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The contribution of fintech and E-commerce startups to economic growth in the context of digital disruption (The Case of Algeria)

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Abstract---This study explores the impact of FinTech and e-commerce startups on Algeria's economic growth and digital disruptions during the period from 1990 to 2023. Using an ARDL model. It examines the effects of digital innovation startups on GDP; findings show initial negative impacts due to transitional costs but highlight Algeria's capacity to adapt and capitalize on these innovations in the long run. Employment in FinTech positively contributes to growth over time, and the economy demonstrates resilience, quickly returning to equilibrium. Key recommendations include policies to manage labor transitions, invest in human capital, and improve digital infrastructure for sustainable growth.

Keywords---Digital Disruption, FinTech, E-Commerce, Startups, Economic Growth, Employment,

مساهمة المؤسسات الناشئة في مجال التكنولوجيا المالية والتجارة الإلكترونية في النمو الاقتصادي في ظل الاضطراب الرقمي
(حالة الجزائر)

المخلص:

تستكشف هذه الدراسة تأثير المؤسسات الناشئة في مجال التكنولوجيا المالية والتجارة الإلكترونية على النمو الاقتصادي في الجزائر واضطرابات الرقمية خلال الفترة بين 1990 و2023، باستخدام نموذج ARDL. تفحص الدراسة تأثير الابتكار الرقمي على الناتج المحلي الإجمالي؛ حيث أظهرت النتائج تأثيرات سلبية في البداية بسبب تكاليف الانتقال، لكنها أبرزت قدرة الجزائر على التكيف والاستفادة من هذه الابتكارات على المدى الطويل. كما يساهم التوظيف في قطاع التكنولوجيا المالية بشكل إيجابي في النمو بمرور الوقت، ويظهر الاقتصاد مرونة من خلال العودة السريعة إلى التوازن. تتضمن التوصيات الرئيسية سياسات لإدارة انتقال العمالة، والاستثمار في رأس المال البشري، وتحسين البنية التحتية الرقمية لتحقيق نمو مستدام.

الكلمات المفتاحية: الاضطراب الرقمي، التكنولوجيا المالية، التجارة الإلكترونية، المؤسسات الناشئة، النمو الاقتصادي.

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Introduction

The global economic landscape is undergoing a period of rapid transformation driven by digital technologies. This wave of digital disruption is particularly impactful in developing economies like Algeria, where traditional economic structures are being challenged by the emergence of innovative business models and digitally-driven sectors (Lee & Shin, 2018). In particular, the rise of financial technology (Fintech) and electronic commerce (E-commerce) startups presents both significant opportunities and challenges for economic growth in these contexts.

Despite government initiatives to diversify Algeria's hydrocarbon-dependent economy, the nation still grapples with issues like unemployment, financial exclusion, and a challenging business environment (Kuckertz et al., 2020). While anecdotal evidence suggests a positive correlation between the growth of the digital economy and economic development, robust empirical research quantifying this relationship specifically within the Algerian context remains limited.

This study aims to address this gap by conducting a comprehensive quantitative analysis of the impact of Fintech and E-commerce startups on economic growth in Algeria. By examining key indicators of startup activity within these sectors and their relationship with macroeconomic indicators, this research aims to provide evidence-based insights for policymakers, investors, and entrepreneurs alike. This study aims to address the following objectives:

1. Quantify the direct relationship between the growth of Fintech and E-commerce startups and economic growth in Algeria.
2. Analyze the indirect contributions of Fintech and E-commerce startups to economic growth through spillover effects on financial inclusion and ecosystem development.
3. Identify and examine the key mediating factors that influence the relationship between Fintech/E-commerce startup activity and broader economic growth in Algeria.

Based on the above, the main research question can be formulated as follows:

1. What is the direct impact of Fintech and E-commerce startup growth on economic growth indicators in Algeria?
2. To what extent do Fintech and E-commerce startups contribute to the development of a broader digital ecosystem in Algeria?

By addressing these questions, this study aims to contribute valuable insights into the transformative potential of digital disruption in driving economic growth within Algeria, offering a data-driven roadmap for harnessing the full potential of Fintech and E-commerce startups.

