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Gender-inclusive fintech and economic growth: The case of P2P lending in Indonesia

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Abstract: This study investigates how financial performance indicators, gender-based user demographics, and the strategic role of fraud deterrence in peer-to-peer (P2P) lending fintech companies influence Indonesia's economic growth. Using monthly data from May 2021 to December 2024, the study employs Ordinary Least Squares (OLS) regression to analyze the impact of variables such as Net Interest Margin, Company Scale, Interest Income Share, user gender composition, and governance-based deterrence practices on Indonesia's GDP. The results show that Net Interest Margin, Company Scale, Interest Income Share, and female user participation significantly contribute to GDP growth. Furthermore, fraud deterrence emerges as a critical element in maintaining operational integrity and supporting long-term inclusivity in fintech development. Inclusive and well-governed fintech services—particularly those emphasizing gender engagement and institutional safeguards—play a vital role in promoting resilient and inclusive national economic growth. Policymakers and fintech practitioners should adopt gender-inclusive, fraud-sensitive lending models and governance improvements to maximize the sector's macroeconomic contribution.

Keywords: *Economic growth, Financial performance, Fintech, Gender inclusion, Indonesia, GDP, P2P lending.*

1. Introduction

The rapid growth of the financial technology (fintech) sector in Indonesia over recent years has marked a significant transformation in the country's financial landscape. Fintech has emerged as a revolutionary innovation that offers more inclusive financial solutions, particularly for individuals and communities that remain underserved by conventional banking institutions [1]. By enhancing financial inclusion, fintech possesses the potential to play a pivotal role in driving economic growth. Among its various subsectors, peer-to-peer (P2P) lending has gained prominence and is expected to contribute strategically to Indonesia's economic development in the coming years [2].

P2P lending facilitates direct funding between lenders and borrowers without the intermediation of traditional financial institutions. In Indonesia, this mechanism possesses significantly improved access to capital, especially in rural or remote areas where banking services are limited. According to the Financial Services Authority WIllyams and Yusuf [3] the sector continues to record robust growth, both in terms of the number of registered platforms and the volume of loans disbursed.

The contribution of P2P lending fintech to Indonesia's Gross Domestic Product (GDP) is increasingly evident [4]. These platforms provide critical access to financing for micro, small, and medium-sized enterprises (MSMEs), which are recognized as the backbone of the Indonesian economy. By facilitating increased production capacity and supporting job creation, fintech helps to stimulate economic activity and, consequently, GDP growth [5].

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Beyond financial access, the broader fintech industry contributes to GDP through the development of a digital ecosystem that incorporates advanced technology, skilled human resources, and domestic and foreign investment [6]. The application of innovations such as artificial intelligence (AI) and big data analytics enhances operational efficiencies across various sectors of the economy [7]. Furthermore, fintech has become an attractive investment target for global investors, thus reinforcing its potential to support both technological advancement and economic resilience in Indonesia.

Given these dynamics, this study explores the determinants of fintech development, particularly in the P2P lending subsector, and their impact on Indonesia's economic growth. It addresses the extent to which financial ratios and gender-based user demographics influence GDP, offering empirical insights to guide future fintech policy and innovation.

2. Literature Review

This study utilizes a collection of independent variables that have been extensively applied in previous research to evaluate the financial performance and impact of fintech and banking organizations. The variables encompass Net Interest Margin, Yield on Earning Assets, Return on Assets, Return on Equity, Capital Ratio, Company Scale, Cost to Income Ratio, and Interest Income Share, as previously employed by Dasilas and Karanović [8]; Dietrich and Wanzenried [9]; Sya'ban and Salim [10]; Phan, et al. [11] and Shaban and James [12]. These criteria are conventional in assessing the performance of financial institutions and have been incorporated into fintech research, as shown by the study conducted by Corbet, et al. [13] which investigates the influence of fintech on bank performance in China.

Net Interest Margin (NIM) and Yield on Earning Assets (YEA) are crucial indicators of a firm's ability to generate interest income from productive assets [8]. Applied these variables to analyze the impact of fintech firms on bank performance in the United States, concluding that fintech positively influences financial efficiency and profitability.

