Financial Inclusion, Fintech and Gender Gap in MENA Countries

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Abstract:

People, especially youths, lack financial inclusion regarding account holding and the use of financial services, both traditional and digital. We tackle the following research question: Do financial inclusion patterns differentiate according to gender, age and driving factors (self-selection vs. discrimination)? We analyse the determinants of financial inclusion for 6,000 individuals over 2011-2021, addressing a representative sample of six MENA countries: Algeria, Egypt, Jordan, Lebanon, Palestine and Tunisia. Probit regressions provide four results related to hypotheses: (i) Gender gap (*H1*) regarding financial inclusion (account holding) rose during the pandemic. (ii) There is an age gap (*H2*) regarding account holding and use of traditional services, with an inverted age gap for digital services, predominating for females over males. (iii) Endogenous self-selection surpasses exogenous discrimination (*H3*). (iv) Despite the gender gap, men do not enjoy substantially greater financial inclusion than women, with respect to self-selection and discrimination (*H4*).

Keywords: Discrimination; Financial inclusion; Fintech; Gender; MENA countries; Probit regressions; Self-selection; Youth.

JEL: D14; G21; G5; O33.

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1. Introduction

Financial inclusion, a major challenge in a monetary economy, promotes economic development and reduces inequality. It is positioned as the United Nations Sustainable Development Goal (SDG 17), to be achieved by 2030.

The definition of financial inclusion encapsulates account ownership (in a formal financial institution or with a mobile money service provider), which first allows access to financial services and then their uses (savings, loans, digital services, etc.) (Ozili 2020; Sahay et al 2020). Despite the rise in account holding since 2011, including mobile money accounts, it has not benefitted all groups equally, especially women and youths. The MENA region reports the highest gender gap (13 points) worldwide in 2021: 42 per cent of women in developing MENA economies compared to 54 per cent of men. OECD (2020) shows that the share of women borrowing from financial institutions (2017) ranges from two to five per cent in Egypt, Algeria, Palestine and Tunisia, up to 15 per cent in Jordan, whilst the gender gap ranges from 0.25 (Jordan) to 1 (Palestine and Tunisia). Worldwide, the age gap declines marginally by four points between 2011 (17 points) and 2021 (14 points) and adults over 25 years old hold more accounts than young adults aged 15-24 years. This gap also varies across the developing economies, including the MENA region (Demirgüç-Kunt et al 2022), which contains the lowest proportion of adults holding a bank account (excluding high-income economies). In Egypt, the gap between these two age groups is almost 25 percentage points, whilst in Jordan and Tunisia, it is not as high but still in double digits (Demirgüç-Kunt et al 2022; Berguiga & Adair 2024).

Financial inclusion concerns those who participate in the labour force, both employees and self-employed. However, the female unemployment rate is almost twice that of males. (ILO 2024), whilst youth unemployment levels in MENA countries are the highest worldwide, e.g., Jordan (40%), Tunisia (37%) and Algeria (29 %) in 2021 (ILOSTAT). The share of informal employment in total employment is higher for youths. In Palestine, Egypt and Tunisia, four out of five workers aged 15-29 held informal jobs (ILO 2023).

Such considerable gender and age gaps constitute obstacles to the economic empowerment of women and youths. Closing these gaps is challenging, in particular in the MENA region; designing effective policies (World Bank 2013) requires a distinction between voluntary exclusion (i.e., self-selection) and involuntary exclusion (i.e., discrimination according to Phelps' statistical theory). Perrin & Hyland (2023) include factors related to voluntary financial exclusion, religious or cultural impediments or lack of interest in financial services, whilst factors related to involuntary exclusion include lack of trust in the financial system, affordability that is actually somewhat voluntary, along with inappropriate product design and inability to meet the eligibility

criteria required by the financial institution. Other issues include insufficient income, difficult paperwork, distance of financial institution and/or religion, which confuses involuntary with voluntary exclusion. In MENA countries, on average, the density of ATMs (automated teller machines) has been increasing throughout the period 2011-2017, although it slows down in 2021 (Figure A1). The density of bank branches displays a S-curve: dropping in 2014, increasing in 2017 and stalling in 2021 (Figure A2). Mobile cellular subscriptions decline throughout the survey period (Figure A3). More men (over 60%) in Egypt and Tunisia use the internet than women (less than 50%) (ITU, 2019).

Our research question is twofold: First, are financial inclusion patterns similar or distinct, according to gender and age in MENA countries? Second, what are the main factors, endogenous and exogenous, holding back financial inclusion with regards to gender?

Despite the importance of these issues, to the best of our knowledge, no paper has addressed the topic of financial inclusion, with respect to gender, age and exclusion factors in developing MENA countries. Most recent publications dedicated to MENA countries focus on the gender gap or/and income gap. Some include non-developing countries (Bahrain, Kuwait, Saudi Arabia and United Arab Emirates), whilst others only focus on an individual country. They only either assess traditional financial inclusion (account holding and use of traditional services) before the pandemic, or digital financial inclusion - without making any comparison between these two types of financial inclusion. Research into the drivers of financial exclusion in the MENA region remains scarce. First, age is a relevant variable that can detect the financial inclusion patterns of youths in MENA countries, and especially for women, who are less financially included. Second, the relationship between traditional and digital financial inclusion for young women is key for policymakers to implement tailored financial services within an inclusive regulatory framework. Third, interventions must aim at narrowing gaps, thus extending financial inclusion.

Our paper analyses the impact of gender, age and factors driving exclusion for MENA people before and during the COVID-19 pandemic, on each aspect of financial inclusion, account holding and use of both traditional and digital services. We focus on young adults (15-34 years old) that make up half of the MENA population. We provide a measurement for the digital services variable, which was not directly available in the Global Findex database. We make a distinction between self-selection which is related to endogenous demand-side factors and discrimination, which is linked to exogenous supply-side factors. We draw four pooled samples from the Global Findex Database as of 2011, 2014, 2017 and 2021 for a representative sample of six MENA countries (Algeria, Egypt, Jordan, Lebanon, Tunisia and Palestine). We test four hypotheses, amongst which two are related to gender (*H1)* and age (*H2*) according to workforce

and two which address endogenous and exogenous factors of financial exclusion (*H3* and *H4*) according to gender that were not tackled elsewhere and which introduce original insights.