Literature Background and Hypothesis

Digital Disruption, Economic Growth, and Startups

Digital transformation and startups are not only essential, but they also grasp the key to boosting economic development in today's corporate scenery. As (Shaydullaeva Sobirjonovna & Zaynidinova Sayfiddin Qizi, 2021) fact out, digital transformation and disruptive thinking also open up new avenues for businesses to expand their operations and increase profits. The rapid expansion of startups is not just about generating jobs, but also about fostering innovation and benefiting economies globally (Moinoddin, 2019). The shift to a digital economy presents many opportunities for businesses adopting new technologies, and thus requires the creation of regional ecosystems that facilitate the activities of digital startups (Thomas et al., 2019). Local stakeholders must guide these ecosystems to bypass traditional political constraints. Startups also improve services for consumers and businesses (Silva & Mamede, 1 C.E., 2022). As the digital economy expands, its impact on market disruption and economic progress has become more significant. A large body of research confirms the ability of digital technology to boost economic development. (Lee & Shin, 2018) argue that digital disruption, characterized by the rapid development and acceptance of new technologies, has stimulated the formation of new sectors and business models, especially within the startup ecosystem. (Deleon Frisnedi et al., 2022) argue that traditional economic growth theories, which focus on capital and labor, must evolve to include the roles of innovation, technology diffusion, and entrepreneurial activities in economic development (Margiansyah, 2020). Digital disruption significantly impacts economic development by fostering innovation and competing with existing market participants. Startups use digital technology to create innovative goods and services, often focusing on unexplored industries, increasing competition and improving customer choice (Silva & Mamede, 1 C.E.). This disruption goes beyond traditional industries, addressing social challenges such as the gender wage gap by enabling high-value firms to reform market structures and promote economic inclusion (Berre, 2024). Moreover, digital entrepreneurs are gradually moving to rural areas, boosting local development and enhancing competitiveness compared to urban centers (Wuth, 2023).

Digital startups, with their rapid development competences, often challenge traditional business models, forcing incumbents to either change or risk becoming obsolete (Gut, 2023). This forces incumbents to adopt strategic responses that allow them to remain competitive in the face of digital disruption. While digital disruption provides opportunities for growth and innovation, it also poses challenges to traditional businesses striving to survive in a changing world.

Fintech and E-commerce as Drivers of Growth

In the context of digital disruption, Fintech and E-commerce have become essential drivers of economic development, especially in emerging nations (Fridayani & Chiang, 2022). Fintech innovations enhance financial services, hence improving financial inclusion, access to credit, and transaction efficiency (Lo, 2022). E-commerce has revolutionized corporate operations, broadening markets and enhancing productivity (Hadi & Sutono, 2024).

These technologies have shown significant advantages for micro, small, and medium companies (MSMEs) as well as creative sectors. According to (Hilda &

Gusti, 2024), fintech promotes financial innovation, enhances inclusiveness, and optimizes shopping efficiency, consequently allowing MSMEs to get funding and access broader markets (Homepage et al., 2020). This leads to increased sales and improved financial performance (Hasyim et al., 2022.). Importantly, research using Input-Output analysis indicates that investment in Sharia e-commerce and fintech subsectors has the potential to significantly enhance national economic growth and labor income (Barata,2019).

Nonetheless, obstacles remain. (Hilda & Gusti, 2024) highlight issues with data security, regulatory intricacies, and fierce market competitiveness. Furthermore (Hasyim et al., 2022) observe an insufficiency of proper socialization and training for entrepreneurs in the use of these technologies. Notwithstanding these challenges, fintech and e-commerce remain essential catalysts for economic expansion and financial inclusion.

The Role of Startups in Digital Transformation

Fintech and e-commerce solutions, particularly those using digital technology, encounter challenges to advancement owing to the innovation and agility of entrepreneurs. (Kuckertz et al., 2020) contend that nascent enterprises often serve as catalysts for digital transformation by introducing creative concepts that challenge established industries and generate unexplored niches. Moreover, as (Wright et al., 2017) indicate, startups significantly contribute to economic growth by using their unique attributes and functioning inside specialized ecosystems.

Paulo José Albuquerque de Melo et al. (2023) assert that startups play a crucial role in digital transformation across several industries under Industry 4.0(Albuquerque De Melo et al., 2023). These companies facilitate the implementation of novel technologies, resulting in innovation and market upheaval (Lisa et al., 2020). Startups must prioritize digital transformation, agility, and customer-centricity to thrive in the digital era, as highlighted by (Stephen Joel et al., 2024). According to Stephen Joel et al. (2024), ecosystem participation and cooperation are essential for the dissemination of knowledge and resources.

(Basu, 2020)posits that the Indian startup ecosystem serves as a trial for startups' capacity to assist the government and institutions in their digital transformation. Nevertheless, entrepreneurs must surmount several obstacles to using Industry 4.0 technologies. Paulo José Paulo José Albuquerque de Melo et al. (2023)) advocate for more research to ascertain the possibilities and challenges in this domain.

