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Gender Diversity and Sustainability Performance: The Role of Financial Technology Adoption as Moderator

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ABSTRACT: This research is intended to explore the influence of gender diversity on financial and bank environmental performance. In addition, in order to strengthen the impact of gender diversity on financial performance and environmental performance, this research also tests the moderating effect of financial technology adoption. The population in this study examines banks that received the 2022 Digital Banking Awards, which is the research period from 2017-2022. The proportion of women on the Board of Commissioners and the Board of Directors is a proxy for gender diversity. This research method uses random effect models and fixed effect models in regression equations that test financial performance. Meanwhile, the regression model that tests environmental performance uses logit regression. This study shows that the percentage of females on boards has an impact on financial results, but not on environmental performance. The financial and environmental performance is not affected by the gender ratio in the board of directors. Other results show that, although financial technology can enhance the influence of women's representation on boards regarding environmental performance, but it does not have an impact on financial performance. On the other hand, the impact on financial and environmental performance of the proportion of women on the board of directors is not reduced by the adoption of financial technology. The implications of these findings provide input for regulators to determine the threshold for women's involvement on the board of directors.

Keywords: Gender Diversity, Sustainability Performance, Financial technology Adoption

INTRODUCTION

In view of the growing urgency of social issues such as climate change and natural resources, companies have begun to focus on environmental issues. Sustainable Development Goal Goal 13 calls for urgent development action at all levels to differentiate climate risks and protect environmental ecosystems (Birindelli et al., 2019). Stakeholders realize the importance of protecting the earth and the extinction of environmental ecosystems, so they demand repairs to the environment damaged by company operations.

All industrial sectors have a role in protecting the environment, including the banking industry sector. Banks make an enormous contribution even though banking is not directly related to environmental damage because its operational activities do not touch the environment. Banks are heavily reliant on resources such as energy and paper, thereby contributing to indirect CO2 emissions from business travel (Bătae et al., 2021). Three views can be taken into account in assessing the bank's environmental commitment: reducing the risk of lending to dirty industries, financing environmentally conscious industrial projects, and efficiently using resources within the bank by deciding on funding flow to companies whose business operations are destructive to the environment. This has resulted in the evolution of the banking environment, which means that financial benefits are not only considered when selecting funding channels. Green banks not only improve operational performance and reduce risks; (Gangi et al., 2018; Jo et al., 2015) but reputation and customer loyalty will also improve (Aramburu & Pescador, 2019). In turn, this will help banks reduce the consequences of reputational crises. (Giannarakis & Theotokas, 2011), in other words, increasing banking competitive advantage.

Primary research emphasizes the identification of the drivers of environmental performance and the moderation of these direct impacts in the growing literature on corporate environmental management (Cordeiro et al., 2020). The main driver of this paradigm shift is centered on inner company governance mechanisms, particularly board diversity. According to the resource dependence perspective, the diversity of the board could increase the information provided to managers about the reach of the board by making the existing information more accurate (Biduri et al., 2023). The diversity of boards allows the board to gain a more detailed insight into the complexity of their organizational environment, thus improving decisions (Luanglath et al., 2019). In particular, it is not only the Board's composition that constitutes a major instrument for corporate governance to monitor management activity but also its decision making body on strategic objectives such as sustainability (Akhmetshin et al., 2018; Ferramosca & Verona, 2020).

Board Diversity can be determined from various factors, including educational background, age, and gender. Gender diversity helps avoid dangerous cognitive biases by supporting decision-making mechanisms based entirely on multiple, freely expressed perspectives (Galbreath, 2018). Having women on boards contributes positively to governance effectiveness, as women tend to develop different approaches and reduce risks (Galletta et al., 2021). Gender diversity at issue is not only a failure to achieve gender equality, but banks need women at the center of policymaking. Progress has been made in gender equality, but more attention needs to be paid to the presence of women on boards.

The demand to prioritize gender diversity faces challenges that companies must balance to improve financial and environmental performance. Huang (2019) has published a systematic review of 21 metanalyses and found that there seems to be stronger relationship between the environment and corporate financial performance as compared with social and governance quality and financial performance. These findings indicate that directors need to formulate strategic steps for the company to balance financial performance and environmental performance woman directors are usually visible as beneficial because they are extra orientated closer to social responsibility than men, are more inquisitive about community service and philanthropic activities, and convey distinct perspectives to the board (Cordeiro et al., 2020). In addition, it is claimed that women directors are subject to more rigorous and strict oversight than male directors which can lead to improved performance of the company.