Section 2 includes a substantial literature review devoted to theories, determinants of financial inclusion, especially gender and age in the MENA region and hypotheses. Section 3 presents the descriptive statistics regarding four samples pooling the six MENA countries over 2011-2021 and methodology. Section 4 displays the estimates from probit regressions (with interaction variables), addressing three hypotheses on both aspects of financial inclusion, account holding and effective use of financial services (both traditional and digital), with respect to gender, age and exclusion factors. Section 5 checks the robustness of the results of our hypotheses (*H1, H2* and *H3*) upon the female and male sub-samples and tests hypothesis *H4*. Section 6 is dedicated to the conclusion and policy implications.

2. Literature Review

2.1. Theoretical background

Ozili (2020) aims at bridging academic and policy purposes regarding financial inclusion. He defines financial inclusion as the ease of access to, and the availability of, basic financial services to all members of the population. He claims to be the first to present a catalogue of financial inclusion theories belonging to three broad categories from a conceptual perspective: (i) vulnerable beneficiaries (such as poor people, youths and women); (ii) delivery processes (community echelon, public service or special agent) and (iii) funding. Strangely enough, he does not mention analytical concepts, such as demand and supply, or exogenous and endogenous impediments to financial inclusion.

Technology Acceptance Model (TAM), developed by Davis (1989) is applied to digital financial inclusion, in order to understand human behaviours towards new financial technologies (Fintech) with respect to two main factors: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). The Unified Theory of Acceptance and Use of Technology (UTAUT), developed by Venkatesh (2003), enlarges the set of factors whereby gender and age act as strong moderators. However, it does not adequately account for critical factors of Fintech adoption, such as socio-cultural factors and digital infrastructure.

2.2. Financial Inclusion of Women and Youths in MENA countries: Hypotheses

Özşuca (2019) addresses the gender dimension of financial inclusion in MENA countries, with regards to account ownership and use of saving and borrowing financial services, with a Fairlie decomposition method in 2017. The contributing factors to the financial inclusion gap are employment, age and higher education and, to a lesser extent, upper income quintiles. Ozşuca (2024) examines this issue with regards to digital finance across different age groups upon a

large sample, including six MENA countries. The working-age population experiences the largest gap, whose main part is attributable to employment, whilst secondary education and income level are also significant, with tertiary education helping to close the gap for young adults.

The sample of Cicchiello et al (2021) and Kazemikhasragh et al (2022) in 2017 includes sixteen countries, two of which are not MENA countries (Afghanistan and Pakistan) and three oil-exporters are high income countries (Kuwait, Saudi Arabia and United Arab Emirates). Authors state that the gender gap in respect of financial inclusion is larger in low-income countries, an issue that is not tackled in the paper. Women are less likely to hold a bank or a mobile money account and use financial services (savings and loans), as compared to men. However, being a woman increases the probability of owning a credit card and saving semi-formally, through a savings club or a person outside the family. The main barriers to financial inclusion are lack of money and documentation, high transaction costs, the distance to the bank and the fact that a family member already has an account and religious reasons. These are the most relevant factors explaining female financial exclusion. Older age, better education and high-income increase the probability of men being financially included. Being younger, a woman, who is less educated and on a low income reduces the opportunity for financial inclusion.

Mabrouk et al (2023) differentiate High-Income Economies and Developing Economies before and during COVID-19 to explore the connection between female economic empowerment (income) and digital financial inclusion. They observe that the impact of age may have a non-linear relationship with income. Noteworthy is that the Saudi context is distinct from other MENA countries and that the impact of digital services differs before and during the pandemic.

Tripathi & Rajeev (2023) gauge the financial inclusion for women in 109 countries, including a few MENA countries with the Global Findex database for 2011, 2014, 2017 and 2021. They design two distinct indices: a digital financial service usage index and a conventional financial service usage index. They find that that health, education, labour force participation rate and female political empowerment significantly affect the digital financial inclusion of women.

Perrin & Hyland (2023) document the relationship between legal gender equality and the use of financial services, combining data from the Global Findex and WBL databases for 148 developed and developing economies. There is a significant and positive correlation between legal gender equality and women's access to financial services. Greater legal equality alleviates the involuntary financial exclusion of females. However, prevailing adverse social norms can cancel out the beneficial effects of legal equality on financial inclusion.

Elmasmari & Amaghouss (2024) examine the determinants of financial inclusion and FinTech

and their effects on youth labour force participation in the MENA region in 2021. According to probit estimations and propensity score matching, young people with higher education, higher incomes, mobile phones and internet access are more likely to be included in the traditional and digital financial systems. Factors hindering financial inclusion include a lack of documentation, religious beliefs and the costs of financial services. Account holding, along with savings, formal loans and digital transactions have a significant impact on young people's participation in the labour force.

Berguiga & Adair (2024) address the youth determinants of financial inclusion in Egypt, Jordan and Tunisia from 2014 and 2017 to 2021. Five results highlight the role of job status, income, education, gender and age. Before the pandemic, financial inclusion of young entrepreneurs is affected by (female) gender, (middle) income, (low) education level and country policy. During the pandemic, young women became more financially included. There was no age gap regarding digital services provided by a formal financial institution. Despite improvement, these digital services remain unsuitable for poorly educated youths. Gender does not affect the financial inclusion of young employees before and during the pandemic.

The results of these different studies on financial inclusion in the MENA region focus on the gender gap and the age gap, without studying both the link between these two gaps and driving factors (self-selection vs. discrimination). This allows us to design four hypotheses testing financial inclusion in MENA countries (Box 1).

Box 1. Hypotheses

H1. There is a gender gap (women vs. men), with respect to financial inclusion. It declines over time but increases with economic shocks (e.g., Covid-19 pandemic).

H2. There is an age gap (youths vs. mature), with respect to financial inclusion. It increases over time.

H3. Female financial inclusion depends on exogenous and endogenous factors.

H3a. Female financial exclusion is driven by (endogenous) self-selection.

H3b. Female financial exclusion is driven by (exogenous) discrimination.

H3c. Female financial exclusion is driven by both self-selection and discrimination.

H4. Males enjoy greater financial inclusion than females, with respect to exogenous and endogenous factors.

