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The Influence of Fintech on Regional GDP in Indonesia

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This study analyzes the influence of fintech on regional GDP in Indonesia. This study finds that fintech development significantly increases GDP, emphasizing the importance of technological advances in the financial sector for economic performance. These findings suggest that fintech plays an important role in strengthening the influence of trade on regional GDP. These changes reflect the structural transformation of regional economies, which are starting to rely on sectors that are more suited to the digital era and new technologies.
Keywords: Communication, Employee engagement, Firm performance, Management support, Partial Least Square (PLS), Shop floor management system.

1. Introduction

Economic regional growth is a long-term objective that every country must prioritize, as achieving high economic regional growth is crucial for national progress and prosperity. Generally, most countries share a similar goal, which is to accelerate economic regional growth within their borders [1].

Theoretically, exports and import can stimulate economic growth and market expansion, serving as a crucial source of foreign exchange for financing the import of industrial raw materials and capital goods essential for domestic needs. This is particularly significant for developing countries that implement industrial policies aimed at substituting imported raw materials and capital goods[2].

Fintech, also known as internet finance or digital financial inclusion, refers to the integration of finance and information technology. It encompasses functions such as payment and settlement, risk management, networking channels, and resource allocation. The rapid growth of the Internet, information technology, mobile devices, and digital technologies has led to significant expansion of fintech within the financial industry.

Economic growth refers to the long-term enhancement of a country's production

capacity, enabling it to supply a wider range of economically valuable goods to its population [3]. Based on [4] Fintech development boosts economic growth by raising GDP within the financial sector and indirectly enhancing e-commerce revenue and financing for the real sector.

The significant percentage changes in both constant and current price GDP suggest robust economic growth, which is essential for understanding the impact of fintech developments on regional GDP, particularly in how these advancements influence the balance between exports and imports. This upward trajectory in GDP underscores the importance of exploring the role of financial technology in enhancing trade dynamics and economic performance, data shown figure below.

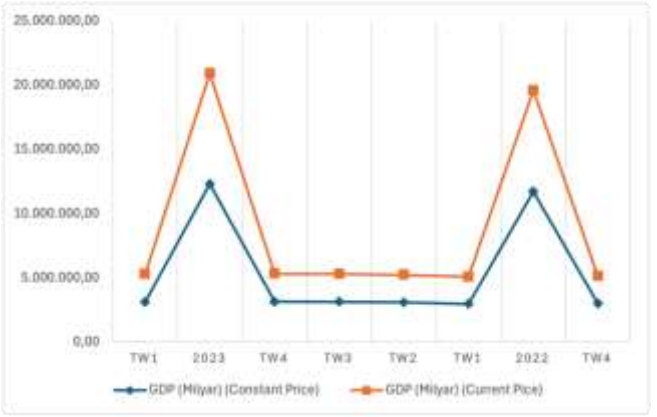

Fig. 1. GDP Constant Price and Current Price

Based on the data analysis, the GDP at constant prices increased from 11,710,247.9 billion IDR in 2022 to 12,301,393.6 billion IDR in 2023, reflecting a growth rate of approximately 5.05%. Similarly, the GDP at current prices rose from 19,588,089.9 billion IDR in 2022 to 20,892,376.7 billion IDR in 2023, demonstrating a growth rate of around 6.66%. These increases indicate a positive trend in economic activity over the analyzed period[5].

The chart illustrates noticeable fluctuations in regional GDP when measured at constant prices versus current prices over different periods. These discrepancies highlight the complexity of accurately assessing economic performance and raise questions about the factors contributing to these variations. Among these factors, the rapid advancement of fintech has emerged as a significant influence on regional economic activities, particularly in how it interacts with traditional trade variables such as exports and imports.

Despite the growing integration of fintech in regional economies, its precise role in shaping the relationship between trade and GDP remains unclear. It is uncertain whether fintech development amplifies the positive effects of trade on economic growth or if it introduces volatility that leads to the observed differences in GDP measurements.