Another challenge the BoD faces, especially in the banking industry, is the presence of new competitors, namely financial technology, which has recently developed rapidly and can be feared

to disrupt banking stability in leading the financial industry. People choose alternative financing through Financial technology rather than banking (Nugroho et al., 2023). Financial technology can provide more varied product choices and is better able to reach people who find it difficult to get access to capital from banks. Innovation in banking, as well as the transformation of traditional services is not confined to emerging Financial Technology innovation at a number of areas of finance such as insurance, cash controls, wholesale billing, retail financing, capital raising and loaning (Luo et al., 2022; Murinde et al., 2022) as well as competing with them.

The emergence of financial technology services can be both a threat and an opportunity for banks. Banks that can integrate their products with financial technology will have a competitive advantage. This trend has forces banks to change and even collaborate with financial technology companies. Banks benefit from more stringent regulation and capital; on the other side, financial technology benefits from its pliability (Nugroho et al., 2023). Digital banking developed by banks can be a response to the massive rise of financial technology and a strategic step in creating an environmentally friendly industry. Digital banking can reduce carbon emissions by minimizing the use of paper, an essential contribution for banks in managing the environment.

On the other hand, investment in digital banking is quite significant and can potentially disrupt the bank's financial balance. The diversity of directors serving in the bank will determine which policies will be taken. It is challenging for directors to prioritize the environment or consider the financial impact when adopting financial technology in banks. Not many previous studies have tested the impact of implementing Financial technology on whether it affects a company's environmental performance; only Nugroho et al. (2023) showed that adopting Financial technology can strengthen the negative impact of IT investment on financial performance but have not tested the impact on environmental performance.

Gender diversity in board membership has become increasingly important among academics and policy makers in recent years (Arnaboldi et al., 2020). Extensive research has been conducted on the impact of board gender diversity on CSR (Byron & Post, 2016; Rao & Tilt, 2016; Yasser et al., 2017). However, environmental performance is the most effective indicator of complex CSR engagement in this study, so it is difficult to distinguish between social and environmental performance (Lu & Herremans, 2019), so this studies will cognizance on banks' dedication to decreasing carbon emissions. Research on carbon emissions has also been studied but still leaves gaps. The need for greater representation of women on boards to improve the quality of greenhouse gas emissions reporting in annual reports and sustainability reports is highlighted by Hollindale et al. (2019). In contrast, Cucari et al. (2018) abysmal representation of women on boards and their ESG disclosures, shows that the presence of female directors is exacerbated by regulator.

In ethical management of companies' sustainable business activities, as well as the promotion of ethics policies, board diversity has a key role to play (Gulzar et al., 2019; Nadeem et al., 2017). The existence of different kinds of females on boards improves the financial dimension but does not improve environmental or social dimensions, further authors have found (Reyes Bastidas & del Briano-Turrent, 2018). Previous research argues that gender diversity positively affects bank performance and stability (Garcia-Meca et al., 2015; Owen & Temesvary, 2018). In contrast, Talavera et al., (2018) highlight that more heterogeneous boards may consider different decisions due to differing directors' viewpoints, slowing down the boardroom's decision-making process and leading to poorer bank performance. These findings indicate that a gap still needs to be explored further to examine board diversity on bank financial performance.

When discussing the complexity of bank corporate governance principles, gender diversity plays a role (European Banking Authority, 2020). Despite increased interest from banking regulators in the past few years, there is a lack of evidence on this issue and researchers' attention has been narrowing to gender diversity within the banking sector (Galletta et al., 2021). This research tests whether board diversity influences financial and banking environmental performance. For the most part, researchers have not focused on examining how board diversity affects two dimensions of company performance. In addition, these studies examine whether the adoption of financial technology can increase the influence of board diversity in terms of financial and environmental performance. This is supported because this research examines banks with the title of best digital service in the 2022 Digital Banking Awards. Financial technology adoption is still rarely used in research because there are not yet mushrooming measurements that can be used to measure Financial technology adoption, recently recorded by Al-Matari et al., (2022) and Nugroho et al., (2023). At the same time, neither has attempted simultaneously to test both finances and environment performance. The need to fill the literature gap on board diversity, which remains a subject of debate between academicians, will be helped by this research. This research also develops literature regarding financial technology adoption for which very few sources can be obtained.

