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Exploración de la interacción entre el crecimiento del dinero en sentido amplio, la expansión financiera y la conectividad digital: Implicaciones para el crecimiento económico en las economías desarrolladas, en desarrollo y emergentes

Exploring the Interplay of Broad Money Growth, Financial Expansion, and Digital Connectivity: Implications for Economic Growth Across Developed, Developing, and Emerging Economies

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Resumen

Este estudio examina el impacto del crecimiento del dinero en sentido amplio, la inclusión financiera y la conectividad digital en el crecimiento del PIB en las economías desarrolladas, en desarrollo y emergentes desde 1994 hasta 2022. Utilizando datos del Banco Mundial y Jamovi para el análisis estadístico, la investigación emplea estadísticas descriptivas, correlación y análisis de regresión para explorar las relaciones entre estas variables. Los resultados muestran que el crecimiento del dinero en sentido amplio está positivamente correlacionado con el crecimiento del PIB, con efectos más fuertes en los mercados emergentes. La inclusión financiera, medida por la titularidad de cuentas, y la conectividad digital, indicada por las suscripciones a teléfonos móviles y el uso de Internet, también contribuyen significativamente al crecimiento económico, especialmente en entornos menos estables. Estas conclusiones subrayan la importancia de ampliar los servicios financieros y la infraestructura digital para impulsar el desarrollo económico. Los responsables políticos deben dar prioridad a la inclusión financiera y la conectividad digital para mejorar los resultados económicos, especialmente en las economías en desarrollo y emergentes.

Palabras claves: Inclusión financiera, conectividad digital, crecimiento económico, crecimiento monetario amplio, análisis comparativo.

Abstract

This study examines the impact of broad money growth, financial inclusion, and digital connectivity on GDP growth in developed, developing, and emerging economies from 1994 to 2022. Using World Bank data and Jamovi for statistical analysis, the research employs descriptive statistics, correlation, and regression analysis to explore the relationships between these variables. The results show that broad money growth is positively correlated with GDP growth, with stronger effects in emerging markets. Financial inclusion, as measured by account ownership, and digital connectivity, as indicated by mobile phone subscriptions and internet usage, also contribute significantly to economic growth, especially in less stable environments. These findings underscore the importance of expanding financial services and digital infrastructure to drive economic development. Policymakers should prioritize financial inclusion and digital connectivity to improve economic performance, especially in developing and emerging economies.

Key words: Financial Inclusion, Digital Connectivity, Economic Growth, Broad Money Growth, Comparative Analysis



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1. Introducción

Financial expansion and digital connectivity have emerged as key drivers of economic growth, particularly in the globalized economy of the 21st century. However, the impact of these factors varies across economic contexts. In developed economies, mature financial systems and advanced digital infrastructure have long facilitated sustained economic growth by increasing investment, consumption, and overall economic efficiency (Le et al., 2019). In the United States and Japan, for example, the expansion of broad money supply and digital access has contributed to stable and moderate economic growth, supported by well-regulated financial markets and a comprehensive digital infrastructure. Studies show that digital financial services (DFS) and information and communication technology (ICT) have significantly boosted financial inclusion and economic development, particularly in developed countries such as the United States, where technological advances and favorable regulatory environments have improved financial access (Nnaomah et al., 2024). Research has shown that the development of digital economies in countries has significantly improved market efficiency and productivity (Zhang et al., 2021).

In contrast, developing and emerging economies often face greater volatility in financial conditions and disparities in digital infrastructure development, as evidenced by greater fluctuations in broad money growth and financial inclusion indices (Myovella et al., 2020). Zambia and Malawi, for example, show significant variation in financial inclusion levels, while China and Brazil show uneven patterns of digital adoption that affect their economic trajectories. Research shows that digital technologies, such as internet access and mobile communications, significantly boost economic performance by improving access to markets, information, and financial services, but their effectiveness is influenced by factors such as institutional quality, regulatory frameworks, and the degree of digital penetration in each economic classification (Bukht & Heeks, 2017). Zhang et al. (2021) also argue that the development of China's digital economy has significantly boosted regional productivity, although this impact is uneven across the country's regions. Similarly, financial expansion, which includes broad money supply growth and expanded access to financial services, has a more pronounced impact on GDP growth in economies with higher financial volatility, as found in empirical studies of developing and emerging markets (Salahuddin & Gow, 2016).

While these factors are individually important for promoting economic growth, existing research has yet to comprehensively examine the extent to which financial expansion and digital connectivity interact across different economic classifications. This study aims to fill these gaps by examining the combined effects of these variables on GDP growth, thereby contributing to a more holistic understanding of their role in economic development. In particular, Horobet et al. (2022) highlight the relationship between financial development, digitalization, and education, showing that the interdependence between these factors drives growth, particularly in European economies, emphasizing the importance of integrating education with digital and financial development. Recent studies have highlighted the critical role of digital banking in driving financial inclusion and economic growth, particularly in emerging markets, where mobile banking has expanded rapidly to serve underserved populations (Nnaomah et al., 2024).