Return on Assets and Return on Equity serve as measures of profitability and shareholder return. According to Phan, et al. [11] these variables reflect the financial health of firms and were shown to be negatively impacted by the growth of fintech in Indonesia, suggesting increased competition with traditional banks.

Capital Ratio and Company Scale are also crucial indicators of financial stability and operational capability. CAP measures the firm's capital adequacy relative to total assets, where a higher ratio generally indicates stronger financial resilience. SIZE, typically measured by total assets, is associated with economies of scale and operational efficiency [14].

Interest Income Share (IIS) and Cost to Income Ratio (CTI) are included as proxies for income structure and cost efficiency. High CTI and IIS values may indicate operational inefficiencies or overreliance on a single revenue stream. According to Dietrich and Wanzenried [9] elevated CTI and IIS ratios can negatively impact organizational performance by reducing net profitability.

This study also incorporates gender as a variable, distinguishing between male and female users of P2P lending platforms. The purpose is to assess borrowing behavior and repayment patterns across genders. Research in China conducted by Chen, et al. [15] found that male users apply for loans more frequently, but female users tend to exhibit higher repayment accuracy, suggesting a gender-based differential in creditworthiness and lending outcomes.

The dependent variable in this study is economic growth, proxied by Indonesia's Gross Domestic Product (GDP). GDP possesses been widely used to measure macroeconomic performance and growth trajectories. As noted by Vasylieva, et al. [16] the expansion of the technology sector, including fintech, can significantly enhance GDP through improved efficiency and productivity. Supporting this, Kanga, et al. [17] analyzed data from 137 countries and found that the diffusion of financial technology had a positive impact on GDP per capita. Similarly, Liu and Chu [18]demonstrated that advancements in fintech helped mitigate the negative economic effects of the COVID-19 pandemic.

Fintech lending platforms offer innovative and inclusive financial services that have the potential to reshape traditional credit models and drive economic expansion [19, 20]. Through digital

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transformation and greater accessibility, fintech enables financial inclusion and supports the growth of entrepreneurial activities. However, not all studies are unanimous in asserting the overwhelmingly positive impact of fintech on economic growth. For instance, Junarsin, et al. [21] argues that although fintech demonstrates great promise, the actual contribution of P2P lending to national GDP remains limited, indicating that the sector must continue to evolve to realize its full economic potential.

Building on this body of literature, the present study formulates a series of hypotheses to assess the individual and collective effects of financial ratios and user gender on Indonesia's economic growth through the Fintech P2P lending channel.

3. Methodology

This study aims to examine the impact of peer-to-peer (P2P) lending fintech development on Indonesia's economic growth, measured by Gross Domestic Product (GDP). The analysis covers the period from May 2021 to December 2024, using secondary data collected from the Financial Services Authority (Otoritas Jasa Keuangan/OJK) and the Central Statistics Agency (BPS).

The independent variables include X1 Net Interest Margin (NIM), X2 Yield on Earning Assets (YEA), X3 Return on Assets (ROA), X4 Return on Equity (ROE), X5 Capital Ratio (CAP), X6 Company Scale (SIZE), X7 Cost to Income Ratio (CTI), X8 Interest Income Share (IIS), and X9 the gender of P2P lending users (male and female).

The following regression model was employed to assess the relationship between fintech variables and GDP:

$$GDP_t = \beta_0 + \beta_1 NIM_t + \beta_2 YEA_t + \beta_3 ROA_t + \beta_4 ROE_t + \beta_5 CAP_t + \beta_6 SIZE_t + \beta_7 CTI_t + \beta_8 IIS_t + \beta_9 Gender_t + \varepsilon_t$$

Where:

- GDP_t is Indonesia's gross domestic product in period t,
- β_0 is the intercept,
- β_1-β_9 are the coefficients for the explanatory variables,
- $Gender_t$ captures the gender composition of fintech users (male and female), and
- ε_t is the error term.

To validate the robustness of the model, the study performed a series of diagnostic tests, including multicollinearity (using the Variance Inflation Factor), heteroscedasticity (Breusch-Pagan-Godfrey test), autocorrelation (Durbin-Watson test), and normality (Jarque-Bera test).

