Digital Financial Inclusion, Institutional Quality, And Banking Sector Performance: Evidence From High-Income Economies

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Abstract
This study investigates the impact of digital financial inclusion (DFI) on banking sector performance (BSP) in high income economies, with a focus on the moderating role of institutional quality. Using a balanced panel dataset of 45 high income economies over 2011–2021, the study constructs composite indices for DFI, BSP, and institutional quality via Principal Component Analysis (PCA). The two-step System GMM estimator is employed to address endogeneity, dynamic persistence, and unobserved heterogeneity. The findings reveal that DFI significantly enhances BSP, while institutional quality does not significantly moderate this relationship, indicating that strong governance in advanced economies already supports effective digital financial adoption. Foreign bank presence also positively contributes to performance, whereas macroeconomic controls are largely insignificant. These results highlight the central role of DFI in promoting efficiency, profitability, and stability in mature banking systems.

Keywords: Digital Financial Inclusion, Banking Sector Performance, Institutional Quality, High income Economies, System GMM, Principal Component Analysis
JEL Classification: G21, O16, O33, E02, C23.

Introduction

Digital transformation has fundamentally reconfigured financial intermediation in high income economies, where banking systems are technologically advanced, financially deep, and institutionally mature. Digital financial inclusion (DFI) defined as the access to and use of formal financial services through digital platforms has expanded rapidly over the past decade, reshaping the structure, efficiency, and risk profile of banking institutions. According to the World Bank Group, high income economies classified based on Gross National Income (GNI) per capita exceeding USD 13,845 in 2023 record account ownership rates above 95%, substantially higher than the global average of 76% (World Bank, 2022). Moreover, more than 90% of adults in these economies use digital payment methods, reflecting the near-universal penetration of electronic financial channels and the maturity of digital ecosystems.

The scale and intensity of digital financial activity in advanced economies are considerable. Data from the International Monetary Fund indicate that digital transactions per capita exceed 1,500 annually in several high income countries, while credit and debit card penetration per 1,000 adults remains among the highest globally (IMF, 2023). Concurrently, traditional banking infrastructure such as branches per 100,000 adults has declined steadily, reflecting a structural shift toward internet and mobile-based financial services (OECD, 2023). This transformation signifies not merely technological substitution but a reconfiguration of banking business models, revenue streams, and cost structures. In highly competitive banking environments characterized by compressed interest margins, digitalization may play a decisive role in sustaining profitability and operational efficiency.

Theoretically, financial intermediation theory posits that improvements in information processing and transaction technologies reduce information asymmetries and transaction costs, thereby enhancing financial efficiency and resource allocation (Levine, 1997). Digital financial inclusion facilitates automation, real-time data analytics, and platform-based service delivery, which can lower operational costs and improve cost-to-income ratios while expanding non-interest income sources (Beck, Demirgüç-Kunt, & Levine, 2000). In high income economies, where banking systems are already highly penetrated, the marginal impact of digital inclusion is less about expanding access and more about intensifying usage, improving efficiency, and optimizing asset-liability management. Empirical evidence suggests that digital finance enhances transaction volumes, fee-based income, and operational scalability, contributing positively to return on assets (ROA) and return on equity (ROE) (Ozili, 2018; Vives, 2019).

At the same time, the implications of digital financial inclusion extend beyond profitability to banking stability. Expanded digital deposit bases and diversified transaction platforms can strengthen liquidity positions and funding stability, thereby improving Z-scores and capital adequacy indicators (Demirgüç-Kunt et al., 2022). Recent estimates show that banks in advanced economies maintain regulatory capital ratios above 16%, exceeding Basel III minimum thresholds, and average ROA between 0.8% and 1.2%, indicating resilience but also highlighting ongoing profitability pressures (IMF, 2023). However, increased digital interconnectedness may introduce

operational and cybersecurity risks that could affect systemic stability if governance and regulatory mechanisms are inadequate (Bank for International Settlements [BIS], 2023). Thus, the relationship between DFI and banking sector performance (BSP) captured through efficiency, profitability, and stability dimensions remains theoretically ambiguous and empirically relevant in high income contexts.

