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Dynamics of Digital Financial Inclusion in Türkiye

Behice Canatan[1] ⓘ **, Ayşe Akboz-Caner[2]** ⓘ **, Gökhan Özbilge[3]** ⓘ

Abstract
This study examined the dynamics of different levels of digital financial inclusion (DFI) in Türkiye within the framework of individuals' basic financial behaviours and socioeconomic conditions and investigated factors that may affect the utilisation rate of DFI. Accordingly, findings from the 2017–2021 World Bank Global Findex dataset were estimated using the ordered logit model. The concept of DFI, which is becoming increasingly important, underscores that financial systems should have two basic conditions. First, the ability of those who can access financial systems digitally should be as high as possible. Second, these actors with access to financial systems should also have sufficient utilisation rates of the relevant financial instruments. In this respect, by focusing on the determinants of this second condition, the study fills a gap in the literature and provides clues for policy recommendations. These findings provide empirical evidence for our motivation. In this respect, the results clearly show that socioeconomic factors, such as education level and income level, as well as financial behaviours, such as formal savings and borrowing, should be taken into account when expanding DFI.

Keywords: Digital financial inclusion, Financial behaviours, Socioeconomic factors, Ordered logit, Global findex

Introduction

Financial inclusion is a multidimensional concept that affects the accessibility and availability of financial products and services (Ahmad et al., 2021).This concept explicitly refers to a high proportion of both those who have access to the financial system and those who use the services offered by this financial system (WB, 2014; Demirgüç-Kunt et al., 2017; WB, 2019). Building on the same basic structure, digital financial inclusion (DFI) refers to financial systems in which a high proportion of individuals access and use financial services digitally (Lyman & Lauer, 2015). Thus, ever-evolving technologies can create opportunities for those excluded from the financial system and those with limited access (Niu et al., 2022) and help individuals make choices that promote financial stability (Ozili, 2018).

1 **Corresponding Author:** Behice Canatan (Phd Candidate), Tarsus University, Department of Finance & Banking, Mersin, Turkiye.
E-mail: behice_canatan@tarsus.edu.tr

2 Ayşe Akboz-Caner (Phd Candidate), Tarsus University, Department of Finance & Banking, Mersin, Turkiye.
E-mail: ayse_akboz@tarsus.edu.tr

3 Gökhan Özbilge (Res. Asst.), Istanbul Gelişim University, Department of International Trade And Finance, Istanbul, Turkiye.
E-mail: gozbilge@gelisim.edu.tr

Over time, innovations in digital technologies play an essential role in increasing the slow penetration of financial inclusion (Tiwari et al., 2019) and in developing and transforming digital financial markets (Heckel and Waldenberger, 2022). With such innovation, digitised financial inclusion can provide financial services to a wide range of households (Akanfe et al., 2020) and increase their likelihood of participating in the financial market (Liao & Zhou 2020; Shen et al., 2022; Zhou & He 2020).DFI is central to reducing economic and social negatives, especially during times of crisis, such as during the current COVID-19 pandemic. Increasing financial access in different segments of society can also contribute to financial repair (Tay et al., 2022).DFI can improve the width and depth of financial services, decrease service costs, and reach more populations (Chen et al., 2022). Apart from all of its benefits, the significant increase in loan supply and recent household debt with digital loan platforms, due to the widespread use of DFI, has drawn the attention of researchers (Feng et al., 2019; Chen et al., 2020; Yue et al., 2022). Studies in this direction have shown that DFI encourages more households to borrow through formal channels (Li et al., 2022; Yue et al., 2022).

Examining the definitions and characteristics of the inclusions mentioned above makes it easier to move towards the main idea of this study. This research also helps the existing literature in several ways. First, it provides a microeconomic perspective, focusing on the individual characteristics of financial actors that may affect their use of DFI. Because, as will be recalled, DFI is by definition a financial system with a high proportion of both those who can access and use digital financial services. As in this study, these actors can include individuals (Chen et al., 2022) and guide their financial choices. In this context, this study examines basic financial behaviours such as savings, debt, and socioeconomic factors, that affect individuals' DFI levels. The existing literature generally focuses on financial inclusion (Sanderson et al., 2018; Sarigul, 2020; Teker et al., 2021; Avcı, 2022; Girón et al., 2022), whereas studies on DFI (Naumenkova, 2019; et al., 2021; Li et al., 2022) are relatively new and limited. In other words, research on the factors that may affect the utilisation rate of DFIs has been ignored, and the focus has been on access.

