



## The Digital Finance Transformation and Personal Consumption Debt in Thailand: An Empirical Analysis

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### Abstract

The rapid expansion of digital financial services has significantly transformed financial systems. In Thailand, the development of digital finance has increased financial accessibility and convenience for households. However, easier access to digital financial services may also influence consumption behavior and contribute to rising levels of consumption debt. This study aims to investigate the relationship between digital financial development and personal consumption debt in Thailand. A Digital Financial Index (DFI) is constructed to capture the development of digital financial services using indicators such as PromptPay usage, mobile banking accounts, e-money services, digital lending platforms, and credit card activities. Using quarterly data from 2012 to 2024, the study applies the Autoregressive Distributed Lag (ARDL) model to examine relationships. The empirical results show that the digital financial development has a positive and statistically significant effect on personal consumption debt in Thailand. A 1% increase in the Digital Financial Index leads to a long-run increase of approximately 0.1% in real personal consumption debt. The digitalization dimension shows the strongest effect. Further analysis indicates that this relationship is primarily driven by the payment-digitalization channel, reflecting reduced “pain of paying,” rather than by expanded access to credit.

**Keywords:** Digital Financial Index, Personal Consumption Debt, Autoregressive Distributed Lag (ARDL)

### Introduction

The current global economy has entered the digital era, which has significantly transformed financial systems, business operations, and consumer behavior. Digital financial services such as mobile banking, electronic payments, and online lending have enabled faster financial transactions, improved accessibility to financial services, and facilitated the expansion of financial inclusion across many countries.



In Thailand, the development of digital finance provides many advantages. These services improve financial accessibility, reduce transaction costs, and improve efficiency (Moenjak, Kongprajya, & Monchaitrakul, 2020; Minphimai, 2024). However, the increase in accessibility to digital finance may also influence household financial behavior. It may encourage higher consumption (Dunne & Kasekende, 2017), while online lending platforms make borrowing easier and faster (Yue, Korkmaz, Yin, & Zhou, 2021). At the same time, Thailand has experienced a significant rise in personal consumption debt, particularly in the form of credit card debt and personal loans (Bank of Thailand, 2025).

Despite extensive international research, empirical evidence in Thailand remains limited. In particular, there is no comprehensive Thailand-specific Digital Financial Index (DFI), and existing studies have not clearly examined the dynamic relationship between digital financial development and personal consumption debt.

To address these gaps, this study aims to (1) construct a Thailand-specific Digital Financial Index (DFI), and (2) examine its impact on personal consumption debt. Accordingly, this study addresses the following research questions:

1. How can a Digital Financial Index (DFI) be constructed to reflect digital financial development in Thailand?
2. What is the impact of digital financial development on personal consumption debt in Thailand?

## Conceptual and Theoretical Framework

This study integrates insights from empirical literature and behavioral economic theories to explain the relationship between digital financial development and personal consumption debt. Since limited empirical studies have examined this issue in the context of Thailand, this research draws on international literature on digital finance and personal consumption debt.

Previous studies suggest that the expansion of digital financial services—such as digital payments, mobile banking, and online lending platforms—can increase financial accessibility and facilitate borrowing behavior (Yue et al., 2022; Li, Lv, & Han, 2023). While these services promote financial inclusion and improve transaction efficiency, they may also increase household borrowing and consumption-related debt (Yuan, Fang, & Sun, 2024).

In addition to institutional mechanisms, behavioral economic theories provide explanations for how digital financial services influence consumption behavior. This study applies Loss Aversion Theory and Present Bias Theory.

Loss aversion, derived from Prospect Theory, suggests that individuals experience losses more strongly than gains. In the context of consumption, this is closely related to



the concept of the “pain of paying,” which refers to the psychological discomfort associated with spending money. Traditional cash payments make this cost more salient, as individuals physically observe the outflow of money. In contrast, digital payments—such as mobile banking and e-wallets—reduce this psychological friction by making transactions less visible and more seamless. As a result, individuals may perceive spending as less costly, leading to higher consumption levels and a greater likelihood of relying on credit for consumption purposes (Kahneman & Tversky, 1979; Woods, 2021).

Meanwhile, Present Bias explains individuals’ tendency to prioritize immediate consumption over future financial obligations, particularly when access to credit is fast and convenient through digital financial platforms (Ahn & Nam, 2022; Phan, Filomeni, & Kok, 2024).