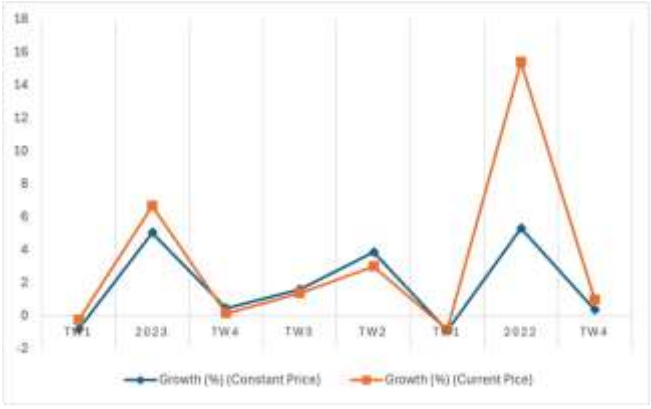

Fig. 2. GDP Growth

In 2022, the overall growth was 5.31% at constant prices and 15.38% at current prices, suggesting that price increases had a significant impact on nominal growth. In 2023, the growth was slightly lower at 5.05% for constant prices and 6.66% for current prices, indicating a reduced influence of general price increase compared to the previous year.

Quarterly trends show that in the first quarter (TW1) of 2022, there was an economic contraction with negative growth in both constant and current prices, a trend that continued in the first quarter of 2023, though the contractions were smaller. The second quarter (TW2) of 2022 saw a strong rebound with significant growth, especially at constant prices (3.86%), while TW2 of 2023 experienced more moderate but positive growth. Both the third quarter (TW3) of 2022 and 2023 showed positive growth, though slightly lower in 2023, with a constant price growth of 1.6%. In the fourth quarter (TW4), the growth was modest for both years, with TW4 of 2023 slightly outperforming TW4 of 2022 in terms of constant price growth [6]. In conclusion, Indonesia's GDP shows instability with significant fluctuations, differences between constant and current prices indicating the influence of general price increase of goods and services, and several periods of negative growth that could indicate problems in the economy.

The high standard deviations of the fintech variables indicate that there is quite a large variation in the data (table 1). This indicates that the values of these variables vary significantly across regions or over time, which may affect regional GDP. This raises the question of whether variations in non-oil and gas exports and imports and fintech transactions contribute to variations in GDP. Economic interconnectedness is also considered an important determinant of GDP, as it influences the utilization of labor resources and overall productivity [7]. The wide range of minimum and maximum values in the fintech variables indicate that there are regions that are very low or very high in these activities. The research question may arise from the need to understand whether differences in these economic activities (either in the form of exports, imports, or fintech use) can explain differences in regional GDP. The regional GDP has a fairly large mean, but with quite a large variation, indicate that there are factors that greatly affect GDP in certain regions. Given that exports, imports, and fintech are important economic indicators, the question of the extent to which each of these variables affects regional GDP is relevant to study.

Fintech, or financial technology has the potential to increase efficiency in international transactions, both in terms of payment speed, reduced transaction costs, and accessibility to international markets [8]. Fintech is also a technological innovation in financial services that includes digital payments, peer-to-peer lending, app-based banking services, and alternative financing platforms. Many Fintech solutions, such as mobile payment applications, digital banking, or blockchain systems, are developed using information technologies that are also used in various industries that use ICT (Information and Communication Technology)[9]. The existence of fintech is considered to facilitate public and business access to financial services that are faster, cheaper, and more efficient compared to traditional banking. According to endogenous growth theory, increasing access to more efficient financial services can accelerate economic growth through more effective capital allocation and higher productivity. Fintech enables micro, small, and medium enterprises to obtain easier financing, which in turn can increase the economic output of the region.

Fintech expands access to financing for individuals and businesses in areas previously underserved by conventional banks, which can increase productivity and local economic growth. Easier access to credit through fintech encourages household consumption and business investment, thereby increasing aggregate demand that can contribute to increasing regional GDP. Fintech also brings efficiency in financial services, such as faster money transfers, easier payments, and more effective credit monitoring, which contribute to economic efficiency and drive regional economic growth [8].

2. Literature Review

Result of research shown that the research parallel with the theory stating that in the long run, export affect economic growth positively, where export is the source of revenue of the state that can stimulate economy and there is the effect of export and import on economic growth. In the long run, every 1% of the decline in import lead to the 1.17% increase of the economic growth, while 1% increase in export lead to the 1.83% increase of the economy[2] . Research conducted by [10] It has been demonstrated that, in the long run, exports and imports influence economic growth, while the exchange rate has no impact. In the short term, only imports have an effect on economic growth, whereas exports and exchange rates do not have any influence.. According to [11] indicate that fintech, as well as its submeasures of third-party payment, credit, and insurance, are key determinants of China's economic growth.

Based on the theory, empirical studies, and previous research results, the hypothesis can be formulated as follows.s Alternative Hypothesis (H1): Fintech has a positive and significant effect on regional GDP.