Institutional quality is central to understanding this nexus. High income economies generally exhibit strong governance structures, regulatory effectiveness, rule of law, and supervisory capacity, as documented by the World Bank Group Worldwide Governance Indicators (World Bank, 2023). Institutional theory suggests that robust legal and regulatory frameworks enhance financial development outcomes by mitigating agency problems, enforcing contracts, and ensuring prudential oversight (La Porta et al., 1998; Beck, Demirgüç-Kunt, & Levine, 2006). In the context of digital finance, high institutional quality can amplify efficiency gains by supporting innovation-friendly regulation, consumer protection, cybersecurity standards, and effective risk supervision. Conversely, excessive compliance burdens or regulatory rigidities may dampen digital transformation benefits (OECD, 2023). Therefore, institutional quality may moderate the impact of digital financial inclusion on banking sector performance, strengthening or constraining its effects depending on governance effectiveness.

Despite the advanced stage of financial and technological development in high income economies, empirical research has predominantly focused on developing and emerging markets, where financial exclusion remains a central concern. Limited attention has been given to examining how digital financial inclusion influences banking performance within mature financial systems characterized by saturated access but varying digital usage intensity. Moreover, the moderating role of institutional quality in shaping the digital finance–performance relationship remains underexplored in high income settings, even though institutional robustness is one of their defining characteristics.

To address this gap, the present study constructs a composite Digital Financial Inclusion (DFI) index using Principal Component Analysis (PCA), incorporating indicators of access, usage, and infrastructure: number of borrowers, number of deposit accounts, credit cards per 1,000 adults, debit cards per 1,000 adults, mobile and internet banking transactions, and banking access points (branches and ATMs per 100,000 adults). Banking Sector Performance (BSP) is similarly measured through a PCA-based composite index capturing efficiency (net interest margin, non-interest income to total assets, cost-to-income ratio), profitability (ROA, ROE), and stability (Z-score, capital adequacy ratios, and liquidity indicators). Focusing exclusively on high income economies as classified by the World Bank Group based on GNI per capita, this study provides refined evidence on how digital financial inclusion interacts with institutional quality to influence banking outcomes in technologically advanced and institutionally strong environments. Motivated by this gap the study frame two key research question; How does digital financial inclusion affect banking sector Performance in high income economies? And To what extent does institutional quality moderate the relationship between digital financial inclusion and banking sector performance in high income

economies? By isolating high income economies, the study minimizes structural heterogeneity related to income-level disparities and allows for a clearer evaluation of digital transformation within mature financial systems. The findings are expected to contribute to the literature on digital finance, banking performance, and institutional economics by clarifying whether digital financial inclusion enhances efficiency, profitability, and stability in advanced economies and by identifying the institutional conditions under which these effects are strengthened.

Significance of the Study

Focusing exclusively on high income economies classified by the World Bank Group based on GNI per capita allows for a deeper understanding of how digital transformation operates within mature financial systems. Given the advanced technological infrastructure, high financial penetration rates, and strong governance frameworks in these economies, this study contributes to the literature by isolating digital inclusion effects without the confounding structural deficiencies typical of lower-income contexts.

Literature Review

Theoretical Framework

This study integrates Financial Intermediation Theory, and Institutional Theory to explain how digital financial inclusion (DFI) influences banking sector performance (BSP) and how institutional quality moderates this relationship in high income economies.

Financial Intermediation Theory argues that banks improve economic efficiency by reducing information asymmetries, lowering transaction costs, and allocating capital more effectively (Levine, 1997). Digital financial inclusion through increased mobile and internet banking transactions, card penetration, deposit accounts, and borrower outreach enhances banks' screening, monitoring, and service delivery capacities. In high income economies, where financial access exceeds 95% (World Bank, 2022), digitalization primarily improves usage intensity and operational efficiency rather than basic access. Empirical evidence shows that digital banking reduces operating costs, improves cost-to-income ratios, increases non-interest income, and enhances return on assets (ROA) and return on equity (ROE) (Ozili, 2018; Vives, 2019; IMF, 2023). Furthermore, diversified digital deposits and improved liquidity monitoring can strengthen bank stability indicators such as Z-scores and capital adequacy ratios (Demirgüç-Kunt et al., 2022). However, digital expansion also introduces operational and cybersecurity risks that may affect financial stability if governance frameworks are weak (BIS, 2023). This risk-performance trade-off is particularly relevant in advanced banking systems characterized by high digital interconnectedness.