Based on these theoretical and empirical perspectives, this study proposes that the development of digital financial services may influence personal consumption debt through increased financial access and behavioral changes in consumption decisions, as illustrated in Figure 1.

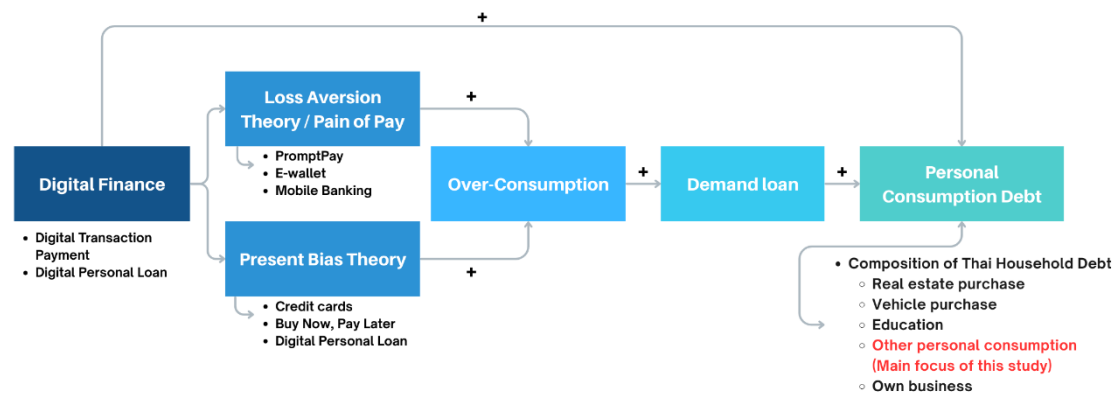


Figure 1: Concept framework

## Methodology

This research constructs a Digital Financial Index (DFI) to measure the level of digital financial development in Thailand, adapted from the Peking University Digital Financial Inclusion Index framework (Feng et al., 2019) and adjusted to reflect Thailand’s financial system.

The DFI consists of three dimensions: (1) Breadth of Coverage measures access to digital financial services (e.g., PromptPay accounts, mobile banking accounts, e-money accounts, digital lending users, and credit card accounts), (2) Depth of Usage measures the intensity of digital financial service usage, and (3) Level of Digitalization reflects the degree to which digital financial services replace traditional financial services.



All indicators are first standardized into dimensionless values using a base-year normalization approach, with Q1 2022 selected as the reference period due to its relatively stable and comprehensive data coverage. The overall DFI is then constructed using equal weights across all indicators. This approach is adopted due to differences in data availability between the Chinese and Thai contexts.

The index is used to examine the relationship between digital financial development and personal consumption debt. This study employs a time-series econometric model using quarterly data from 2012 to 2024. The baseline model is specified as:

$$\ln(\text{Debt}) = f(\ln(\text{DFI}), \ln(\text{Inc}), \ln(\text{Unem}), \ln(\text{CPI}), \text{Dummy})$$

Where: Debt = Real personal consumption debt, DFI = the Digital Financial Index, Inc = GDP per capita, Unem = the Unemployment rate, CPI = the Consumer Price Index, Dummy = the COVID-19 economic shock during 2020-2021.

The Autoregressive Distributed Lag (ARDL) model is employed because it allows estimation of both short-run and long-run relationships and can be applied when variables have mixed integration orders at levels I(0) and I(1).

## Results

The empirical analysis starts with constructing Thailand's DFI, which is used to measure the development of digital finance in Thailand. The results show a continuous upward trend in digital financial development over the study period, reflecting the rapid expansion of digital payments and mobile banking in Thailand, as illustrated in Figure 2.