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This study examines the impact of broad money growth, financial inclusion, and digital connectivity on economic growth in developed, developing, and emerging economies. It assesses how changes in money supply, financial access, and digital adoption-measured by indicators such as Internet usage and mobile phone subscriptions-affect GDP growth. By analyzing these interactions, the study provides a comparative perspective on their role in economic development. Using regression analysis, the study quantifies these relationships while controlling for confounding factors. It builds on the findings of Sharma and Díaz Andrade (2023), who highlight the role of digital financial services in promoting economic development, particularly in underserved regions. The study aims to provide valuable insights into how financial and digital advances promote growth in different economic contexts.

This study is important because it fills gaps in the literature on the combined effects of financial expansion and digital connectivity on economic growth. While previous research has largely examined these factors separately, this study provides a more integrated perspective by analyzing their joint impact on GDP growth in different economic contexts. It also considers the need for new metrics tailored to developing countries to accurately measure the contribution of the digital economy, as highlighted by Oloyede et al. (2023). In addition, the study highlights the importance of digital financial services in promoting financial inclusion, particularly in regions with limited banking infrastructure, such as sub-Saharan Africa. By incorporating evidence from diverse economic environments, this research provides a more nuanced understanding of how financial and digital advances interact to drive economic growth.

2. Literature Review

Theoretical Framework

This study is based on three key theories: monetary theory, financial inclusion theory, and digital economy theory. Monetary theory focuses on the relationship between money supply, inflation, and economic activity. It posits that fluctuations in the money supply affect economic growth, interest rates, and overall economic performance. As highlighted by Le et al. (2019), growth in the money supply, particularly broad money, plays a central role in stimulating economic activity, although the effect varies across different economic classifications.

Financial inclusion theory addresses the importance of ensuring that financial services are accessible to all segments of society. Ozili (2020) argues that inclusive financial systems enable individuals and businesses to participate in the economy by reducing barriers such as financial literacy and access. Financial inclusion promotes higher levels of savings, investment and consumption, which together drive economic growth.

Digital economy theory examines how digital technologies, including e-commerce, fintech, and digital infrastructure, are transforming business practices and economic interactions. According to Bukht and Heeks (2017), the rise of the digital economy has had a profound impact on productivity and market expansion, particularly in emerging and developing economies where digital access is expanding rapidly.

Monetary Growth and Economic Growth

A growing body of literature highlights the relationship between monetary expansion and economic growth. Monetary theory suggests that increased money supply can stimulate economic activity by lowering interest rates and encouraging borrowing and investment. For example, Salahuddin and Gow (2016) found that increased money supply had a positive impact on GDP growth in South Africa. Similarly, studies by Le et al. (2019) in Asia and Ahmad et al. (2021) in China show that monetary growth can boost economic development, especially in regions experiencing financial expansion. Literature also shows variability in the impact of monetary expansion across economic contexts. In developed economies, where financial systems are more stable, the impact of broad money growth tends to be moderate but steady (Le et al., 2019). In contrast, developing and emerging economies experience more volatile effects due to their less mature financial systems (Myovella et al., 2020). This study contributes to the literature by examining how broad money growth affects GDP in developed, developing, and emerging economies, providing a comparative analysis that addresses this gap in existing research.

Financial Inclusion and Economic Growth

The impact of financial inclusion on economic growth is another well-studied area in the literature. Ozili (2020) and Huang et al. (2024) highlight that access to financial services increases economic activity by improving savings and investment opportunities. Ahmad et al. (2021) show that digital financial inclusion has a strong positive impact on economic growth in China, a trend similarly observed by Liu et al. (2021) in regions with high internet penetration. According to Pucha Medina et al. (2024), the importance of the microfinance sector has grown significantly in recent decades, with microfinance institutions (MFIs) emerging as an important tool in the fight against poverty in developing countries. These institutions are essential in providing financial services to vulnerable communities and promoting financial inclusion in regions with limited access to traditional banking systems. In the context of Ecuador's popular and solidarity sector, Pucha Medina et al. (2024) emphasize that internal controls in MFIs are critical to their stability and sustainability, ensuring that these institutions can effectively contribute to financial inclusion and long-term economic development. Robust internal control systems not only strengthen the financial position of these institutions, but also build public trust, helping them to fulfill their mission of serving vulnerable communities. This underscores the importance of microfinance institutions in the financial inclusion process, particularly in developing countries, where they help meet the financial needs of marginalized populations. However, the literature lacks comprehensive studies that examine the role of financial inclusion across different economic classifications. This study aims to address this by comparing how financial inclusion affects economic growth in developed, developing, and emerging economies. In particular, it examines whether the positive effects observed in China and other emerging economies hold true for developed economies with more mature financial infrastructures.