Institutional Theory explains the moderating role of governance structures in shaping financial outcomes. Strong institutions defined by regulatory quality, rule of law, and supervisory effectiveness enhance financial development and banking performance by reducing uncertainty and enforcing prudential standards (La Porta et al., 1998; Beck, Demirgüç-Kunt, & Levine, 2006). In high income economies, institutional quality

indicators reported by the World Bank Group demonstrate consistently high governance effectiveness and regulatory capacity (World Bank, 2023). Robust institutional environments can amplify the positive effects of DFI by supporting innovation-friendly regulation, ensuring cybersecurity compliance, protecting consumers, and maintaining capital discipline (OECD, 2023). Conversely, regulatory rigidity or inadequate digital oversight may weaken efficiency gains or heighten systemic risk (BIS, 2023).

Therefore, combining Financial Intermediation Theory with Institutional Theory suggests that digital financial inclusion enhances banking sector efficiency, profitability, and stability in high income economies, but the magnitude of this effect depends on institutional quality. Strong governance frameworks are expected to strengthen the positive DFI–BSP relationship by enabling technological innovation while safeguarding financial stability.

Empirical Reviews

The growing digitalization of financial services has intensified scholarly debate regarding the implications of digital financial inclusion (DFI) for banking sector performance (BSP). While the majority of empirical studies examine emerging and developing markets, theoretical and empirical insights remain highly relevant for high income economies where financial systems are mature but increasingly digitized.

From the perspective of financial intermediation, digital technologies reduce transaction and information costs, thereby enhancing allocative efficiency (Levine, 1997; Beck, Levine, & Loayza, 2000). In advanced banking systems, digital financial inclusion captured through higher card penetration, mobile and internet banking transactions, and expanded deposit and borrower accounts improves screening, monitoring, and service delivery mechanisms. Berger (2003) argues that technological progress significantly enhances bank productivity and cost efficiency. More recent evidence suggests that digital banking adoption improves operational performance by lowering cost-to-income ratios and increasing non-interest income (Ozili, 2018; Vives, 2019; Philippon, 2016). Using cross-country banking data, the International Monetary Fund reports that digitally advanced banks in high income economies maintain stronger efficiency ratios despite compressed interest margins (IMF, 2023). Profitability effects of digital financial inclusion remain nuanced. On one hand, digital platforms enhance customer reach, increase transaction volumes, and facilitate fee-based income diversification (Demirgüç-Kunt et al., 2022). On the other hand, fintech competition and high technological investment costs can exert downward pressure on traditional banking margins (Claessens, Frost, Turner, & Zhu, 2018). Fuster, Plosser, Schnabl, and Vickery (2019) demonstrate that fintech-enabled credit platforms improve loan processing efficiency but also intensify competitive dynamics in advanced markets. Similarly, Thakor (2020) emphasizes that financial technology reshapes intermediation structures, affecting bank profitability depending on adaptation strategies. In high income economies, where account ownership exceeds 95% (World Bank, 2022), digital inclusion affects performance more through intensity of usage and revenue diversification than through access expansion. The stability implications of digital

financial inclusion generate mixed findings. Greater deposit diversification and enhanced liquidity monitoring can strengthen resilience, reflected in improved Z-scores and capital adequacy ratios (Beck, De Jonghe, & Schepens, 2014; Demirgüç-Kunt et al., 2022). Digital data analytics also enhance risk assessment and credit portfolio management (BIS, 2023). However, increased reliance on digital infrastructure exposes banks to cyber risk, operational disruptions, and systemic interconnectedness (Carstens, 2018; BIS, 2023). Philippon (2016) further argues that while financial technology increases efficiency, it may not proportionally reduce systemic vulnerabilities without effective regulatory oversight.

Institutional quality is consistently identified as a foundational determinant of financial performance. Legal origin theory and institutional economics literature establish that strong rule of law, regulatory quality, and supervisory effectiveness enhance financial development and banking stability (La Porta et al., 1998; Beck, Demirgüç-Kunt, & Levine, 2006; Acemoglu & Robinson, 2012). In high income economies, governance indicators from the World Bank Group show high levels of regulatory effectiveness and institutional stability (World Bank, 2023). Strong institutions facilitate innovation-friendly regulation, enforce cybersecurity compliance, and mitigate agency problems in digital finance (OECD, 2023). Claessens et al. (2018) argue that regulatory frameworks significantly shape the competitive and stability outcomes of fintech expansion. Conversely, excessive regulatory rigidity may dampen innovation incentives and reduce efficiency gains.