Mediating Factors Influencing Startup Impact

The relationship between Fintech and E-commerce startup activity and broader economic growth is not always straightforward or guaranteed. Several mediating factors can influence the extent to which these startups contribute to economic development. These factors include, but are not limited to, government policies and regulations, the availability of funding and investment, the level of digital infrastructure development, and consumer adoption and trust in digital solutions (Leong et al., 2017).

Conceptual Model and Hypothesis

Based on the aforementioned literature, this study proposes a conceptual model that posits a positive relationship between the growth of Fintech and E-commerce startups and economic growth in Algeria. This relationship is hypothesized to be mediated by a set of contextual factors specific to the Algerian ecosystem.

Hypothesis: Increased activity within the Fintech and E-commerce startup sectors in Algeria will have a positive and significant impact on economic growth, contingent upon the influence of mediating factors such as government policies, access to funding, and consumer adoption of digital technologies.

To answer the sub-questions, the following research hypothesis will be formulated:

FinTech and E-commerce startups substantially advance the evolution of a comprehensive digital ecosystem in Algeria by cultivating digital infrastructure, improving financial inclusion, and facilitating the incorporation of conventional industries into the digital economy.

This study aims to empirically test this hypothesis through a quantitative analysis of relevant data from the Algerian economy. By examining the specific contributions of Fintech and E-commerce startups, this research seeks to inform policy decisions and guide investments to foster a thriving digital economy in Algeria.

Research Methodology

Sample and data collection

This research used data on fintech and e-commerce companies in Algeria from 1999 to 2022, sourced from the World Bank's yearly datasets. The statistics on fintech and e-commerce companies include factors like the number of firms founded. Additional macroeconomic metrics, such as gross domestic product (GDP) and employment rates, were sourced from the World Bank database (World Bank Data, 2022). The main objective of this research is to analyze the impact of fintech and e-commerce businesses on economic growth in Algeria. The study assesses the capacity of digital disruption to stimulate economic development via the integration of new technology in the Algerian economy. Additionally, the research used the ARDL model (Pesaran & Shin, 1995; Hashem Pesaran et al., 2001), estimated using Eviews12 software, and the quantitative econometric technique.

Variables

This study used GDP per capita (GDP), standardizing the data to account for scale variations, as a proxy measure for economic growth in accordance with similar studies. The exogenous variables are the number of fintech startups (fintech) and the number of e-commerce startups (com), which signify the extent of fintech activities and the expansion of e-commerce in Algeria, respectively. To mitigate biases in our estimated model stemming from omitted variables, additional

variables are incorporated to control for the potential influences of other growth-determining factors, as established in prior research: gross fixed capital formation (invest) to reflect the investment level in the economy, and employment rate (emp) to consider labour market dynamics crucial for comprehending the role of startups in job creation and overall economic growth. (Table I)

Table I. Descriptive statistics summary of the research variables

Variable	Obs	Mean	Std. Dev.	Min	Max
GDP	34	0.7895	2.4870	-6.6317	5.0675
EMP	34	45.4209	1.1096	42.8240	47.1540
INVEST	34	3.6408	6.7077	-9.2114	20.8749
ECOM	34	11.6992	22.0558	0.0000	68.0945
FINTECH	34	0.5444	0.1217	0.3483	0.8300

Source: Descriptive statistics summary prepared by authors.

Estimating model

This research examines the influence of fintech and e-commerce companies on Algeria's economic development via an econometric model based on endogenous growth theory. The model asserts that economic development is influenced by internal characteristics rather than an external technical growth rate, as shown in neoclassical models (Romer, 2011). Jhingan (2011) asserts that the endogenous growth model emphasizes technical advancement as a function of investment rates and capital stock, including human capital. This model analyzes the impact of fintech and e-commerce companies as catalysts for economic development via their contributions to the digital economy.

The econometric model is expressed as:

$$GDP_t = \beta_0 + \beta_1 FINTECH_t + \beta_2 ECOM_t + \beta_3 INVEST_t + \beta_4 EMP_t + \epsilon_t$$

Where:

GDP_t : The GDP per capita, serving as the dependent variable (economic growth) for year t;

$FINTECH_t$: The total number of fintech startups, representing the independent variable for fintech sector growth in year t;

$ECOM_t$: The total number of e-commerce startups in year t;

$INVEST_t$: The gross fixed capital formation, which represents capital investment in Algeria's economy;

EMP_t : The employment rate, included as a control variable to capture the labor market's contribution to economic growth;

ϵ_t : The error term.

