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Central Bank Regulatory Policy, FinTech Entrepreneurship, and Digital Financial Innovation in an Emerging Economy: Evidence from Jordan

Haya Awawdeh[1], Najwa Alsuwais[2]

[1] Department of Entrepreneurship, Faculty of Administrative and Financial Sciences, Irbid National University, Irbid, Jordan.
E-mail: h.awawdeh@inu.edu.jo, ORCID: https://orcid.org/0009-0002-7733-4685
[2] Department of Finance and Banking Science, Faculty of Administrative and Financial Sciences, Irbid National University, Irbid, Jordan.
E-mail: najwa.suwais@gmail.com, ORCID: https://orcid.org/0009-0006-7164-6302

Abstract
This study examines whether central bank regulatory policy is associated with digital financial innovation in an emerging economy and whether FinTech entrepreneurship transmits part of this relationship. Drawing on institutional and innovation-ecosystem perspectives, the study analyzes an anonymized cross-sectional survey matrix containing 159 valid responses from the Jordanian banking-FinTech context. Regulatory policy is represented by regulatory enablement, infrastructure and ecosystem facilitation, and incentives and capacity building; digital financial innovation is represented by product, process and technology, and business model and market innovation. Reliability, convergent validity, HTMT-based discriminant validity, common method diagnostics, standardized path analysis, and bootstrap mediation testing were applied. Regulatory policy has a positive total association with digital financial innovation (beta = 0.666, p < .001), is positively associated with FinTech entrepreneurship (beta = 0.387, p < .001), and retains a positive direct association with digital financial innovation after FinTech entrepreneurship is included (beta = 0.499, p < .001). FinTech entrepreneurship is also positively associated with digital financial innovation (beta = 0.431, p < .001). The indirect effect is significant (beta = 0.167, 95% bootstrap CI [0.093, 0.242]), indicating partial mediation. The findings show that central bank policy may support digital financial innovation through both direct institutional mechanisms and an indirect entrepreneurial pathway. The study extends institution-enabled innovation research with evidence from Jordan and offers implications for regulators, banks, and FinTech ventures in emerging financial ecosystems.

Keywords: regulatory policy; FinTech entrepreneurship; digital financial innovation; central bank regulation; banking innovation; Jordan; emerging economies; mediation analysis

1. Introduction

Digital financial innovation has become a central issue in business, economics, and finance because it changes how financial services are designed, delivered, governed, and accessed. Banks increasingly rely on digital platforms, automated processes, mobile financial services, data-enabled customer interfaces, and new business models. These developments are consistent with the broader literature showing that digital finance and FinTech reshape service delivery, competition, operational efficiency, and innovation opportunities in financial markets (Gomber et al. 2017; Lee and Shin 2018; Thakor 2020; Boot et al. 2021). Evidence from Jordanian banks likewise shows that digital financial technologies, particularly when combined with business intelligence capabilities, can strengthen digital entrepreneurship (Alsuwais et al. 2025).

The regulatory dimension is particularly important in emerging economies, where digital finance can expand access to financial services but may also raise concerns related to financial stability, cybersecurity, consumer protection, interoperability, data governance, and market readiness. In such contexts, central banks and financial regulators can act not only as supervisors but also as institutional enablers of responsible financial innovation. Regulatory sandboxes, innovation hubs, national financial inclusion strategies, and digital payment infrastructure may reduce uncertainty and provide banks and FinTech entrepreneurs with a clearer environment for experimentation and market development (Arner et al. 2017; Zetzsche et al. 2017; Feyen et al. 2023).

Jordan provides a relevant setting for studying this relationship. The Central Bank of Jordan has developed a financial technology and innovation agenda, including the Jo-FinTech Center and the regulatory sandbox known as JoRegBox. The Jo-FinTech Center is presented by the Central Bank of Jordan as an ecosystem-building initiative intended to

strengthen innovation and entrepreneurship in the financial and banking sector, while JoRegBox provides a controlled regulatory environment for testing digital financial applications (Central Bank of Jordan n.d.-a, n.d.-b). These initiatives indicate an effort to strengthen the digital financial ecosystem while maintaining regulatory oversight and financial stability (Central Bank of Jordan 2023).