3. Samples: Descriptive Statistics and Methodology.

Our pooled household samples in six MENA countries[3] are selected from the Global Findex Database before the pandemic (2011, 2014 and 2017), and during the pandemic (2021). The comparison of these countries is consistent for two reasons. (i) According to the World Bank, they belong to the category of lower middle-income including quite a large spectrum, with

[3] Morocco was not selected due to biased oversampling and Israel was withdrawn because its classification amongst high income countries would introduce another bias.

respect to GDP per capita (2021 PPA), amounting to $15,579 in Egypt, $14,497 in Algeria and $12,375 in Tunisia in North Africa, $11,600 Lebanon, $9,182 in Jordan, but only $5,663 in Palestine in the Middle East. (ii) The sample size of datasets (i.e., over 1,000 individuals every year) is roughly the same for each six countries.

3.1. Descriptive Statistics.

Over 2011-2021, more than half the individuals are mature men (over 35 years old), Table 1 reports. The share of female workforce declined from 2017 (33.77%) to 2021 (16.08%).

The percentage of the population holding an account (97% at financial institutions) remains below 44 per cent, although it is increasing over the survey period. The percentage of account ownership in a financial institution slightly declines from 2014 (99.77%) to 2021 (97.19%). Indeed, the use of a financial account has been replaced to some extent by that of a mobile money account, which has been rising gradually from 2014 (0.15%) to 2021 (9.39%).

Account holding differs according to household characteristics: gender, age and workforce status. Over 60 per cent of women owned an account before the pandemic; a share that dropped sharply below 40 per cent during the pandemic, due to Egypt and Lebanon. Women became less financially included during the pandemic, but they hold slightly more accounts with financial institutions (97.83%) than men do (96.77%). The increase in mobile account ownership is larger for men than for women.

Bank account holding increases with age, whereas holding a mobile money account declines with age. Although the share of youths holding a financial institution account increased from 2011 (31%) to 2021 (43%), the pandemic accelerated their access to mobile money accounts (13.85%), especially for males, compared with 2014 (1.89%).

The pandemic reduced the use of financial institution accounts for females within the labour force, but it remains important compared to their male counterparts. Although the increased use of mobile money accounts is significant for this grouping of females (rising from 1.85% in 2014 to 8.58% in 2021), it remains lower than that of men (10.55% in 2021).

Table 1. Household characteristics according to the nature of account holding over 2011-2021.

Year	2011		2014				2017				2021			
		Account Holding[a]		Account Holding	Nature of account			Account Holding	Nature of account			Account Holding	Nature of account	
					Financial institution	Mobile money[b]			Financial institution	Mobile money			Financial institution	Mobile money
	N (%)	N (%)	N (%)	N (%)	N (% [c])	N (% [c])	N (%)	N (%)	N (% [c])	N (% [c])	N (%)	N (%)	N (% [c])	N (% [c])
Gender														
Female	2,952 (48.64)	1,204 (64)	2,941 (48.55)	1,339 (60.67)	1,336 (99.77)	24 (1.79)	2,860 (47.44)	1,522 (60.2)	1,512 (99.34)	34 (2.23)	2,975 (49.29)	1,017 (39.14)	995 (97.83)	78 (7.66)
Male	3,117 (51.36)	677 (35.99)	3,117 (51.45)	868 (39.32)	866 (99.76)	8 (0.92)	3,169 (52.56)	1,006 (39.79)	1,005 (99.9)	18 (1.78)	3,061 (50.71)	1,581 (51.64)	1,530 (96.77)	166 (10.49)
Total	6,069 (100)	1,881 (100)	6,058 (100)	2,207 (100)	2,202 (99.77)	32 (14.53)	6,029 (100)	2,528 (100)	2,517 (99.56)	52 (2.05)	6,036 (100)	2,598 (100)	2,525 (97.19)	244 (9.39)
Age														
Youths 15-34	2,850 (47.02)	879 (46.78)	2,995 (49.46)	948 (42.97)	945 (99.68)	18 (1.89)	2,736 (45.39)	942 (37.27)	934 (99.15)	23 (2.44)	2,778 (46.03)	960 (36.96)	921 (95.93)	133 (13.85)
Female	1,606 (26.49)	528 (28.1)	1,487 (24.55)	546 (24.75)	543 (99.45)	15 (2.74)	1,271 (21.08)	564 (22.31)	556 (98.58)	21 (3.72)	1,337 (22.15)	387 (14.90)	376 (97.15)	39 (10.37)
Male	1,605 (26.48)	351 (18.68)	1,508 (24.99)	402 (18.22)	402 (100)	3 (0.74)	1,465 (24.30)	378 (14.95)	378 (100)	8 (2.11)	1,441 (23.87)	573 (22.06)	545 (95.11)	94 (17.24)
Mature +35	3,211 (52.98)	1,000 (53.21)	3,060 (50.54)	1,258 (57.02)	1,256 (41.04)	14 (1.11)	3,292 (54.61)	1,585 (62.72)	1,309 (82.58)	29 (1,82)	3,257 (53.96)	1,637 (63.03)	1,603 (97.92)	111 (6.78)
Total	6,061 (100)	1,879 (100)	6,055 (100)	2,206 (100)	2,201 (99.77)	32 (1.45)	6,028 (100)	2,527 (100)	2,516 (99.56)	52 (2.05)	6,035 (100)	2,597 (100)	2,524 (97.18)	244 (9.39)
Workforce														
In workforce[d]	*N/A*	*N/A*	1,879	817	815 (99.75)	12 (1.46)	2,962 (49.13)	1,680 (66.45)	1,676 (99.76)	39 (2.32)	3,235 (53.60)	1,737 (66.85)	1,686 (97.06)	173 (10.26)
Female			1,009	540	539 (99.81)	10 (1.85)	2,036 (33.77)	1,169 (46.24)	1,166 (99.74)	23 (1.96)	971 (16.08)	524 (20.16)	512 (97.70)	45 (8.58)
Male			870	277	276 (99.63)	2 (0.72)	926 (15.35)	511 (20.21)	510 (99.80)	16 (3.13)	2,264 (37.5)	1,213 (46.68)	1,174 (96.78)	128 (10.55)
Out of workforce	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	3,067 (50.87)	848 (33.54)	841 (99.17)	13 (15.33)	2,801 (46.40)	861 (33.14)	839 (97.44)	71 (8.24)
Total							6,029 (100)	2,528 (100)	2,517 (100)	52 (100)	6,036 (100)	2,598 (100)	2,525 (100)	244 (100)
Total	6,069 (100)	1,881 (30.99)	6,058 (100)	2,207 (36.43)	2,202 (99.77)	32 (0.15)	6,029 (100)	2,528 (41.93)	2,517 (99.56)	52 (2.05)	6,036 (100)	2,598 (43.04)	2,525 (97.19)	244 (9.39)

Notes: [a] Only at financial institutions. [b] includes those holding both accounts. [c] Percentage of total for various accounts is related to total account holding for each sub-sample (read horizontally). [d] It includes employees, self-employed and unemployed. Information is lacking in 2011 and in 2014, with respect to unemployed.
Source: Authors from the Global Findex database (2011, 2014, 2017 and 2021).