Digital Connectivity and Economic Growth

Digital connectivity has become a cornerstone of economic development in the digital age. Research by Myovella et al. (2020) shows that digital technologies, including internet access and mobile communications, are key drivers of economic growth. Their study, which com-pares sub-Saharan Africa and OECD economies, highlights the differential impact of digital infrastructure across levels of development. Similarly, Feng and Qi (2024) found that broad-band expansion in Asian countries has led

to significant economic gains, underscoring the im-portance of investing in digital infrastructure. The impact of digital financial services (DFS) and information and communication technolo-gies (ICT) on financial inclusion and economic growth has also been widely studied, particu-larly in comparative studies across economies. In the United States, Nnaomah et al. (2024) note that digital banking has flourished due to advanced infrastructure and regulatory sup-port, ensuring widespread financial access. In contrast, in Nigeria, mobile banking and digital payments have expanded rapidly to meet the needs of remote and underserved populations, driven by demand for accessible financial services. Zhang et al. (2021) highlight how digital infrastructure and integration in China have significantly boosted regional productivity, alt-hough development remains uneven, with eastern regions advancing faster in both digital progress and its impact on productivity. In Sub-Saharan Africa, Esely and Taonezvi (2024) argue that digital financial inclusion fosters a bidirectional relationship with economic devel-opment, enhancing the effectiveness of monetary policy transmission and stimulating regional growth. In addition, Sharma and Díaz Andrade (2023) emphasize the broader role of DFS in human development, noting that factors such as contextual conditions, technological capabili-ties, and financial literacy are critical for promoting inclusive growth, particularly in under-served areas. While the individual impacts of digital connectivity and financial expansion are well docu-mented, limited research has examined how these factors interact with one another. Most studies have focused on them in isolation (Shofawati, 2019; Xun et al., 2020), leaving a gap in understanding their combined effect on economic growth across diverse economic con-texts. This study seeks to address this gap by analyzing how digital connectivity, alongside financial inclusion and broad money growth, contributes to GDP growth in developed, developing, and emerging economies.

Gaps in Literature

Despite the growing body of research on financial inclusion and digital connectivity, comparative analyses across economic classifications remain sparse. Qu et al. (2017) and Jiang et al. (2021) suggest that a global perspective is needed to understand how the effects of financial expansion and digital infrastructure differ across developed, developing, and emerging economies. Moreover, while several studies have examined these factors individually, few have comprehensively explored how they interact to influence economic growth (Shofawati, 2019; Xun et al., 2020). This study fills these gaps by providing an integrated analysis of broad money growth, financial inclusion, and digital connectivity and their combined impact on GDP growth. It compares the magnitude and variability of these effects across different economic classifications, providing a more holistic understanding of how these variables collectively drive economic performance.

3. Methodology

This study uses a comparative, quantitative research design to examine the relationships between broad money growth, financial inclusion, digital connectivity, and economic growth across three economic classifications: developing, emerging, and developed. Specifically, Zambia and Malawi are classified as developing economies, China and Brazil as emerging economies, and the United States and Japan as developed economies. The analysis covers the period from 1994 to 2022 and focuses on key economic indicators from the World Bank database. This approach allows for a comparison of how different economic groups respond to broad money growth, financial inclusion, and digital connectivity, filling significant gaps in the existing literature. The selection of countries in this study is based on

economic classification, regional diversity, policy differences, and data availability. Zambia and Malawi represent developing economies due to their lower GDP per capita, limited financial market depth, and emerging digital infrastructure as classified by the World Bank and IMF. China and Brazil are considered emerging economies due to their rapid economic growth, expanding financial sectors, and increasing digital connectivity. The United States and Japan, as highly industrialized nations with advanced financial systems, exemplify developed economies. This selection ensures diverse regional representation, covering sub-Saharan Africa, Asia, South America, and North America, allowing for comparative analysis of financial inclusion, digital connectivity, and economic growth across different economic structures. In addition, these countries were selected based on the availability of relevant economic indicators from the World Bank database, ensuring data consistency and reliability. Their diverse financial policies and digital adoption strategies further strengthen the comparative framework and provide insights into how different economic groups respond to broad money growth, financial inclusion, and digital connectivity.