This model aims to quantify the influence of digital disruption particularly through the expansion of fintech and e-commerce startups on Algeria's economic growth. By incorporating these variables, the study measures how these innovative sectors contribute to economic development within the framework of endogenous growth theory.

Results

Testing the Stationarity of the Time Series for the Study Variables (Unit Root Test)

One prerequisite for establishing cointegration is testing whether or not time series data is stationary. When the variables display integration of order $I(0)$, $I(1)$, or a mix of the two, the Autoregressive Distributed Lag model is used (Atif et al., 2010). The Augmented Dickey-Fuller test and the Phillips-Perron (PP) test were used to determine whether the series was stationary (Dickey & Fuller, 1981; Perron, 1988). (Table II).

Table II: Stationarity Test Results

At Level					
	INVEST	GDP	FINTECH	EMP	ECOM
t-Statistic	-3.6815	-3.5714	-2.5119	-2.2532	-0.8475
Prob.	0.0092	0.0120	0.1219	0.1925	0.7920
	***	**	n0	n0	n0
t-Statistic	-3.6202	-3.5176	-2.4644	-2.9177	-1.9564
Prob.	0.0433	0.0539	0.3423	0.1701	0.6027
	**	*	n0	n0	n0
t-Statistic	-2.7733	-3.3647	0.0295	-0.1902	-0.3859
Prob.	0.0071	0.0014	0.6851	0.6101	0.5373
	***	***	n0	n0	n0
At First Difference					
	d(INVEST)	d(GDP)	d(FINTECH)	d(EMP)	d(ECOM)
t-Statistic	-12.6185	-9.7286	-5.7345	-8.0520	-4.9771
Prob.	0.0000	0.0000	0.0000	0.0000	0.0003
	***	***	***	***	***
t-Statistic	-22.8574	-9.9970	-5.6270	-8.5634	-5.5072
Prob.	0.0000	0.0000	0.0003	0.0000	0.0005
	***	***	***	***	***
t-Statistic	-11.5566	-9.7714	-5.8126	-7.9735	-4.8905
Prob.	0.0000	0.0000	0.0000	0.0000	0.0000
	***	***	***	***	***

Source: Stationarity Test Results by authors using Eviews 12.

The Phillips-Perron test findings indicate that INVEST and GDP are stationary at the level $I(0)$, but FINTECH, EMP, and ECOM achieve stationarity after first differencing $I(1)$. These results indicate the use of ARDL modelling to address the mixed order of integration.

Lag Selection Test

The optimal time lags are determined by testing the Akaike information criterion, Hannan and Schwarz's (1978) information criterion (Chow Wai Yip William, 1998)(Figure I).

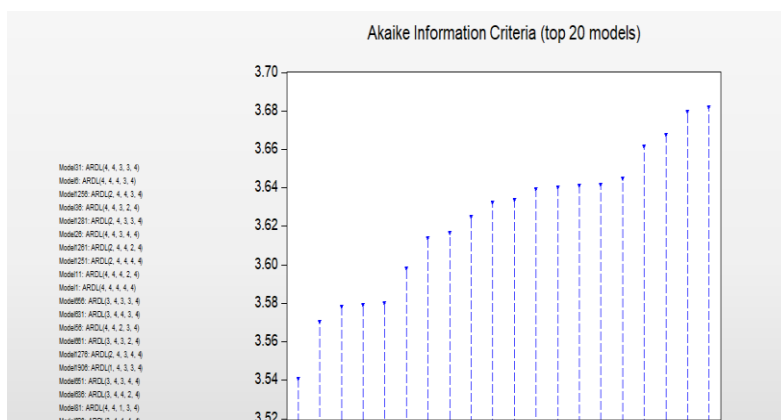


Figure I: Determination of Optimal Lag Length

Source: Determination of Optimal Lag Length by authors using Eviews 12

Figure one illustrates the Akaike Information Criterion (AIC) for the top 20 ARDL model specifications, with the minimum AIC value of around 3.52 signifying the optimal model fit. As the Akaike Information Criterion (AIC) grows, the model fit deteriorates, aiding in the identification of the most suitable Autoregressive Distributed Lag (ARDL) structure for your investigation.