Despite growing interest in FinTech regulation, the mechanisms linking regulatory policy to digital financial innovation in emerging economies remain insufficiently explained. Much of the literature treats regulation either as a constraint on innovation or as a background condition. Less attention has been paid to the entrepreneurial transmission mechanism through which regulatory clarity, infrastructure support, and capacity-building initiatives may stimulate FinTech entrepreneurship and, in turn, support innovation in banking products, processes, and business models.

This study addresses that gap by examining the relationship between regulatory policy, FinTech entrepreneurship, and digital financial innovation in Jordan. Instead of treating regulation only as a compliance constraint, the study conceptualizes regulatory policy as an institutional resource that may facilitate innovation directly and indirectly. The guiding research question is: To what extent does regulatory policy support digital financial innovation, and does FinTech entrepreneurship mediate this relationship?

The study contributes to the literature in three ways. First, it explains central bank regulatory policy as an institutional resource rather than only a compliance constraint. Second, it integrates institutional and innovation-ecosystem perspectives to identify FinTech entrepreneurship as a partial transmission mechanism between policy and digital financial innovation. Third, it provides evidence from Jordan and derives practical implications for regulators, banks, and FinTech ventures seeking to build a collaborative and innovation-supportive financial ecosystem.

The remainder of the article is organized as follows. Section 2 reviews the literature and develops the hypotheses. Section 3 explains the research design, measurement structure, analytical boundaries, and data analysis procedures. Section 4 presents the results. Section 5 discusses the findings and implications. Section 6 presents limitations and future research directions, and Section 7 concludes.

2. Literature review and hypotheses development

2.1 Digital financial innovation, FinTech ecosystems, and emerging economies

FinTech is commonly understood as the use of technology to provide, transform, or enable financial services. Prior research shows that FinTech has reshaped payments, lending, wealth management, customer interfaces, data analytics, and banking competition (Puschmann 2017; Gomber et al. 2017; Gai et al. 2018; Thakor 2020). In emerging economies, digital finance also carries a developmental dimension because it can improve financial inclusion, reduce transaction frictions, and widen access to formal financial services (Ozili 2018; Feyen et al. 2023).

Digital financial innovation in banking can take several forms. Product innovation includes digital wallets, mobile banking services, online lending interfaces, and new payment services. Process and technology innovation includes digital onboarding, automation, cybersecurity tools, data analytics, and integration with payment infrastructure. Business model and market innovation includes platform-based finance, partnerships with FinTech ventures, ecosystem-based services, and new market-access channels. These categories reflect the idea that financial innovation is not only a new product outcome but also a change in processes, technologies, business models, and institutional arrangements.

2.2 Theoretical foundation

Institutional theory explains how formal rules, normative expectations, and legitimacy shape organizational behavior (Scott 2014). In a highly regulated sector such as finance, central bank policy can reduce uncertainty, authorize controlled experimentation, coordinate infrastructure, and signal which forms of digital innovation are legitimate. Regulatory enablement, ecosystem facilitation, and capacity building can therefore be treated as institutional resources that influence whether banks and FinTech ventures invest in new products, processes, and business models.

An innovation-ecosystem perspective complements this institutional explanation because financial innovation depends on alignment among interdependent actors rather than on the capabilities of a single firm (Adner 2017; Lee and Shin 2018). Regulators shape the rules and infrastructure, banks provide market access and regulated delivery channels, and FinTech ventures contribute entrepreneurial experimentation and specialized technologies. Together, these perspectives imply two pathways: a direct policy pathway to digital financial innovation and an indirect pathway transmitted through FinTech entrepreneurship.

2.3 Regulatory policy and digital financial innovation

The relationship between regulation and innovation in finance is increasingly viewed as dynamic rather than purely restrictive. Although financial regulation traditionally focuses on stability, prudential soundness, market integrity, and

consumer protection, digital finance has expanded the role of regulators. Regulators now influence the conditions under which new technologies, platforms, and digital financial products can be tested and scaled. This is especially relevant for banks, which operate in highly regulated environments and may depend on regulatory clarity before adopting new digital processes or collaborating with technology-based financial ventures (Vives 2017; Arner et al. 2017; Zetzsche et al. 2017).