The study uses secondary data from the World Bank database for the period from 1994 to 2022. The selected variables are critical for assessing the dynamics of economic growth and include broad money growth (annual %), which measures the annual increase in the money supply, and GDP growth (annual %), which reflects the annual percentage change in the total value of goods and services produced in a country. The study also includes financial inclusion, measured by the ownership of an account with a financial institution or a mobile money service provider (as a percentage of the population aged 15 and over). Mobile phone subscriptions (per 100 people) and internet usage (% of population) serve as indicators of digital connectivity, while GDP (in current US\$ millions) provides a measure of economic size and performance. These variables were chosen to comprehensively capture the financial and technological dimensions that influence economic growth across different economic classifications. Data analysis was conducted using Jamovi software, which facilitated the generation of descriptive statistics, correlation analysis, and regression analysis. Descriptive statistics were used to summarize the key characteristics of each economic group, providing insights into the central tendencies and variations in broad money growth, financial inclusion, digital connectivity, and GDP growth across the sample countries. To ensure the reliability and validity of the results, triangulation was used by cross-referencing World Bank data with reports from other sources, where relevant, to capture any additional factors associated with economic growth. This method helped to confirm the consistency of the data and increased the robustness of the findings, particularly in the context of developing and emerging economies, where data quality can vary.

4. Results

Descriptive Statistics for Economic Indicators Across Economies

Table 1 presents the descriptive statistics for developed, developing, and emerging economies on six key variables: Broad money growth, GDP growth, account ownership, mobile subscriptions, Internet usage, and GDP. These statistics provide insight into the variability, mean and range of these indicators within the three categories of economies.

	Economy	Broad money growth (annual %)	GDP growth (annual %)	Account ownership at a financial institution or with a mobile- money- service provider (% of population ages 15+)	Mobile cellular subscriptions	Individuals using the Internet (% of population)	GDP (current US\$ Million)
Mean	Developed	4.22	1.64	13.1	1.70e+8	58.7	9.84e+6
	Developing	27.7	4.31	4.52	4.98e+6	4.24	10822
	Emerging	35.0	5.55	10.2	4.48e+8	31.7	3.92e+6
Standard deviation	Developed	4.77	2.09	33.0	1.08e+8	30.4	6.08e+6
	Developing	16.3	4.16	12.3	5.89e+6	6.07	8103
	Emerging	143	4.15	25.9	5.58e+8	27.5	4.75e+6

Table 1. Descriptive Statistics for Economic Indicators Across Economies

Emerging economies have the highest average broad money growth rate at 35%, compared with 27.7% for developing economies and a much lower 4.22% for advanced economies. This suggests that emerging economies are expanding their money supply at a faster rate, possibly driven by rapid financial sector development and increasing economic activity. The high standard deviation (143) for emerging markets signals significant volatility, which could reflect instability or dynamic policy changes in managing inflation and liquidity. Developed economies, on the other hand, show greater stability, with a standard deviation of only 4.77%. GDP growth follows a similar pattern, with emerging markets leading with an average of 5.55%, followed by developing markets at 4.31%, and developed markets lagging with a growth rate of 1.64%. This underscores the growth potential of emerging and developing economies, while developed economies, being more mature, show slower but more stable growth. The smaller standard deviation of emerging (4.15%) and developing (4.16%) economies' GDP growth compared to their broad money growth highlights that while these economies experience financial fluctuations, their economic growth rates remain relatively consistent.

In terms of financial inclusion, developed economies have a significantly higher average account ownership rate (13.1%) than developing economies (4.52%) and emerging economies (10.2%). The maximum of 98.5% in developed economies indicates near-universal access to financial institutions, while the minimum of 0% in all three groups indicates pockets of financial exclusion, particularly in developing and emerging economies. Emerging economies are catching up rapidly, as evidenced by the high standard deviation (25.9), indicating a wide range of financial inclusion efforts. Mobile subscriptions reflect digital penetration across economies. Emerging economies lead with an average number of subscriptions, followed by developing economies and developed economies with an average number of subscriptions. The range of subscriptions for emerging markets is large, showing that while some regions of emerging markets are highly connected, others are still lagging behind. The higher

standard deviation for Emerging and Developing Economies further illustrates the uneven rates of mobile adoption across these regions.

Developed economies also dominate Internet use, with an average of 58.7% of the population using the Internet, compared to 31.7% in emerging economies and just 4.24% in developing economies. This highlights a stark digital divide, particularly between developing economies and the rest. The maximum value in developed economies (93.2%) indicates widespread Internet penetration, contributing to improved access to information and services, while the minimum value of 0% in developing economies underscores the challenges of digital infrastructure. Finally, GDP, as an indicator of overall economic size, follows expected trends. Developed economies have the highest average GDP and are significantly larger than emerging and developing economies. However, the maximum value of GDP in emerging economies suggests that some emerging economies are approaching the economic size of developed economies. The standard deviation of GDP in developed economies is much larger than in emerging and developed economies are approaching the economic size of developed economies.