Table 2 reports distinct factors explaining why MENA people do not hold an account at a financial institution.

Table 2. Factors for the absence of account holding at a financial institution amongst young men and women

Sample/ Year	Full 2011 (%[a])	Young Men	Young Women	Full 2014(%[a])	Young Men	Young Women	Full 2017(%[a])	Young Men	Young Women	Full 2021(%[a])	Young Men	Young Women
Exogenous (supply side)	1,097 (26.21)	360 (28.7)	299 (27.73)	1,539 (39.91)	448 (22.99)	393 (55.58)	1,350 (39.26)	387 (21)	268 (23.18)	1,242 (36.12)	338 (38.94)	344 (36.21)
Endogenous (demand side)	3,536 (84.49)	1,071 (85.4)	872 (80.89)	3,523 (91.48)	1,023 (52.51)	827 (87.6)	2,460 (71.55)	732 (39.73)	470 (40.65)	3,386 (98.48)	859 (98.96)	890 (93.68)
Exogenous & *Endogenous*[b]	937 (22.38)	317 (25.27)	236 (21.89)	1,322 (34.32)	391 (20.07)	320 (33.89)	1,113 (32.37)	320 (17.37)	207 (17.90)	1,190 (31.81)	327 (18.61)	325 (21.35)
Total no. account holding	4,185	1,254	1,078	3,856	1,106	944	3,438	1,842	1,156	3,438	868	950

Note: [a] The percentage of each factor for exclusion is calculated according to the number of those not holding a financial account, because the household may have more than one reason for exclusion.
[b] Individuals who are financially excluded by both endogenous and exogenous factors
Source: Authors from the Global Findex database (2011, 2014, 2017 and 2021)

From the supply side, exogenous factors include the absence of available banking infrastructure, such as a branch, lack of necessary documentation, high cost of financial services and constraints upon opening an account. From the demand side, endogenous factors are the absence of need for financial services or because a family member already has an account, distrust of financial institutions, religious beliefs or lack of money. Endogenous factors of financial exclusion (between eight and nine out of ten) prevail over exogenous factors (between one out of four and two out of five), whatever the gender and the period. Young women cope with more endogenous factors than young men do, whereas it is not the case for exogenous factors in 2011 and 2021. Factors may also be both endogenous and exogenous (between two and three out of ten) and, in this respect, more young women (21.35%) do not hold accounts during the pandemic than young men (18.61%). Women are more prone to self-selection but also face discrimination to a lesser extent.

3.2. Methodology.

Three binary variables measure two aspects of financial inclusion, account ownership and use, and stand as the dependent variables of three models addressing financial inclusion: Account holding at a formal financial institution, a mobile money service provider or both (*Account holding)* vs. No account holding (model 1), using traditional services provided by a financial institution (*Traditional services*) vs. No use (model 2), and using digital services from a financial institution and/or mobile money service provider (*Digital services*) vs. No use (model 3). The *Digital services* variable is measured from various transactions such as withdrawals, check accounts, pay bills, send or receive money, wages and public or private transfers, savings and/or borrowings and other digital services.

Box 2. Probit regressions

Three models estimate each explained variable (financial inclusion) *Y*, for every household *i* located in country *k*. The general model is:

$$\boldsymbol{E}\left(Y = 1/X_{ikj}\right) = P_{ikj}$$
$$= \sum_j \pi_j Gender_{ikj} + \sum_j б_j Age_{ikj} + \sum_j \alpha_j X_{ikj} + \sum_j \mu_j W_{ikj} + \sum_j \beta_j T_{ikj} + \sum_j \varphi_j Z_{ikj} + \varepsilon_j$$

Y = Financial inclusion aspects: *Account Holding (Model 1), Traditional services (Model 2), Digital services by financial institution and/or Mobile money service provider (Model 3).*

Xj = Other Characteristics of households*;*

Wj = External funding sources;

Tj = Exclusion factors;

Zj = Country dummies;

ε_j = Error term.

Source: Authors

These three probit regression models (model 1, model 2 and model 3) estimate the predicted probabilities of each financial inclusion aspect before (2011, 2014 and 2017) and during the pandemic (2021), as reported in Box 2. First, in order to test gender gap (*H1*) and age gap (*H2*) hypotheses, *Age* and *Gender* stand as independent variables with other variables regarding household characteristics (*Job status*, *Education level* and *Income*), external funding sources (*Informal loan)*, factors of financial exclusion *(Endogenous*, *Exogenous*, and *Endogenous* and *exogenous)* and *Country dummies* as control variables (Appendix Table A1) for the overall sample. Second, the *Gender* variable is used as an interaction variable with each exclusion factor *(Endogenous, Exogenous, Endogenous and exogenous)* with the *Gender* dummy (*Female*) - *Endogenous*Female, Exogenous*Female, Endogenous and Exogenous*Female* - to test *H3* hypothesis, respectively self-selection behaviour (*H3a*), discrimination behaviour (*H3b*) and self-selection and discrimination behaviour (*H3c*). Last, *Gender* is used to compare a female sub-sample and a male subsample (*H4*) in order to check the robustness of our hypotheses.

4. Results:

4.1. Gender Gap.

Table 4 presents the marginal effects of three probit regressions for each year on the full sample. Regarding the first aspect of financial inclusion (*Account holding*), women hold more accounts than men before the pandemic, but this ownership declines over time. This result contradicts that of Cicchiello et al (2021) and Kazemikhasragh et al (2022): Being a woman reduces the probability of account holding at a financial institution or via a mobile money provider. This may be due to the fact that 2021 is not surveyed and that their sample lacks consistency. Indeed,

the sign of the *Gender* variable changed and became negative in 2021 (model 1.21): The pandemic generated a gender gap with respect to account holding in the six MENA countries. Hypothesis *H1* is partially confirmed.