Cointegration Test Using the Bounds Approach

The Bounds Test evaluates the existence of a long-term equilibrium connection between the dependent variable and the independent variables in the model (Pesaran et al., 2001). (Table III)

Table III: Cointegration Test Results

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic k	4.186938 4	Asymptotic: n=1000		
		10%	2.2	3.09
		5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37
Actual Sample Size	30	Finite Sample: n=30		
		10%	2.525	3.56
		5%	3.058	4.223
		1%	4.28	5.84

Source: Cointegration Test Results by authors using Eviews 12.

According to Table III, The F-Bounds test indicates an F-statistic of 4.1869, above the threshold value at the 5% significance level for the limited sample (3.058 for

I(0) and 4.223 for I(1)). This indicates the presence of a long-term relationship among the variables in your ARDL model.

Estimation of the ARDL Model and Error Correction Model (ECM)

To select the optimal lag lengths for the variables in the model estimation, we relied on the HQIC criterion (Morimune & Mantani, 1995). Based on this criterion, the appropriate model is ARDL (4,4,3,4). The estimation results are presented as follows:

Table IV: Long-Run Relationship Estimation Results

Levels Equation Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INVEST	0.464218	0.135528	3.425267	0.0111
FINTECH	-0.798182	3.373527	-0.236602	0.8197
EMP	1.754175	0.826249	2.123059	0.0714
ECOM	0.075715	0.031288	2.419931	0.0461
C	-80.26955	37.01702	-2.168450	0.0668
EC = GDP - (0.4642*INVEST - 0.7982*FINTECH + 1.7542*EMP + 0.0757 *ECOM - 80.2696)				

Source: Long-Run Relationship Estimation Results by authors using Eviews 12.

The estimated findings from the output indicate significant correlations among the variables of investment (INVEST), fintech (FINTECH), employment (EMP), and e-commerce (ECOM) in their contribution to GDP within the model.

Investment (INVEST): The coefficient is positive (0.464218) and statistically significant at the 5% level (p-value = 0.0111). This indicates that investment has a substantial and beneficial influence on economic development. An increase of one unit in investment results in a 0.464-unit rise in GDP, underscoring the significant impact of investment on financial performance.

The coefficient for fintech is negative (-0.798182) and lacks statistical significance (p-value = 0.8197). This suggests that fintech does not have a statistically significant influence on economic development under this model. The coefficient indicates a possible negative correlation; however, this finding is not sufficient to draw conclusions about fintech's impact on economic development.

The employment coefficient is positive (1.754175) and marginally significant at the 10% level (p-value = 0.0714). This outcome underscores the positive influence of employment on GDP; however, the effect lacks sufficient statistical strength to assert significance at the customary 5% threshold. An increase of one unit in employment correlates with a 1.75-unit rise in GDP, emphasizing the significance of employment in promoting economic development.

The coefficient for e-commerce is positive (0.075715) and statistically significant at the 5% level (p-value = 0.0461). This signifies that e-commerce has a substantial and favourable influence on GDP, with a one-unit rise in e-commerce resulting in a 0.0757-unit boost in GDP. Internet commerce is a significant catalyst for economic development, presumably owing to its enhancement of efficiency and market expansion.

Estimation of the Error Correction Model

Table V: Error Correction Model Estimation Results

ECM Regression Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	0.279568	0.173800	1.608556	0.1517
D(GDP(-2))	0.136293	0.136821	0.996146	0.3524
D(GDP(-3))	0.305147	0.162366	1.879375	0.1023
D(INVEST)	0.059586	0.041999	1.418721	0.1989
D(INVEST(-1))	-0.488717	0.108681	-4.496796	0.0028
D(INVEST(-2))	-0.256695	0.091695	-2.799454	0.0265
D(INVEST(-3))	-0.159591	0.052089	-3.063784	0.0182
D(FINTECH)	-10.91354	2.494342	-4.375318	0.0033
D(FINTECH(-1))	-5.174704	2.279158	-2.270446	0.0574
D(FINTECH(-2))	-4.159235	2.434910	-1.708168	0.1314
D(EMP)	0.646703	0.438481	1.474871	0.1837
D(EMP(-1))	-1.844567	0.620195	-2.974171	0.0207
D(EMP(-2))	-0.523493	0.353463	-1.481041	0.1821
D(ECOM)	-0.012024	0.020026	-0.600407	0.5672
D(ECOM(-1))	-0.124060	0.026961	-4.601534	0.0025
D(ECOM(-2))	-0.114199	0.034948	-3.267666	0.0137
D(ECOM(-3))	-0.199975	0.037285	-5.363422	0.0010
CointEq(-1)*	-1.543950	0.235271	-6.562442	0.0003
R-squared	0.936779	Mean dependent var	0.225457	
Adjusted R-squared	0.847217	S.D. dependent var	2.670142	
S.E. of regression	1.043691	Akaike info criterion	3.207113	
Sum squared resid	13.07149	Schwarz criterion	4.047832	
Log likelihood	-30.10670	Hannan-Quinn criter.	3.476066	
Durbin-Watson stat	1.941666			

Source: Error Correction Model Estimation Results by authors using Eviews 12.