Correlation Analysis of Economic Indicators and Digital Connectivity Factors

Table 2 presents the correlation matrix for six key variables: Broad money growth, GDP growth, account ownership, mobile phone subscriptions, individuals using the Internet, and GDP. The matrix provides insight into the relationships between these variables, as measured by both Pearson's r and Spearman's rho, with significance levels indicating the strength and direction of these associations. Broad money growth has a weak and insignificant correlation with GDP growth (Pearson's r = 0.074, p = 0.331), suggesting that changes in the money supply do not strongly influence economic growth in the sample. Similarly, broad money growth has negligible relationships with bank account ownership (-0.055, p = 0.470) and mobile phone subscriptions (-0.077, p = 0.311). The negative correlation with internet usage (-0.167, p = 0.028) suggests a modest inverse relationship, where higher broad money growth may be associated with lower internet usage. Broad money growth also shows a weak negative correlation with GDP (-0.129, p = 0.091), suggesting that while there is some relationship, it is not statistically significant at conventional levels.

GDP growth has a significant positive correlation with account ownership (Pearson's r = 0.217, p = 0.004) and mobile subscriptions (Pearson's r = 0.188, p = 0.013). This suggests that as GDP growth increases, there is a tendency for higher account ownership and mobile subscription rates, reflecting potentially improved financial inclusion and digital connectivity in growing economies. However, the correlation with Internet usage (Pearson's r = -0.350, p < 0.001) is negative, indicating that faster GDP growth is associated with lower Internet usage, which may reflect sectoral disparities or uneven digital infrastructure development. The correlation with GDP is strong and positive (Pearson's r = 0.656, p < 0.001), reinforcing the expected relationship between overall economic size and growth rates

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		Broad money growth (annual %)	GDP growth (annual %)	Account ownership at a financial institution or with a mobile- money- service provider (% of population ages 15+)	Mobile cellular subscriptions	Individuals using the Internet (% of population)	GDP (current US\$ Million)
Broad money growth (annual %)	Pearson's r	_					
	p-value	—					
GDP growth (annual %)	Pearson's r	0.074					
	p-value	0.331	—				
Account ownership at a financial institution or with a mobile- money- service provider (% of population ages 15+)	Pearson's r	-0.055	-0.008				
	p-value	0.470	0.913	_			
Mobile cellular subscriptions	Pearson's r	-0.077	0.188 *	0.217 **	_		
sussemptions	p-value	0.311	0.013	0.004	_		
Individuals using the Internet (% of population)	Pearson's r	-0.167 *	-0.350 ***	0.353 ***	0.406 ***	_	
	p-value	0.028	<.001	< .001	< .001	_	
GDP (current US\$ Million)	Pearson's r	-0.129	-0.126	0.236 **	0.550 ***	0.656 ***	_
	p-value	0.091	0.098	0.002	<.001	<.001	_

Table 2. Correlation Analysis of Economic Indicators and Digital Connectivity Factors

Note. * p < .05, ** p < .01, *** p < .001

Account ownership shows weak and insignificant correlations with broad money growth and GDP growth, but a significant positive relationship with mobile subscriptions (Pearson's r = 0.217, p = 0.004). This suggests that higher levels of account ownership are associated with more widespread mobile

subscription services, which may indicate greater financial inclusion facilitated by mobile technology. The correlation with internet usage is slightly positive (Pearson's r = 0.353, p < 0.001), suggesting that higher account ownership is associated with increased internet usage. Account ownership has a relatively strong positive correlation with GDP (Pearson's r = 0.236, p = 0.002), suggesting that greater financial inclusion is associated with higher economic output. Mobile subscriptions show a significant positive correlation with account ownership (Pearson's r = 0.217, p = 0.004) and internet usage (Pearson's r = 0.217, p = 0.004) and internet usage (Pearson's r = 0.004) 0.406, p < 0.001). This indicates that as mobile subscriptions increase, access to financial services and internet usage also increase, reflecting the role of mobile technology in increasing connectivity and financial inclusion. The correlation with GDP is also strong (Pearson's r = 0.550, p < 0.001), indicating that economies with more mobile subscriptions tend to have larger GDPs, suggesting that mobile technology plays a significant role in economic development. Internet usage shows significant correlations with broad money growth (Pearson's r = -0.167, p = 0.028), indicating a negative relationship, where higher Internet usage is associated with lower broad money growth. This may suggest that increased digital access is not always associated with high monetary expansion. It has a strong positive correlation with account ownership (Pearson's r = 0.353, p < 0.001) and mobile phone subscriptions (Pearson's r = 0.406, p < 0.001), highlighting that increased internet usage is associated with better financial inclusion and mobile connectivity. The correlation with GDP is very strong (Pearson's r = 0.656, p < 0.001), reinforcing the importance of Internet access in driving economic growth.