Second, this study contributes to the existing literature in several ways. First, an index was created using variables (debit cards, credit card ownership, making bill payments online, buying something online, using mobile phones or the internet to access financial institution accounts, and using mobile phones or the internet to check account balances) included in the studies (Akanfe et al., 2020; PAL, 2020; Nandru et al., 2021; Ozili, 2022) as indicators of DFI, each of which also contains different information. Although various studies (Nandru et al., 2021) have analysed and correlated relevant variables, these indicators provide only partial and therefore incomplete information when used individually and separately. Therefore, considering the current deficiencies in the literature, an additional DFI index was created in this study. Using the DFI index created by principal component analysis (PCA) instead of using the variables separately strengthens the measurement capability.

Most importantly, despite the recent global spread of DFI, more research has yet to be conducted in Türkiye. However, Türkiye has the infrastructure to ensure DFI (PAL, 2020; Yıldırım, 2020; CBFO, 2021). Here, one of the important points is decisions that affect the participation rate of individuals in DFI. Moreover, including basic financial behaviours such as savings and debt, in the analysis is important for identifying which financial behaviours will affect the actors covered by DFI and how and in what way. On the other hand, given the increasing use of digital financial services in recent years, determining the impact of financial behaviours on DFI. This is because DFI not only increases household savings and the amount of loans taken from financial institutions, which may increase the likelihood that individuals fall into debt traps. Thus, this study analyzes the impact of financial behaviour on DFI in Türkiye and socioeconomic variables to examine the impact of DFI from a more detailed perspective. For this purpose, the ordered logit model was applied using data obtained from the World Bank's Global Findex database for 2017–2021.

The remainder of this article is organised as follows: Section 2 reviews previous studies on financial inclusion and DFI, Section 3 provides datasets and methodology, Section 4 presents empirical results and discussions, and Section 5 presents concluding remarks.

Literature Review

This section provides an overview of the literature on financial inclusion and DFI. Although the main factors determining financial inclusion have been the focus of many studies, DFI has not been adequately explained, especially in Türkiye. This study contributes to the DFI literature by addressing this gap and expanding the existing literature's scope.

When studies on financial inclusion in the current literature were examined, it was seen that they generally focused on the relationship between financial inclusion and macroeconomic indicators. Lenka and Sharma (2017) used autoregressive distributed lag (ARDL) to examine the impact of financial inclusion on economic growth in India. They emphasised the positive impact of financial inclusion on economic growth. Fernandes et al. (2021) investigated the impact of digital financial services on financial inclusion with ARDL in Mozambique. Gündüz & Özyıldırım (2020) revealed the role of participation banking on financial inclusion in Türkiye. Sarıgül (2021) investigated factors determining financial inclusion in Türkiye using a co-integration test. Chen et al. (2022) examined the relationship between financial inclusion, economic growth, income inequality, and poverty using panel data from China. They found that financial inclusion has a long-term effect on poverty reduction in China, whereas the effect of economic growth is relatively weak. Kouladoum et al. (2022) sought to uncover the relationship between digital technology and financial inclusion in Africa through generalised method of moments (GMM). They emphasised that the rate of financial inclusion in Africa has increased as digital technologies have increased. Demir et al. (2022) sought to

reveal the relationship between quantile regression and financial technologies, financial inclusion, and income inequality in 140 countries. The determinants of financial inclusion and regional inequality in Türkiye were examined by Takmaz et al. (2022) using an ordered logit model. Canatan & İpek (2023) researched factors affecting household financial inclusion in Türkiye. These studies considered macroeconomic variables in various dimensions, such as economic growth, income inequality, poverty, digital technologies, and their financial use. In this context, it is understood that these studies emphasised that financial inclusion supported by digitalisation can positively contribute to income, income inequality, economic growth, and regional inequalities.