According to the use of traditional services from financial institutions (model 2), the *Gender* variable is not significant: whatever the period, there is no difference between men and women in this respect. This non-significance does not validate hypothesis *H1* and contradicts the result of Shihadeh (2022), reporting that women and the poor in Palestine are less likely to be involved in loans and formal accounts ownership.

However, being a woman has a positive effect on the probability of using digital services before the pandemic, but this effect slightly declines from 2011 (model 3.11) to 2017 (model 3.17). There is no gender gap and hypothesis *H1* is unverified with regard to the use of digital services. Our result is consistent with those of Demirgüç et al (2018), Breza et al (2020), Tripathi & Rajeev (2023) and Morrar et al (2024), who contend that fintech promotes financial inclusion and reduces the gender gap in accessing financial services.

4.2. Age Gap.

Young people (*Youths*) hold less bank accounts or from mobile money service providers before and during the pandemic (model 1**)**. This age gap, as regards account holding, declines over 2011-2017 but increases in 2021. Our result confirms hypothesis *H2* to some extent and also that of Mouna & Jarboui (2022): Young people are disproportionately exposed to financial exclusion in MENA countries. Noteworthy is that legal restrictions on young people (Skykes et al 2016) may also prevent them from being financially included. This age gap also concerns the use of traditional services: The Age variable (*Youths*) is negative and significant, whatever the period (model 2). However, the evolution of this gap is not clear.

Young people use more digital services than mature adults, especially during the pandemic (model 3.11 and model 3.21). Youth financial inclusion increases over time. In this respect, there is an inverted age gap and, thus, hypothesis *H2* is partially validated. This result confirms descriptive statistics (Table 1) and Berguiga (2024): youths in five MENA countries (Egypt, Jordan, Lebanon, Palestine and Tunisia) increased their use of digital services during the pandemic, which reduced the age gap in financial inclusion.

Table 4. Estimation of financial inclusion models on the full sample (marginal effects).

Sample	**Account holding (model 1)**				**Use of traditional services (model 2)**				**Use of digital services (model 3)**			
Year	**2011**	**2014**	**2017**	**2021**	**2011**	**2014**	**2017**	**2021**	**2011**	**2014**	**2017**	**2021**
Model	**(1.11)**	**(1.14)**	**(1.17))**	**(1.21)**	**(2.11)**	**(2.14)**	**(2.17)**	**(2.21)**	**(3.11)**	**(3.14)**	**(3.17)**	**(3.21)**
Gender: *Female*	0.1107***	-0.0077	0.0167**	-0.0215**	0.0192**	0.0098	0.0130	0.0040	0.0280***	0.0113**	0.0106*	0.0213
(ref.: *Male)*	(7.6556)	(-1.4479)	(2.1420)	(-2.4526)	(2.3378)	(1.1764)	(1.2705)	(0.5890)	(3.6260)	(2.0518)	(1.6460)	(1.6019)
Age: *Youths (15-34)*	-0.0986***	-0.0109**	-0.0199***	-0.0344***	-0.0182**	-0.0458***	-0.0201**	-0.0118*	0.0172**	0.0056	0.0098	0.0687***
(ref.: *Mature ≥ 35)*	(-6.4732)	(-1.9677)	(-2.7489)	(-4.1452)	(-2.1513)	(-4.9775)	(-2.0822)	(-1.8161)	(2.1494)	(0.9520)	(1.6261)	(5.3052)
Education: *Primary*	-0.1793***	-0.0063	-0.0127	-0.0404***	-0.0123	-0.0364**	-0.0165	-0.0217**	-0.0996***	-0.0399***	-0.0199*	-0.1523***
(ref.: *Tertiary*)	(-6.1707)	(-0.5162)	(-1.0047)	(-3.0470)	(-0.8856)	(-2.0645)	(-0.9169)	(-2.0274)	(-7.9325)	(-3.8351)	(-1.9109)	(-7.0779)
Education: *Secondary*	-0.1490***	0.0038	-0.0248**	-0.0389***	-0.0273**	-0.0259	-0.0238	-0.0232**	-0.0707***	-0.0187**	-0.0111	-0.0649***
(ref.: *Tertiary*)	(-5.8913)	(0.3344)	(-2.0633)	(-3.2587)	(-2.2988)	(-1.5979)	(-1.3969)	(-2.3599)	(-6.8289)	(-2.0700)	(-1.2422)	(-3.6453)
Income: *Poorest*	-0.2079***	-0.0202**	-0.0251**	0.0007	-0.0645***	-0.0025	-0.0039	0.0004	-0.0874***	-0.0070	-0.0223**	-0.1070***
Q1 (ref.: *Richest Q5)*	(-8.3870)	(-2.3620)	(-2.3363)	(0.0602)	(-4.2318)	(-0.1884)	(-0.2649)	(0.0429)	(-6.0964)	(-0.8516)	(-2.5329)	(-5.1597)
Income: *Middle (Q2+Q3+Q4)*	-0.1095***	-0.0045	-0.0142*	-0.0135	-0.0167*	0.0003	-0.0101	-0.0073	-0.0377***	-0.0099	-0.0152**	-0.0563***
(ref.: *Richest Q5)*	(-6.3058)	(-0.7503)	(-1.6668)	(-1.3491)	(-1.7202)	(0.0251)	(-0.8276)	(-0.9145)	(-4.4026)	(-1.5234)	(-2.3263)	(-3.6474)
Job status: *Self-employed*		0.0278***	0.0244***	0.0515***		0.0950***	0.0541***	0.0165		0.0136	0.0076	0.0553
(ref.: *Unemployed*)		(3.8472)	(2.6644)	(2.5907)		(8.4018)	(4.0362)	(1.1300)		(1.6274)	(0.8938)	(1.4687)
Job status: *Employee*		0.0071	0.0198**	0.0485***		0.0017	0.0136	0.0217***		-0.0064	0.0101	0.0414**
(ref.: *Unemployed*)		(1.0108)	(1.9738)	(4.7649)		(0.1471)	(0.9428)	(2.7428)		(-0.8226)	(1.2323)	(2.4919)
Endogenous factors		-0.0029	-0.0141	0.0039	-0.1446***	-0.0507***	0.0260**	-0.0007	-0.1317***	-0.0042	-0.0101	0.0254
(ref.*: No endogenous factors)*		(-0.2550)	(-1.3787)	(0.2052)	(-14.7877)	(-2.9388)	(1.9996)	(-0.0451)	(-14.7570)	(-0.3831)	(-1.2640)	(0.7872)
Exogenous factors		-0.0073	0.0215	-0.0289	-0.1576***	-0.0369	0.0388**	-0.0095	-0.0865***	-0.0174	0.0281***	-0.0110
(ref.*: No exogenous factors)*		(-0.4777)	(1.5634)	(-0.6880)	(-5.2289)	(-1.5426)	(1.9872)	(-0.2664)	(-4.4963)	(-1.0739)	(2.8202)	(-0.1887)
Exo/ & Endogenous factors		0.0143	0.0057	0.0306	0.1155***	0.0600**	-0.0625***	0.0193	0.0015	0.0189	-0.0153	0.0195
(ref.*: No exo/ &endo/ factors)*		(0.8860)	(0.3616)	(0.7161)	(3.3753)	(2.3366)	(-2.7599)	(0.5318)	(0.0560)	(1.1013)	(-1.2755)	(0.3259)
Informal loan: (ref.:	-0.0075	0.0128**	0.0077	0.0051	-0.0397***	0.0584***	0.0152	0.0251***	-0.0232**	0.0121*	0.0019	0.0502***
No informal loan)	(-0.4119)	(2.1520)	(1.0700)	(0.6237)	(-3.8988)	(6.1521)	(1.5381)	(3.9062)	(-2.5026)	(1.8793)	(0.3080)	(3.9412)
Country: *Algeria*	0.0139	-0.0132	0.0254*	-0.0132	0.0533***	0.0204	0.0969***	0.0289**	0.2196***	0.0379***	-0.0112	
(ref.: Palestine)	(0.6534)	(-1.4274)	(1.7698)	(-0.8814)	(3.8251)	(0.9958)	(5.3830)	(2.2207)	(18.7534)	(3.4883)	(-1.1744)	
Country: *Egypt*	0.0625*	-0.0309***	0.0418***	-0.0443***	-0.0172	0.0638***	-0.0360**	0.0303***	-0.0647***	0.0218**	-0.0011	-0.1403***
(ref.: Palestine)	(1.6584)	(-3.6407)	(3.1835)	(-3.0379)	(-1.0367)	(4.1789)	(-2.3521)	(2.6376)	(-3.7647)	(2.3163)	(-0.1265)	(-6.4630)
***Country**: Jordan*	0.0947***	-0.0574***	0.0565***	0.0525***	0.0234	0.1050***	0.0219	0.0378***	-0.0244*	0.0092	-0.0129	0.0497***
(ref.: Palestine)	(3.9647)	(-4.4411)	(4.3477)	(4.3106)	(1.6323)	(6.3736)	(1.5847)	(3.2140)	(-1.8197)	(0.8663)	(-1.3968)	(2.8491)
***Country**: Lebanon*	0.2248***	-0.0129	-0.0120	-0.0547***	0.0075	0.0775***	-0.0292*	-0.0017	0.0209	0.0083	-0.0267**	0.0208
(ref.: Palestine)	(8.1491)	(-1.5313)	(-0.7266)	(-3.9003)	(0.5011)	(4.5692)	(-1.7694)	(-0.1291)	(1.6081)	(0.7348)	(-2.3563)	(1.0288)
***Country**: Tunisia*	0.1927***	-0.0005	0.0102	0.0042	0.0302**	0.0524***	0.0142	0.0471***	-0.0199	0.0285***	-0.0206**	0.0430**
(ref.: Palestine)	(7.3163)	(0.2507)	(0.6993)	(0.3218)	(2.0607)	(3.2498)	(0.8607)	(4.0565)	(-1.3931)	(2.9719)	(-1.9713)	(2.3909)