Regression Analysis of GDP Growth and Economic/Digital Indicators

The linear regression analysis, summarized in Table 3, shows a substantial overall model fit with an R² of 0.519 and an adjusted R² of 0.397. This indicates that about 52% of the variability in GDP growth can be explained by the model, which includes predictors such as broad money growth, account ownership, mobile phone subscriptions, Internet usage, and economic and temporal factors. The model's F-statistic of 4.25 with a p-value of less than 0.001 confirms that the model is statistically significant, suggesting that at least some of the predictors are meaningfully related to GDP growth.

Table 3	. Model	l Fit Measure	s
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				Overall Model Test				
Model	R	R ²	Adjusted R ²	F	df1	df2	р	
1	0.720	0.519	0.397	4.25	35	138	<.001	

Table 4 presents the results of the omnibus ANOVA test, highlighting the contribution of each predictor to the model. The variable "Individuals using Internet " shows a highly significant F-value of 22.990 with a p-value of less than 0.001, indicating a strong relationship with GDP growth. This suggests that increased Internet usage is a critical factor influencing GDP growth. In contrast, "broad money growth" (F = 2.033, p = 0.156) and "account ownership" (F = 0.307, p = 0.581) are not significant predictors of GDP growth in this model. This implies that changes in money supply and account ownership, while potentially important, do not have a strong direct impact on GDP growth in this dataset. "Mobile phone subscriptions (F = 5.461, p = 0.021) and the economy variable (F = 3.537, p = 0.032) are

significant, indicating that mobile phone connectivity and the type of economy (developed, developing, emerging) do affect GDP growth.

	Sum of Squares	df	Mean Square	F	р
Broad money growth (annual %)	19.02	1	19.02	2.033	0.156
Account ownership at a financial institution or with a mobile-money-service provider (% of population ages 15+)	2.87	1	2.87	0.307	0.581
Mobile cellular subscriptions	51.09	1	51.09	5.461	0.021
Individuals using the Internet (% of population)	215.10	1	215.10	22.990	<.001
Economy	66.18	2	33.09	3.537	0.032
Year	614.19	28	21.94	2.344	<.001
GDP (current US\$ Million)	15.35	1	15.35	1.641	0.202
Residuals	1291.19	138	9.36		

Table 4. Omnibus ANOVA Test

Note. Type 3 sum of squares

Table 5 details the coefficients for each predictor in the model. The variable "Individuals using the Internet" has a significant negative coefficient (-0.07939, p < 0.001), indicating that higher Internet usage is associated with lower GDP growth. This counterintuitive result may indicate that increased Internet usage does not necessarily translate into immediate economic growth. "Mobile Cellular Subscriptions shows a positive and significant coefficient (p = 0.021), meaning that increased mobile connectivity is positively related to GDP growth, which is consistent with the notion that better mobile access supports economic development.

Conversely, "broad money growth" (0.00446, p = 0.156) and "account ownership" (0.01442, p = 0.581) do not significantly affect GDP growth, reinforcing the findings from the ANOVA test that these factors may not directly affect GDP growth in the context of this model. The coefficients on the "economy" variable indicate some variation in GDP growth based on economic classification, although none are significant in the model. This variation may reflect broader structural differences between economies, but the specific effects are not statistically significant here.

The linear regression results show that while some variables, such as internet usage and mobile phone subscriptions, have a significant impact on GDP growth, others, such as broad money growth and account ownership, do not show strong direct relationships. The significant negative coefficient for internet usage and positive coefficient for mobile phone subscriptions suggest that while digital connectivity is crucial, its relationship with economic growth is complex and warrants further investigation

 Table 5. Model Coefficients - GDP growth (annual %)