Regulatory policies that clarify acceptable practices, support infrastructure, and build capacity may reduce uncertainty and encourage banks to invest in digital innovations. Prior evidence suggests that FinTech innovation can create value and reshape competition in financial services, but its benefits depend on market structure, institutional readiness, and regulatory conditions (Buchak et al. 2018; Chen et al. 2019; Boot et al. 2021). In emerging economies, this relationship may be stronger because regulators often play a central role in infrastructure development and trust formation. Related evidence from Jordanian SMEs also indicates that governance-enabling managerial capabilities can improve financing credibility and outcomes, underscoring the value of capacity building alongside external regulatory support (Alrefai et al. 2026).

Based on this logic, the first hypothesis is proposed:

H1: Regulatory policy has a positive effect on digital financial innovation.

2.4 Regulatory policy and FinTech entrepreneurship

FinTech entrepreneurship refers to entrepreneurial activity directed toward creating, commercializing, and scaling technology-enabled financial services. Such ventures may introduce new service concepts, use data-driven delivery models, challenge incumbent business models, and form partnerships with banks and other financial institutions (Gozman et al. 2018; Haddad and Hornuf 2019; Jagtiani and Lemieux 2018). In emerging financial ecosystems, however, FinTech ventures may face barriers related to licensing, access to payment infrastructure, regulatory uncertainty, limited institutional trust, and limited collaboration with incumbent banks.

Supportive regulatory policies can reduce these barriers by defining market rules, enabling experimentation, facilitating access to infrastructure, and encouraging capacity-building initiatives (Philippon 2016; Arner et al. 2017; Feyen et al. 2023). Regulatory sandboxes and innovation hubs are particularly relevant because they allow innovators to interact with regulators and test financial solutions within controlled environments. In Jordan, JoRegBox similarly allows entrepreneurs and innovators to test digital financial products and services under Central Bank oversight within defined standards and controls (Central Bank of Jordan n.d.-b).

Accordingly, the second hypothesis is proposed:

H2: Regulatory policy has a positive effect on FinTech entrepreneurship.

2.5 FinTech entrepreneurship as a mediator

FinTech entrepreneurship may influence digital financial innovation through several channels. FinTech ventures can introduce new service concepts, provide technological capabilities, create competitive pressure, and form partnerships with banks. These mechanisms can help banks adopt digital products, improve processes, and experiment with new business models. However, the effect of FinTech entrepreneurship on banking-related innovation may depend on the regulatory environment, consumer trust, and the maturity of collaboration between banks and FinTech firms (Ryu 2018; Vives 2017; Chen et al. 2019). Recent evidence from FinTech-oriented digital ecosystems in Jordan further shows that digital entrepreneurship can transmit the effect of artificial intelligence capabilities into financial innovation, reinforcing its role as an innovation-conversion mechanism (Awawdeh et al. 2026).

The mediation logic of this study is therefore straightforward. Regulatory policy may directly support digital financial innovation by providing infrastructure, clarity, and institutional support. At the same time, regulatory policy may stimulate FinTech entrepreneurship, and such entrepreneurship may then contribute to digital financial innovation. This suggests a partial mediation process rather than a purely direct relationship, consistent with an institutional view in which regulation enables innovation through both direct infrastructure channels and indirect entrepreneurial mechanisms.

The following hypotheses are proposed:

H3: FinTech entrepreneurship has a positive effect on digital financial innovation.

H4: FinTech entrepreneurship mediates the relationship between regulatory policy and digital financial innovation.

3. Research methodology

3.1 Research design and analytical framework

This study adopts a quantitative cross-sectional survey design to examine the associations among central bank regulatory policy, FinTech entrepreneurship, and digital financial innovation in the Jordanian banking-FinTech

ecosystem. The empirical analysis uses 159 complete anonymized response cases measured through 35 five-point Likert-scale items. This design is appropriate for testing the proposed measurement structure and mediation pathway, while the cross-sectional nature of the evidence precludes causal or temporal claims.

The analysis focuses on construct-level relationships. Regulatory policy is modeled as an institutional antecedent, FinTech entrepreneurship as the mediating mechanism, and digital financial innovation as the outcome variable. The questionnaire items are reported in Appendix A to make the operationalization of each construct transparent.