According to the findings shown in Table five, the following observations can be made:

The error correction term (ECT) is markedly negative and statistically significant, suggesting that the model adjusts by about 154%, with significance at the 1% level. This indicates a technique for rectifying long-term aberrations, indicating that divergences from the long-term economic trajectory are rectified swiftly. In the realm of FinTech startups, this rapid adaptation signifies that the industry and the economy may promptly rebound from transient disturbances induced by technology or market fluctuations.

The lagged values of GDP are mostly insignificant, with only the third lag approaching significance. This indicates that while historical GDP figures are relevant, they do not significantly affect the present GDP levels. This tenuous association indicates that the growth trajectory of the economy is likely more affected by modern variables, such as investments, employment, and the rise of

FinTech technologies, rather than a significant reliance on historical GDP performance.

The variable INVEST in the first lag demonstrates a substantial adverse effect on GDP in the near run. This outcome is rather paradoxical since one would anticipate that investments, particularly in industries such as FinTech, would have a beneficial influence on GDP. The negative coefficient may signify inefficiencies or a delay in the actualization of investment benefits. Initial investments may incur costs or need modifications that briefly depress GDP before yielding advantages in later times.

The coefficients for the FINTECH variable and its lags demonstrate substantial negative effects on GDP. This is unexpected since one would anticipate FinTech technologies to have a beneficial impact on economic development. This outcome may indicate disruptive short-term impacts, whereby the rapid emergence of FinTech companies might temporarily replace existing sectors or incur transitory economic losses. Ultimately, these companies may provide efficiency improvements; nevertheless, the immediate effects might include adjustment costs for the labour market or financial institutions.

The first leg of EMP has a favourable and considerable effect on GDP. This corresponds with forecasts since rises in employment often foster economic development. An expanded workforce, especially in innovative industries such as FinTech, may enhance productivity, foster entrepreneurship, and stimulate consumption, all of which contribute to GDP development. The importance of the first lag suggests that job growth has a delayed influence on GDP.

Unexpectedly, ECOMMERCE has a negative and substantial effect on GDP in the present era and both lagged periods. This may be attributed to e-commerce's disruptive characteristics, which might be supplanting conventional retail sectors and causing temporary economic dislocations. Moreover, in countries with nascent digital infrastructure, the first phases of e-commerce may incur elevated expenses (e.g., expenditures in technology and logistics) prior to achieving favourable returns on GDP growth.

These results emphasize the variables' importance in both the short and long terms and the relevance of the error-correcting process in restoring long-term balance after short-term disruptions.

Diagnostic Tests for the Model

Once the model has been estimated, it is essential to verify that the model is not affected by any econometric difficulties in order to assure the accuracy and reliability of the parameter estimations. In order to confirm this, we carried out a sequence of diagnostic tests for the Error Correction Model (Alogoskoufis & Smith, 1991). The results are displayed in the following manner:

Table VI: Diagnostic Tests for the Model

Test	Test Name	Statistic	Value	P-Value
Serial Correlation	Breusch-Godfrey LMLags	F-Statistique	0.668862	0,55
Heteroscedasticity	ARCH	Chi2	0.31	0.98
Model Specification	Ramsey RESET	F-Statistique	2.49233	0.1655

Source: Diagnostic Tests for the Model Results by authors using Eviews 12.

The Breusch-Godfrey LM test (p-value = 0.55) and the ARCH test indicate that the model is free from serial correlation and heteroscedasticity since both tests fail to reject the null hypothesis. The Ramsey RESET test (p-value = 0.1655) further corroborates the model's functional specification, suggesting the absence of severe econometric issues inside the model.