3. Research Methodology

Data

This study used a sample of 29 provinces out of 38 provinces in Indonesia. The sampling technique used purposive sampling technique, where the samples used were samples that had

complete quarterly data in the period of the 2nd quarter of 2019 to the 4th quarter of 2023. In this research, data of regional GDP, Fintech, non-oil and gas imports, and data of non-oil and gas exports, data are taken from [5].

The Fintech variable in this study is proxied by the accumulated number of borrower accounts (unit of entity) which refers to the number of accounts from individuals, legal entities, and/or business entities that have debt obligations due to loan agreements through fintech platforms. In other words, this variable measures the accumulated number of accounts involved in fintech lending activities, both individuals and business entities, who have debts due to using loan services from fintech platforms. The use of this proxy provides an overview of the extent to which fintech lending services are adopted and used in various regions.

Regional GDP per province referes to the total value of goods and services produced by all economic units within a province quarterly (IDR million). Regional GDP measures economic activity that occurs within the geographical boundaries of a province and includes economic sectors such as agriculture, industry, trade, services, and others. Regional GDP is calculated by adding up all gross value added generated by production units within the province, plus net indirect taxes and minus subsidies. This value provides an overview of the level of economic welfare in each province and can be used to measure economic growth, determine the contribution of certain sectors to the economy, and compare economic performance between provinces.

This study uses trade openness as control variables according to research [12]. Trade openness in this case is proxied by non-oil and gas exports and imports, and non-oil and gas imports. Non-oil and gas exports are the total value of goods and services exported by a country excluding oil and gas products. Non-oil and gas exports include various types of products such as agriculture, manufacturing, textiles, electronics, automotive, food and beverages, and various other commodities not related to the oil and natural gas industry. Non-oil and gas export data is in USD million. Meanwhile, non-oil and gas imports are the value of goods and services imported by a country that do not include oil and gas products. Non-oil and gas imports include various types of products such as consumer goods, raw materials, industrial equipment, electronics, vehicles, textiles, foodstuffs, and various other commodities that are not related to the oil and gas sector. For example, in Indonesia, non-oil and gas imports include goods such as machinery, vehicles, raw materials for industry, electronic products, and certain foodstuffs that are not produced in sufficient quantities domestically. Non-oil and gas import data is in USD million.

Table 1. Summary Descriptive Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
Import	543	501.6812	1488.926	0.002650	10375.64
Export	545	623.4407	851.1530	0.000810	5563.050
Fintech	551	15333686	38829718	16247.00	2.37E+08
GDP	551	1.50E+08	1.93E+08	9812832	8.85E+08

Table 1 shows that there is significant variation in each of the variables across regions. This variation can raise research questions on how these variables, such as exports, imports, and fintech, affect regional GDP. This analysis provides an important basis for further exploration of the relationship between these economic variables and regional economic

performance. The import is 501.6812. This shows that in general, the value of non-oil imports in the studied region (29 provinces) is around this figure. The average export is 623.4407, which is slightly higher than imports. This could indicate that the region as a whole may be more focused on exports than imports. The average number of fintech transactions is 15333686. This figure shows that fintech transactions are quite large, which could be an indication that financial technology plays a significant role in economic activity in the region. The average GDP is 1.50E+08, indicating a fairly high value, reflecting the size of the regional economy. The import standard deviation of 1488.926 indicates that there is quite a large variability in the value of import across regions. The standard deviation of exports is 851.1530 also shows significant variation, although slightly lower than import. The standard deviation of fintech is 38829718, indicating a very high variability, which may indicate a significant difference in fintech adoption and usage across regions. The standard deviation of GDP is 1.93E+08, which also indicates a large variation in regional GDP, indicating that there are significant differences in economic strength across regions. The minimum value of import is 0.002650 and the maximum is 10375.64. This range indicates that there are regions with very low to very high import activity. The minimum value of export is 0.000810 and the maximum is 5563.050, which also indicates a large variation across regions. The range of fintech transaction values from 16247.00 to 2.37E+08 indicates that some regions have significantly higher fintech activity than others. The GDP range from 9812832 to 8.85E+08 indicates a large difference in economic size across regions, which can be influenced by factors including levels of imports, exports, and fintech use.

Table 2. Matrix Of Correlation

Variables	1	2	3	4
GDP (1)	1			
Fintech (2)	0.756085**	1		
Export (3)	0.601477**	0.459582**	1	
Import (4)	0.667021**	0.643269**	0.514916**	1

*** p<0.01, ** p<0.05, * p<0.1

In Table 2, Based on the correlation table presented below, no correlation value exceeds 0.90, so it can be concluded that there is no significant multicollinearity between the variables in this model.

