

Determinants of digital financial inclusion in Mexico

Sergio Hernández-Mejía, Elena Moreno-García*, Román Culebro-Martínez

Universidad Cristóbal Colón, Financial Literacy Research Center, Veracruz 94271, Mexico

* Corresponding author: Elena Moreno-García, elenam@ucc.mx

CITATION

Hernández-Mejía S, Moreno-García E, Culebro-Martínez R. (2024). Determinants of digital financial inclusion in Mexico. *Journal of Infrastructure, Policy and Development*. 8(16): 10095. <https://doi.org/10.24294/jipd10095>

ARTICLE INFO

Received: 5 November 2024
Accepted: 18 December 2024
Available online: 31 December 2024

COPYRIGHT



Copyright © 2024 by author(s).
Journal of Infrastructure, Policy and Development is published by EnPress Publisher, LLC. This work is licensed under the Creative Commons Attribution (CC BY) license.
<https://creativecommons.org/licenses/by/4.0/>

Abstract: This study aims to analyze the effect of financial literacy and financial education on digital financial inclusion in Mexico. The analysis is carried out with 13,554 data from the National Survey of Financial Inclusion 2021, corresponding to Mexican adults who use digital financial services. The population under study comprises people over 18 years old, residing in Mexico, disaggregated by size of locality, and divided into six geographical regions. The dichotomous Probit model is used to estimate the effect of financial literacy and sociodemographic variables on digital financial inclusion. The results show that financial literacy and financial education have a marginal effect, of 0.94% and 4.42%, respectively, on digital financial services. Results also show that the marginal effect of financial literacy and financial education is greater on the use of mobile payments than on the acquisition of online accounts or apps and online credit. The results also show that gender, locality size, educational level, income and asset holding have a statistically significant relationship with the use of digital financial services. The findings confirm that financial literacy and financial education contribute to the digital financial inclusion of Mexicans, in this sense, providing financial education can especially benefit vulnerable population groups such as those living in rural areas and those with low income and low education levels.

Keywords: financial literacy; financial education; digital financial services; financial inclusion; Mexico

1. Introduction

According to the World Bank (2014), financial inclusion can be defined as the proportion of individuals and firms that use financial services. However, financial inclusion is constantly being developed in academic discourse (Adamo et al., 2024). Gortsos (2016) defines financial literacy as the process of ensuring affordable and adequate access to a wide range of financial products and services, as well as proliferation to their use in all parts of society with a special focus on vulnerable groups, through the implementation of existing and innovative approaches, such as financial literacy programs. Financial inclusion can help an individual achieve financial well-being. At the macroeconomic level, financial inclusion, or people's access to useful and affordable financial products that meet their financial needs, represents a cornerstone of economic development (Demirgüç-Kunt et al., 2022). However, financial exclusion remains a significant obstacle to equitable development in the global financial landscape (Amnas et al., 2024).

According to the World Bank, although the rate of financial inclusion has increased in recent years, 24% of adults worldwide still lack a bank account (Ansar et al., 2023). In Mexico, only 36.9% of Mexicans in 2020 had a bank account. This level of financial inclusion was 20 percentage points below countries with the same level of per capita income (Navis et al., 2020).

Digital financial services can increase the percentage of banked people by eliminating the need for bank branches (Shaikh et al., 2023). Digitization makes financial services more affordable and accessible to a broader group of people, which has a real effect on financial inclusion, especially in places where traditional banking services are scarce (Amnas et al., 2024). The results of the International Financial Literacy Survey (INFE), show a significant increase in the use of digital finance. In developed countries, 90% of adults have made a digital payment while in developing countries this percentage is only 45% (OECD, 2020).

There is relatively recent literature highlighting the importance that financial literacy plays in the adoption and use of digital finance (Gunawan et al., 2023; Isaia and Oggero, 2022; Yang et al., 2023). However, studies are still scarce and most of them have focused on the link between financial literacy and internet banking. Considering the importance of financial inclusion in developing countries like Mexico, this paper aims to study the relationship between financial literacy, financial education and the use of digital financial services by Mexicans. The paper also examines the relationship between digital financial services and socioeconomic and demographic characteristics, such as gender, age, education level, marital status, geographical region, working status, job position, home Internet access, asset holdings, income, and locality size.

The article is structured as follows. Section 2 reviews the literature on the relationship between digital financial inclusion, financial literacy and financial education, as well as the relationship with sociodemographic variables. Section 3 describes the research variables and their operationalization and the model used for the analysis. Section 4 shows the results obtained and the testing of the hypotheses on the influence of financial education and financial literacy on the use of digital finance services. Section 5 discusses the main findings with previous literature. Section 6 presents the main conclusions and lines of research that should be addressed in future studies.

2. Literature review

2.1. Financial literacy and its impact on digital financial inclusion

Financial literacy is a form of human capital that includes the understanding of financial concepts and the knowledge necessary to make appropriate financial decisions (Lusardi and Mitchell, 2014). Human capital theory states that education is perceived as an investment (Becker, 1964). According to Lusardi and Mitchell (2014), from this perspective, people who invest in financial education can obtain returns above the expected average return. Under this approach, the study addresses the relationship between financial literacy, financial education, and digital financial inclusion. Human capital theory underpins the relationship between financial literacy and financial inclusion. Financially educated individuals tend to be more proficient in using financial services and products than individuals who lack these skills (Ahmad et al., 2022). Thus, as people increase their level of financial literacy, they will increase their demand for formal financial services, increasing financial inclusion (Al-Shami et al., 2024; Boachie and Adu-Darko, 2024; Rahmi and Aliasuddin, 2020). Empirical evidence determines a positive and statistically significant relationship between digital

finance and financial literacy (Gunawan, et al., 2023; Isaia and Oggero, 2022; Widodo, et al., 2022; Yang et al., 2023).

The findings of Isaia and Oggero (2022) provide evidence that financial literacy is a key factor in using digital platforms that provide financial services. Their results show that people with a high level of financial literacy are more likely to be potential users of such digital platforms, compared to those with a low level of financial literacy. Likewise, Yang et al. (2023) identify that household financial literacy significantly improves the use of digital finance. Their findings show that financial literacy significantly increases the probability of using digital finance, with a marginal effect of 2.69%. They identified that the impact of financial literacy is more significant on applying for loans and online financial products than on using mobile payments, which highlights the importance of financial literacy as the complexity of digital financial products increases. In turn, Gunawan et al. (2023) show the positive and statistically significant effect of financial literacy on user behavior with respect to the management of digital financial payment instruments.

The findings of Andreou and Anyfantaki (2021) and Widodo et al. (2022) show that financial literacy has a positive and indirect effect on financial inclusion through digital financial products and internet usage. Koskelainen et al. (2023) identify positive links between financial literacy, digitization, and the financial capabilities of individuals, emphasizing that digitization offers opportunities to increase the financial capabilities of individuals, but requires them to have skills and knowledge to collect and analyze financial information obtained from digital environments. On the other hand, Elsinger et al. (2018) argue that Fintech products can improve people's access to complex financial services, but lacking adequate financial literacy to assess the risks of these products could put households' financial stability at risk.

Aziz and Hasan et al. (2021) and Naima (2021) study the impact of financial literacy on access to digital financial services in rural populations. They find that, although digitization has facilitated access to financial services in marginalized areas, such services have not been used to their full potential due to factors such as lack of connectivity and low financial literacy among the population. Frimpong et al. (2022), identify that when the firm's decision maker is financially literate, they would be 42.5% more likely to make financial transactions via digital platforms. Moreover, Al-Shami et al. (2024) and Irman et al. (2023), find that financial literacy has a positive and significant influence on the level of financial inclusion and digital financial literacy in the small and medium enterprises, improving their ability to access digital financial services and online marketplaces. From the above evidence, the first hypothesis of the research arises:

H1. Financial literacy has a positive and significant effect on digital financial inclusion.