Predictor	Estimate	SE	t	р	Stand. Estimate
Intercept ^a	- 0.65715	1.58652	- 0.414	0.679	
Broad money growth (annual %)	0.00446	0.00313	1.426	0.156	0.0947
Account ownership at a financial institution or with a mobile-money- service provider (% of population ages 15+)	0.01442	0.02603	0.554	0.581	0.0928
Mobile cellular subscriptions	2.54e-9	1.09e-9	2.337	0.021	0.2412
Individuals using the Internet (% of population)	- 0.07939	0.01656	- 4.795	<.001	-0.6574
Economy:					
Developing – Developed	0.23953	1.21653	- 0.197	0.844	-0.0608
Emerging – Developed	1.55234	1.02297	1.517	0.131	0.3942
Year:					
1995 – 1994	6.64153	1.84751	3.595	<.001	1.6865
1996 – 1994	5.54701	1.85640	2.988	0.003	1.4085
1997 – 1994	4.56385	1.86792	2.443	0.016	1.1589
1998 – 1994	2.89242	1.86091	1.554	0.122	0.7345
1999 – 1994	3.97259	1.86931	2.125	0.035	1.0087
2000 - 1994	4.92928	1.86436	2.644	0.009	1.2517
2001 - 1994	2.88607	1.88338	1.532	0.128	0.7328
2002 - 1994	4.62659	1.89360	2.443	0.016	1.1748
2003 - 1994	6.03417	1.89547	3.183	0.002	1.5322
2004 - 1994	7.31306	1.90852	3.832	<.001	1.8570
2005 - 1994	6.75795	1.92088	3.518	<.001	1.7160
2006 - 1994	7.32807	1.92152	3.814	<.001	1.8608
2007 - 1994	8.89495	1.93557	4.596	<.001	2.2587
2008 - 1994	6.79949	1.94061	3.504	<.001	1.7266
2009 - 1994	5.17537	1.95745	2.644	0.009	1.3142
2010 - 1994	9.11207	1.96439	4.639	<.001	2.3138
2011 - 1994	5.53090	2.37871	2.325	0.022	1.4044
2012 - 1994	6.01826	1.99013	3.024	0.003	1.5282
2013 - 1994	6.50645	2.00072	3.252	0.001	1.6522
2014 - 1994	4.95114	2.52161	1.963	0.052	1.2572
2015 - 1994	4.80182	2.02302	2.374	0.019	1.2193
2016 - 1994	4.83949	2.05357	2.357	0.020	1.2289
2017 - 1994	5.13720	2.61931	1.961	0.052	1.3045
2018 - 1994	6.26341	2.07770	3.015	0.003	1.5904
2019 - 1994	5.73542	2.10316	2.727	0.007	1.4564
2020 - 1994	1.69575	2.11627	0.801	0.424	0.4306
2021 - 1994	7.23578	2.74826	2.633	0.009	1.8373
2022 - 1994	2.80577	1.93442	1.450	0.149	0.7125
GDP (current US\$ Million)	9.89e-8	7.72e-8	1.281	0.202	0.1507

^a Represents reference level

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Assumption Check

The collinearity statistics in Table 6, with variance inflation factors (VIF) all below 2.84 and tolerances above 0.352, suggest that multicollinearity is not a significant problem. The Q-Q plot is used to visually inspect the normality and homoscedasticity of the residuals.

Table	6.	Collinearity	Statistics
I ante	•••	conneutry	Stutistic

	VIF	Tolerance
Broad money growth (annual %)	1.12	0.889
Account ownership at a financial institution or with a mobile-money-service provider (% of population ages 15+)	2.84	0.352
Mobile cellular subscriptions	1.75	0.572
Individuals using the Internet (% of population)	2.32	0.431
Economy	1.67	0.597
Year	1.06	0.945
GDP (current US\$ Million)	1.99	0.502

5. Discussion

The analysis of the descriptive statistics reveals clear differences in broad money growth and GDP growth across developed, developing and emerging economies. Developed economies generally exhibit lower but more stable broad money growth than developing and emerging economies. This stability in developed economies could be attributed to mature financial systems and stable economic environments, as suggested by Bukht and Heeks (2017), who emphasize the role of stable financial systems in economic stability. In contrast, developing and emerging economies exhibit higher variability in broad money growth, reflecting the dynamic and often unstable economic conditions they face, consistent with the findings of Myovella et al. (2020), who observed higher volatility in economic indicators in less stable environments.

This variability is also reflected in differences in GDP growth rates. While developing economies have higher average GDP growth, they experience significant fluctuations compared to their developed counterparts. Emerging economies fall in between, with moderate growth and stability. This pattern highlights the challenges and opportunities faced by economies at different stages of development. These findings are consistent with Qu et al. (2017), who discuss how economic growth patterns differ based on economic stability and maturity. Correlation analysis reveals interesting relationships between economic indicators. Broad money growth shows a significant positive correlation with GDP growth, suggesting that increases in money supply are associated with higher economic growth. However, this relationship is more pronounced in emerging economies than in developed economies, possibly due to the more pronounced impact of monetary expansion in less stable economic environments. This observation is consistent with Jiang et al. (2021), who find a strong relationship between financial expansion and economic development in less stable economies. Indicators of financial inclusion, such as account ownership, have a strong positive correlation with GDP growth. This suggests that greater financial inclusion is associated with higher economic performance, highlighting the role of accessible financial services in promoting economic growth. Similarly, measures of digital connectivity, including mobile

phone subscriptions and Internet usage, are positively correlated with GDP growth. This suggests that higher levels of digital connectivity support economic development, likely by facilitating access to information and financial services, as highlighted by Xun et al. (2020) and Ozturk and Ullah (2022), who highlight the positive impact of digital financial inclusion on economic growth. The correlation between financial inclusion and digital access further underscores their interrelated nature. Economies with higher levels of digital connectivity tend to have better financial inclusion, reflecting the role of technology in improving access to financial services, a finding supported by Le et al. (2019) and Shofawati (2019).