In the following sections, we successively determine the research design, discuss the findings and present conclusions.

METHOD

Our research focuses on examining banks that have adopted financial technology, so the population of this research is banks that won the 2022 Digital Banking Awards organized by Investor Magazine. The number of banks that received awards was 27 companies, and the research period was from 2017 - 2022. We obtained several selected samples using a purposive sampling technique, with the main criterion being banks listed on the Indonesia Stock Exchange (IDX). Companies excluded from the sample because they did not meet these criteria were five banks, namely DBS Indonesia, CTBC Indonesia, Sahabat Sampoerna, BCA Syariah, and BCA Digital Bank. Meanwhile, banks that meet the criteria for this research are listed in Table 1 below:

Table 1. Research Sample

No	Bank
1	Mandiri
2	BRI
3	BCA
4	BNI
5	Danamon
6	UOB Indonesia
7	Permata
8	Tabungan Negara
9	Mega
10	Maybank Indonesia
11	CIMB Niaga
12	KEB Hana Bank
13.	Mayapada Internasional

14. Commonwealth Bank
15. Oke Indonesia
16. Artha Graha Indonesia
17. MNC Internasional
18. BTPN Syariah
19. Bank Syariah Indonesia
20. Bank Raya Indonesia
21. Neo Commerce Bank
22. Bank Jago

Source: Digital Banking Award, 2022

Data collection for this research uses secondary data from annual reports published on the IDX and the relevant bank websites and other paid access. This research has four types of variables, namely dependent, independent, moderating, and control variables. The dependent variable consists of financial performance (KK), measured using ROA, and environmental performance (KL), measured using a dummy variable, which has a value of 1 if the bank has a policy to increase emission reduction. Otherwise, it is given a value of 0. This measurement follows Galletta et al. (2021). Meanwhile, details for measuring the independent, moderating, and control variables are listed in Table 2.

Table 2. Variable's Measurement

Variable	Measurement
Independent	
Women Commissioner (W_COM)	Percentage of women on the board of commissioners
Women Director (W_DIR)	Percentage of women on the board of directors
Moderator	
Financial technolog Adoption (FIN)	Content analysis using the Global Financial technology Adoption Index
Control	
Firm Size (SIZE)	Natural logarithm of total assets
Board Size (BZ)	Total members of the board of directors
Board Skill (BS)	Dummy variable, code 1 if the bank describes the professional experience or skills or age of each member of the board of directors, value 0 otherwise
CEO Woman (CW)	Dummy variable, code 1 if the main director (CEO) is a woman, value 0 otherwise
Critical Mass of Women (CMW)	Dummy variable, code 1 if the board of directors has at least 3 women, value 0 otherwise
Liquidity (LIK)	Net loans/total asset
Capital Adequacy (CA)	Total equity/total asset
Operating Cost (OP)	Overhead/total asset

The independent variable in this research is Board Diversity, which is proxied using the percentage of women on the board of commissioners (W_COM) and board of directors (W_DIR), following Galletta et al., (2021). This is because the governance context in Indonesia applies a two-tier system. Financial technology adoption is measured following Al-Matari et al. (2022), while the control variables follow Galletta et al., (2021) and Birindelli et al., (2019).

This quantitative empirical research uses three regression equation models, namely PLS regression, logistic regression, and moderated regression. This is because this research has two dependent

variables which have different characteristics. Data processing uses STATA version 17, with the following research model equation formula:

$$KK_{i,t} : \alpha + \beta_1 W\_COM_{i,t} + \beta_2 W\_DIR_{i,t} + \beta_3 BZ_{i,t} + \beta_4 BS_{i,t} + \beta_5 CW_{i,t} + \beta_6 CMW_{i,t} + \beta_7 LIK_{i,t} + \beta_8 CA_{i,t} + \beta_9 OP_{i,t} + e \text{ ……..(1)}$$