2.2. The effect of financial education on digital financial inclusion.

According to the OECD (2020), the goal of financial education is to better prepared people to manage their money and thus achieve financial well-being. In this regard, Chen and Volpe (2002) find that, on average, students with an academic background in business and have taken courses on financial topics have higher financial competencies and capabilities.

Urban et al. (2020) found that financial education programs, and teacher training correlated with access to loans with better credit scores and lower defaults in young adults. Research by Németh et al. (2024) supports the significance of financial education in enhancing financial security, particularly within the Hungarian context, indicating that well-implemented financial literacy programs can directly impact economic stability and individual financial well-being. Chen et al. (2023) identified that consumers who received financial education courses in school, college, or at their workplace are more likely to be financially included than those who did not. On the other hand, García et al. (2013) point out that financial inclusion in Latin American countries would be favored if the financial education of their citizens were increased.

Frisancho (2020) conducted an experiment on financial education in schools and found that those teachers who received training in financial education increased the probability of using formal savings and credit channels by 13% and 22%, respectively. Panait et al. (2020), analyzing different financial education platforms in a sample of countries, found evidence of the role of financial education as a means of accessing new digital financial instruments and services. Goel (2024) and Yang et al (2023) identify that financial education has a positive and significant effect on the use of digital finance. The results of the latter evidence that the marginal effect on the use of digital financial services of those respondents who indicated having taken a course in economics or finance is 19.53%, compared to the group that did not take the course. Malatyinszki et al. (2024a, 2024b) further highlight that a shift towards a circular economy in Europe, facilitated by improved financial literacy, could positively impact national income, as individuals are better prepared to engage in sustainable economic practices. Based on the preceding literature, the second research hypothesis is posed:

H2: Financial education has a positive and significant effect on digital financial inclusion.

2.3. Sociodemographic determinants of digital financial inclusion

Most studies on digital financial inclusion analyze sociodemographic variables that significantly determine the use of digital financial services. For example, Kálmán et al. (2024b) examine corruption's impact on financial inclusion, highlighting regional disparities in financial access and underscoring the importance of equitable digital finance accessibility across diverse populations. Yuneline and Rosanti (2023) point out that access to new information technologies such as the Internet, has contributed to new products and processes in the financial services market, which favors financial inclusion. In this sense, Corrado and Corrado (2015) identified that access to the Internet at home increases the probability of households banking inclusion and access to credit, with a significant difference between regions.

Asset holdings and household wealth are variables that impact the use of digital finance. Yang et al. (2023) identify that households with high levels of wealth or income are more likely to use digital finance. A 1% increase in wealth and income increases the probability of using digital finance by 0.04 and 0.05 percentage points, respectively. Kálmán et al. (2024c) also examine financial behaviors within the context of perceived corruption and environmental metrics, which could affect wealth distribution and, by extension, access to digital financial services in various socio-economic regions.

Liu et al. (2021) find that women, despite being more risk averse than men, are even more likely to engage in digital financial transactions. Yang et al. (2023) show that women and married people are more likely to use digital finance compared to men and singles. In contrast, Chamboko (2022) examines the access and use of digital financial services in a developing country and finds that gender is not a significant predictor of digital financial services use. However, the study reveals that educational level, locality size and income level are important factors influencing the use of digital financial services.

Young adults are the most exposed to online shopping and digital payments, as they grew up with digital technology and the Internet, and comprise the largest group of online shoppers among Internet users (Zainudin et al., 2019). Meanwhile, Cassimon et al. (2022) identified that mobile banking accounts are most popular among young people, those with high educational attainment, those with middle and high income, and people living in urban areas.

Working status and job position are variables that positively affect the use of digital finance. According to Yang et al. (2023), being employed increases the probability of using digital finance, with a marginal effect of 2.04%, compared to those who are not employed, while being an entrepreneur or businessperson increases the probability of digital finance use, with a marginal effect of 5.41%, compared to being employed. Similarly, Kálmán et al. (2024a) emphasize the need for sustainable economic policies to foster inclusive financial systems, particularly in diverse urban settings such as Budapest and Mumbai, where employment trends heavily influence financial behaviors.

Marumbwa (2014) finds that the frequency of use of digital money transfer services is determined by educational level and employment status, while factors such as age, gender, and income level have little impact. Simovic et al. (2023) found that college students' location (Serbia), educational level (bachelor's degree), field of study (finance), employment status (employed) and gender (female) are variables positively associated with high levels of digital skills use.

Digital financial exclusion could be associated with the need for more digital infrastructure in rural localities. According to Sha'ban et al. (2024) urbanization is a variable that significantly impacts on the level of digital financial inclusion. Kálmán et al. (2024d) further examine sustainable tourism development in rural geoparks, which aligns with the broader issue of infrastructure deficits in rural areas, as inadequate resources often hinder digital financial inclusion efforts. Similar results are reached by Liu et al. (2021), who highlight the inequality between rural and urban populations, noting that most inhabitants of rural localities do not use digital financial services. By the above arguments, the third and last hypothesis of the research is stated as follows:

H3: Digital financial inclusion is related to gender, age, educational level, marital status, locality size, geographical region, working status, job position, income, home Internet service and asset holding.

3. Data and method

The research is non-experimental, cross-sectional, descriptive and correlational.

For this research, 13,554 data were used from the 2021 National Financial Inclusion Survey (ENIF) of Mexico (INEGI, 2022a). The sample is considered to be nationally representative. The population under study is made up of people over 18 years old, residing in Mexico, disaggregated by size of locality and divided into six geographical regions (Northwest, Northeast, West Bajío, Mexico City (CDMX), Central South and East, South). A household inhabitant is randomly selected to answer the ENIF questions. The ENIF survey (2021) provides information on access to and use of financial services, in both traditional and digital form, financial literacy, financial education, and the sociodemographic characteristics of respondents.

The data analyzed were from individuals who indicated making use of some digital financial service, as suggested in Yang et al. (2023). Questions on the use of digital financial services were asked to all respondents and not only to those who reported being traditional financial users. To measure digital finance inclusion, three types of digital financial services are used: 1) mobile payments, which is measured from questions 7.7 and 7.8 of ENIF (2021): purchase or payment by electronic transfer or mobile app; 2) account or app contracted through the Internet, which is measured from question 5.4.8 (such as Mercado Pago or Albo); 3) online credit, which is measured from question 6.2.8 (credit contracted through the Internet or app such as Prestadero, Doopla or Playbusiness).

According to Yang et al. (2023), three binary variables are constructed to indicate the use of the three types of digital financial services. The binary variable takes the value 1 when the person used a digital service, and zero when he or she did not. With the results of the three dichotomous variables, the indicator of digital financial inclusion is constructed, with a dichotomous variable, which takes the value of 1 if the respondent used some of these services and zero otherwise. Given the characteristic of the dependent variable, the dichotomous Probit model is constructed (Greene, 2018).

