on profit after tax (PAT). These technologies reduce transaction costs, expand customer access, and improve efficiency, thereby enhancing profitability. In contrast, internet banking and POS terminals exhibit insignificant effects on PAT, reflecting limited adoption, infrastructural challenges, and low customer trust in online platforms.

4.2. Return on Equity (ROE)

When financial performance is measured using return on equity (ROE), the results are consistent but slightly different. ATMs and mobile banking demonstrate significant positive impacts, confirming their role in strengthening shareholder returns. However, POS terminals have a negative and significant effect on ROE, suggesting that the costs of maintaining POS infrastructure outweigh the benefits in the Ethiopian context. Debit cards, internet banking, and inflation were found to have statistically insignificant effects on ROE.

4.3. Inflation as a Control Variable

Inflation consistently emerged as a negative moderating factor, eroding profitability and weakening the positive effects of e-banking adoption. This highlights the vulnerability of Ethiopian banks to macroeconomic shocks, even when technological innovations are adopted.

5. Discussion

The results of this study highlight the uneven impact of electronic banking services on the financial performance of Ethiopian commercial banks.

ATMs and Mobile Banking

ATMs and mobile banking emerged as the most effective drivers of profitability and shareholder returns. Their widespread adoption, ease of use, and ability to reduce transaction costs explain their strong positive effects on both profit after tax (PAT) and return on equity (ROE). These findings align with comparative evidence from Kenya and Tanzania, where mobile money platforms such as M-Pesa have transformed financial inclusion and bank performance.

POS Terminals

POS terminals, in contrast, were found to be costly and underutilized. Their negative effect on ROE suggests that the expenses associated with installation, maintenance, and limited customer uptake outweigh potential benefits. This reflects structural inefficiencies in Ethiopia's banking infrastructure and highlights the need for cost restructuring and integration with mobile payment systems.

Internet Banking

Internet banking showed insignificant effects on both PAT and ROE. This outcome is largely attributed to infrastructural challenges, limited internet penetration, and low customer trust in online platforms. Without improvements in connectivity and security, internet banking is unlikely to deliver measurable financial benefits in the Ethiopian context.

Inflation

Inflation consistently undermined gains from electronic banking adoption. As a macroeconomic factor, inflation erodes profitability and weakens the positive effects of technological innovations. This finding underscores the importance of strong risk management and diversified revenue strategies to cushion banks against external shocks.

Comparative Insights

The Ethiopian experience contrasts sharply with Kenya and Tanzania, where faster adoption of mobile and agent banking has produced more consistent improvements in profitability and financial inclusion. The comparison suggests that adoption speed and regulatory support are critical determinants of success in leveraging e-banking technologies.

6. Conclusion

This study assessed the impact of electronic banking services on the financial performance of commercial banks in Ethiopia using panel data from fifteen institutions between 2017 and 2023. The findings demonstrate that ATMs, debit cards, and mobile banking significantly enhance profitability (PAT) and shareholder returns (ROE), confirming their role as effective drivers of financial performance. In contrast, internet banking and POS terminals showed insignificant or negative effects, reflecting infrastructural challenges, limited adoption, and high operational costs.

The analysis further revealed that inflation consistently undermines profitability, moderating the positive effects of e-banking adoption. This highlights the vulnerability of Ethiopian banks to macroeconomic shocks despite technological innovation.

Overall, the study concludes that while electronic banking contributes positively to financial performance, its impact varies across products. Technologies that are widely adopted and user-friendly, such as ATMs and mobile banking, deliver measurable benefits, whereas services with limited penetration, such as internet banking and POS, require structural improvements.

7. Recommendations

Based on the findings of this study, several recommendations are proposed for Ethiopian commercial banks and policymakers:

Banks should prioritize mobile banking services, as they demonstrated the strongest positive impact on both PAT and ROE. Wider coverage, user-friendly applications, and partnerships with telecom providers can accelerate adoption and enhance profitability.

Investment in ATM networks should continue, especially in underserved areas. ATMs remain a reliable and cost-effective channel for customer transactions and contribute significantly to profitability and shareholder returns.

To overcome low usage, banks must build customer trust in internet banking platforms by improving security, simplifying interfaces, and conducting awareness campaigns. Collaboration with service providers to ensure reliable internet access is also essential.

Since POS terminals currently show weak or negative impacts, banks should evaluate cost structures, improve reliability, and integrate POS with mobile payment systems to make them more attractive to merchants and customers.

Policymakers and banks must recognize inflation's negative impact on profitability. Strategies such as diversifying revenue streams, adjusting pricing models, and strengthening risk management can help cushion banks against macroeconomic shocks.

The National Bank of Ethiopia should continue updating policies to encourage innovation, ensure transaction security, and promote financial inclusion through electronic banking. Regulatory support is critical to accelerate adoption and maximize benefits.

Abbreviation

ATM	Automated Teller Machine
DW	Durbin–Watson Test
FEM	Fixed Effect Model
GDP	Gross Domestic Product
ICT	Information and Communication Technology
NBE	National Bank of Ethiopia
OLS	Ordinary Least Squares
PAT	Profit After Tax
POS	Point of Sale
REM	Random Effect Model
ROE	Return on Equity
VIF	Variance Inflation Factor

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Author Contributions

Misganaw Ayele Gizaw: Conceptualization, Data curation, Formal Analysis, Methodology, Writing – original draft, Writing – review & editing

Conflicts of Interest

The authors declare that no conflicts of interest exist in relation to this study. The research was conducted independently and was not supported, influenced, or funded by any external organizations, institutions, or other writers. All analyses, interpretations, and conclusions are solely the responsibility of the authors.

Appendix

Appendix I: Correlation Analysis of PAT and ROE

This appendix presents the correlation matrices used to examine the relationship between electronic banking variables (Debit Cards, ATMs, Mobile Banking, Internet Banking, POS) and financial performance indicators (Profit After Tax – PAT, Return on Equity – ROE).

Appendix II: Variance Inflation Factor (VIF)

The VIF results are included to test for Multicollinearity among independent variables. The values confirm that Multicollinearity was not a significant issue in the regression models.

Appendix III: Heteroscedasticity Tests

Breusch–Pagan test results for both PAT and ROE models are reported. The findings indicate whether variance in the error terms was constant across observations.

Appendix IV: Hausman Test for Model Specification

Hausman test results are provided to determine whether the fixed effect model (FEM) or random effect model (REM) was more appropriate for the panel data analysis.

Appendix V: Regression Results for PAT and ROE

Detailed regression outputs for both dependent variables (PAT and ROE) are presented, including coefficients, significance levels, and model fit statistics.

Appendix VI: Durbin–Watson Test

Durbin–Watson statistics are reported to check for autocorrelation in the residuals of the regression models.

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Biography



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