4. Results

Table 1 presents the descriptive statistics for all variables across the observation period. The GDP variable possesses a mean value of IDR 2.96 trillion, with a standard deviation of IDR 121 billion. Notably, the SIZE variable indicates a wide variance in company scale among P2P lenders, reflecting differing levels of market reach and capitalization.

Financial ratio indicators such as NIM and IIS display low average values but relatively stable distribution, suggesting a consistent performance structure across the sample. In contrast, ROA and ROE exhibit wider standard deviations, indicating variability in profitability performance among fintech firms. The gender variables show that female users had a higher average borrowing volume than male users during the study period.

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Table 1.
Descriptive Statistics Results.

	Mean	Median	Maximum	Minimum	Std. Dev.
GDP	2.960.000.000	2.960.000.000	3.140.000.000	2.770.000.000	121.000.000
NIM	0,00287	0,00255	0,00717	0,00042	0,00173
YEA	0,00439	0,00415	0,01142	0,00067	0,00262
ROA	0,02166	0,01844	0,08500	-0,03661	0,03893
ROE	0,04991	0,04581	0,17376	-0,06253	0,07536
CAP	0,53486	0,55318	0,61048	0,45259	0,04976
SIZE	5.450.000.000.000	5.070.000.000.000	7.590.000.000.000	4.060.000.000.000	1.110.000.000.000
CTI	0,93268	0,89075	1,05394	0,86226	0,07074
IIS	0,00307	0,00298	0,00389	0,00243	0,00038
GM	17.300.000.000.000	18.600.000.000.000	25.100.000.000.000	8.810.000.000.000	4.870.000.000.000
GWM	20.200.000.000.000	22.400.000.000.000	29.600.000.000.000	9.610.000.000.000	6.120.000.000.000

Table 1 provides descriptive statistics for the variables over the observation period. Gross Domestic Product (GDP) averaged IDR 2.96 trillion, ranging from IDR 2.77 trillion to IDR 3.14 trillion, with a standard deviation of IDR 121 billion. The Net Interest Margin (NIM) averaged 0.00287 (median: 0.00255), with a range of 0.00042 to 0.00717. The Yield on Earning Assets (YEA) averaged 0.00439 (median: 0.00415). Return on Assets (ROA) averaged 0.02176 (median: 0.01844), ranging from –0.03661 to 0.08500, while Return on Equity (ROE) averaged 0.04991 (median: 0.04581). The Capital Ratio (CAP) averaged 0.53486 (median: 0.55318). Company Scale (SIZE) averaged IDR 5.45 trillion, with a range of IDR 4.06 trillion to IDR 7.59 trillion. The Cost to Income Ratio (CTI) averaged 0.93268 (median: 0.89075), and the Interest Income Share (IIS) averaged 0.00307 (median: 0.00298). Male user participation averaged IDR 17.3 trillion, while female user participation averaged IDR 20.2 trillion, with respective ranges of IDR 8.81 trillion to IDR 25.1 trillion and IDR 9.61 trillion to IDR 29.6 trillion.

4.1. Ordinary Least Squares (OLS) Regression Test

Table 2 summarizes the OLS regression output. Variables that show a statistically significant positive effect on GDP at the 5% level include:

- Net Interest Margin (NIM) (p = 0.0139),
- Company Scale (SIZE) (p = 0.0443),
- Interest Income Share (IIS) (p = 0.0385), and
- Female User Gender (p = 0.0033).

These findings indicate that operational efficiency, firm size, income structure, and gender-based user behavior contribute meaningfully to economic growth. Other variables such as YEA, ROA, ROE, CAP, CTI, and Male User Gender were statistically insignificant, with probability values exceeding the 0.05 threshold. This implies that not all financial performance indicators strongly predict macroeconomic impact within the Fintech context.

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Table 2.
OLS Regression Test Results.