In this research, financial literacy is measured as proposed by Lusardi (2019), based on the understanding of compound interest; inflation and its effect on purchasing power, and the benefit of risk diversification. For this purpose, three questions from the ENIF (2021) are used (question 13.3: compound interest, question 13.4: knowledge of inflation and question 4.7.3: diversification of savings). For the statistical procedure, a binary variable is designed for each question, which takes the value of 1 if the respondent selected the correct answer and 0 otherwise. With the answers to the three questions, a financial literacy indicator is designed, obtained as the sum of the correct answers. The range of the indicator is from 0 to 3, where 0 represents the lowest level of financial literacy and three the highest level (Lusardi and Mitchell, 2011; Yang et al., 2023).

In line with OECD (2020), for measuring the respondent's financial education, question 4.5 of the ENIF (2021) is used: Have you taken any course on how to save, how to make a budget or how to use credit responsibly? To measure physical asset holdings, we consider whether the person owns a house, car, or land, as suggested by Friedline and West (2016). The following sociodemographic characteristics of the respondents are included: gender, age, educational level, marital status, income, region of residence, locality size, working status, job position, asset holding, and whether they have internet service at home. **Table 1** presents the coding, operationalization, and references of the research variables.

Table 1. Coding and operationalization of research variables.

Variable	ENIF question number (INEGI, 2022a)	Coding and operationalization
Digital financial inclusion	7.7, 7.8, 5.4.8, 6.2.8	A dichotomous variable is constructed that takes the value of 1 if the respondent used any of the three digital financial services considered and 0 if he/she did not use any (Yang, et al., 2023).
Financial literacy	13.3, 13.4 y 4.7.3	Financial literacy indicator is obtained as the sum of the number of correct answers. The range of the indicator is from 0 to 3, where 0 represents the lowest level and 3 the highest level (Lusardi and Mitchell, 2011; Yang et al., 2023).
Financial education	4.5	Dichotomous variable equal to 1 if the respondent reported having taken a financial education course, and 0 otherwise (Yang et al., 2023).
Gender	2.4	Dichotomous variable 1 if male, 0 if female (Cassimon et al., 2022; Yang et al., 2023).
Age	2.5	Age range in years. Categories are proposed as suggested in Cassimon et al. (2022). Categories 18–27, 28–37, 38–47, 48–57, 58–67, 68–77, 78 years and older. Base category: 18–27 years.
Educational level	3.1	Educational level: elementary school or less, junior high school, high school, college, master’s degree or doctorate (Mexican Ministry of Education: Secretaría de Educación Pública, 2021). Dichotomous variable for each category (Cassimon et al., 2022). Base category: elementary school or less.
Marital status	3.2	Marital status categories (INEGI, 2022b): common law, separated, divorced, widowed, married, single. Dichotomous variable for each category. Base category: single (Yang et al., 2023).
Locality size	Identification question	According to the number of people (INEGI, 2022b): 1 to 14,999 inhabitants (rural) and 15,000 and more inhabitants (urban). Dichotomous variable equal to 1 if the respondent’s dwelling belongs to a rural locality and 0 to an urban locality (Cassimon et al., 2022; Yang et al., 2023).
Geographical region	Identification question	Geographical regions according to the ENIF 2021 (INEGI, 2022b): Northwest, Northeast, West and Bajío, CDMX, Central South and East, South. Dichotomous variable for each region (Cassimon et al., 2022; Yang et al., 2023). Base category: CDMX.
Working status	3.5	Dichotomous variable equal to 1 if the respondent is employed and 0 if is not employed (students, homecare workers, retired and disabled) (Yang et al., 2023).
Job position	3.7	Dichotomous variable equal to 1 if the respondent is self-employed or employer and 0 if the respondent is unpaid worker, day laborer or employee and unemployed (Yang et al., 2023).
Income	3.8a, 3.8b	Quintiles of income expressed in US dollar* are designed as proposed in Cassimon et al. (2022). A dichotomous variable is designed for each quintile and for those who do not have income, as well as for those who did not want to provide information. Base category: quintile 3. The average income per quintile is: quintile 1 = \$81.08; quintile 2 = \$205.02; quintile 3 = \$283.45, quintile 4 = \$402.07; quintile 5 = \$884.62.
Home Internet service	Identification question	Dichotomous variable equal to 1 if the respondent’s home has Internet service and 0 otherwise (Corrado and Corrado, 2015; Yang et al., 2023).
Asset holding	14.2.1, 14.2.2, 14.2.3	Dichotomous variable equal to 1 if the respondent indicated owning assets (home or apartment, car, land) and 0 if does not own assets (Yang et al., 2023).

* Average income stated in US dollar. Mexican peso/US dollar exchange rate at 28 October 2024 (20.007 Mexican pesos per dollar). Calculated with data from Banco de México exchange market web page. Retrieved from: <https://www.banxico.org.mx/tipcamb/main.do?page=tip&idioma=sp>
Source: Own elaboration with information from the ENIF 2021 (INEGI, 2022b).

To estimate the effect of financial literacy and sociodemographic variables on digital financial inclusion, the dichotomous Probit model is used as in Yang et al. (2023). The Probit model for a binary variable with possible values 0 and 1 assumes that the binary dependent variable (y_i) follows a standard normal distribution and the probability $p(x)$ that the event occurs $E(y_i = 1 / X)$ is linear in a vector of predictors X :

$$p(x) = E(y_i = 1 / X) = Prob (Z \leq z_i) = \left(\frac{1}{\sqrt{2\pi}} \right) \int_{-\infty}^{\beta x_i} e^{-\frac{z^2}{2}} dz$$

where $p(x)$ measures the expected probability that the dependent variable takes the value of 1, that is, if the person surveyed uses any of the types of digital financial services, conditional on the sociodemographic variables denoted as X ; Z is the standard normal variable and β is the parameter vector to estimate.

The Gretl statistical package, version May 2024 (<https://gretl.sourceforge.net/>), is used for the estimation. From the results, the individual significance of the variables is evaluated, for which the test statistic $t = \beta_j / ee(\hat{\beta}_j)$ and the significance level are used. To interpret the results, the marginal effect of the dichotomous variables is calculated when going from $x_k = 0$ to $x_k = 1$, keeping all other variables fixed.

$$= G(\beta_0 + \beta_1 x_1 + \dots + \beta_{k-1} x_{k-1} + \beta_k) - G(\beta_0 + \beta_1 x_1 + \dots + \beta_{k-1} x_{k-1})$$

The expression G is evaluated with the average value of the independent variables. The independent variables are: gender, age, educational level, marital status, size of the locality, geographical region, working status, job position, income, home Internet service, asset holding, financial literacy and financial education.

4. Results and discussion

The sociodemographic characteristics of the total sample are as follows: 54.19% are women, 60.93% are between 18 and 47 years old and 11.24% are 68 years old or older. The highest educational level of the majority is high school (55.35%), 19.99% have a bachelor's degree and only 1.92% have a master's or doctorate degree. Only 7.42% reported having received financial education. The 58.54% declared being married or living in a common-law marriage, 34.48% do not receive any income, 63.19% reside in an urban locality, 63.31% indicated that their home has internet service, 64.42% were working at the time of the survey, 20.58% indicated that they were self-employed or employers and 50.75% reported owning assets.

Table 2 compares the use of digital financial services in the total sample and among groups according to sociodemographic characteristics. Of the total sample, on average, 9.30% of respondents used some of the three types of digital financial services (mobile payments, accounts or applications contracted online, and online credit); 7.69% indicated having used the digital financial service of mobile payments, 2.49% contracted an account or application online, and 0.43% contracted a loan online or through a digital medium. The use of digital finance varies by population group. Digital financial services are more frequent among men compared to women (10.69% and 8.13%, respectively) and among people in the 18–47 age range compared to those aged 48 and older. Likewise, respondents with a higher level of education (bachelor's, master's or doctoral degree), those who are single and those who have a job use digital financial services in more significant proportion, compared to those with lower level of education, those who are married and those who are unemployed, respectively.