Although the literature on DFI is relatively new, international studies have been increasing rapidly, whereas national studies still need to be comprehensive. Ahmad et al. (2021) examined the relationship between FDI and economic growth in China using panel data analysis. Dai (2021) conducted a study on the development and supervision of robo-advisors of complex systems and DFI in China. Keliküm (2021) revealed the relationship between DFI, informal economy, and poverty through GMM in Africa. Kumar (2021) explored the role of DFI on access, use, and quality of digital finance in India. Liu et al. (2021) investigated the relationship between DFI and economic growth. Nandru et al. (2021) reported on the determinants of DFI in India. Chen et al. (2022) used panel data to investigate the impact of DFI on household poverty in China. Li et al. (2022) examined the impact of DFI on household debt in China using panel data. Li et al. (2022) aimed to determine the effect of household consumption on DFI using spatial econometrics in China. Luo et al. (2022) studied the effect of DFI on household consumption in China using a fixed-effect model. Ozturk and Ullah (2022) examined DFI, economic growth, and environmental sustainability in GMM and OBRI economies. Saxena and Thakur (2022) investigated the factors affecting DFI by ANOVA in India. These studies generally recommended expanding DFI participation to achieve higher economic growth and reduce poverty and income inequality.

As a result, there are still some limitations in the relevant literature. More than macroeconomic indicators should be considered for DFI. Therefore, this study identified and evaluated factors affecting DFI by creating a micro-based DFI index to fill Türkiye's research gap. As this study's main contribution emphasises, to say that DFI is fully present, the rate of people using digital financial systems must be high. Only in this way can the DFI rate be fully increased and the above-mentioned macroeconomic developments be achieved. Thus, these findings are expected to help DFI become more efficient and broad.

Data Set

The Global Findex dataset is one of the microdata sets that measures individuals' savings, debt, payment, remittance, and risk management (+15) in the most detailed way (WB, 2018).

In this study, the 2017–2021 Global Findex Data Set (2011–2014 were not included because they did not have variables presenting the DFI index) was used as a pool to determine the impact of socioeconomic conditions and financial behaviours that affect DFI in Türkiye.

In this regard, a composite DFI indicator was created for Türkiye, which included DFI indicators via PCA. The formation of PCA follows the strategy of the World Bank (2022b), data set availability, and the relevant literature (Akanfe et al., 2020; Nandru et al., 2021; Ozili, 2022) and (PAL, 2020). For the DFI index, a triple-categorical dependent variable was formed that included items like debit cards, credit card ownership, making bill payments on-line via the internet, buying something online using the internet, using mobile phones or the internet to access financial institution accounts, and using mobile phones or the internet to check account balances. In addition, this indicator considered the need to use system contents and access financial systems. Furthermore, debt and savings variables were used to measure the effects of using the financial system for the same purpose. The PCA methodology and DFI construction are described in detail in the next section.

In addition, the choice of the independent variables debt and savings is based on their potential impact on the utilisation rate of DFI. An important point is to use borrowers that are family or friends rather than informal borrowers. One reason for this is that individuals in the sample may be reluctant to report informal borrowing (as Lyons et al. (2022) noted, factors such as legal and regulatory institutions and cultural factors, which are particularly emphasised in this study, are important in Türkiye and similar societies). Another reason is that the effects of borrowing from family or friend networks are well known in Türkiye (Yük-seker, 2010), especially for sociological aspects). Finally, choosing socioeconomic variables is important in guiding their financial behaviour and understanding how they can guide their utilisation rates while following relevant literature. The variables included in the dataset and their summary statistics are detailed in Table 1.