Despite substantial theoretical support linking digitalization and banking outcomes, empirical literature specifically examining high income economies remains limited. Most studies emphasize developing markets where financial inclusion gaps are pronounced (Sahay et al., 2020). In contrast, advanced economies exhibit near-universal access but heterogeneous digital usage intensity, making the performance implications of DFI more complex. Furthermore, limited research explicitly investigates how institutional quality moderates the DFI–BSP relationship within mature financial systems.

Overall, the literature suggests that digital financial inclusion can enhance banking sector efficiency and profitability while potentially strengthening or challenging stability, depending on regulatory and institutional conditions. However, empirical evidence focusing exclusively on high income economies and incorporating institutional quality as a moderating factor remains scarce. This gap motivates the present study to examine (i) the direct impact of digital financial inclusion on banking sector performance and (ii) the moderating role of institutional quality in shaping this relationship within high income economies.

Methodology

This study adopts a quantitative research design using secondary balanced panel data to examine the impact of Digital Financial Inclusion (DFI) on Banking Sector Performance (BSP) and the moderating role of Institutional Quality (INSTQ) in high income economies. The sample includes more than 45 high income countries classified by the World Bank Group based on GNI per capita, covering the period 2011–2021.

This timeframe captures rapid digital banking expansion and post-crisis regulatory strengthening in advanced economies (Sahay et al., 2020; Demirgüç-Kunt et al., 2022; IMF, 2023).

To ensure multidimensional measurement and reduce multicollinearity, Principal Component Analysis (PCA) is employed to construct composite indices. The DFI index aggregates indicators of access, usage, and infrastructure, including borrowers, deposit accounts, card penetration, mobile and internet banking transactions, and banking access points. BSP is constructed through PCA using three core dimensions established in banking literature (Berger, 2003; Beck et al., 2014): efficiency (net interest margin, non-interest income, cost-to-income ratio), profitability (ROA, ROE), and stability (Z-score, capital adequacy, liquidity ratios). Institutional Quality (INSTQ) is similarly derived using PCA from the six Worldwide Governance Indicators reported by the World Bank Group (World Bank, 2023), consistent with institutional theory (La Porta et al., 1998; Beck, Demirgüç-Kunt, & Levine, 2006). The empirical model includes standard macroeconomic controls GDP per capita, inflation, foreign bank presence, and trade openness identified as key determinants of banking performance in prior research (Ozili, 2018; Claessens et al., 2018; Vives, 2019). The PCA-based construction enhances dimensional consistency and strengthens the robustness of panel estimations assessing both the direct DFI–BSP relationship and the moderating effect of institutional quality in high income economies.

Econometric model

The study employs a panel data approach to examine the impact of digital financial inclusion (DFI) on banking sector performance (BSP) and the moderating role of institutional quality (INSTQ) in high income economies. PCA is used to construct composite indices for DFI, BSP (efficiency, profitability, stability), and INSTQ (six WGI dimensions). The general econometric model is specified as follows:

$$\text{BSP}_{(i,t)} = \alpha + \alpha_1 \text{BSP}_{(it-1)} + \beta_1 \, DFI_{(i,t)} + \gamma Z_{(i,t)} + \varepsilon_{(i,t)}$$
$$1$$

$$\text{BSP}_{(i,t)} = \alpha + \alpha_1 \text{BSP}_{(it-1)} + \beta_1 \, DFI_{(i,t)} + \beta_2 \big(INSTQ_{(i,t)} \big) + \gamma Z_{(i,t)} + \varepsilon_{(i,t)}$$
$$2$$

$$\text{BSP}_{(i,t)} = \alpha + \alpha_1 \text{BSP}_{(it-1)} + \beta_3 \big(DFI_{(i,t)} \times INSTQ_{(i,t)} \big) + \gamma Z_{(i,t)} + \varepsilon_{(i,t)}$$
$$3$$

Where: BSP represents banking sector performance index, DFI denotes Digital Financial Inclusion index, of Z is a vector of control variables, including, inflation, GDP per capita, foreign bank presence, and trade openness and ε_{it} is the idiosyncratic error term.

Description of Variable

The study examines Banking Sector Performance (BSP) as the dependent variable, measured as a PCA-based composite of efficiency, profitability, and stability indicators. Digital Financial Inclusion (DFI) serves as the key independent variable, constructed via PCA from access, usage, and infrastructure components. Institutional quality is

captured through PCA of the six Worldwide Governance Indicators. The model also controls for GDP per capita, trade openness, foreign bank presence, and inflation to account for macroeconomic and structural differences across high income economies.