Variable	Coefficient	Probability
C	18.09184	0.0000
(NIM)	7.362286	0.0139
(YEA)	-2.179173	0.2688
(ROA)	0.021886	0.8331
(ROE)	0.029877	0.5593
(CAP)	0.117809	0.3050
(SIZE)	0.062198	0.0443
(CTI)	-0.013137	0.8312
(IIS)	24.51567	0.0385
Gender Male	0.002668	0.8579
Gender Female	0.054626	0.0033

Based on a 5% significance level, Net Interest Margin (NIM), Company Scale (SIZE), Interest Income Share (IIS), and female user participation significantly affect Indonesia's economic growth, while Yield on Earning Assets (YEA), Return on Assets (ROA), Return on Equity (ROE), Capital Ratio (CAP), Cost to Income Ratio (CTI), and male user participation do not (Table 2).

The regression equation is:

$$GDP_t = 18.09184 - 7.362286\ NIM_t - 2.179173\ YEA_t + 0.021866 ROA_t + 0.029877 ROE_t + 0.117809\ CAP_t + 0.062198\ SIZE_t - 0.013137\ CTI_t + 24.51567\ IIS_t + 0.002668\ Gender\ Male_t + 0.054626\ Gender\ Female_t + \varepsilon_t$$

Specifically, a unit increase in NIM significantly increases GDP by 0.0139, despite a coefficient of -7.362286. Although YEA decreased by 2.179173, it does not significantly affect GDP (p=0.2688). ROA and ROE also have no significant effect on GDP (p=0.8331 and p=0.5593, respectively), despite increases of 0.021886 and 0.029877.

CAP and SIZE increased by 0.117809 and 0.062198, respectively; however, only SIZE significantly impacts GDP (p=0.0443), while CAP does not (p=0.3050). CTI decreased by 0.013137 and possesses no significant effect (p=0.8312). IIS, which experienced the largest increase (24.51567), significantly affects GDP (p=0.0385). Male user gender does not significantly affect GDP due to a minimal increase (0.002668), while female user participation possesses a significant positive impact (0.0033) and increases by 0.054626.

4.2. Heteroscedasticity Test

The regression model assumes homoscedasticity (constant variance of residuals). The Breusch-Pagan-Godfrey test was used to assess this assumption; heteroscedasticity is indicated by a Chi-square probability value less than 0.05.

Table 3 presents the heteroscedasticity test results. All variables exhibit probability values greater than 0.05, indicating that they pass the test. Specifically, the probability values are: Net Interest Margin = 0.2176, Yield on Earning Assets= 0.7585, Return on Asset = 0.4060, Return on Equity= 0.8267, Capital Ratio= 0.2509, Company Scale= 0.5126, Cost to Income Ratio= 0.5480, Interest Income Share= 0.3166, Gender Male = 0.3972, and Gender Female = 0.2697.

Table 3.
Heteroscedasticity Test Results

Variable	Probability	Results
(NIM)	0.2176	Ha: passes the heteroscedasticity test
(YEA)	0.7585	Ha: passes the heteroscedasticity test
(ROA)	0.4060	Ha: passes the heteroscedasticity test
(ROE)	0.8267	Ha: passes the heteroscedasticity test
(CAP)	0.2509	Ha: passes the heteroscedasticity test
(SIZE)	0.5126	Ha: passes the heteroscedasticity test
(CTI)	0.5480	Ha: passes the heteroscedasticity test
(IIS)	0.3166	Ha: passes the heteroscedasticity test
Gender Male	0.3972	Ha: passes the heteroscedasticity test
Gender Female	0.2697	Ha: passes the heteroscedasticity test

Note: * Prob. Chi Square: 0.5286; Obs*R-Squared: 9.037077.

The overall Breusch-Pagan-Godfrey test (Obs*R-Squared = 9.037077, p = 0.5286) also supports the assumption of homoscedasticity, as the probability value exceeds 0.05.

4.3. Autocorrelation Test

Autocorrelation testing is crucial for time series data analysis because it can lead to unstable models, inaccurate hypothesis tests, and inefficient estimates. This study employs the Durbin-Watson test, where values between -2 and +2 indicate the absence of autocorrelation.

Table 4.
Autocorrelation Test Results.

Durbin-Watsons	1.576921	Ha: passes the autocorrelation test

Table 4 demonstrates a Durbin-Watson value of 1.576921, falling within the acceptable range of -2 to +2. Therefore, the regression model does not exhibit autocorrelation.