3.2 Study context and data characteristics

The survey was designed for respondents with exposure to banking innovation, FinTech activity, digital financial services, or the regulatory and institutional dimensions of financial innovation in Jordan. The context is relevant because central bank initiatives, digital payment infrastructure, regulatory experimentation, and bank-FinTech collaboration have become central to financial-sector modernization.

Table 1. Sample and data characteristics

Sample information	Available description
Study context	Jordanian banking-FinTech ecosystem
Research design	Quantitative cross-sectional survey
Valid responses	159
Measurement format	35 coded Likert-type items
Personal identifiers	Not included in the coded matrix
Demographic variables	Not available in the coded dataset
Analysis level	Construct-level analysis
Subgroup comparisons	Not conducted

Table 1 summarizes the characteristics that can be verified from the anonymized matrix. Because the retained dataset does not contain a demographic profile, a sampling-frame identifier, or variables suitable for subgroup analysis, the study makes no claims about demographic representativeness and limits interpretation to construct-level associations within the available sample.

3.3 Questionnaire design and variable operationalization

The questionnaire included 35 five-point Likert-scale items assigned to seven first-order constructs. The measurement structure is aligned with the research model: regulatory policy is operationalized through regulatory enablement, infrastructure and ecosystem facilitation, and incentives and capacity building; digital financial innovation is operationalized through digital product innovation, process and technology innovation, and business model and market innovation; and FinTech entrepreneurship is modeled as the mediating construct. The full questionnaire items are provided in Appendix A.

The variable alignment is as follows: q1-q5 measure Regulatory Enablement (RE), q6-q10 measure Infrastructure and Ecosystem Facilitation (IEF), q11-q15 measure Incentives and Capacity Building (ICB), q16-q20 measure Digital Product Innovation (DPI), q21-q25 measure Process and Technology Innovation (PTI), q26-q30 measure Business Model and Market Innovation (BMMI), and q31-q35 measure FinTech Entrepreneurship (FTE). Therefore, the questionnaire items, coded dataset, reliability diagnostics, HTMT assessment, and mediation model use the same construct structure.

Table 2. Coded measurement structure

Domain	Code	Construct	Coded items
Regulatory policy	RE	Regulatory enablement	q1-q5
Regulatory policy	IEF	Infrastructure and ecosystem facilitation	q6-q10
Regulatory policy	ICB	Incentives and capacity building	q11-q15
Digital financial innovation	DPI	Digital product innovation	q16-q20
Digital financial innovation	PTI	Process and technology innovation	q21-q25
Digital financial innovation	BMMI	Business model and market innovation	q26-q30
Mediator	FTE	FinTech entrepreneurship	q31-q35

3.4 Data analysis procedure

The analysis proceeded in four stages. First, item scores were aggregated according to the prespecified measurement structure to obtain first-order constructs and the three main model composites. Descriptive statistics were then calculated for regulatory policy, FinTech entrepreneurship, and digital financial innovation. Second, reliability and convergent validity were assessed using Cronbach alpha, composite reliability, and average variance extracted (AVE), consistent with established measurement-model practice (Fornell and Larcker 1981; Hair et al. 2022). Third, discriminant validity and common method risk were examined using HTMT values, Harman single-factor variance, and full collinearity VIF values (Henseler et al. 2015; Podsakoff et al. 2003; Kock 2015). Fourth, standardized regression-based path analysis was used to estimate the direct relationships, and non-parametric bootstrapping was used to test the indirect effect (Preacher and Hayes 2008).

The analysis reports reliability, AVE, HTMT, collinearity, explained variance, and bootstrap mediation estimates. These diagnostics assess internal consistency, convergent validity, discriminant validity, and model-level collinearity within the coded matrix; they do not remove the limitations associated with a single-source, cross-sectional survey.

3.5 Ethical considerations

The analysis is based on an anonymized, voluntary, non-interventional survey matrix without personally identifying or sensitive information. Participants provided informed consent before completing the questionnaire. Formal institutional ethics approval was not obtained for the original anonymous survey. The dataset is treated as confidential, and only aggregate construct-level results are reported.