$$KK_{i,t} : \alpha + \beta_1 W\_COM_{i,t} + \beta_2 W\_DIR_{i,t} + \beta_3 BZ_{i,t} + \beta_4 BS_{i,t} + \beta_5 CW_{i,t} + \beta_6 CMW_{i,t} + \beta_7 LIK_{i,t} + \beta_8 CA_{i,t} + \beta_9 OP_{i,t} + \beta_{10} W\_COM*FIN_{i,t} + \beta_{11} W\_DIR*FIN_{i,t} + e \text{ ……..(2)}$$

$$KL_{i,t} : \alpha + \beta_1 W\_COM_{i,t} + \beta_2 W\_DIR_{i,t} + \beta_3 BZ_{i,t} + \beta_4 BS_{i,t} + \beta_5 CW_{i,t} + \beta_6 CMW_{i,t} + \beta_7 LIK_{i,t} + \beta_8 CA_{i,t} + \beta_9 OP_{i,t} + e \text{ ……..(3)}$$

$$KL_{i,t} : \alpha + \beta_1 W\_COM_{i,t} + \beta_2 W\_DIR_{i,t} + \beta_3 BZ_{i,t} + \beta_4 BS_{i,t} + \beta_5 CW_{i,t} + \beta_6 CMW_{i,t} + \beta_7 LIK_{i,t} + \beta_8 CA_{i,t} + \beta_9 OP_{i,t} + \beta_{10} W\_COM*FIN_{i,t} + \beta_{11} W\_DIR*FIN_{i,t} + e \text{ ……..(4)}$$

Equations 1 and 2 are panel models, which will be processed using PLS, Fixed Effect, or Random Effect regression. Before carrying out the test, make sure that the BLUE problem has been resolved, related to the problem of classical assumptions in the form of normality, multicollinearity, heteroscedasticity, and autocorrelation. Equation models 3 and 4 are logistic models that will be processed using logit regression.

RESULT AND DISCUSSION

This research determines the regression model used using the Haussman Test to determine whether to use a fixed effect model (FEM) or a random effect model (REM) for regression equations 1 and 2. The results of the Hausman Test show that Eq . 1 has a significance of 0.0054, so using FEM, and Eq. 2 obtains a significance of 0.2035, so it uses REM. To overcome the problems of heteroscedasticity and autocorrelation in Eq. 1, the regression adopts Generalized Least Squares (GLS). Meanwhile, Eq. 3 and Eq. 4 use logit regression.

Descriptive Statistic and Hypothesis Testing

Table 3 shows the results of descriptive analysis of each variable used in this research. Meanwhile, Table 4 displays the results of multiple regression, logistic, and moderation regression tests for all regression equations in this study.

Table 3. Descriptive Statistic

	N	Min	Max	Mean	Std. Deviation
KK	132	-.1958599	.0909855	.0097434	.0315095
KL	132	0	1	.5833333	.4948848
W_COM	132	0	66.66667	14.70276	16.67081
W_DIR	132	0	100	17.92715	17.52137
FIN	132	0	.5789474	.2276715	.160682
BZ	132	4	23	12.81818	5.184855
BS	132	0	1	.9393939	.2395153
CW	132	0	1	0984848	.2991042
CMW	132	0	1	.1969697	.3992243
LIK	132	.1371372	1.03091	.7535646	.1969186
CA	132	.055336	.6700107	.1882885	.1051868
OP	132	.000182	.181121	.0413852	.0319856

Source: Author Data, 2023

An exciting finding in Eq. 1 shows that W_COM has a significance of 0.005, below the value of 0.05, and the direction of the coefficient is positive, which means that W_COM has a positive effect on financial performance. In contrast, W_DIR does not show a significant value. This shows that the role of women on the BoD does not affect financial or environmental performance. The findings in Eq. 2, which tested the moderating variable of financial technology adoption, actually showed values of 0.394 and 0.712, which means the values are not significant, meaning that the adoption of financial technology by banks is not able to strengthen the influence of gender diversity in improving bank financial performance. On the other hand, the findings of Eq. 3 show the significance value of W_COM and W_DIR above 0.05, thus indicating an insignificant influence. Eq. 4 shows the significance value of FIN*W_COM of 0.010, which means it has a significant effect.