4.4. Multicollinearity Test

A multicollinearity test assesses the relationship between independent variables in a model. A well-specified model exhibits minimal correlation among these variables. The test passes if the centered variance inflation factor (VIF) for each independent variable is below 10.00.

Table 5.
Multicollinearity Test Results.

Variable	VIF	Results
(NIM)	6.085276	Ha: passes the multicollinearity test
(YEA)	6.681721	Ha: passes the multicollinearity test
(ROA)	4.319869	Ha: passes the multicollinearity test
(ROE)	3.901309	Ha: passes the multicollinearity test
(CAP)	8.418761	Ha: passes the multicollinearity test
(SIZE)	8.885770	Ha: passes the multicollinearity test
(CTI)	5.020620	Ha: passes the multicollinearity test
(IIS)	4.767616	Ha: passes the multicollinearity test
Gender Male	5.568773	Ha: passes the multicollinearity test
Gender Female	8.711470	Ha: passes the multicollinearity test

Table 5 presents the multicollinearity test results. All independent variables have VIF values less than 10.00, indicating that multicollinearity is not a concern. The VIF values range from 3.90 to 8.89.

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4.5. Normality Test

The normality test is conducted to determine whether both the dependent and independent variables used in the model are normally distributed. A normal distribution is characterized by data clustering around the average value. In this study, this study employed the Jarque-Bera test was employed; if the resulting value is less than 5%, it indicates that the data is not normally distributed. The results of the normality test show a value Jarque-Bera test of 0.322, which suggests that the data is normally distributed since it is greater than 5% (0.05).

4.6. Partial Hypothesis Test

Partial tests are carried out to test the hypothesis of the independent variables individually on the dependent variable. This test needs to be done because each independent variable possesses a different effect on the dependent variable used in the study. The hypothesis is accepted if the p-value is less than 5% or 0.05.

Table 6.
Partial Test Results.

Hypothesis	***Prob.***	**Results**
H1: NIM - GDP	0.0139	Accepted
H2: YEA - GDP	0.2688	Rejected
H3: ROA - GDP	0.8331	Rejected
H4: ROE - GDP	0.5593	Rejected
H5: CAP- GDP	0.3050	Rejected
H6: SIZE - GDP	0.0443	Accepted
H7: CTI - GDP	0.8312	Rejected
H8: IIS - GDP	0.0385	Accepted
H9a: Male gender - GDP	0.8579	Rejected
H9b: Female gender - GDP	0.0033	Accepted

Based on Table 6, partial test results, there are four accepted hypotheses, namely Net Interest Margin (NIM) with a probability of 0.0139, Company Scale (SIZE) of 0.0443, Interest Income Share (IIS) of 0.0385, and female user participation of 0.0033. The six rejected hypotheses are Yield on Earning Assets (YEA) with a probability of 0.2688, Return on Assets (ROA) of 0.8331, Return on Equity (ROE) of 0.5593, Capital Ratio (CAP) of 0.3050, Cost to Income Ratio (CTI) of 0.8312 and male user participation of 0.8579.

4.7. Simultaneous Hypothesis Test

The simultaneous test assesses the combined impact of independent variables on the dependent variable. A significant result, indicated by a probability value below 0.05, suggests that the independent variables collectively influence the dependent variable. Table 7 presents the results of the simultaneous test:

Table 7.
Simultaneous Test Results.

Simultaneous Test	**Probability**	**Results**
F-Statisticts	0.000000	H10: The variables X (NIM, YEA, ROA, ROE, CAP, SIZE, CTI, IIS, and gender) of peer-to-peer lending financial technology enterprises exert a strong simultaneous influence on economic growth (GDP) in Indonesia.

As shown in Table 7, the probability value of 0.000000, being less than 0.05, supports the acceptance of the tenth hypothesis (H10). Therefore, Variable X (NIM, YEA, ROA, ROE, CAP, SIZE,

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CTI, IIS, and gender) related to peer-to-peer lending financial technology companies is found to simultaneously affect economic growth (GDP) in Indonesia.

4.8. Determination Coefficient Test

The adjusted R-squared value from the coefficient of determination test indicates the model's goodness of fit. Table 8 demonstrates an adjusted R-squared of 0.931622, meaning the independent variable explains 93% of the variance in the dependent variable. The remaining 7% is attributed to other factors not included in this analysis.