There is a disparity in the use of digital finance between urban and rural localities. Of the total number of residents in the urban locality, 12.43% use digital finance, while the proportion is 3.93% among rural residents. The use of digital financial services also varies by region. In the Northwest, Northeast and Mexico City regions, the use of digital finance is more frequent (10.18%, 10.36% and 13.78% respectively), compared to the South Central and South Region (8.19% and 6.86% respectively). The use of

digital finance increases with income level, with asset holding and also with education level. The percentage of people using digital finances is higher in each income level: in quintile 5, 28.50% of respondents use digital finances while in quintile 1 the percentage is 6.43%. Likewise, of the total who indicated having assets, 11.78% use digital financial services compared to 6.76% of those with no assets. With respect to educational level, among those with master’s or doctorate degrees, the use of digital financial services is 39.23% versus 1.14% of those with only elementary school.

Table 2. Digital financial inclusion by sociodemographic characteristics.

Variable		Digital Financial Inclusion	Mobile payments	Account or application contracted online	Online credit
	Total sample	9.30%	7.69%	2.49%	0.43%
Gender	Male	8.13%	7.07%	1.67%	0.33%
	Female	10.69%	8.42%	3.45%	0.55%
Age	18–27	12.32%	8.99%	4.59%	0.84%
	28–37	14.66%	12.41%	4.06%	0.50%
	38–47	9.39%	7.92%	2.29%	0.68%
	48–57	6.64%	6.03%	0.89%	0.09%
	58–67	4.55%	3.88%	0.79%	0.06%
	68–77	2.38%	2.28%	0.21%	0.00%
	78–	2.49%	2.29%	0.21%	0.00%
Educational level	Elementary	1.14%	1.01%	0.11%	0.03%
	Junior High School	3.40%	2.69%	0.78%	0.29%
	High School	10.22%	8.53%	2.21%	0.49%
	Bachelor	24.81%	20.45%	7.75%	1.07%
	Master or doctorate degree	39.23%	32.69%	9.62%	0.77%
Marital status	Common law	8.80%	6.92%	2.57%	0.76%
	Separate	6.69%	5.59%	1.27%	0.08%
	Divorce	12.11%	10.69%	2.14%	0.48%
	Widowed	2.76%	2.38%	0.29%	0.10%
	Married	8.74%	7.56%	2.13%	0.27%
	Single	13.71%	10.91%	4.34%	0.64%
Locality size	Urban	12.43%	10.27%	3.30%	0.56%
	Rural	3.93%	3.25%	1.08%	0.20%
Geographical region	Northwest	10.18%	8.50%	2.40%	0.36%
	Northeast	10.36%	8.62%	2.96%	0.57%
	West Bajío	9.31%	7.53%	2.40%	0.54%
	CDMX	13.78%	12.39%	2.56%	0.21%
	Central South and East	8.19%	6.76%	2.53%	0.28%
	South	6.86%	5.32%	2.13%	0.47%
Working status	Without a job	4.09%	3.55%	0.77%	0.08%
	Working	12.19%	9.97%	3.44%	0.62%

Table 2. (Continued).

Variable		Digital Financial Inclusion	Mobile payments	Account or application contracted online	Online credit
Job position	Unpaid worker, day laborer or employee	9.23%	7.79%	2.24%	0.40%
	Entrepreneur or businessman	9.57%	7.31%	3.44%	0.54%
Income	Without income (students, home-based workers, retirees)	3.98%	3.38%	0.86%	0.06%
	Quintile 1	6.43%	5.65%	1.23%	0.14%
	Quintile 2	4.92%	3.86%	1.68%	0.34%
	Quintile 3	9.10%	7.33%	2.49%	0.46%
	Quintile 4	11.39%	9.37%	2.70%	0.81%
	Quintile 5	28.50%	23.31%	8.58%	1.43%
	Did not answer	16.76%	15.43%	2.67%	0.00%
Home Internet service	No	8.16%	6.62%	2.25%	0.38%
	Yes	9.96%	8.31%	2.62%	0.45%
Asset holding	No	6.76%	5.50%	1.86%	0.34%
	Yes	11.78%	9.81%	3.10%	0.51%

Source: Own elaboration with data from ENIF (2021).

Table 3. Financial literacy responses by use of digital financial services.

	Sample (n = 13554)	Do not use digital financial services (n = 12,293)	Use digital financial services (n = 1261)	Two-tailed mean difference test
Compound Interest				
Incorrect	65.60%	66.46%	57.26%	
Correct	34.40%	33.54%	42.74%	p-value = 0.00
Inflation Knowledge				
Incorrect	26.44%	27.74%	13.72%	
Correct	73.56%	72.26%	86.28%	p-value = 0.00
Savings Diversification				
Incorrect	34.01%	35.13%	23.08%	
Correct	65.99%	64.87%	76.92%	p-value = 0.00
Number of correct responses				
0	7.75%	8.31%	2.22%	p-value = 0.00
1	29.22%	30.27%	19.03%	p-value = 0.00
2	44.36%	43.85%	49.33%	p-value = 0.00
3	18.67%	17.56%	29.42%	p-value = 0.00

Note: The last column represents the results of the proportion difference test for respondents who achieved correct answers in financial literacy.

Source: Own elaboration with data from ENIF (2021).

Table 3 presents the results corresponding to the financial literacy questions by condition of digital financial services. Of the total sample, only 18.67% of correctly answer the three financial literacy questions, 34.40% can do compound interest calculations, 73.56% understand the effect of inflation on purchasing power and 65.99%

understand the concept of diversification. When analyzing financial literacy regarding digital financial inclusion, the percentage of respondents who answer the three questions correctly is significantly higher in the group that uses digital finance than to those who do not.

Table 4 presents the distribution of financial literacy responses and the condition of having or not receiving financial education regarding digital financial services. The results show a positive association between the percentage of respondents who used any of the digital financial services and the financial literacy indicator. The higher level of financial literacy, as measured by the number of correct answers, the higher the percentage of respondents who use digital finance (14.66% of respondents had all three answers, compared to 6.06% who had only one correct answer). The ratio is similar for all three types of digital financial inclusion. Also, the use of digital financial services is more frequent in those who indicated having taken a financial education course, compared to those who indicated they had not (28.73% vs. 7.75%, respectively). These descriptive results suggest that respondents with higher financial literacy and financial education use digital financial services in greater proportion.

Table 4. Digital financial inclusion by financial literacy and financial education condition.

	Digital Financial Inclusion	Mobile Payments	Account or application contracted online	Online credit
Financial Literacy Indicator (number of correct responses)				
0 correct responses	2.67%	2.10%	0.76%	0.10%
1 correct response	6.06%	5.05%	1.51%	0.28%
2 correct responses	10.34%	8.61%	2.66%	0.48%
3 correct responses	14.66%	11.94%	4.31%	0.67%
Financial Education				
No	7.75%	6.53%	1.82%	0.30%
Yes	28.73%	22.07%	10.83%	1.99%

Source: Own elaboration with data from ENIF (2021).