Observations	2,306	3,928	3,502	3,532	5,940	3,913	3,218	3,531	5,917	3,912	3,497	2,722

Note: [a] Endogenous and exogenous *factors* are omitted in model 1.11. No information about *Job status* in 2011. *Self-employed* only includes farmers in 2021. Country (*Algeria*) is omitted because it does not contain any observation on digital services. Robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors from Global Findex (2011, 2014, 2017, 2021)

4.3. Financial Inclusion of Females Facing Self-selection vs. Discrimination.

Table 5 reports the estimation results of the three models of financial inclusion on the full sample with the Gender interaction variable. These results confirm the absence of a gender gap for all aspects of financial inclusion, according to hypothesis *H1* in 2011 along with the existence of the age gap with respect to account holding and the use of traditional services, identified in table 4. Interaction variables allow us to test hypothesis *H3* regarding factors (endogenous, exogenous, and both endogenous and exogenous) driving financial inclusion for females.

4.3.1 Self-selection.

According to model 1a.17, *Endogenous factors*, mainly the absence of need for financial services and the lack of money, reduce account holding in 2017. The interaction of *Endogenous factors* with Gender (*Female*) demonstrates that the relationship between Endogenous factors and account holding varies according to gender: Only in 2017, are women prone to self-selection compared to men, with respect to account holding.

Regarding the use of traditional services, the Endogenous factors variable is significantly negative in 2011-2014. The interaction *Endogenous factors*Female* (model 2a.11) shows that the negative relationship in 2011 also remains negative with the female gender, confirming the existence of a self-selection behaviour for females vs. males, with regards to the use of traditional services.

The relationship between *Endogenous* factors and the use of digital services is negative in 2011 (model 3a.11) and positive in 2021 (model 3a.21). *Endogenous factors*Female* is negative only in 2021: Female financial exclusion is driven by self-selection behaviour regarding the use of digital services.

These results partially confirm hypothesis *H3a* with respect to all financial inclusion aspects.

4.3.2 Discrimination.

Exogenous factors, mainly the high cost of financial services and the constraints upon account opening, in interaction with Gender (*Female*) are negative and significant in 2014 and 2021: These factors reduce women's account holding (model 1a.14 and 1a.21)., Thus, there is discrimination against women.