Table no 1: Definition and operationalization of all variables

Variable Category	Variable name	Symbol	Measurement Indicator/Proxy	Source
Dependent variable	Banking Sector Performance (Composite index derived via PCA from three key dimensions i.e efficiency , profitability and stability; measured though the proxies)	BSP	Bank Net interest margin % , bank non-interest income to total asset %, bank Cost-to-income ratio, Return on Assets/ Equity , Z-score, Bank capital to total assets, Bank regulatory capital to risk-weighted assets, Liquid assets to deposits and short term funding	IMF FSI / Bankscope / Orbis / Bureau van Dijk
Independent variable	Digital Financial Inclusion (Composite index via PCA from Eight components)	DFI	Bank accounts per 1,000 adults, Bank branches per 100,000 adults, ATMs per 100,000 adults, Borrowers, Deposit accounts, Mobile and internet banking transactions Commercial banks, No of Credit/ debit cards	Financial Access Survey (FAS)
Moderating Variable	Institutional quality (index via PCA from Six indicators)	INSTQ	Control of Corruption, Government Effectiveness, Political Stability, Rule of Law, Regulatory Quality, and Voice and Accountability.	WGI
Control Variables	Trade Openness	Trade Openness	Ratio of total trade (exports + imports) to GDP	World Bank WDI / IMF
	GDP per capita	GDP per capita	Gross Domestic Production Per Capita	WDI / IMF
	Foreign bank presence	Foreign Bank	Foreign banks among total banks (%)	Global financial development
	Inflation	Inflation (CPI)	CPI annual inflation rate (%)	WDI / IMF

Estimation Technique

Given the dynamic nature of banking performance and potential endogeneity from reverse causality or omitted variables, the study employs the two-step System GMM estimator (Arellano & Bond, 1991; Arellano & Bover, 1995; Blundell & Bond, 1998). This approach is well-suited for panels with many cross-sectional units and relatively short time periods, combining equations in first differences and levels while using lagged values of explanatory variables as internal instruments to address simultaneity, dynamic persistence, and unobserved heterogeneity. To improve efficiency and correct finite-sample bias, the two-step estimator applies the Windmeijer (2005) robust standard error correction. Model validity is assessed via the Hansen J-test for overidentifying restrictions and the Arellano-Bond AR(1) and AR(2) tests for serial correlation. Additional robustness is confirmed using the one-step System GMM.

Results and Discussions
Descriptive Statistics
Table no 2 descriptive statistics of all variables of high income economies

Descriptive Statistics of High income economies					
Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
BSP	555	0.34089	1.24194	-11.141	13.6435
DFI	469	0.30941	1.80532	-0.204	11.4835
Trade Openness	698	1.18788	0.76847	0.23402	6.79233
Inflation (CPI)	869	0.78744	0.56739	0.000	3.43189
GDP per capita	836	10.4493	0.63037	7.56219	11.8128
Foreign Bank	869	0.25471	0.34527	0.000	1.000
INTQ_PCA	869	0.25953	2.26214	-4.9262	4.71304
DFI × INSTQ	869	-0.1419	1.08617	-10.901	1.53662

The descriptive statistics show that Banking Sector Performance (BSP) has a mean of 0.341 with a standard deviation of 1.242, indicating moderate variation in efficiency, profitability, and stability across high income economies. Digital Financial Inclusion (DFI) averages 0.309 but exhibits higher dispersion (SD = 1.805), reflecting substantial differences in digital banking adoption and usage intensity. Control variables suggest that trade openness is relatively high (mean = 1.188), while inflation is low and stable (mean = 0.787), consistent with the macroeconomic characteristics of advanced economies. GDP per capita shows limited variation (mean = 10.449, SD = 0.630), confirming the sample's focus on high income countries. Foreign bank presence averages around 25%, indicating partial but uneven penetration. Institutional quality (INTQ_PCA) is positive on average (0.260) with notable variability, while the interaction term between DFI and institutional quality shows a slightly negative mean (-0.142), reflecting heterogeneity in how institutional frameworks may moderate the impact of digital financial inclusion on banking performance. Overall, these statistics suggest sufficient variation in key variables to support panel regression analysis.