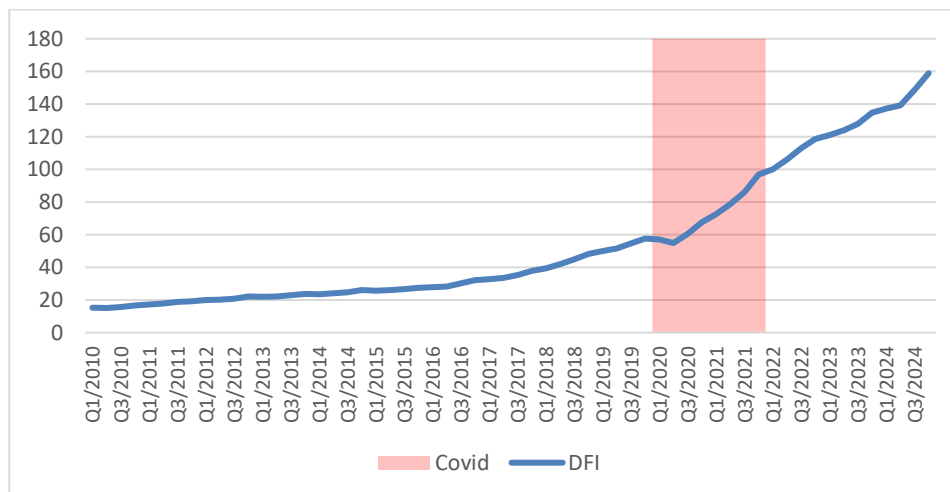


Figure 2: Digital Financial Index (DFI) Trend in Thailand (2012-2024)



After obtaining the DFI index, the Augmented Dickey-Fuller (ADF) test indicates that the variables are integrated at a mixture of I(0) and I(1), satisfying the conditions for applying the ARDL model.

The optimal lag structure is selected using the Akaike Information Criterion (AIC) and Schwarz Criterion (BIC). The optimal ARDL specification is then estimated to examine the relationship between digital finance and personal consumption debt. The results are interpreted based on the model that satisfies both the Bound test and the normality test.

Table 1 shows the result of the ARDL-ECM form. Based on the Bound test and normality test, only Models 1, 3, and 5 are selected as the preferred specifications. The Error Correction Term (ECT) in all selected models is negative and statistically significant, indicating that the system converges toward long-run equilibrium. In Models 1 and 5, the adjustment speed suggests that approximately 26–31% of disequilibrium is corrected within one quarter, while Model 3 shows a slower adjustment speed of about 10% per quarter.

The long-run estimation results indicate that the DFI has a positive and statistically significant effect on personal consumption debt. In Models 1 and 5, a 1% increase in DFI increases personal consumption debt by approximately 0.04–0.05%. In Model 3, which includes additional macroeconomic variables, the impact is stronger, with a 1% increase in DFI raising personal consumption debt by about 0.1%. This study focuses primarily on the long-run relationship, as it provides more stable and consistent evidence of the impact of digital financial development on consumption debt.

In Model 3, Income also shows a positive and significant long-run effect, indicating that higher household income increases the capacity to incur debt. In contrast, CPI exhibits a negative relationship with personal consumption debt, suggesting that higher inflation reduces consumption demand and consequently lowers borrowing.

**Table 1:** ARDL-EMC estimation results

Dependent Variable (ln (Debt))	ARDL (4, 4, 4, 4, 4, 0)					ARDL (3, 4, 3, 0, 1, 0)		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
ln (Debt <sub>t-1</sub> )	-0.311*** (0.088)	-0.259*** (0.116)	-0.100 (0.117)	-0.095 (0.141)	-0.268*** (0.078)	-0.249** (0.100)	-0.193* (0.099)	-0.240* (0.120)
ln (DFI <sub>t-1</sub> )	0.051*** (0.018)	0.046* (0.022)	0.105*** (0.031)	0.105*** (0.032)	0.044** (0.017)	0.041** (0.020)	0.063*** (0.021)	0.063*** (0.021)
ln (Inc <sub>t-1</sub> )	0.110 (0.070)	0.082 (0.085)	0.480** (0.178)	0.480** (0.182)	0.105 (0.068)	0.099 (0.072)	0.146 (0.100)	0.153 (0.102)
ln (Unem)						-0.004 (0.014)	-0.005 (0.013)	-0.010 (0.015)