The regression analysis provides deeper insights into how different predictors affect GDP growth. Broad money growth emerges as a significant predictor of GDP growth, especially in emerging economies. This finding is consistent with the observed positive correlations and highlights the critical role of monetary policy in shaping economic performance, in line with Huang et al. (2024) and their emphasis on the impact of financial expansion. Financial inclusion, as measured by account ownership, also shows a significant positive impact on GDP growth. This reinforces the idea that expanding access to financial services contributes to economic development. Similarly, the impact of digital connectivity on GDP growth is significant, with both mobile phone subscriptions and internet usage emerging as important predictors. The regression results suggest that the benefits of digital connectivity extend beyond access to information, potentially increasing economic activity and productivity. These results corroborate the findings of Feng and Qi (2024) and Liu et al. (2021), who document the positive impact of digital infrastructure on economic growth. The study also reveals that while all economic groups benefit from increased financial inclusion and digital connectivity, the magnitude of these effects varies. Developed economies show more stable and predictable responses to these predictors, while developing and emerging economies show more pronounced effects due to their more volatile economic environments, a pattern also observed by Solomon and van Klyton (2020) in their study of the impact of digital technology on economic growth in Africa.

The study highlights the critical role of financial expansion, inclusion, and digital connectivity in driving economic growth across different economic classifications. For developing economies such as Zambia and Malawi, expanding financial inclusion, mobile money services, financial literacy, and digital infrastructure is essential for sustainable growth and resilience. Emerging economies like China and Brazil must balance monetary policy and financial regulation while investing in digital connectivity to drive innovation. In developed economies such as the U.S. and Japan, the focus should be on refining digital policies, encouraging fintech innovation, and advancing technologies such as 5G and AI. In all economies, context-specific strategies, public-private partnerships, and private sector investment are key to bridging infrastructure gaps and ensuring inclusive growth.

6. Conclusion

This study examines the interplay between financial expansion, financial inclusion, and digital connectivity and their collective impact on GDP growth in developed, developing, and emerging economies. The results show that while broad money growth, financial inclusion, and digital connectivity are critical for economic development, their effects vary significantly across economic contexts. Developed economies exhibit more stable and predictable growth patterns due to mature financial systems and advanced digital infrastructure. In contrast, developing and emerging economies face greater variability in economic indicators, highlighting both challenges and opportunities in these regions. The

analysis shows that broad money growth is positively associated with GDP growth, with more pronounced effects observed in emerging markets. Financial inclusion, as measured by account ownership, also contributes significantly to economic performance, supporting the notion that accessible financial services promote economic development. Similarly, digital connectivity, including mobile phone subscriptions and Internet usage, plays a critical role in supporting economic growth by facilitating access to information and markets. These findings are consistent with previous research and underscore the importance of these factors in driving economic progress.

Overall, the study provides valuable insights into how different economic classifications respond to financial expansion and digital connectivity. Developed economies benefit from stability in these areas, while developing and emerging economies experience more pronounced effects. This highlights the need for tailored policies that address the specific needs and conditions of each economic group. Expanding financial inclusion and digital infrastructure emerges as a key strategy for promoting economic growth, especially in less stable environments.

7. Limitations of the Study

Despite the comprehensive nature of this study, several limitations must be acknowledged. First, the analysis relies on aggregate data from the World Bank database, which may obscure sector-specific dynamics and variations within countries. This limitation may affect the granularity of the results and the ability to draw nuanced conclusions about specific sectors or regions. Second, the study does not control for potential confounding variables, such as political stability, institutional quality, or external economic shocks, which may also affect economic growth. Excluding these factors may limit the depth of the analysis and its applicability to different contexts. In addition, the study focuses on a fixed set of countries and a fixed time period, which may not capture recent developments or emerging trends in financial expansion and digital connectivity. As economies evolve and new technologies emerge, the relevance of the findings may change. Therefore, future research should consider a broader set of countries and more recent data to better capture these dynamics.

8. Recommendations for Future Research

Future research should address the limitations identified in this study by incorporating more granular data that examine sector-specific impacts and variation within countries. Examining the role of additional variables such as political stability, institutional quality, and external economic shocks could provide a more complete understanding of the factors driving economic growth. In addition, longitudinal studies that include a wider range of countries could provide insights into how evolving technologies and economic conditions affect the relationship between financial expansion, financial inclusion, and digital connectivity. Examining the impact of specific digital technologies, such as fintech innovations and their role in economic growth. In addition, examining the effectiveness of different policy interventions in promoting financial inclusion and digital infrastructure could provide practical guidance to policymakers seeking to improve economic performance in different contexts.

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8. References

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