Table 1
Summary Statistics

Variable	Description and Summary Statistics
DFI	Digital Financial Inclusion Index, N:1294, Min:1-Max:3 1:Low: 435(%33.62); 2:Med: 465(%35.94); 3:High: 394(%30.45);
Income	Income group, N:1294, Min:1-Max:5 1:Poorest: 146(%11.28), 2:Second: 155(%15.69), 3:Middle: 221(%17.08), 4:Fourth: 297(%22.95), 5:Richest: 475(%36.71)
Education	Education level, N:1294, Min:1-Max:3 1:Completed primary or less: 188(%14.53), 2:Secondary: 766(%59.20), 3:Completed tertiary or more: 340(%26.28)
Gender	Gender, N:1294, Min:1-Max:2 1:Male: 785(%60.66), 2:Female: 509(%39.34),
Workforce	Labour force inclusion status, N:1294, Min:1-Max:2 1:In-workforce: 967(%74.73); 2:Out-of-workforce: 327(%25.27);

Variable	Description and Summary Statistics
Age	Age, N:1294, Min:17-Max:87
	Mean: 37.84, standard deviation: 13.86
Saved FI	Saved in past 12 months: Using an account at a financial institution, N:1294, Min:1-Max:2
	1:Yes: 345(%26.66), 2:No: 949(%73.34)
Saved IS	Saved in past 12 months: Using an informal savings club, N:1294, Min:1-Max:2
	1:Yes: 106(%8.19), 2:No: 1188(%91.81)
Borrowed FI	Borrowed in past 12 months: From a financial institution, N:1294, Min:1-Max:2
	1:Yes: 347(%26.82), 2:No: 947(%73.18)
Borrowed FF	Borrowed in the past 12 months: From family or friends, N:1294, Min:1-Max:2
	1:Yes: 465(%35.94), 2:No: 829(%64.06)

Finally, remarkable descriptive statistics regarding the variables in the dataset can be observed. In this regard, only 30.45% of the respondents in the DFI index are at a high level. In comparison, the percentage of those at low and medium levels is 69.56%. These rates are preliminary evidence for our research question and emphasise that for a sample like Türkiye, where digital financial infrastructure is available, the usage rate of tools offered by the relevant infrastructure should be high. In addition, the fact that the rate of those who borrowed from a family/friend network was 35.94%, whereas the rate of those who borrowed from a financial institution was 26.82% strengthens the argument that was made before for the variable under consideration. In conclusion, inadequate saving rates and other essential points highlighted in this paragraph emphasise that DFI must consider individual factors.

Methodology

The ordered logit model is widely used when the dependent variable has more than two ordered responses. This approach provides a methodology for finding independent variables that explain ordinal variables, considering the measurement uncertainty of the data (Ballerin et al., 2016). The ordered logit model can be written as in Eq.(1) and represents the dependent variable reflecting the DFI categories (DFI1, DFI2, and DFI3):

$$y_i^* = \beta^{'}x_i + \varepsilon_i \qquad i = 1, \ldots, n \qquad (1)$$

$$
\begin{aligned}
y_i = \quad & 0 \text{ if } -\infty < y_i^* \leq \mu_0 && \text{(low level of DFI: DFI1)} \\
= \quad & 1 \text{ if } \mu_0 < y_i^* \leq \mu_1 && \text{(medium DFI: DFI2)} \\
= \quad & 2 \text{ if } \mu_1 < y_i^* \leq \infty && \text{(high DFI: DFI3)}
\end{aligned}
\qquad (2)
$$

Here, μ is the threshold points and indicates the bounds of the dependent variable, xi represents the explanatory variable matrix, εi is the error term, and β is the vector of the parameter to be estimated. In the xi explanatory variables matrix in Eq.(1) and adapted to the

study, there are gender, age, educational status, employment status, income status, and saving and borrowing behaviors of the individual. In the next section, in Table 5, where the ordered logit model estimation results are shown, the odds ratio values are estimated according to the reference group and express the effect of the variables on DFI proportionally. In the logit models, the interpretation is made based on the odds ratio In logit models, interpretation is based on odds ratios and marginal effects (İpek, 2020).