Dependent Variable (ln (Debt))	ARDL (4, 4, 4, 4, 0)				ARDL (3, 4, 3, 0, 1, 0)			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
ln (Unem <sub>t-1</sub> )		-0.022 (0.026)	0.011 (0.027)	0.012 (0.029)				
ln (CPI <sub>t-1</sub> )			-2.730** (0.988)	-2.751** (1.065)			-0.780 (0.482)	-0.580 (0.558)
Covid				-0.001 (0.015)				0.010 (0.014)
ECT <sub>t-1</sub>	-0.311*** (0.078)	-0.259*** (0.067)	-0.100*** (0.019)	-0.095*** (0.018)	-0.268*** (0.068)	-0.249*** (0.063)	-0.193*** (0.043)	-0.240*** (0.053)
Observations	48	48	48	48	48	48	48	48
Adjusted R-squared	0.892	0.885	0.926	0.926	0.894	0.894	0.911	0.912
S.E. of regression	0.0125	0.0129	0.0104	0.0104	0.0124	0.0124	0.0114	0.0113
F-test	F (12,35) 33.46***	F (16,31) 23.62***	F (20,27) 30.19***	F (20,27) 30.2***	F (10,37) 40.65***	F (10,37) 40.78***	F (11,36) 44.66***	F (11,36) 45.47***
Bound test	Cointegration	Inconclusive	Cointegration	Inconclusive	Cointegration	Inconclusive	Inconclusive	Inconclusive
Normality test	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal

Note: \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively. Figures in parentheses are the standard error.  $\Delta$  denotes first difference, and ECT represents the error-correction term.

In addition, the estimation results are examined under three alternative specifications to ensure robustness. Case 1 excludes credit card indicators from the Digital Financial Index (DFI) to reduce potential overlap between the explanatory variable and personal consumption debt. Case 2 further decomposes the DFI into three dimensions to identify which aspect of digital finance has the strongest effect on personal consumption debt. Case 3 further decomposes the DFI into two theoretical components to explore the underlying behavioral mechanisms, namely the payment-digitalization channel (DFI1), associated with Loss Aversion Theory, and the credit-access channel (DFI2), associated with Present Bias Theory.

The results from Case 1 remain consistent with the baseline findings, showing that digital financial development continues to be positively related to personal consumption debt, even when credit card indicators are excluded. This suggests that the positive effect of digital finance on household borrowing is not driven solely by the inclusion of credit card variables in the index.

For Case 2, the estimation results show that the three dimensions of digital finance do not affect personal consumption debt equally. Among them, the Digitalization dimension has the strongest positive effect, indicating that the substitution



of traditional financial services with digital financial transactions plays the most important role in increasing consumption-related borrowing.

For Case 3, the estimation results show that the payment-digitalization component (DFI1) has a positive and statistically significant effect on personal consumption debt in most specifications, whereas the credit-access component (DFI2) does not exhibit a statistically significant long-run effect. This suggests that digital financial development influences consumption borrowing primarily through reduced payment friction rather than through expanded access to credit, as illustrated in Table 2.

**Table 2:** ARDL-EMC estimation results based on theoretical decomposition

Dependent Variable (ln (Debt))	ARDL (3, 2, 4, 3, 4, 1, 0)				ARDL (3, 1, 4, 3, 0, 1, 0)			
	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
ln (Debt <sub>t-1</sub> )	-	-						
	0.277*** (0.080)	0.297*** (0.086)	-0.287** (0.105)	-0.342*** (0.121)	-0.252*** (0.079)	-0.232*** (0.079)	-0.181** (0.079)	-0.254** (0.101)
ln (DFI1 <sub>t-1</sub> )	0.026* (0.014)	0.071** (0.026)	0.071*** (0.024)	0.063** (0.026)	0.022 (0.014)	0.037** (0.017)	0.055*** (0.018)	0.045** (0.020)
ln (DFI2 <sub>t-1</sub> )	0.005 (0.012)	-0.034 (0.024)	-0.023 (0.033)	-0.018 (0.034)	0.010 (0.011)	-0.008 (0.017)	0.007 (0.019)	0.012 (0.019)
ln (Inc <sub>t-1</sub> )	0.042 (0.121)	-0.361 (0.230)	-0.354 (0.228)	-0.270 (0.246)	0.043 (0.122)	-0.128 (0.171)	-0.224 (0.160)	-0.130 (0.179)
ln (Unem)						-0.022 (0.016)	-0.032** (0.015)	-0.031** (0.015)
ln (Unem <sub>t-1</sub> )		-0.062* (0.031)	-0.053 (0.032)	-0.053 (0.032)				
ln (CPI <sub>t-1</sub> )			-0.287 (0.696)	-0.006 (0.762)			-0.810 (0.490)	-0.413 (0.595)
Covid				0.013 (0.014)				0.014 (0.012)
ECT <sub>t-1</sub>	-	-	-0.100*** (0.019)	-0.095*** (0.018)	-0.268*** (0.068)	-0.249*** (0.063)	-0.193*** (0.043)	-0.240*** (0.053)
Observations	48	48	48	48	48	48	48	48
Adjusted R-squared	0.935	0.938	0.949	0.950	0.933	0.937	0.949	0.951
S.E. of regression	0.0097	0.0095	0.0087	0.0085	0.0098	0.0096	0.0086	0.0084
F-test	F (12,35) 56.84***	F (16,31) 45.23***	F (17,30) 51.50***	F (17,30) 53.39***	F (11,36) 60.54***	F (11,36) 64.42***	F (12,35) 73.82***	F (12,35) 77.39***
Bound test	Cointegration	Inconclusive	Cointegration	Inconclusive	Cointegration	Cointegration	Cointegration	Cointegration
Normality test	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal



Note: \*, \*\*, and \*\*\* denote statistical significance at the 10%, 5%, and 1% levels, respectively. Figures in parentheses are the standard error.  $\Delta$  denotes first difference, and ECT represents the error-correction term.

## Conclusions and Discussion

This study aims to construct a Digital Financial Index (DFI) for Thailand and examine the impact of digital financial services on personal consumption debt. Using quarterly time-series data from 2012 to 2024 and employing the ARDL model, the analysis explores both short-run and long-run relationships between digital finance and consumption borrowing behavior.

The results show that digital financial development in Thailand has increased steadily over time, particularly following the expansion of digital payment infrastructure such as PromptPay and QR payment systems.

Empirical findings indicate that digital financial development has a positive relationship with personal consumption debt in Thailand. The long-run results suggest that an increase in the Digital Financial Index leads to higher levels of consumption debt. This implies that the expansion of digital financial services increases financial accessibility and reduces barriers to credit. As a result, households are more able to finance consumption through borrowing. These findings are consistent with previous studies that show financial innovation tends to expand credit access and increase household borrowing (Yue et al., 2022).

The additional results are also consistent with behavioral economic theories. Loss Aversion theory suggests that individuals perceive losses more strongly than gains, and digital payments reduce the psychological “pain of paying,” which may encourage greater spending (Kahneman & Tversky, 1979; Woods, 2021). Consistent with this argument, the empirical results show that the payment-digitalization component has a positive and statistically significant effect on personal consumption debt, indicating that reduced payment friction plays an important role in driving borrowing behavior.

Meanwhile, Present Bias Theory explains that consumers tend to prioritize immediate consumption over future repayment obligations. The availability of digital lending services, therefore, reinforces borrowing behavior and contributes to higher consumption debt (Ahn & Nam, 2022; Phan et al., 2024). However, the empirical findings in this study do not provide strong evidence of a significant long-run effect of the credit-access component. This suggests that while digital lending may influence borrowing behavior in the short term, it is not the primary driver of persistent increases in consumption debt.

From a policy perspective, the findings suggest that the impact of digital finance on household debt is driven more by behavioral factors than by credit expansion alone. In particular, the significant effect of the payment-digitalization component is consistent



with Loss Aversion Theory. Therefore, policymakers should not focus only on regulating credit access but also on promoting financial literacy and awareness of digital spending behavior. While regulatory oversight of digital lending platforms remains important (Moenjak et al., 2020), policies targeting payment behavior may be more effective in limiting long-term growth in consumption debt.

In conclusion, digital financial development plays an important role in shaping consumption debt dynamics in Thailand. Although digital finance improves financial access and efficiency, it may also contribute to rising household debt if not accompanied by appropriate financial regulation and consumer protection measures.

### Recommendation

As this study is among the first to construct a Digital Financial Index (DFI) for Thailand, an equal-weighting approach is adopted, which is a standard method in the absence of sufficient theoretical or empirical evidence to justify differential weights.

In addition, the indicators used in this study primarily capture the dimensions of digital spending and borrowing. Other important dimensions of digital finance, such as digital investment and insurance, are not included due to data limitations.

Future research may consider alternative weighting methods to better reflect the relative importance of each indicator.

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