4. Results

4.1 Descriptive statistics

Table 3. Descriptive statistics for the main constructs

Construct	Mean	SD	Minimum	Maximum
Regulatory policy	3.725	0.446	2.60	4.73
FinTech entrepreneurship	3.497	0.564	2.00	4.80
Digital financial innovation	3.549	0.451	2.40	4.53

The mean scores are above the midpoint of the response scale, indicating generally positive perceptions of regulatory policy, FinTech entrepreneurship, and digital financial innovation among respondents in the coded dataset.

4.2 Reliability and convergent validity

Table 4. Reliability and convergent validity of first-order constructs

Code	Construct	Items	Cronbach alpha	Composite reliability	AVE
RE	Regulatory enablement	q1-q5	0.746	0.832	0.498
IEF	Infrastructure and ecosystem facilitation	q6-q10	0.805	0.865	0.563
ICB	Incentives and capacity building	q11-q15	0.787	0.854	0.540
DPI	Digital product innovation	q16-q20	0.766	0.843	0.520
PTI	Process and technology innovation	q21-q25	0.760	0.841	0.515
BMMI	Business model and market innovation	q26-q30	0.804	0.866	0.566
FTE	FinTech entrepreneurship	q31-q35	0.785	0.853	0.539

All Cronbach alpha values exceed 0.70 and all composite reliability values exceed 0.80, indicating acceptable internal consistency. AVE values are above 0.50 for most constructs. The AVE for regulatory enablement is marginally below 0.50 (0.498), but the construct is retained because its composite reliability is acceptable, the value is very close to the conventional threshold, and the construct is theoretically central to the model. This borderline result is reported transparently and should not be overstated.

4.3 Discriminant validity and common method diagnostics

Table 5. HTMT discriminant validity matrix

Construct	RE	IEF	ICB	DPI	PTI	BMMI	FTE
RE	1.000						
IEF	0.868	1.000					
ICB	0.477	0.597	1.000				
DPI	0.464	0.691	0.821	1.000			
PTI	0.472	0.480	0.699	0.813	1.000		
BMMI	0.574	0.484	0.570	0.708	0.614	1.000	
FTE	0.293	0.383	0.543	0.667	0.611	0.720	1.000

All HTMT values are below 0.90, which supports discriminant validity among the first-order constructs. The highest value is between regulatory enablement and infrastructure and ecosystem facilitation, which is theoretically expected because both constructs represent regulatory policy mechanisms.

Table 6. Common method and collinearity diagnostics

Diagnostic	Result	Interpretation
Harman single-factor variance	29.2%	Below the 50% diagnostic threshold
Full collinearity VIF: regulatory policy	1.801	Below 3.3
Full collinearity VIF: FinTech entrepreneurship	1.641	Below 3.3
Full collinearity VIF: digital financial innovation	2.507	Below 3.3

Harman single-factor variance is below 50%, and the full collinearity VIF values are below the conservative 3.3 threshold, providing no indication of a dominant single factor or severe model-level collinearity. These diagnostics reduce, but do not eliminate, concern about common method variance in a single-source cross-sectional design; this limitation is considered again in Section 6.

4.4 Structural model and mediation analysis

The structural model supports the hypothesized associations. Regulatory policy explains 15.0% of the variance in FinTech entrepreneurship (R2 = 0.150), while regulatory policy and FinTech entrepreneurship jointly explain 60.1% of the variance in digital financial innovation (R2 = 0.601).

Table 7. Structural path results

Hypothesis	Path	Beta	SE	t-value	p-value	Decision
H1	RP -> DFI	0.499	0.055	9.105	< .001	Supported
H2	RP -> FTE	0.387	0.074	5.259	< .001	Supported
H3	FTE -> DFI	0.431	0.055	7.853	< .001	Supported

Table 8. Mediation results

Effect	Beta	SE	95% bootstrap CI	p-value	Interpretation
Total effect: RP -> DFI	0.666	0.060	N/A	< .001	Positive total effect
Direct effect: RP -> DFI	0.499	0.055	N/A	< .001	Direct effect remains significant
Indirect effect: RP -> FTE -> DFI	0.167	0.041	[0.093, 0.242]	< .001	Partial mediation

Notes to Tables 7 and 8: RP = regulatory policy; FTE = FinTech entrepreneurship; DFI = digital financial innovation.