To test the research hypotheses, the impact of financial literacy, financial education and socio-demographic variables on the use of digital finance is estimated. In **Table 5**, the results of model 1 show a positive association between the use of digital financial inclusion and the financial literacy indicator. For each correct answer, the probability of using digital finance increases by 3.60%. In models 2, 3, and 4, the marginal effect of financial literacy on the use of mobile payments, Internet-contracted accounts or applications and online credit is 2.99%, 0.91%, and 0.13%, respectively. The above results support hypothesis 1 of this research: Financial literacy has a positive and significant effect on the use of digital finance.

Table 5. Probit estimation of digital financial inclusion. Marginal effect.

	(1) Digital Financial Inclusion	(2) Mobile Payments	(3) Accounts or applications contracted online	(4) Online credit
Financial literacy	0.0360*** (0.0193)	0.0299*** (0.0204)	0.0091*** (0.0304)	0.0013** (0.0586)
Financial Education	0.1847*** (0.0454)	0.1342*** (0.0478)	0.0781*** (0.0597)	0.0146*** (0.1071)
Number of observations	13,554	13,554	13,554	13,554
Mean of dependent variable	0.0930	0.0768	0.248	0.0042
McFadden R-squared	0.0594	0.0481	0.0718	0.0540
Number of 'correctly predicted' cases =	12293 (90.7%)	12512 (92.3%)	13217 (97.5%)	13496 (99.6%)
f(beta'x)	0.153	0.133	0.048	0.010
Likelihood ratio test: $\chi^2(g.l)$	$\chi^2(2) = 498.722$ [0.0000]	$\chi^2(2) = 353.501$ [0.0000]	$\chi^2(2) = 226.751$ [0.0000]	$\chi^2(2) = 40.447$ [0.0000]

Notes: The table reports the marginal effect and standard errors (in parentheses). *, **, ***: Significance level (< 0.10, < 0.05, < 0.01, respectively). f(beta'x) evaluated at the mean of the independent variables.

The marginal effect of the financial education variable on the digital financial inclusion indicator evidences that those respondents who indicated having taken a course in financial education are 18.47% more likely to make use of any of the types of digital financial services, compared to those who indicated not having received financial education. These results support hypothesis 2 of this research: Financial education has a positive and significant effect on the use of digital finance. Likewise, the results show that the marginal effect of financial literacy and financial education is greater in mobile payments compared to contracting an account or application through the Internet and online credit.

Table 6 shows the results of the Probit estimation regarding the use of digital financial services related to financial literacy, financial education and demographic and socioeconomic variables. After incorporating all the variables, it is identified that the results corresponding to financial literacy and financial education are similar to those obtained in the base model. Financial literacy has a positive and significant effect on the probability of using digital financial services, except for online credit. The corresponding marginal effect of financial literacy on the use of digital financial services, mobile payments and online contracting of accounts and apps is 0.94%, 0.72% and 0.13% respectively. The marginal effect of financial literacy on digital financial inclusion is 4.42%.

The results show a gender difference in digital financial inclusion in favor of women. The negative marginal effect of the gender variable (0.89%) is significant. It indicates that the probability of using digital financial services is lower for men than for women, with the exception of contracting financial accounts online, where the probability is higher for men. The probability of using digital finance is negatively and significantly related to age. Among the younger groups of respondents (18–27 and 28–37 years old) there is no significant difference in the use of digital financial services,

however, as the age range increases, the probability of using digital financial services decreases, compared to the 18–27 years old category.

The probability of being financially included is higher as the educational level increases. The marginal effect of having a bachelor’s, master’s or doctoral degree is 16.21% and 27.38%, respectively, compared to those with a basic education. The respondents’ marital status is not significant in the decision to use digital financial services. Significant differences are identified in the use of digital finance by rural and urban locality. The negative marginal effect of the rural location variable indicates that those residing in urban locations are more likely (2.94%) to use digital finance. No significant differences are identified in the use of digital financial services among the different regions of Mexico.

The variables working status, job position and home Internet service are not significant in deciding to use digital financial services. Being a day laborer or unpaid worker is identified as impacting on the possibility of contracting an online financial account or application. The variables income and asset holdings have a positive and significant effect on digital financial inclusion, with a higher income, it is more likely to use digital finance. The marginal effect of income on the use of digital finance is 5.01% higher for quintile 5 compared to quintile 3, while the marginal effect of non-income earners, quintile 1 and quintile 2 is 2.35%, 2.49% and 2.0% lower compared to quintile 3. Asset holding has a marginally positive and significant effect (2.43%) on the likelihood of using digital financial services compared to those without assets. The results of the Probit model provide evidence to support hypothesis 3 of this research, regarding the relationship in the use of digital finance with the following demographic and socioeconomic variables: gender, age, educational level, size of locality, income, and asset holding.

Table 6. Probit estimation of digital financial inclusion. Marginal effect.

	(5) Digital Financial Inclusion	(6) Mobile Payments	(7) Account or application contracted online	(8) Online credit
Financial literacy	0.0094*** (0.0224)	0.0072*** (0.0234)	0.0013** (0.0360)	0.0001 (0.0668)
Financial Education	0.0442*** (0.0502)	0.0248*** (0.0528)	0.0127*** (0.0675)	0.0027*** (0.1209)
Gender (man) (Ref=woman)	-0.0089** (0.0377)	-0.0123*** (0.0395)	0.0026*** (0.0589)	-0.0000 (0.1099)
Age (Ref. = 18–27 yrs.)				
28–37 years	-0.0057 (0.0511)	0.0030 (0.0541)	-0.0034*** (0.0742)	-0.0006* (0.1382)
38–47 years	-0.0271*** (0.0595)	-0.0158*** (0.0629)	-0.0060*** (0.0914)	-0.0000 (0.1417)
48–57 years	-0.0330*** (0.0677)	-0.0192*** (0.0705)	-0.0078*** (0.1245)	-0.0010** (0.2598)
58–67 years	-0.0329*** (0.0797)	-0.0219*** (0.0839)	-0.0067*** (0.1422)	-0.0008 (0.3263)
68–77 years	-0.0333*** (0.1153)	-0.0206** (0.1179)	-0.0068*** (0.2830)	
78 years or more	-0.0282** (0.1581)	-0.0174 (0.1629)	-0.0057** (0.3656)	

Table 6. (Continued).