Table 4. Hypothesis Test

	Eq. 1	**Eq. 2**	**Eq. 3**	**Eq. 4**
	KK	**KK**	**KL**	**KL**
(Constant)	0.019 (.0462145)	0.121 (.0480436)	0.167 (.029893)	0.346 (- .0876733)
W_COM	0.005** (.0004726)	0.049** (.0005667)	0.075* (1.04113)	0.079* (-.9054196)
W_DIR	0.141 (-.0002998)	0.246 (-.0003221)	0.117 (-.9501149)	0.584 (-.9741987)
FIN*W_COM		0.394 (-.0008089)		0.010** (1.83768)
FIN*W_DIR		0.712 (.0003657)		0.666 (-.9300323)
BZ	0.000*** (.0027479)	0.013** (.0019673)	0.000*** (1.484573)	0.000*** (1.51002)
BS	0.000*** (-.0448804)	0.100 (-.0244144)	0.013** (-.0490142)	0.010** (-.0380102)
CW	0.514 (.0062929)	0.465 (.0080074)	0.803 (1.370455)	0.908 (1.18531)
CMW	0.231 (.0099013)	0.343 (.0089074)	0.072* (9.038698)	0.208 (5.347984)
LIK	0.008** (-.0432901)	0.066* (-.0483695)	0.501 (-.2327965)	0.243 (-.064594)
CA	0.091* (-.0490284)	0.201 (-.0518483)	0.929 (1.333443)	0.859 (-.5365993)
OP	0.030** (.1975302)	0.694 (.0481672)	0.714 (58.98655)	0.272 (744907.3)
R- square	58.39	55.20	47.52	53.55
Log Likelihood			-47.053843	-41.641664

Source: Author Data, 2023
*) significant at level 10%
**) significant at level 5%
***) significant at level 1%

Gender Diversity, Financial Technology Adoption, Financial Performance

Eq. 1 shows that the relationship of female Commissioners to Company Financial Performance is favorable. The Agency's theory that board members are acting as representatives and protecting

the interests of shareholders in order to prevent what amounts to agency costs has been confirmed by this finding (Galletta et al., 2021). It is more important for women to be involved in board supervision, so as to enhance the financial performance of banks. This is because in making decisions, there are many different backgrounds which bring their own perspectives (Valls Martinez et al., 2019). The presence of women on a company's board of commissioners can provide variations in supervision, where women are seen as more detailed and thorough in examining things. The argument for gender diversity in business is based on the monitoring efforts of female board members, which might be more efficient than those of men and would help firms to improve their economic performance (Adams & Ferreira, 2009). Women have special skills on corporate boards, including their tendency to be more risk-averse than men (Arnaboldi et al., 2021).

However, there does not appear to be any material impact in the financial performance of a bank with female board members. The increase of performance in the BoD and company is not guaranteed by gender diversity (Creary et al., 2019). On the other hand, the culture of the BoD is a factor that can influence the diversity of the BoD in carrying out their duties (Jabari & Muhamad, 2021). Gender diversity will hinder the company's operational decision-making process because it causes different views, which can harm the bank's financial performance. Risk outweighs the value and diversity means that members with different backgrounds have to incur greater costs of decision making and conflict (Adams et al., 2015; Farag & Mallin, 2017). This finding could be caused by the fact that there are banks whose directors are all women, so the diversity depicted is not explained well because men are not involved on the board of directors.

Another interesting finding is that the adoption of financial technology by banks does not strengthen the influence of gender diversity on bank financial performance. This finding is supported by Al-Matari et al., (2022) but contradicts the findings of Nugroho et al., (2023). IT investment to create financial technology services is expensive, so banks' ability to adopt financial technology varies. The Financial technology innovation used takes into account the bank's uniqueness and specificity so that each bank's development focus is not the same. Banks have to enforce semi-unified technology to make certain the supply of quality services that assist enhance bank performance (Al-Matari et al., 2022).

Gender Diversity, Financial technology Adoption, Environmental Performance

Gender diversity in the ranks of commissioners and directors does not influence banking environmental performance; this is contrary to the findings in Eq. 1. These findings agree with Nadeem (2020) and Nguyen et al. (2021) did not reveal a relationship between female directors and environmental performance. A positive relationship between gender diversity and environmental performance has not been established in some studies (Boulouta, 2013; Glass et al., 2016).