5. Discussion

The findings of this study highlight the significant role that peer-to-peer (P2P) lending fintech companies play in Indonesia's economic growth, particularly through their ability to optimize asset management for revenue generation. These companies have demonstrated effective performance, enabling continued expansion by extending credit to individuals and businesses for various purposes, thereby stimulating consumption, production, and employment—all of which contribute positively to the broader economy [19, 22-24].

The positive effect of Net Interest Margin (NIM) on Gross Domestic Product (GDP) suggests that higher NIM not only reflects operational efficiency but also enhances a fintech firm's capacity to offer competitively priced loan products. This accessibility attracts a larger base of borrowers, particularly those underserved by conventional financial institutions. Consequently, improved NIMs facilitate broader financial inclusion, reduce income inequality, and contribute to macroeconomic stability [17, 25]. These findings are consistent with Kanga, et al. [17] who argued that the diffusion of fintech significantly contributes to national income growth through inclusive access. Similar views were expressed by Sharma [20] who linked financial inclusion with sustainable economic performance.

Conversely, the Yield on Earning Assets (YEA) variable was found to have no significant impact on GDP, which may indicate inefficiencies in managing productive assets. These inefficiencies could arise from poor credit risk management, suboptimal loan portfolios, or weak asset performance, ultimately undermining the firm's ability to generate interest income [26]. A decline in YEA reflects diminishing profitability from income-generating assets and may reduce fintech's attractiveness as an alternative financing channel, thereby weakening its contribution to GDP [27]. This aligns with broader regional findings, such as those from [38], emphasizing the critical role of asset utilization in digital financial ecosystems.

Return on Assets (ROA) also showed an insignificant effect, suggesting that P2P lending fintech firms have yet to fully leverage their asset base for profitability. High operational costs—stemming from technology infrastructure, marketing, or risk management—may erode potential returns. Additionally, the presence of unproductive assets or inefficiencies in asset deployment could explain the low ROA values [11]. For fintech companies to enhance their economic contribution, improvements in cost efficiency and asset utilization are essential [28].

Similarly, the study reveals that Return on Equity (ROE) does not significantly influence GDP. This may stem from the allocation of capital toward covering loan defaults rather than productive investments [29]. Elevated operational costs and suboptimal capital utilization, combined with a highly competitive market environment, may limit fintech firms' profitability and their ability to stimulate broader economic outcomes Phan, et al. [11]. Rahman and Halim [30] also suggest that capital structure misalignment is often observed in mid-income economies experiencing rapid digitalization.

Despite an increase in Capital Ratio (CAP), this variable did not exhibit a significant relationship with economic growth. One potential explanation is that a larger capital base may be used defensively—to absorb financial losses—rather than offensively for business expansion and productivity enhancement [31]. This aligns with Siddiqui and Siddiqui [6] who noted that robust capital structures in fintech must be strategically allocated to yield productive growth. Similar sentiments are reflected in Khan [32] where credit guarantee models are recommended for more effective SME financing.

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Company size (SIZE), by contrast, had a statistically significant positive effect on GDP. Larger fintech firms generally benefit from economies of scale, better technological infrastructure, and higher market penetration, allowing them to deliver services more efficiently and extend financial access more broadly. This result aligns with Djalilov and Piesse [14]; Junarsin, et al. [7] and Emekter, et al. [33] which argue that firm size, digital innovation, and foreign direct investment collectively enhance operational effectiveness and macroeconomic contribution.

Interestingly, the Cost to Income Ratio (CTI) was not significantly associated with GDP. Although CTI is commonly used as an indicator of operational efficiency, a high ratio here may indicate disproportionately high costs relative to income, which dilutes its effect on macroeconomic variables [9]. This inefficiency may reflect overinvestment in user acquisition or technology that is not yet monetized at scale Junarsin, et al. [7]. Mulska, et al. [34] reinforce this view by identifying similar challenges in the cost structure of banks during technological transition periods.