Although *Exogenous* factors have a negative impact on the use of traditional products (model 2a.11, 2a.14 and 2a.21), this relationship may change positively with gender (model 2a.21), confirming the absence of discrimination against women.

In as much as *Exogenous factors*females* have no impact on the use of digital services, women using digital services are not discriminated against (model 3a).

These results partially validate ŧ hypothesis *H3b* as for account holding.

4.3.3 Self-selection and Discrimination.

The *Endogenous and exogenous factors* variable is insignificant, whatever the period (model 1a) for account holding. The interaction of this variable with *Female* is negative in 2017 and 2021, identifying both discrimination and self-selection behaviours in respect of women's account holding (model 1a.17 and 1a.21).

Regarding the use of traditional services, interaction variable factors are only negative and significant in 2021 (model 2a.21): women using traditional services are prone to self-selection and face discrimination during the pandemic.

Whatever the period, Exogenous and endogenous factors have no impact on the use of digital services, also by women because *Endogenous and exogenous factors *Female* is not significant (model 3b).

These results confirm partially hypothesis *H3c,* with regards to account holding and traditional services.

Table 5. Estimation of financial inclusion models on the full sample (with interaction variables).

	Account holding (model 1a)				Use of traditional services (model 2a)				Use of digital services (model 3a)			
Year	**2011**	**2014**	**2017**	**2021**	**2011**	**2014**	**2017**	**2021**	**2011**	**2014**	**2017**	**2021**
Model	**(1a.11)**	**(1a.14)**	**(1a.17)**	**(1a.21)**	**(2a.11)**	**(2a.14)**	**(2a.17)**	**(2a.21)**	**(3a.11)**	**(3a.14)**	**(3a.17)**	**(3a.21)**
Gender: *Female*	0.4959***	0.1648	0.0244	-0.3128	0.1929***	-0.1219	0.0533	-0.2489	0.2606***	-0.1275	0.0554	0.7388**
(ref.: *Male)*	(7.3530)	(0.4328)	(0.1446)	(-0.9626)	(3.2558)	(-0.4891)	(0.3428)	(-0.6291)	(4.0147)	(-0.3790)	(0.3034)	(2.0308)
Age: *Youths (15-34)*	-0.4418***	-0.1901**	-0.2351***	-0.3045***	-0.0938**	-0.3460***	-0.1507**	-0.1601*	0.1182**	0.0878	0.1551	0.3661***
(ref.: *Mature ≥ 35)*	(-6.3317)	(-1.9658)	(-2.8263)	(-4.2028)	(-1.9800)	(-4.9695)	(-2.0809)	(-1.8587)	(2.2976)	(0.9658)	(1.6063)	(5.2486)
Education: *Primary*	-0.8032***	-0.0984	-0.1461	-0.3647***	-0.0741	-0.2788**	-0.1210	-0.2914**	-0.6443***	-0.6192***	-0.3223*	-0.8030***
(ref.: *Tertiary*)	(-6.0071)	(-0.4636)	(-0.9891)	(-3.1227)	(-0.9549)	(-2.0895)	(-0.8964)	(-2.0655)	(-7.9329)	(-3.9544)	(-1.9432)	(-7.0475)
Education: *Secondary*	-0.6674***	0.0785	-0.2862**	-0.3467***	-0.1532**	-0.1981	-0.1762	-0.3084**	-0.4532***	-0.2879**	-0.1790	-0.3423***
(ref.: *Tertiary*)	(-5.7620)	(0.3987)	(-2.0507)	(-3.2837)	(-2.3100)	(-1.6098)	(-1.3810)	(-2.3892)	(-6.7679)	(-2.0679)	(-1.2555)	(-3.6284)
Income: *Poorest*	-0.9311***	-0.3661**	-0.3009**	0.0102	-0.3516***	-0.0193	-0.0325	0.0046	-0.5545***	-0.1108	-0.3572**	-0.5708***
Q1 (ref.: *Richest Q5)*	(-8.0852)	(-2.4534)	(-2.4331)	(0.0947)	(-4.1416)	(-0.1919)	(-0.2944)	(0.0360)	(-5.9346)	(-0.8735)	(-2.5547)	(-5.1714)
Income: *Middle (Q2+Q3+Q4)*	-0.4906***	-0.0838	-0.1696*	-0.1160	-0.0898*	-0.0025	-0.0768	-0.0994	-0.2386***	-0.1569	-0.2410**	-0.3011***
(ref.: *Richest Q5)*	(-6.1239)	(-0.7869)	(-1.7139)	(-1.3034)	(-1.6679)	(-0.0300)	(-0.8386)	(-0.9327)	(-4.2982)	(-1.5691)	(-2.3183)	(-3.6860)
Job status: *Self-employed*		0.4959***	0.2810***	0.4492**		0.7281***	0.4037***	0.2164		0.2128*	0.1171	0.2927
(ref.: *Unemployed*)		(4.0341)	(2.6669)	(2.5719)		(8.5142)	(4.0519)	(1.1070)		(1.6506)	(0.8613)	(1.4739)
Job status: *Employee*		0.1261	0.2183*	0.4306***		0.0104	0.0977	0.2852***		-0.1005	0.1576	0.2132**
(ref.: *Unemployed*)		(1.0197)	(1.8855)	(4.8559)		(0.1203)	(0.9012)	(2.7376)		(-0.8242)	(1.1944)	(2.4153)
Endogenous factors		0.0762	-0.3558**	0.0077	-0.7112***	-0.4282**	0.1525	-0.1257	-0.7093***	-0.1934	-0.1824	0.5280*
(ref.*: No endogenous factors)*		(0.2778)	(-2.1990)	(0.0321)	(-9.6106)	(-2.5292)	(1.2492)	(-0.4564)	(-9.5014)	(-0.8786)	(-1.1402)	(1.7251)
Endo/ factors * Female		-0.2944	0.3915*	0.0463	-0.1854*	0.1055	0.1024	0.2176	-0.2926***	0.2867	0.0457	-0.6205*
		(-0.7376)	(1.7569)	(0.1384)	(-1.7780)	(0.3992)	(0.5448)	(0.5299)	(-2.6816)	(0.8085)	(0.1922)	(-1.6689)
Exo/ factors		0.3040	0.0816	-0.0964	-0.7551***	-0.4948*	0.2651	-3.6705***	-0.4900***	-0.7020	0.2779	0.4541
(ref.*: No exo/ factors)*		(0.9045)	(0.3542)	(-0.2096)	(-3.3286)	(-1.9030)	(1.3828)	(-12.6435)	(-2.7694)	(-1.6430)	(1.2397)	(0.9766)
Exo/ factors * Female		-4.5378***	0.3483	-3.2795***	-0.2252	0.4329	0.0620	4.0132***	-0.1043	0.7413	0.3498	-0.8634
		(-9.9919)	(1.1125)	(-6.3632)	(-0.6728)	(1.1754)	(0.2101)	(6.2950)	(-0.4337)	(1.3413)	(1.1238)	(-1.3507)
Exo/ & Endogenous factors		-0.2021	0.4006	-0.0086	0.5866**	0.5773**	-0.3997*	3.6847***	-0.1071	0.7036	-0.1479	-0.3714
(ref.*: No exo/ & endo/ factors)*		(-0.5681)	(1.5285)	(-0.0182)	(2.3089)	(2.0862)	(-1.8298)	(11.5169)	(-0.4565)	(1.5840)	(-0.5521)	(-0.7820)
Exo/ & Endo/ factors * Female		4.5900***	-0.6775*	3.5211***	0.0554	-0.2213	-0.1660	-3.8030***	0.2544	-0.6991	-0.1938	0.7918
		(9.4121)	(-1.8427)	(6.5719)	(0.1440)	(-0.5632)	(-0.4913)	(-5.7684)	(0.7588)	(-1.2019)	(-0.5061)	(1.2121)
Informal loan: (ref.:	-0.0337	0.2306**	0.0974	0.0430	-0.2212***	0.4437***	0.1166	0.3342***	-0.1458**	0.1886*	0.0340	0.2614***
No informal loan)	(-0.4119)	(2.2347)	(1.1652)	(0.5862)	(-3.8888)	(6.2101)	(1.5850)	(4.0267)	(-2.4552)	(1.8979)	(0.3385)	(3.8889)
Country: *Algeria*	0.0623	-0.2480	0.2851*	-0.1232	0.2993***	0.1632	0.7228***	0.3741**	1.4031***	0.5909***	-0.1800	
(ref.: Palestine)	(0.6528)	(-1.5381)	(1.7096)	(-0.9267)	(3.8382)	(1.0504)	(5.4225)	(2.1633)	(17.1978)	(3.5814)	(-1.1807)	
Country: *Egypt*	0.2801*	-0.5587***	0.4638***	-0.3993***	-0.0862	0.4871***	-0.2763**	0.3975***	-0.3998***	0.3384**	-0.0138	-0.7342***
(ref.: Palestine)	(1.6449)	(-3.8639)	(3.0579)	(-3.1037)	(-0.9358)	(4.1966)	(-2.4008)	(2.6231)	(-3.6336)	(2.3335)	(-0.0995)	(-6.3765)
***Country**: Jordan*	0.4243***	-1.0194***	0.6442***	0.4559***	0.1309	0.8059***	0.1626	0.4982***	-0.1584*	0.1456	-0.2059	0.2719***