Empirical Results

PCA is a data analysis tool that preserves the information of many interrelated variables and is used to reduce the number of variables. The most significant components (principal components) are determined using the eigenvalues and eigenvectors of the covariance matrix of the data matrix. The index created by PCA is based on projections of the principal components of the data (Abeyasekera, 2003; Vyas and Kumaranayake, 2006). In this study, a DFI index was constructed using a weighted combination. Where $w_i,...,w_n$ are the weights of the components on the index. X_n is the projection of the nth principal component:

$$\text{Index} = w_i X_i + \cdots + w_n X_n \qquad (3)$$

$$\text{DFI}=0.45*(\text{PC1})+0.40*(\text{PC2})+0.27*(\text{PC3}) + 0.37*(\text{PC4})+ 0.44*(\text{PC5})+ 0.46*(\text{PC6}) \qquad (4)$$

Table 2
The results of Principal Component Analysis

	PC1	PC2	PC3	PC4	PC5	PC6
Eigenvalue	0.3012	0.5514	0.8921	3.1678	0.6445	0.4428
Proportion	0.0502	0.0919	0.1487	0.5280	0.1074	0.0738
Cumulative	1.0000	0.8760	0.6767	0.5280	0.7841	0.9498
Eigenvectors						
Component 1	0.4550	0.4024	0.2738	0.3761	0.4421	0.4681
Component 2	-2.2381	-0.2194	0.8478	0.3314	-0.1211	-0.2277
Component 3	-0.2309	0.5124	0.3364	-0.6796	0.2960	-0.1464
Component 4	-0.4130	0.6196	-0.2563	0.5177	-0.0758	-0.3257
Component 5	0.2756	0.3757	0.1653	-0.1369	-0.8327	0.2097
Component 6	0.6606	0.0537	0.0053	0.0036	0.0553	-0.7467

Eigenvalues are a metric that measures how much each principal component explains the variance in the data set in PCA. Large eigenvalues indicate that the component is significant and reflects the underlying structure in the data set (Demšar et al., 2013). PC4 (first principal component) has a variance of 3.16 and explains 52% of the total variance (3.16/6). PC3 (second principal component) has a variance of 0.89, i.e. 14% of the total variance (0.89/6). As a result, we can also say that the first two principal components explain the sum of the variances of the individual components or about 66% of the total variance.

The suitability of PCA was measured using the Keiser–Meyer–Olkin (KMO) test and Bartlett's test of sphericity. To test the sample adequacy, the results of the KMO test and Bartlett's test of sphericity were used and are given in Table 3. If the KMO index is 0.80, it is considered meritorious, 0.70 middling, and below 0.50 is unacceptable (Kaiser & Rice, 1974; Wu, 2021). The results supported the use of PCA in this study.

Table 3
KMO and Bartlett's Test Results

Variable		KMO	
Overall		0.83	
PC1: Check account		0.80	
PC2: Buying something online		0.88	
PC3: Credit card		0.84	
PC4: Debit card		0.88	
PC5: Making bill payments online		0.86	
PC6: Account		0.79	
Bartlett's	Chi-square	df	p-value
	2593.308	15	0.000

The findings of the ordered logit model used to study the DFI effect are included in this section. The parallel assumption, which is the most critical assumption in the ordered logit model, was tested with the help of Wolfe Gould and Brant's (1990) tests. The hypothesis that the coefficients of independent variables are the same across all dependent variable categories must be tested. More technically, this means that the odds ratios of a category in all logistic models remain the same against a variable created by collapsing all categories except itself (Williams, 2016). Thus, a more generous interpretation technique can be used. Therefore, parallel assumption tests were applied.

Table 4
Parallel Regression Tests

Test	Chi2	df	P> Chi2
WolfeGould	11.88	13	0.537
Brant	12.48	13	0.489
Score	12.03	13	0.525
Likelihood Ratio	12.24	13	0.508
Wald	12.12	13	0.518
Information Criteria	ologit	gologit	difference
AIC	2477.93	2491.69	-13.76
BIC	2555.41	2636.32	-80.91

Table 4 presents the results of the Wolfe–Gould and Brant tests, in which the parallelism assumption was tested for the model in general. It was concluded that the probability value of the Ho hypothesis was greater than 0.05; therefore, the assumption of parallelism was provided for the overall model. When the model goodness of fit, Akaike Information Criterion (AIC), and Bayesian Information Criterion (BIC) values were compared, it was observed that the ordered logit model (ologit) had lower information criterion values. Lower AIC and BIC information criteria were selected.