Coefficients are standardized. The bootstrap confidence interval for the indirect effect excludes zero, supporting H4. Because the direct effect remains significant after FinTech entrepreneurship is included, the mediation is partial rather than full. The indirect effect represents approximately 25.1% of the total standardized association (0.167/0.666), indicating that regulatory policy is associated with digital financial innovation through both direct institutional mechanisms and an entrepreneurial pathway.

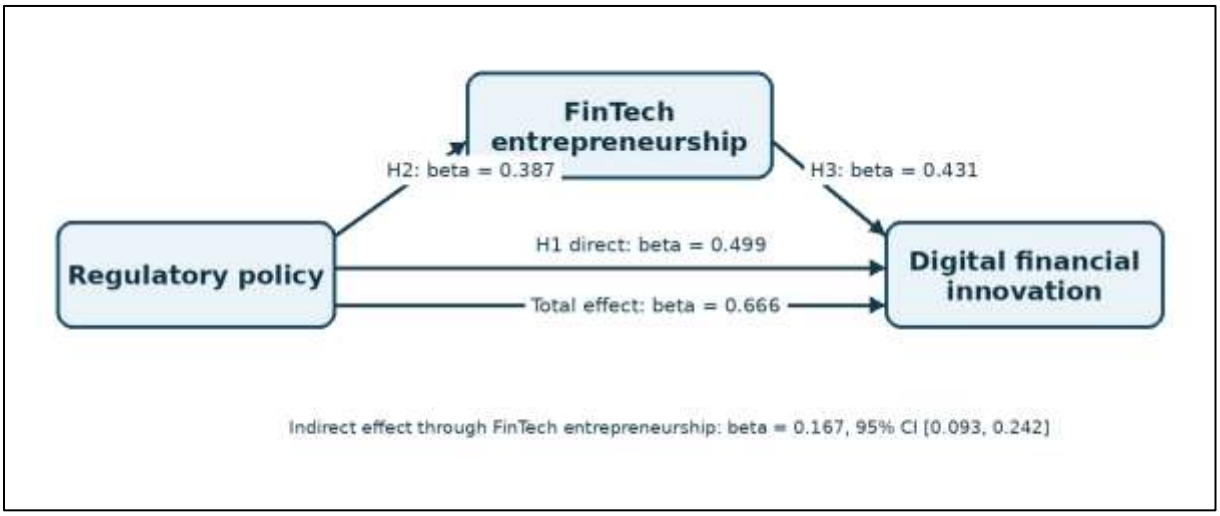

Figure 1. Structural mediation model and standardized path estimates

5. Discussion

The results show that central bank regulatory policy is positively associated with digital financial innovation in Jordan. This supports the argument that regulation can function as an enabling institution rather than solely as a compliance constraint. In an emerging economy, regulatory clarity, infrastructure facilitation, and capacity-building initiatives may give financial institutions the legitimacy and confidence needed to adopt digital products, improve technological processes, and develop innovative financial business models.

The results also show that FinTech entrepreneurship partially mediates the relationship between regulatory policy and digital financial innovation. This means that regulation supports innovation not only directly but also by strengthening the entrepreneurial mechanisms through which digital financial solutions are created and introduced into the financial ecosystem. The finding is important because it avoids overstating the role of FinTech entrepreneurship as the only driver of innovation. Instead, it suggests that the relationship is ecosystem-based: regulatory policy, banks, and FinTech ventures jointly shape innovation outcomes.

For Jordan, the findings are consistent with the view that financial innovation is likely to develop through a bank-FinTech-regulator ecosystem. Central bank initiatives such as innovation hubs, regulatory sandboxes, and financial technology support structures may increase confidence among market participants and reduce uncertainty. The partial mediation result indicates that the direct role of regulatory policy remains strong, which may reflect the bank-centered nature of the financial system and the importance of regulator-led infrastructure in shaping digital finance.

5.1 Theoretical implications

The study contributes to institutional theory by showing how central bank policy can operate as a formal enabling institution for digital financial innovation (Scott 2014). It also advances the innovation-ecosystem perspective by identifying FinTech entrepreneurship as a mechanism that partially transmits policy support into innovation outcomes (Adner 2017). The evidence from Jordan therefore links regulatory institutions, interdependent ecosystem actors, and entrepreneurial action within one empirical model.