	(5) Digital Financial Inclusion	(6) Mobile Payments	(7) Account or application contracted online	(8) Online credit
Educational level (Ref. = elementary)				
Junior high school	0.0208** (0.0760)	0.0145** (0.0797)	0.0108** (0.1916)	0.0031* (0.3481)
High school	0.0806*** (0.0736)	0.0691*** (0.0767)	0.0209*** (0.1874)	0.0042** (0.3465)
Bachelor's	0.1621*** (0.0739)	0.1348*** (0.0771)	0.0542*** (0.1858)	0.0059** (0.3484)
Master's or doctorate degree	0.2738*** (0.1087)	0.2251*** (0.1119)	0.0844*** (0.2177)	0.0035 (0.4494)
Marital status (Ref. = single)				
Common-law	-0.0000 (0.0526)	-0.0014 (0.0557)	0.0004 (0.0788)	0.0007 (0.1325)
Separated	0.0012 (0.0748)	0.0005 (0.0785)	-0.0003 (0.1283)	-0.0007 (0.3274)
Divorced	0.0028 (0.0990)	0.0035 (0.1021)	-0.0011 (0.1746)	-0.0000 (0.2826)
Widowed	-0.0034 (0.1091)	-0.0052 (0.1135)	-0.0014 (0.2479)	-0.0002 (0.3846)
Married	0.0005 (0.0494)	0.0024 (0.0515)	-0.0000 (0.0766)	-0.0004 (0.1496)
Locality size (Ref = urban)	-0.0294*** (0.0446)	-0.0229*** (0.0470)	-0.0036*** (0.0725)	-0.0003 (0.1317)
Geographical region (Ref = CDMX)				
Northwest	-0.0059 (0.0714)	-0.0074 (0.0734)	0.0008 (0.1224)	0.0010 (0.2854)
Northeast	0.0015 (0.0713)	-0.0026 (0.0734)	0.0051** (0.1196)	0.0024* (0.2782)
West Bajío	-0.0055 (0.0724)	-0.0084 (0.0747)	0.0020 (0.1218)	0.0018 (0.2798)
Central South and East	0.0069 (0.0735)	0.0015 (0.0758)	0.0067** (0.1225)	0.0014 (0.2946)
South	-0.0089 (0.0754)	-0.0126** (0.0783)	0.0031 (0.1249)	0.0025* (0.2822)
Working status (Ref= without a job)	0.0042 (0.0889)	-0.0052 (0.0946)	0.0064*** (0.1473)	0.0003 (0.3044)
Entrepreneur or businessman (Ref = unpaid worker, day laborer or employee)	-0.0023 (0.0461)	-0.0078* (0.0487)	0.0048**** (0.0669)	0.0001 (0.1242)
Income (Ref = quintile 3)				
Without income	-0.0235** (0.1033)	-0.0279*** (0.1104)	0.0033 (0.1629)	-0.0010 (0.3607)
Quintile 1	-0.0249*** (0.0875)	-0.0214*** (0.0930)	-0.0032 (0.1474)	-0.0006 (0.2435)
Quintile 2	-0.0200*** (0.0733)	-0.0173*** (0.0782)	-0.0011 (0.1136)	-0.0002 (0.2051)
Quintile 4	0.0041 (0.0671)	0.0036 (0.0709)	-0.0007 (0.1074)	0.0008 (0.1802)

Table 6. (Continued).

	(5) Digital Financial Inclusion	(6) Mobile Payments	(7) Account or application contracted online	(8) Online credit
Quintile 5	0.0501*** (0.0611)	0.0391*** (0.0643)	0.0062*** (0.0932)	0.0014* (0.1717)
Did not answer	0.0569*** (0.1036)	0.0595*** (0.1075)	0.0014 (0.1825)	
Home Internet service	0.0047 (0.0369)	0.0050 (0.0388)	0.0004 (0.0578)	0.0001 (0.1076)
Asset holding	0.0243*** (0.0405)	0.0200*** (0.0423)	0.0028*** (0.0647)	0.0000 (0.1170)
Number of observations	13,554	13,554	13,554	13,554
Mean of dependent variable	0.0930	0.0768	0.0248	0.0042
McFadden R-squared	0.2271	0.2055	0.2320	0.1727
Number of 'correctly predicted' cases =	12,325 (90.9%)	12,507 (92.3%)	13,217 (97.5%)	13,496 (99.6%)
f(beta'x)	0.101	0.087	0.017	0.003
Likelihood ratio test: $\chi^2(g.l)$	$\chi^2(34) = 1906.13$ [0.0000]	$\chi^2(34) = 1510.14$ [0.0000]	$\chi^2(34) = 732.32$ [0.0000]	$\chi^2(31) = 129.293$ [0.0000]

Notes: The table reports the marginal effect and standard errors (in parentheses). *, **, ***: Significance level (< 0.10, < 0.05, < 0.01, respectively). f(beta'x) evaluated at the mean of the independent variables. The results of the multicollinearity test for the regressors with the variance inflation factor (VIF) show values less than 10, therefore the hypothesis of non-collinearity between the regressors is not rejected.

The results of this research highlight the role of financial literacy and financial education in financial inclusion through digital finance. In our results, on average only 9.30% of the respondents indicated having used some of the three types of digital financial services, which contrasts with the 29.1% reported by Yang et al. (2023) and with the general trend reported by OECD (2020). The results also show that of the total residents in urban locality, 12.43% use digital financial services while this percentage is only 3.93% in the rural locality, evidencing the disparity in the use of digital finance between rural and urban areas, as reported in Yang et al. (2023).

The results also show that those who have knowledge of financial concepts tend to use digital finance, which favors financial inclusion, as reported in Isaia and Oggero (2022). The results of the Probit model provide evidence that financial literacy and financial education have a positive and significant effect on the likelihood of making use of digital finance through mobile payments, online accounts or apps, and online credit, which is consistent with the results of Frimpong et al. (2022), Gunawan, et al. (2023) and Yang et al. (2023).

Our results show that the marginal effect of financial literacy on the probability of using any forms of digital finance is 3.6%, similar to marginal effect of 2.69% found by Yang et al. (2023). Likewise, our results identify that the marginal effect of financial literacy and financial education is higher for the use of mobile payments compared to online accounts and applications and online credit while in Yang et al. (2023) the marginal effect is larger for loans and financial products. From Probit model results, the positive and significant effect of financial education on digital financial inclusion is evident, coinciding with Yang et al. (2023).

Regarding the use of digital finance by gender, the likelihood of using digital financial services is lower among men than among women, which is consistent with Yang et al. (2023). In addition, the results show that the use of digital finance is more likely among young people like Cassimon, et al. (2022) and Zainudin et al. (2019) found. Also, individuals are more likely to make use of digital finance the higher their educational level, the higher their income level and the more assets they own, in congruence with what has been reported by other research (Cassimon et al., 2022; Yang et al., 2023). Working status (being employed) and job position (being an entrepreneur or businessman) are variables that significantly affect the use of online accounts and applications, but not the use of mobile payments and online credit, a result that differs from that reported by Yang et al. (2023). The Probit model results identify that access to internet service from home is a non-significant variable, which contrasts with that reported by Corrado and Corrado (2015).

5. Conclusion

The results of this research show the significant effect of financial literacy and financial education on digital financial inclusion. Likewise, the sociodemographic variables that are significantly related to the use of digital finance are identified. The results allow us to accept the hypotheses regarding the relationship of digital financial inclusion with financial literacy, financial education, and sociodemographic variables of Mexicans over 18 years old. Gender, locality size, educational level, income, and asset holding are variables that significantly impacts on the use of digital finance.

The results show that educational level has a greater impact than financial education on the possibility of having digital finances and that financial education is a more important determinant than financial knowledge. This finding emphasizes the importance of designing public policies to improve the educational level of Mexicans, especially for rural and low-income inhabitants. Improving the level of education and facilitating access to technological tools can significantly contribute to reducing inequality in Mexico. It is suggested for future research to analyze the levels of financial literacy, financial education, and the analysis of the sociodemographic determinants of people who report being financially excluded and/or who do not trust the services provided by financial institutions.

One limitation of the study is that it does not include in the analysis the supply of financial products and services; the survey does not collect this information. In this sense, the significance of the size of the locality could be due more to the limited access to financial services in small localities than to the number of inhabitants of the locality itself. Given that data collected is from the person who answered the survey, there is no way of knowing if the household has contracted any digital financial services through another member of the family.

The paper contributes to the existing literature on financial inclusion by providing evidence of an unexplored relationship, the use of digital financial services, and the financial literacy and financial education of Mexicans, and the sociodemographic determinants.

Author contributions: Conceptualization, SHM and EMG; methodology, SHM; software, SHM; validation, SHM, EMG and RCM; formal analysis, SHM and EMG; investigation, RCM and EMG; data curation, SHM; writing—original draft preparation, SHM; writing—review and editing, EMG; visualization, RCM; supervision, SHM and EMG; project administration, EMG. All authors have read and agreed to the published version of the manuscript.