Normality Test

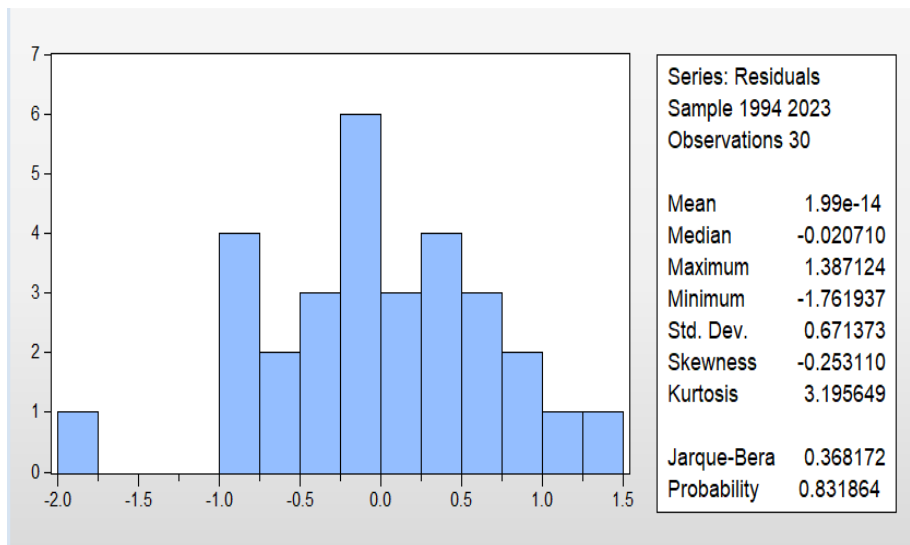


Figure 1: Normality Distribution

Source: Normality Distribution Results by authors using Eviews 12.

The results of the normalcy distribution show that the Jarque-Bera statistic is 0.37, which suggests that the model's parameters follow a normal distribution. Furthermore, the p-value is nearly 80%, providing additional evidence in favour of the distribution's normality.

Structural Stability of the Model's Parameters:

To assess the structural stability of the estimated model parameters, we utilized the Cumulative Sum of Residuals (CUSUM) test and the Cumulative Sum of Squares of Residuals (CUSUM SQ) test (Zeileis et al., 2005). These tests assess the stability of the parameters over the sample period.

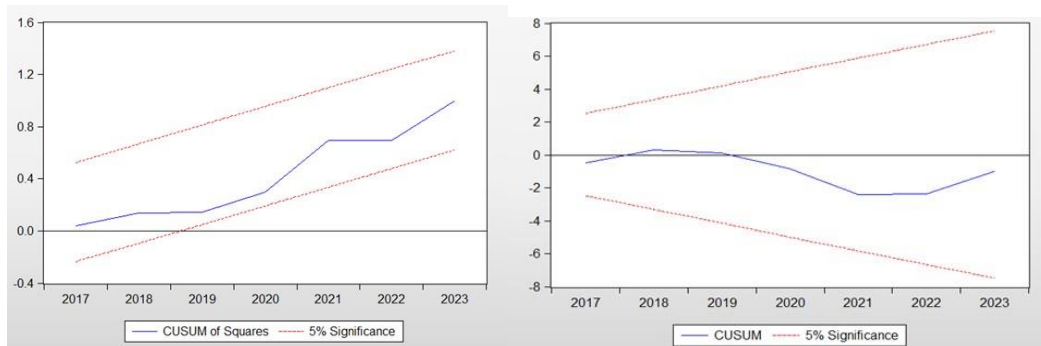


Figure III: Structural Stability of the Model's Parameters

Source: Structural Stability of the Model's Parameters Results by authors using Eviews 12.

The provided figure clearly shows that the model stays inside the crucial constraints at the 5% significance level in the first figure. Despite encountering some instability, the model ultimately reverted to its original form, as evidenced by the Cumulative Sum of Squares of Residuals (CUSUM SQ). Thus, we confirm the null hypothesis, showing that the model has structural stability.

Discussion

The results of the present research investigating the premise that heightened activity in the Fintech and E-commerce startup sectors in Algeria would favourably influence economic development are assessed as follows:

The short-term disruptions revealed in this research, whereby both fintech and e-commerce negatively affected GDP, correspond with prior literature indicating that technology breakthroughs might initially induce disruptions. This discovery aligns with Gut's (2023) findings, which highlight that digital entrepreneurs disrupt conventional business models, often replacing established firms. Transitional costs are prevalent since the fast growth of digital startups necessitates the reorganization of established industries prior to the realization of new technological advantages (Thomas et al., 2019). Thus, the theory is partly validated. However, it recognizes the short-term economic disturbances characteristic of the innovation adoption period.