Model 1: Impact of Digital Financial Inclusion and Control Variables on Banking Sector Performance

Model 1; Examines the direct effect of digital financial inclusion (DFI) on banking sector performance (BSP), showing a significant positive impact, with foreign bank presence also enhancing performance.

Table 3 presents Two Step System GMM estimates of the effect of digital financial inclusion on banking sector performance.	
Dependent Variable: BSP	
Variables	Coefficient (P-Value)
L.BSP	0.2887*** (0.004)
DFI	0.4256** (0.040)
GDP per capita	0.2337 (0.146)
Inflation (CPI)	-0.0793 (0.569)
Foreign Bank	0.6778*** (0.010)
Trade Openness	0.1500 (0.155)
Constant	-0.2993214
Model Diagnostics	
Observations	389
Groups	44
Instruments	23
F-statistic	15.17
Prob > F	0.000
AR(1) p-value	0.041
AR(2) p-value	0.46
Hansen p-value	0.35
Source: **Author**	
Note: **Significance levels: ***p < 0.01, **p < 0.05, *p < 0.10.**	

In Model 1; Digital Financial Inclusion (DFI) has a statistically significant and positive effect on Banking Sector Performance (BSP) in high income economies (coef = 0.426, $p < 0.05$). This suggests that greater adoption of digital financial services enhances bank efficiency, profitability, and stability. This result aligns with recent evidence showing that digital finance can improve operational efficiency by lowering transaction and processing costs and expanding customer reach in advanced banking systems (Gomber et al., 2018; Khan et al., 2022). The strong positive coefficient on lagged BSP (0.289, $p < 0.01$) confirms performance persistence, consistent with banking dynamics observed in panel-based studies of advanced economies (Baltagi, 2021).

The positive and significant impact of foreign bank presence (coef = 0.678, $p < 0.01$) is consistent with the literature suggesting that foreign banks bring advanced technology, governance standards, and competitive discipline that can improve domestic banking performance in high income settings (Cull & Peria, 2013; Claessens & Van Horen, 2014). Other controls (GDP per capita, inflation, trade openness) are

insignificant, which corroborates findings that macroeconomic variation becomes less important than technological adoption in explaining bank performance in high income economies (Sahay et al., 2020; IMF, 2023). The AR(2) p-value (0.46) and Hansen J-test (0.35) indicate no second-order autocorrelation and valid instruments, confirming the reliability of the two-step System GMM estimates.

Model 2: Effect of Digital Financial Inclusion and Institutional Quality on Banking Sector Performance with Control Variables
Model 2; Adds institutional quality (INSTQ) to the model; DFI remains positive, while institutional quality is insignificant, suggesting strong governance in high income economies already supports performance

Table 4 shows Two Step System GMM estimates of the impact of digital financial inclusion and institutional quality on banking sector performance.	
Dependent Variable: BSP	
Variables	High Income
L.BSP	0.2675 (0.004)***
DFI	0.3516 (0.073)*
INTQ_PCA	0.0068 (0.839)
GDP per capita	0.1860 (0.310)
Inflation (CPI)	-0.0366 (0.809)
Foreign Bank	0.6049 (0.030)**
Trade Openness	0.1866 (0.122)
Constant	-2.641796(0.199)
Model Diagnostics	
Diagnostic Test	High Income
Observations	389
Groups	44
Instruments	27
F-statistic	12.62
Prob > F	0.000
AR(1) p-value	0.015
AR(2) p-value	0.435
Hansen test p-value	0.297
Source: **Author** Note: **Significance levels: ***p < 0.01, **p < 0.05, *p < 0.10.**	

In Model 2, while institutional quality (INSTQ_PCA) is positive, it is statistically insignificant (p = 0.839). However, digital inclusion (DFI) remains positive and marginally significant (p < 0.10), indicating that DFI continues to improve BSP even

when institutional quality is accounted for. This outcome resonates with studies showing that once institutional fundamentals reach a high threshold as they generally do in high income economies incremental improvements in institutional quality have limited additional impact (Beck & Laeven, 2006; Kaufmann et al., 2011). This supports recent findings that in advanced financial systems, digital infrastructure and technology adoption are more directly linked to performance than small variations in governance (Bongini et al., 2021). The continued significance of foreign bank presence ($p < 0.05$) underscores the ongoing role of international competition and technological transfer in supporting banking performance in advanced economies. AR(2) $p = 0.435$ and Hansen $p = 0.297$ confirm the validity and robustness of instruments.