Conflict of interest: The authors declare no conflict of interest.

References

- Adamo, R., Federico, D., & Notte, A. (2024). Financial Inclusion Literature Review: Definition, Measurement, and Challenges. In J. Jungo, M. Madaleno, A. Botelho, & E. Dogan (Eds.), *The Role of Financial Inclusion for Reaching Sustainable Development Goals* (pp. 28-46). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3693-0522-5.ch003>
- Ahmad, M., Ahmed, Z., Yang, X., Hussain, N., & Sinha, A. (2022). Financial development and environmental degradation: do human capital and institutional quality make a difference? *Gondwana Research*, 105, 299-310. <https://doi.org/10.1016/j.gr.2021.09.012>
- Al-Shami, S. A., Damayanti, R., Adil, H., & Farhi, F. (2024). Financial and digital financial literacy through social media use towards financial inclusion among batik small enterprises in Indonesia. *Heliyon*, 10(15). <https://doi.org/10.1016/j.heliyon.2024.e34902>
- Amnas M.B., Selvam, M. & Parayitam, S. (2024). FinTech and Financial Inclusion: Exploring the Mediating Role of Digital Financial Literacy and the Moderating Influence of Perceived Regulatory Support. *Journal of Risk and Financial Management*, 17, 108. <https://doi.org/10.3390/jrfm17030108>
- Andreou, P. & Anyfantaki, S. (2021). Financial literacy and its influence on internet banking behavior *European Management Journal*, 39(5), 658-674. <https://doi.org/10.1016/j.emj.2020.12.001>
- Ansar, S., Klapper, L. & Singer, D. (2023). The Importance of Financial Education for the Effective Use of Formal Financial Services, World Bank Group, Policy Research Working Paper, 10345.
- Aziz, A., & Naima, U. (2021). Rethinking digital financial inclusion: Evidence from Bangladesh. *Technology in Society*, 64, 101509. <https://doi.org/10.1016/j.techsoc.2020.101509>
- Becker, J. G. S. (1964). *Human capital: A theoretical analysis with special reference to education*. National Bureau for Economic Research. Columbia University Press.
- Boachie, C., & Adu-Darko, E. (2024). The effect of financial inclusion on economic growth: the role of human capital development. *Cogent Social Sciences*, 10(1), 2346118. <https://doi.org/10.1080/23311886.2024.2346118>
- Chamboko, R. (2022). On the role of gender and age in the use of digital financial services in Zimbabwe. *International Journal of Financial Studies*, 10(3), 82. <https://doi.org/10.3390/ijfs10030082>
- Chen, F., Yu, D. & Sun, Z. (2023). Investigating the associations of consumer financial knowledge and financial behaviors of credit card use. *Heliyon*, 9(1), <https://doi.org/10.1016/j.heliyon.2022.e12713>.
- Chen, H., & Volpe, R. P. (2002). Gender differences in personal financial literacy among college students. *Financial Services Review*, 11(3), 289-307.
- Corrado, G. & Corrado, L. (2015). The geography of financial inclusion across Europe during the global crisis. *Journal of Economic Geography*, 15, 1055–1083. <https://doi.org/10.1093/jeg/lbu054>
- Cassimon, S., Maravalle, A., González, A. & Turroques, L. (2022). Determinants of and barriers to people's financial inclusion in Mexico, OECD Economics Department Working Papers, No. 1728, OECD Publishing, Paris, <https://doi.org/10.1787/73e9341b-en>
- Demirgüç-Kunt, A., Klapper, L., Singer, D. & Ansar, S. (2022). *The global finindex database 2021: Financial inclusion, digital payments, and resilience in the Age of COVID19*. World Bank Publications.
- Elsinger, H., Fessler, P., Feyrer, J., Richter, K., Silgoner, M.A. & Timel, A. (2018) Digitalization in financial services and household finance: fintech, financial literacy and financial stability. *Financial Stability Report*, 35, 50–58.
- Friedline, T. & West, S. (2016). Financial Education is not Enough: Millennials May Need Financial Capability to Demonstrate Healthier Financial Behaviors, *Journal of Family and Economic Issues*, 37(4), 649-671. <https://doi.org/10.1007/s10834-015-9475-y>

- Frimpong, S. E., Agyapong, G., & Agyapong, D. (2022). Financial literacy, access to digital finance and performance of SMEs: Evidence From Central region of Ghana. *Cogent Economics & Finance*, 10(1).
<https://doi.org/10.1080/23322039.2022.2121356>
- Frisancho, V. (2020). Is School-Based Financial Education Effective? Immediate and Long-Lasting Impacts on High School Students. *The Economic Journal*, 133(651), 1147–1180. <https://doi.org/10.1093/ej/ueac084>
- García, N., Grifoni, A., López, J. C., & Mejía, D. (2013). Financial education in Latin America and the Caribbean: Rationale, overview and way forward. *OECD Working Papers on Finance, Insurance and Private Pensions*, 33, OECD Publishing, Paris
<https://doi.org/10.1787/5k41zq7hp6d0-en>
- Goel, I. (2024). Financial education and digitalisation: analysis of avenues. *Sachetas*, 3(1), 17-25.
- Gortsos, C. V. (2016). Financial Inclusion: An overview of its various dimensions and the initiatives to enhance its current level. *Working Papers ECEFIL*, 15.
- Greene, W. H. (2018). *Econometric Analysis*. Ed. Pearson.
- Gunawan, A. Mukmin, Wahyuni, S.F. & Sari, M. (2023). Factors affecting financial management behavior of Paylater users in Indonesia: Examining the moderating role of locus of control. *Investment Management and Financial Innovations*, 20(4), 171-181. [https://doi.org/10.21511/imfi.20\(4\).2023.15](https://doi.org/10.21511/imfi.20(4).2023.15)
- Hasan, M., Le, T., & Hoque, A. (2021). How does financial literacy impact on inclusive finance? *Financial Innovation*, 7(1), 40. <https://doi.org/10.1186/s40854-021-00259-9>
- Hermawan, A. & Gunardi, A. & Sari, L. (2022). Intention to Use Digital Finance MSMEs: The Impact of Financial Literacy and Financial Inclusion. *Jurnal Ilmiah Akuntansi dan Bisnis*. 17. <https://doi.org/10.24843/JIAB.2022.v17.i01.p12>
- INEGI (2022a). Encuesta Nacional de Inclusión Financiera. ENIF 2021. Cuestionario. Retrieved from:
https://www.inegi.org.mx/contenidos/programas/enif/2021/doc/enif_2021_cuestionario.pdf
- INEGI. (2022b). Encuesta Nacional de Inclusión Financiera. Diseño conceptual. Retrieved from:
<https://www.inegi.org.mx/app/biblioteca/ficha.html?upc=889463903895>
- Irman, M., Budiyo, B., & Suwitho, S. (2023). Increasing financial inclusion through financial literacy and financial technology On MSMEs. *International Journal Economics Development Research*, 126-141.
- Isaia, E., & Oggero, N. (2022). The potential use of robo-advisors among the young generation: Evidence from Italy. *Finance Research Letters*, 48, 103046. <https://doi.org/10.1016/j.frl.2022.103046>
- Kálmán B. G., Grotte J., Lakshmi, V., Tóth A., Módos-Szalai Sz., Zugor Zs., & Malatyinszki Sz. (2024a). Sustainable city tourism—A systematic analysis of Budapest and Mumbai. *Journal of Infrastructure, Policy and Development (JIPD)*, 8(9). ID: 7933. <http://doi.org/10.24294/jipd.v8i9.7933>
- Kálmán B. G., Malatyinszki Sz., Bárczi J., & Zéman Z. (2024b). Corrupción e Inclusión Financiera en Hungría y México [Corruption and Financial Inclusion in Hungary and Mexico, in Spanish]. *Revista Mexicana de Economía y Finanzas Nueva Época (REMEF) // Mexican Journal of Economics and Finance*, 19(2). ID: e1015. <http://doi.org/10.21919/remef.v19i2.1015>
- Kálmán B. G., Malatyinszki Sz., Zugor Zs., & Szőke B. (2024c). Perceived Corruption in Light of Green Transition Indicators. *Revista de Gestão Social e Ambiental (RGSA) // Environmental and Social Management Journal*, 18(3). ID: e07855. <http://doi.org/10.24857/rgsa.v18n3-166>
- Kálmán B. G., Dávid L., & Malatyinszki Sz. (2024d). The Role of Geoparks in Sustainable Tourism Development: A Case Study Approach. *Geojournal of Tourism and Geosites (GTG)*, 17(4spl), pp. ...—.... ID: GTG_420_2024. <https://doi.org/...>
- Koskelainen, T., Kalmi, P., Scornavacca, E., & Vartiainen, T. (2023). Financial literacy in the digital age—A research agenda. *Journal of Consumer Affairs*, 57(1), 507-528. <https://doi.org/10.1111/joca.12510>
- Malatyinszki Sz., Módos-Szalai Sz., Jenei Sz., Kerekes E., Kálmán B. G. (2024a). Impact of Material Consumption and Circular Economy on National Income in Europe – Chapter 1. *Revista de Gestão Social e Ambiental (RGSA) // Environmental and Social Management Journal*, 18(5).
- Malatyinszki Sz., Módos-Szalai Sz., Jenei Sz., Kerekes E., Kálmán B. G. (2024b). Impact of Material Consumption and Circular Economy on National Income in Europe – Chapter 2. *Revista de Gestão Social e Ambiental (RGSA) // Environmental and Social Management Journal*, 18(5).
- Liu, G., Huang, Y., & Huang, Z. (2021). Determinants and mechanisms of digital financial inclusion development: Based on urban-rural differences. *Agronomy*, 11(9), 1833. <https://doi.org/10.3390/agronomy11091833>
- Lusardi, A. (2019). Financial literacy and the need for financial education: evidence and implications, *Swiss Journal of Economics and Statistics*, 155, 1. <https://doi.org/10.1186/s41937-019-0027-5>