Our finding is agree with Reyes Bastidas & del Briano-Turrent (2018) that Women directors have a positive impact on the economy, but also affect environmental and social dimensions negatively. Gender diversity is not important as there's no limit to the number of women directors that can make a difference (Cordeiro et al., 2020). The number of female directors and commissioners in banking remains relatively minimal. Although there are, the proportion is still too small compared to male directors. Not a few banks in Indonesia have only male directors and commissioners, so

the presence of women in decision-making is very limited. While minority groups serving as directors on boards can, without problems, be marginalized and taken into consideration tokens if their presence inside the larger group is not too sizeable, as the dimensions of the minority group will increase, they could gain trust, impact, and assignment majority decisions (Bear et al., 2010; Torchia et al., 2011). Gender diversity is reflected in the presence of women on our board and as commissioners. According to Table 3, on average, Indonesian banks account for less than 20% of the total number of directors and committee members. This indicates that there is still a low proportion of females on the Bank's management board, which means that women have no influence as far as environmental policies are concerned.

The impact of the board's gender diversity on environmental performance may, however, be enhanced through financial technology advantages pursued by banks. Financial technology has changed how automation and procedures are implemented, with the use of it to improve finance services (Ren et al., 2021). One of the goals of banks in digitizing through financial technology innovation is to reduce carbon emissions through the use of paper and physical meetings and the presence of physical offices. Environmental benefits can also be achieved by providing renewable energy (Deng et al., 2019). Dorfleitner & Braun (2019) highlight that financial technology can mobilize green finance in the future as it allows access to new financing and investment opportunities. Combining Big Data and Artificial Intelligence to promote the transition towards a greener economy, financial technology can be viewed as representing Green Finance (Wang et al., 2021).

In order to maintain competitiveness and sustain a sound level of fulfilment in the banking sector, banks need to provide value for stakeholders by introducing new methods and products (Nugroho et al., 2023). The board of commissioners pays greater attention to company operations to keep up with technological developments, which will have a multiplier effect on various aspects. Li et al. (2017) argue that diversity in the gender balance, particularly for companies whose impacts on the environment and society are significant, is a key factor to develop healthy environmentally sustainable policies. Implementing financial technology requires enormous costs at the start, and the returns obtained can only be felt in the long term, so directors have no intention of adopting financial technology because it does not benefit them. Meanwhile, the board of commissioners, as supervisors of the BoD and considering the sustainability and competitive advantage of the bank, have the intention to adopt financial technology so that the application of financial technology can strengthen the concentration of the board of commissioners to be involved in decision making regarding the bank's environmental performance. The mere presence of independent commissioners cannot improve the company's environmental performance (Wibowo & Lasdi, 2022). However, a board of commissioners that has gender diversity can be further involved in influencing environmental performance. Consequently, it can be seen that women commissioners in our sample are more concerned about social responsibilities and have improved their board decisions to encourage contributions towards environmental performance.

CONCLUSION

This research proves that a female board of commissioners can influence banking financial performance, but a female board of directors does not influence financial performance This shows that there is considerable involvement of women in the monitoring of financial performance on the Board of Commissioners. The role of women directors in influencing the bank's environmental

performance could, on the other hand, be enhanced by digitalization through adoption of financial technology. Meanwhile, the presence of women on the board of directors and commissioners does not affect the bank's environmental performance. In the future, these findings can be used to test the effectiveness of diversity in the Board of Directors and Commissioners in making decisions that can affect the bank's financial performance and the environment; this is because this research focuses on gender diversity. Future research could also examine the role of gender diversity on bank social performance, which this study has not explored. Future research can develop the financial technology adoption measurement used in this research, which is rarely implemented in research examining Indonesia.

This study has several limitations, but they do not cause bias in the findings obtained. The research uses a measurement of the adoption of financial technology which was not widely developed and inappropriate for Indonesia's economic situation, so it is necessary to establish measurements on this variable. The impact of these limitations causes several indicator points that all banks cannot fulfill because they are not appropriate to the business context in Indonesia. Apart from that, this research also has implications that can be useful for practitioner stakeholders. The implications of the findings in this research are helpful for regulators in determining the threshold for companies to be required to involve women in the board of directors and commissioners, which will support Gender Equality, which is part of the Sustainable Development Goals. Banks can also apply the findings of this research in improving the financial technology services they develop so that they pay attention to indicators of financial technology adoption that are right on target.

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