The partial mediation result is theoretically meaningful. It implies that regulatory policy does not operate only through one channel. It can influence innovation directly by shaping infrastructure, rules, and institutional confidence, while also influencing innovation indirectly by supporting entrepreneurial experimentation and market entry. This finding is consistent with ecosystem perspectives on FinTech, where innovation depends on the interaction among regulators, incumbents, new ventures, and digital infrastructure.

5.2 Policy and managerial implications

For regulators, the findings suggest that innovation-oriented regulation should combine clarity, controlled experimentation, infrastructure support, and capacity-building initiatives. Regulatory sandboxes and innovation centers are most useful when they are integrated into a broader policy architecture that supports market readiness, consumer protection, cybersecurity, and financial stability.

For banks, the results indicate that digital innovation can be strengthened through structured collaboration with FinTech ventures and by using regulatory initiatives as opportunities for controlled experimentation and service

improvement. For FinTech entrepreneurs, the findings highlight the value of regulatory engagement, institutional trust, and partnerships with banks when scaling new technologies. This recommendation is consistent with evidence that digital entrepreneurship can translate digital marketing capabilities into sustainable financial growth in Jordanian banks (Awawdeh et al. 2025).

6. Limitations and future research

This study has limitations. First, the retained anonymized matrix does not include verified demographic variables, a population sampling frame, or information suitable for response-rate and subgroup analysis. The study therefore cannot assess demographic representativeness or compare respondents by gender, age, position, education, or experience. Its findings should be interpreted as construct-level associations within the available Jordanian banking-FinTech sample.

Second, the cross-sectional design does not allow causal claims over time. The study tests theoretically grounded associations and mediation pathways, but it cannot establish temporal ordering in the same way as longitudinal data. Future research could use panel data, repeated survey waves, regulatory event studies, or qualitative process tracing to examine whether regulatory initiatives lead to subsequent innovation outcomes.

Third, the study focuses on Jordan, so future research could compare Jordan with other emerging economies to identify whether similar regulatory mechanisms apply across different institutional contexts. Future research may also examine additional mediators and moderators, such as bank-FinTech collaboration intensity, digital readiness, regulatory maturity, cybersecurity capability, consumer trust, and financial inclusion orientation. These variables may explain when and how FinTech entrepreneurship strengthens the relationship between regulatory policy and digital financial innovation.

7. Conclusion

This study examined the relationships among central bank regulatory policy, FinTech entrepreneurship, and digital financial innovation in Jordan. Based on 159 valid coded survey responses, regulatory policy is positively associated with digital financial innovation and FinTech entrepreneurship, and FinTech entrepreneurship is positively associated with digital financial innovation. Bootstrap analysis further indicates that FinTech entrepreneurship partially mediates the policy-innovation relationship.

Digital financial innovation in an emerging economy is therefore best understood as an ecosystem outcome shaped jointly by regulatory institutions, entrepreneurial activity, and financial-sector digital transformation. The findings support a dual-pathway explanation: central bank policy is linked to innovation directly through rules, infrastructure, and institutional confidence, and indirectly through FinTech entrepreneurship. Subject to the study's cross-sectional and sampling limitations, the model offers useful evidence for regulators, banks, and FinTech ventures seeking to develop responsible and innovation-supportive financial ecosystems.

Appendix A. Questionnaire items

The questionnaire used a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The items below operationalize the seven constructs used in the measurement model and correspond directly to the coded variables q1-q35 analyzed in the study.

Code	Construct	Questionnaire item
q1	Regulatory Enablement (RE)	Central bank regulations provide clear guidance for adopting digital financial services.
q2	Regulatory Enablement (RE)	Regulatory requirements reduce uncertainty for banks and FinTech firms when introducing digital innovations.
q3	Regulatory Enablement (RE)	The regulatory environment supports responsible experimentation with new financial technologies.
q4	Regulatory Enablement (RE)	Central bank policies balance innovation support with financial stability and consumer protection.
q5	Regulatory Enablement (RE)	Regulatory clarity encourages financial institutions to invest in digital financial innovation.
q6	Infrastructure and Ecosystem Facilitation (IEF)	Digital payment infrastructure in Jordan supports the development of innovative financial services.