- Lusardi, A., & Mitchell, O. S. (2011). Financial literacy and planning: Implications for retirement well-being. NBER Working Paper No. 17078, National Bureau of Economic Research. Retrieved from: <https://www.nber.org/papers/w17078>
- Lusardi, A., & Mitchell, O. S. (2014). The Economic Importance of Financial Literacy: Theory and Evidence. *Journal of Economic Literature*, 52(1), <https://doi.org/5-44>. 10.1257/jel.52.1.5
- Marumbwa, J. (2014). Exploring the moderating effects of socio-demographic variables on consumer acceptance and use of mobile money transfer services (MMTs) in Southern Zimbabwe. *American Journal of Industrial and Business Management*, 4(2), 71-79. <https://doi.org/10.4236/ajibm.2014.42011>
- Navis, K., Mukherjee, A., Gelb, A., Castañeda, J. A., Mazari, I. & Torres, L.M. (2020). The Puzzle of Financial Inclusion in Mexico: A Closeable Gap? Center for Global Development. Retrieved from: <https://www.cgdev.org/sites/default/files/puzzle-financial-inclusion-mexico-closeable-gap.pdf>
- Németh E., Kálmán B. G., & Malatyinszki Sz. (2024). Pénzügyi biztonság Magyarországon: a 2023-as OECD-felmérés eredményeinek kettős nézőpontú elemzése [Financial security in Hungary: A dual perspective analysis of the 2023 OECD survey results, in Hungarian]. *Statisztikai Szemle // Hungarian Statistical Review*, 102(9), pp. 896–915. <https://doi.org/10.20311/stat2024.09.hu0896>
- OECD (2020). OECD/INFE 2020 International Survey of Adult Financial Literacy. Retrieved from: www.oecd.org/financial/education/launchoftheoecdinfeglobalfinancialliteracysurveyreport.htm
- Secretaría de Educación Pública (October 15, 2021). Educación por niveles. Retrieved from: <https://www.gob.mx/sep/acciones-y-programas/educacion-por-niveles?state=published>
- Panait, M., Radulescu, I., & Brezoi, A. (2020). Financial markets—under the sign of CSR. Some evidences regarding financial education. *LUMEN Proceedings*, 11, 96-106. <https://doi.org/10.18662/lumproc/gekos2020/11>
- Rahmi, N., & Aliasuddin, A. (2020). Financial inclusion and human capital investment in urban and rural: A case of Aceh Province. *Regional Science Inquiry*, 12(1), 47-54.
- Sha'ban, M., Ayadi, R., Fourouheshfar, Y., Challita, S. & Sandri, S. (2024). Digital and Traditional Financial Inclusion: Trends and Drivers. *Research in International Business and Finance*. 72-B, 102528. <https://doi.org/10.1016/j.ribaf.2024.102528>
- Shaikh, A.A., Glavee-Geo, R., Karjaluoto, H. & Hinson, R.E. (2023). Mobile money as a driver of digital financial inclusion. *Technological Forecasting and Social Change*, 186: 122158. <https://doi.org/10.1016/j.techfore.2022.122158>
- Simovic, V., Domazet, I., Bugarcic, M., Safi, M., Sarhan, H., Bhagat, R., & Martinovic, A. B. (2023). The association of socio-demographic characteristics of university students and the levels of their digital entrepreneurial competences. *Heliyon*, 9(10). <https://doi.org/10.1016/j.heliyon.2023.e20897>
- Urban, C., Schmeiser, M., Collins, J. M., & Brown, A. (2020). The effects of high school personal financial education policies on financial behavior. *Economics of Education Review*, 78, 101786. <https://doi.org/10.1016/j.econedurev.2018.03.006>
- Widodo, J., Hasnawati, S. & Hendrawaty, E. (2022). The Effect of Financial Literacy, the use of Digital Financial Products, and the use of the internet against Financial Inclusion in Indonesia. *SSRG International Journal of Economics and Management Studies*, 9(5), 1-11. <https://doi.org/10.14445/23939125/IJEMS-V9I5P101>
- World Bank (2014). *Global Financial Development Report: Financial Inclusion*. Washington, DC: World Bank Group.
- Yang, J. & Wu, Y. & Huang, B. (2023). Digital finance and financial literacy: Evidence from Chinese households. *Journal of Banking & Finance*, 156, 107005 <https://doi.org/10.1016/j.jbankfin.2023.107005>
- Yuneline, M.H. & Rosanti, M.F.C. (2023) The Role of Digital Finance, Financial Literacy, and Lifestyle on Financial Behaviour. *Holistica Journal of Business and Public Administration*, 14(2), 97-115. <https://doi.org/10.2478/hjbpa-2023-0018>
- Zainudin, R., Mahdzan, N.S. & Yeap, M.-Y. (2019). Determinants of credit card misuse among Gen Y consumers in urban Malaysia. *International Journal of Bank Marketing*, 37(5), 1350-1370. <https://doi.org/10.1108/IJBM-08-2018-0215>