The swift economic adjustment shown by the substantial negative error correction term (ECT) corroborates the dynamic nature of Algeria's economy amidst the growth of fintech and e-commerce. This discovery corroborates Lee and Shin (2018), who emphasized the rapid emergence of new business models and industries in reaction to digital disruption. The capacity to rapidly regain equilibrium during disturbances is essential for sustained economic stability, indicating that fintech companies provide an atmosphere that promotes flexibility and resilience.

Employment as a catalyst for development was seen to have a delayed but favourable influence on economic expansion, especially in the fintech industry. This highlights the significance of human capital development, along with

Moinoddin (2019), who contends that startup growth encompasses not just job creation but also the promotion of creativity. The observed delayed effect may indicate the time needed for human capital investment to completely enhance economic development, underscoring the need for long-term investment in skills to optimize the economic advantages of digital innovation.

The study's policy implications, along with Berre (2024) and Wuth (2023), advocate for alleviating the immediate adverse effects of technology adoption while promoting conditions that nurture both conventional and innovative sectors. Their study indicates that a collaborative approach across regional ecosystems and local stakeholders is crucial to circumvent conventional political limitations and foster economic inclusion via digital entrepreneurs.

The study's results corroborate a portion of the hypothesis, particularly the positive and large influence of fintech and e-commerce on long-term economic development, which is dependent on certain mediating elements. Fridayani and Chiang (2022) and Lo (2022) similarly underscore the revolutionary impact of fintech on enhancing financial inclusion, credit accessibility, and operational efficiency, which are critical components of economic development.

The mediating impact of government regulations, financing accessibility, and consumer acceptance identified in the present research is corroborated by Leong et al. (2017), who contend that regulatory frameworks and consumer behaviour profoundly influence the degree of digital technology adoption. Hilda and Gusti (2024) and Hasyim et al. (2022) highlight the problems related to data security, legislation, and market rivalry, which all affect the effectiveness of fintech and e-commerce developments.

The results corroborate prior research, validating the idea that fintech and e-commerce activities have a favourable influence on long-term economic development, despite short-term disruptions. The research highlights the significance of mediating elements such as governmental backing, investment in digital infrastructure, and consumer acceptance to fully use the promise of fintech and e-commerce. Policymakers are urged to cultivate both conventional and novel sectors, advance digital skills development, and bolster regional ecosystems to guarantee a balanced and inclusive economic transition. This nuanced approach, which stresses the importance of investment in digital infrastructure, fits with the findings of other studies, highlighting that digital transformation and financial inclusion are essential for sustained economic development in developing nations such as Algeria.

Conclusion

This study highlights the revolutionary impact of FinTech and e-commerce firms on Algeria's economic environment, notwithstanding the hurdles these industries now encounter. Although digital disruption has resulted in adverse short-term effects on GDP, mostly owing to the transitory expenses linked to the adoption of new technologies and the replacement of conventional businesses, the data suggest a swift ability for economic adjustment. This resilience enables Algeria to

capitalize on innovation in the long run, contingent upon the implementation of suitable policies.

Findings

- The immediate adverse effects of FinTech and e-commerce on GDP signify the transitory expenses of digital disruption, yet the swift rectification of economic anomalies indicates that Algeria can adeptly adjust to these transformations.
- The expansion of employment in the FinTech industry has a lagged but favourable impact on economic development, underscoring the need to invest in human capital to maximize the advantages of digital innovation.
- The substantial negative error correction term (ECT) signifies that the economy may rapidly revert to equilibrium, which is essential in a context marked by frequent disruptions and changes stemming from technological breakthroughs.
- The findings highlight the intricate link between technology innovation and economic development, especially in the near term, when disruptive impacts may obscure the long-term advantages of industries such as FinTech and e-commerce.

Recommendations

- Policymakers must prioritize mitigating short-term disruptions linked to technological innovation by facilitating labour market transitions, promoting skills development, and investing in human capital to equip the workforce for a swiftly evolving economic landscape.
- Improving digital infrastructure and fostering a conducive environment for both conventional and innovative sectors is crucial for the expedited and effective realization of FinTech and e-commerce advantages.
- By reconciling immediate challenges with the strategic incorporation of digital technologies and supportive policies, Algeria can establish a foundation for sustainable, long-term economic growth that benefits all societal sectors.

These ideas seek to cultivate an inclusive economic landscape that bolsters both conventional and innovative sectors, guaranteeing that digital advancements favourably impact Algeria's economic development and diversification initiatives. Through the use of digital infrastructure and the enactment of conducive policies, Algeria might potentially reshape its economic framework and attain sustainable development.

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