Model and Econometric Methodology

After reviewing the literature, the next model to be used is as follows.

$$GDP_{it} = \alpha_0 + \alpha_1 FINTECH_{it} + X_{it} + \theta_i + \mu_t + \varepsilon_{it} \; ; \quad (1)$$

$$\theta_i = \beta_0 + \alpha Z_i$$

In this model, 〖GDP〗_it is the Gross Domestic Product of region i at time t. 〖FINTECH〗_it represents the level of fintech development in region i at time t. X_it represents the control variables' vector including the imports and export as the proxy of trade openness, and α_0 is the constant term. μ_t represents time-specific effects that are common across all regions (like year effects), ε_it is the error term, capturing other unobserved

factors affecting GDP. θ_i is a function of a set of observed characteristics Z_i for each region, where β_0 is a constant, and 〖αZ〗_i represents the influence of these characteristics on the regional effects [8].

Therefore, the following model of GMM system is presented:

$$GDP_{it} = \alpha_0 GDP_{it-1} + \alpha_1 FINTECH_{it} + \alpha_2 X_{it} + \gamma_t + \varepsilon_{it} \quad (2)$$

4. Results and Discussion

Generalized Method of Moment

This research uses a dynamic panel data estimation model. Robustness test by the Generalized Method of Moments (GMM). The model testing results are presented in the table below:

Table 3 Result of Dynimc Panel Data Analysis

Variables	FEM	REM	GMM
LOGGDP (-1)	0.639384***	0.720613***	0.265663***
	(0.067891)	(0.020350)	(0.014143)
LOGFIN	0.101107***	0.102200***	0.041424***
	(0.034527)	(0.009807)	(0.001311)
LOGEXP	0.014061	0.013106*	0.024596***
	(0.017079)	(0.007200)	(0.000598)
LOGIMP	0.057602***	0.013106***	0.027984***
	(0.018726)	(0.006505)	(0.000993)
Constant	4.799773**	3.369657**	-
	(0.930748)	(0.291431)	-
Observations	509	509	495
Number of Province	28	28	29

Based on the table above, the model equation of GMM method is:

$$GDP_{it} = 0{,}265663\ GDP_{it-1} + 0{,}0414124\ FINTECH + 0{,}024596\ EXPT + 0{,}027984\ IMPT + \varepsilon_{it}$$

The table presents the results of a dynamic panel data analysis using three estimation methods: Fixed Effects Model (FEM), Random Effects Model (REM), and Generalized Method of Moments (GMM). Robustness test shows that the effect of fintech on regional GDP remains positive and significant in various estimation approaches (FEM, REM, and GMM), so H_1 is accepted. This strengthens the conclusion that fintech has an important role in driving economic growth at the regional level, even after controlling for inter-provincial variations and potential endogeneity issues.

Fintech development (FIN) is found to significantly boost GDP, underlining the importance of technological advancements in the financial sector for economic performance. The result in line with [13], [14]. Overall, the findings suggest that fintech development plays a

significant role in strengthening the influence of trade on regional GDP, but careful management is required to optimize the combined effects of these factors.

FinTech Industry as a strategic approach in the digitalization era In addition, this study also adds knowledge related to Industry 4.0 as a result of industrial development in the digitalization era [15]. The analysis also reveals that the lagged GDP significantly influences the current GDP across all models, indicating a strong persistence in economic performance over time.

5. Discussion and Conclusion

The use of fintech contributes positively to GDP, underscoring the importance of financial technology in driving economic growth. Fintech, which is usually related to financial technology such as e-payment, crowdfunding, or online transaction platforms, can change traditional trade patterns. Fintech development opens wider financial access, increases efficiency, encourages consumption, investment, and trade, and creates jobs. All of these factors strengthen the growth of economic sectors in the region, which ultimately drives a positive and significant increase in regional GDP. Fintech is a major catalyst in accelerating regional economic growth in the digital era. Fintech not only functions as a financial tool but also as a major driver in increasing competitiveness and economic productivity at the regional level. This result show that fintech has not only a positive impact but also a significant impact in influencing regional economic growth. By fintech services, access to financing and financial services is easier, especially in areas that were previously unreachable by conventional banking services. This encourages more productive economic activities and contributes to regional GDP growth.

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