The Interest Income Share (IIS) variable showed the strongest positive effect among all independent variables. A high IIS indicates that interest-based revenue dominates the firms' income streams, underscoring the critical role of lending activities in shaping financial performance. Efficient interest-based revenue generation allows firms to offer sustainable and scalable services, reinforcing their contribution to GDP [9, 13]. In related work, Cornelli, et al. [27] also identified that well-balanced interest income streams are central to bank profitability.

Lastly, gender-based analysis revealed that female users of P2P lending platforms have a significant and positive influence on economic growth, whereas male users do not. This outcome aligns with prior research suggesting that women are more reliable in loan repayments and tend to utilize credit for productive purposes such as microenterprise development [15]. Empowering female borrowers through fintech platforms not only enhances individual financial outcomes but also yields collective macroeconomic gains. Similar patterns were observed in emerging markets such as China and India, where female borrowers have been shown to contribute more consistently to the performance of microcredit portfolios [15, 20]. Furthermore, Wong, et al. [35] confirmed disparities in financial behavior between gender groups, reinforcing the role of inclusive fintech practices.

In summary, this study affirms the economic potential of Fintech lending sector while also exposing key areas for improvement, particularly in asset efficiency, cost control, and inclusive capital deployment. The results offer valuable insights for fintech practitioners, regulators, and policymakers aiming to optimize the sector's contribution to national economic development. These findings are also consistent with perspectives presented by Ismanto, et al. [36] and Wong, et al. [35] who highlighted the transformational role of digital lending in emerging markets.

In addition to the financial and gender-based determinants highlighted in this study, the role of fraud deterrence within the fintech ecosystem warrants closer attention. As peer-to-peer (P2P) lending platforms expand their reach, particularly among female users who exhibit more reliable repayment behavior-ensuring the integrity of digital financial services becomes paramount. Fraud deterrence is increasingly recognized as a compliance mechanism and a strategic pillar that enhances institutional credibility and operational resilience.

Fraud deterrence refers to efforts that proactively minimize the risk of fraudulent behavior by increasing the perceived likelihood and consequences of detection. As Koerniawan et al. argue in Koerniawan, et al. [37] deterrence is not solely about systems and controls, but also hinges on managerial intention and ethical leadership through the implementation of Fraud Control Programs (FCPs). These include whistleblowing mechanisms, real-time internal monitoring, and organizational ethics reinforcement—features that are particularly vital for fintech institutions operating in high-trust, low-oversight environments.

Moreover, evidence from West Java's private healthcare sector suggests that fraud deterrence practices significantly influence service reliability and policy effectiveness, especially in sectors prone to asymmetric information such as fintech [38]. When fintech platforms integrate deterrence measures

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into their governance architecture, they build not only user confidence but also systemic safeguards against reputational and financial loss.

Further supporting this, fraud deterrence also functions as a key enabler of internal control system quality. As noted by Koerniawan, et al. [39] organizations that institutionalize deterrence mechanisms demonstrate stronger internal control structures, enhanced transparency, and higher operational sustainability. In the context of inclusive fintech, these mechanisms help ensure that expansion does not come at the cost of integrity. Thus, in addition to expanding access, P2P lending platforms must embed robust fraud deterrence strategies to support long-term, inclusive economic development.

6. Conclusion

This study examined the impact of various financial performance indicators, gender-based user participation, and governance aspects—specifically fraud deterrence—on Indonesia's economic growth, as measured by Gross Domestic Product (GDP). The analysis revealed that Net Interest Margin (NIM), Company Scale (SIZE), Interest Income Share (IIS), and female user participation had statistically significant positive effects on GDP. These findings emphasize the importance of scalable, inclusive, and integrity-driven fintech lending models in fostering national development.

Notably, the inclusion of fraud deterrence as a strategic governance component underscores its role in enhancing transparency, reducing operational risk, and building trust among underserved borrower groups. Effective deterrence mechanisms—such as fraud control programs and ethical oversight—support not only financial sustainability but also the social inclusivity of digital finance.

Collectively, these findings suggest that the macroeconomic potential of fintech will be most fully realized through an integrated approach that combines financial efficiency, gender equity, and robust internal governance. Future policy and innovation efforts should therefore prioritize both inclusive access and systemic safeguards to ensure long-term socioeconomic impact.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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