Code	Construct	Questionnaire item
q7	Infrastructure and Ecosystem Facilitation (IEF)	The financial ecosystem provides sufficient institutional support for FinTech development.
q8	Infrastructure and Ecosystem Facilitation (IEF)	Regulatory initiatives facilitate collaboration between banks and FinTech firms.
q9	Infrastructure and Ecosystem Facilitation (IEF)	Innovation hubs and regulatory sandboxes help financial institutions and FinTech firms test new solutions.
q10	Infrastructure and Ecosystem Facilitation (IEF)	Existing financial infrastructure enables banks and FinTech firms to scale digital services effectively.
q11	Incentives and Capacity Building (ICB)	Capacity-building programs improve institutional readiness for digital financial innovation.
q12	Incentives and Capacity Building (ICB)	Training and awareness initiatives support the adoption of FinTech solutions in the financial sector.
q13	Incentives and Capacity Building (ICB)	Regulatory or institutional incentives encourage banks and FinTech firms to develop innovative financial solutions.
q14	Incentives and Capacity Building (ICB)	Policy initiatives help financial institutions build digital transformation capabilities.
q15	Incentives and Capacity Building (ICB)	Knowledge-sharing initiatives strengthen skills related to digital finance and FinTech entrepreneurship.
q16	Digital Product Innovation (DPI)	Banks and financial institutions have introduced new digital financial products or services.
q17	Digital Product Innovation (DPI)	Mobile banking and online financial services have improved product innovation in the banking sector.
q18	Digital Product Innovation (DPI)	Digital wallets and electronic payment solutions have expanded financial service options.
q19	Digital Product Innovation (DPI)	Financial institutions are developing more customer-oriented digital financial products.
q20	Digital Product Innovation (DPI)	Digital product innovation has increased the variety of financial services available to customers.
q21	Process and Technology Innovation (PTI)	Banks use digital technologies to improve internal operational processes.
q22	Process and Technology Innovation (PTI)	Automation has improved the efficiency of financial service delivery.
q23	Process and Technology Innovation (PTI)	Digital onboarding and electronic verification have improved banking processes.
q24	Process and Technology Innovation (PTI)	Data analytics supports better design and delivery of financial services.
q25	Process and Technology Innovation (PTI)	Technology adoption has improved the speed and quality of banking operations.
q26	Business Model and Market Innovation (BMMI)	Banks are adopting new business models based on digital platforms.
q27	Business Model and Market Innovation (BMMI)	Partnerships with FinTech firms create new market opportunities for financial institutions.
q28	Business Model and Market Innovation (BMMI)	Digital channels help banks and financial institutions reach new customer segments.
q29	Business Model and Market Innovation (BMMI)	Financial institutions are developing ecosystem-based digital business models.
q30	Business Model and Market Innovation (BMMI)	Digital innovation has changed how banks create and deliver value to customers.
q31	FinTech Entrepreneurship (FTE)	FinTech entrepreneurs introduce new digital financial solutions to the market.

Code	Construct	Questionnaire item
q32	FinTech Entrepreneurship (FTE)	FinTech ventures contribute to innovation in banking and financial services.
q33	FinTech Entrepreneurship (FTE)	Entrepreneurial FinTech activity encourages banks to adopt new technologies.
q34	FinTech Entrepreneurship (FTE)	FinTech startups support collaboration and experimentation in the financial ecosystem.
q35	FinTech Entrepreneurship (FTE)	FinTech entrepreneurship strengthens digital transformation in financial services.

Declarations

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Author contributions: N.A. conceptualized the study, developed the model, conducted the analysis, and wrote the original draft. H.A. contributed to the literature review, theoretical development, interpretation of results, and manuscript revision. Both authors reviewed and approved the final manuscript.

Data availability: The anonymized coded dataset used in this study is available from the corresponding author upon reasonable request. The dataset contains coded Likert-type responses only and does not include personally identifying information. The questionnaire items used for construct operationalization are reported in Appendix A.

Ethics approval and consent to participate: Formal institutional ethics approval was not obtained for the original anonymous, voluntary, non-interventional survey. No personally identifying or sensitive information was collected, and informed consent was obtained before questionnaire completion.

Consent for publication: Not applicable.

Use of AI-assisted tools: An AI-assisted writing tool was used to support language editing, structural organization, consistency checking, and document formatting. The authors reviewed and edited the manuscript and take full responsibility for the final content.

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