Model 3: Interaction of Institutional Quality with Digital Financial Inclusion on Banking Sector Performance with Control Variables
Model 3; Tests the moderating effect of institutional quality (DFI × INSTQ); the interaction is insignificant, indicating that institutional quality does not significantly alter the impact of DFI on BSP in advanced economies.

Table 5 presents Two Step System GMM estimates of the moderation effect of institutional quality with digital financial inclusion on banking sector performance	
Dependent Variable: BSP	
Variable / Statistic	High Income
L.BSP	0.2906 (0.002)***
DFI × INSTQ	-0.0289 (0.335)
GDP per capita	0.0578 (0.634)
Inflation (CPI)	0.0486 (0.750)
Foreign Bank	0.2596 (0.113)
Trade Openness	0.0395 (0.577)
Constant	-1.0331 (0.448)
Model Diagnostics	
Observations	466
Groups	52
Instruments	24
F-statistic	17.03
Prob > F	0.000
AR(1) p-value	0.045
AR(2) p-value	0.482
Hansen test p-value	0.475
Source: **Author**	
Note: **Significance levels: ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$.**	

Model 3 tests the interaction between DFI and institutional quality. The coefficient for the interaction term (DFI × INSTQ) is negative and statistically insignificant (p = 0.335), indicating that institutional quality does not significantly moderate the relationship between DFI and BSP in high income economies. This suggests that in contexts with already strong governance foundations, additional institutional variation does not materially change how digital inclusion affects bank performance. This finding is supported by recent research arguing that once institutional quality surpasses a certain level, its moderating effect on technology adoption and financial performance diminishes (Arner et al., 2020; Zetzsche et al., 2020). AR(2) p = 0.482 and Hansen p = 0.475 confirm model validity and instrument reliability.

Overall, the empirical results provide strong support for the hypothesis that **digital financial inclusion** positively **influences banking sector performance in high income economies,** answering the first research question. This effect persists even after controlling for institutional quality and macroeconomic factors. For the second research question, the evidence suggests that **institutional quality does not significantly moderate the DFI–BSP relationship** in high income settings, likely because governance conditions are already advanced and relatively homogeneous across these economies. These findings are consistent with recent literature that highlights the central role of technology adoption rather than institutional variation in driving enhanced performance outcomes in digitally advanced banking systems (Gomber et al., 2018; Sahay et al., 2020; Khan et al., 2022).

Conclusion and Recommendations
Conclusion
This study examines the impact of digital financial inclusion (DFI) on banking sector performance (BSP) in high income economies, with a focus on the moderating role of institutional quality. The empirical results show that DFI significantly enhances BSP, primarily through efficiency, profitability, and stability channels, confirming the central role of technology adoption in advanced financial systems. Institutional quality, while theoretically important, does not significantly moderate this relationship, suggesting that in high income economies with robust governance frameworks, the incremental effect of institutions on the DFI–BSP link is limited. Overall, these findings underscore that digital financial services are a key driver of banking performance in technologically advanced and well-regulated financial environments, consistent with contemporary financial intermediation theory and recent literature (Gomber et al., 2018; Sahay et al., 2020; Khan et al., 2022).

Policy Implications
The findings have several implications for policymakers and regulators. First, promoting digital financial infrastructure such as mobile and internet banking, digital payments, and expanded access points remains critical for sustaining banking sector efficiency and profitability in high income economies. Second, although institutional

quality is generally strong in these economies, regulators should continue to maintain clear, innovation-friendly governance frameworks that safeguard cybersecurity and consumer protection without stifling digital innovation (Arner et al., 2020; Bongini et al., 2021). Third, encouraging foreign bank participation can further enhance performance through technology transfer and competitive pressures. Collectively, these measures can strengthen financial resilience while supporting inclusive and technologically advanced banking systems.

Recommendations for Future Research

Future research could explore several avenues to build on this study. First, longitudinal analysis of post-pandemic digital adoption trends could provide insights into how sudden technology shocks affect banking performance. Second, studies could incorporate fintech-specific indicators such as digital lending platforms, blockchain adoption, and AI-driven credit assessment to capture evolving dimensions of digital financial inclusion. Third, comparative studies across different levels of institutional quality or regulatory regimes could clarify the boundary conditions under which governance moderates the DFI–BSP relationship. Finally, integrating micro-level data on consumer usage and transaction behavior could provide a more granular understanding of how digital inclusion translates into financial performance and stability.

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