Table 5
Ordered Logit Model Estimation Results

Variable	Odds Ratio	Marginal Effect		
		Low DFI	Med DFI	High DFI
Female	1.017	-.003	.000	.002
	(.132)	(.023)	(.003)	(.019)
In Workforce	1.749***	-.101***	.016***	.084***
	(.253)	(.028)	(.008)	(.020)
Age	.967***	.005***	-.000***	-.004***
	(.004)	(.000)	(.000)	(.000)
Secondary education	1.521*	-.084*	.025*	.058**
	(.251)	(.033)	(.012)	(.022)
Completed tertiary or more	4.311***	-.268***	.022*	.245***
	(.892)	(.037)	(.013)	(.035)
Second %20	1.352	-.058	.018	.039
	(.300)	(.042)	(.014)	(.029)
Middle %20	1.740**	-.106**	.029*	.076**
	(.370)	(.040)	(.012)	(.028)
Fourth %20	2.462***	-.169***	.037**	.132***
	(.516)	(.039)	(.012)	(.029)
Richest %20	2.231***	-.152***	.036**	.115***
	(.458)	(.039)	(.012)	(.028)
Saved using an account at a financial institution	2.522***	-.167***	.012*	.154***
	(.369)	(.025)	(.005)	(.025)
Saved using an informal savings club	.913	-.016	.002	.013
	(.213)	(.042)	(.008)	(.034)
Borrowed from a financial institution	2.914***	-.192***	.013*	.179***
	(.417)	(.024)	(.005)	(.025)
Borrowed from a financial institution	.931	-.012	.002	.010
	(.121)	(.023)	(.004)	(.010)
Cut1	.101*			
	(.403)			
Cut2	1.964*			
	(.407)			

Model Diagnostics		The Goodness of Fit Tests	
Number of obs=	1,294	McFadden=	0.161
LR chi2(13)=	388.99	McFadden(adjusted)=	0.148
Prob > chi2=	0.0000	AIC=	2060.489
Pseudo R2=	0.1608	BIC=	2137.971
Log likelihood=	-1015.2444	Hosmer-Lemeshow (25)=	49.408 (0.377)

* p < 0.05, ** p < 0.01, *** p < 0.001and values in parentheses represent standard errors.

Because there was no violation of the parallelism assumption, the ordered logit model was suitable for this study. Additionally, when the fit tests presented in Table 5 were examined, we found a fit between the dataset and the model. The cut-off point, which expresses the μ threshold values in Eq.(2), is the cut-off point for the latent variable used to distinguish the low-level DFI category from the medium and high categories when the independent variables are 0. Table 5 indicates that the lower and upper threshold values for each statistically signi-

ficant category do not equal one. From this viewpoint, it can be concluded that no categories need to be combined in the model, and the categories established are consistent (İpek, 2022).

According to the statistically significant odds ratio results, individuals in the workforce are 1.74% more likely to participate in DFI than those not in the workforce. Increased workforce participation will create opportunities for DFI. With membership in the workforce, account ownership and access to financial transactions will increase, while expanding DFI will contribute. When the age variable among the continuous variables was analysed, it was seen that the likelihood of participating in the DFI decreased as individuals got older. According to the estimation results, education level is the most influential factor on DFI. More educated individuals are more likely to engage in DFI. This finding highlights the importance of education for providing access to digital financial services and products, in other words, for spreading DFI. Digital financial transactions are structured in a way that literate and educated adults can easily adapt, but illiterate people are excluded (Matthews, 2019). An increase in income level increased the probability of participating in DFI. This finding revealed the importance of providing financial services that meet the wishes and needs of low-income group members (Arnold & Gammage, 2019). It can also provide new tools for low-income households to access digital opportunities and help them better manage their financial behaviours while reducing transaction costs. In addition, opportunities can be offered to increase productivity and efficiency to increase income.

Although not statistically significant, the negative coefficient of the odds ratio indicated that, as expected, informal savers are less likely to participate in DFI. Similarly, although statistically insignificant, women are more likely to participate in DFI than men. It is important to consider these implications. In particular, for the Turkish sample, integrating informal savings into the financial system may be easier when women actively participate in the financial system. This is because women in Türkiye are more likely than men to engage in informal savings, i.e. having more savings under their pillow (Bank ING, 2021; Özbilge, 2022). Borrowers from family and friend networks were 0.93% less likely to engage in DFI. Individuals who borrow from nonfinancial institutions are likely less likely to engage in DFI. Due to the social nature of kinship ties, informal debts may be obtained mostly from a network of family and friends (Li et al., 2022).Another finding is that formal savings are 2.52% times more likely to be involved in DFI. Individuals who borrow from a financial institution are 2.91% more likely to engage in DFI. These findings demonstrate the significant impact of financial behaviours on DFI. This study also highlights the importance of individuals' strategies for digitally making their savings and borrowing behaviours (Niankara, 2023).Note that the household debt-income balance must be maintained while expanding DFI to prevent excessive debt growth (Luo & Li, 2022).

When the other variables were constant and the *marginal effects* showing the effect of the factor affecting DFI according to each DFI level compared to the average were examined, men, individuals with higher education and income levels, those who participate in the work-

force, formal savings, and debt holders were more likely to participate in DFI. Considering the rapid increase in digital financial transactions with technology (Jain et al., 2021) and the interactive relationship between finance and digitalisation (Bunje et al., 2022), it is vital to increase education, workforce participation, and income among the masses to ensure DFI and reach underserved segments. Additionally, the studys results highlight the current level of use of DFI and two marginalised groups: family/friend borrowers and informal savers. In particular, the most significant effects on high levels of DFI are from savings from financial institutions and debt variables with positive coefficients of 0.154 and 0.179, respectively. This provides concrete evidence that DFI may cause imbalances in household debt management.

On the other hand, it provides clues that financial institutions can make saving options more attractive and can also help individuals direct their savings. As a result, it allows us to observe the effects of financial behaviour on DFI. Thus, a framework that can provide a prediction for policy recommendations that can be made on the utilisation rate of DFI can be obtained.

Conclusion and Discussion

This study discusses the factors affecting DFI in Türkiye within the framework of financial behaviours and socioeconomic factors that may affect the usage rate. For this purpose, the effect of these determinants was analysed using the ordered logit method on the 2017–2021 Global Findex Dataset. The results obtained provide a perspective, especially for developing countries such as Türkiye, where digital infrastructure exists in terms of financial systems. However, the rate of DFI use needs to be increased. This perspective contributes to the encouragement of individuals to participate in DFI, especially when the possible effects of financial behaviours are known. The results reveal the importance of decisions made, especially regarding debt and savings, when coordinating the development of DFI.

According to the findings, after education level, the utilisation of financial institutions for saving and borrowing are the most important determinants of DFI. However, given the high borrowing costs, DFI may encourage households to overloan while enabling more convenient and efficient access to financial resources. In this context, policies at the household level should make careful efforts to improve and promote DFI and increase its use. Specific improvements should be made by controlling household debt levels.

Because of the analysis conducted in the study, it was found that 34% of the participants had a low DFI, 36% had a medium DFI, and 30% had a high DFI. Notwithstanding its benefits, DFI for Türkiye shows that it is not sufficiently accessible to vast segments of the population, which points to a gap between availability, accessibility, and use. In particular, informal savings and traditional options, such as borrowing from family/friend networks. Thus, DFI

rates will significantly improve as households move towards formal channels. Moreover, and most importantly, it is anticipated that growing the supply of financial products and services alone will only help expand DFI if holistic efforts are made to improve it. The findings that increased workforce participation, education, and income levels. Furthermore, increase DFI necessitate a holistic perspective. Individuals' compliance with financial systems depends primarily on their ability to meet favourable socioeconomic conditions.

Although this study provides important implications for optimising the impact of DFI in Türkiye and determining the factors on which its use depends, it has some limitations. The effect of heterogeneity across units cannot be explained due to the horizontal cross-sectional structure of the dataset. Only situations specific to COVID-19 can be identified and compared with the findings of this study. Based on these limitations, future research could examine more complex financial behaviours and determine whether other aspects, such as digital financial literacy, could benefit, especially in developing DFI. Additionally, where access to datasets showing cultural and behavioural differences is available, other developing countries can be included in the analysis, and the relevant field can be expanded to compare theory and empirical results.

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