(ref.: Palestine)	(3.9191)	(-4.7679)	(4.3755)	(4.2137)	(1.6364)	(6.4855)	(1.5705)	(3.2350)	(-1.8481)	(0.8856)	(-1.3886)	(2.9381)
***Country**: Lebanon*	1.0070***	-0.2315	-0.1646	-0.4964***	0.0413	0.5861***	-0.2247*	-0.0307	0.1298	0.1256	-0.4327**	0.1292
(ref.: Palestine)	(7.8285)	(-1.5698)	(-0.8644)	(-4.0717)	(0.4989)	(4.5480)	(-1.8227)	(-0.1784)	(1.5564)	(0.7166)	(-2.4042)	(1.1959)
***Country**: Tunisia*	0.8631***	-0.0175	0.1049	0.0365	0.1757**	0.4026***	0.1055	0.6220***	-0.1221	0.4425***	-0.3297**	0.2352**
(ref.: Palestine)	(7.0236)	(-0.1403)	(0.6268)	(0.3119)	(2.1471)	(3.2902)	(0.8550)	(4.1302)	(-1.3337)	(3.0414)	(-1.9830)	(2.4637)
Constant	1.4892***	-1.7066***	-1.6825***	-0.9661***	-0.6619***	-1.3618***	-1.4557***	-1.8527***	-0.4842***	-1.6777***	-1.4944***	-1.3899***
	(10.7779)	(-4.9296)	(-8.5074)	(-3.5744)	(-7.1780)	(-6.1272)	(-8.5031)	(-5.5620)	(-5.0854)	(-6.0651)	(-7.6990)	(-4.2979)
Observations	2,306	3,914	3,502	3,532	5,940	3,913	3,218	3,531	5,917	3,912	3,497	2,722

Note: [a] Endogenous and exogenous *factors* are omitted in model 1a.11. In 2011, no information about *Job status*. In 2021, *Self-employed* only includes farmers and *Country* (Algeria) is omitted because it does not contain any observation on digital services. Robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Source: Authors from Global Findex (2011, 2014, 2017 and 2021).

5. Robustness:

Table 6a and Table 6b report the results of marginal effects when estimating the three models of financial inclusion on the two subsamples of females and males over 2011-2021. The comparison of results, allow us to check the robustness of our hypotheses including *H4.*

Although women have more accounts than men before the pandemic (See Table 4), there is indeed an age gap for females (model 1b in Table 6a): young women hold fewer accounts than mature women regardless of the period. The female age gap declines over time, although it rises slightly during the pandemic (model 1b.21). This result runs counter to that of Sahay et al. (2020), Mabrouk et al. (2023), Berguiga & Adair (2024). According to Table 6b and unlike women (Table 6a), only in 2014 and 2021 do young men hold fewer accounts than mature men. The age gap for females holding an account also translates into the use of traditional services but only before the pandemic: young women use traditional banking services less than mature women. Young men only use less traditional services in 2014 (model 2b.14 in Table 6b) compared to mature men.

Regarding digital services, Age (*Youth*) is positive and significant in 2011, 2014 and 2021 (model 3b.11, 3b.14 and 3b.21 in Table 6a). Young women use more digital services than mature women. It is also the case for young men but only in 2021 (model 3b.21 in Table 6b).

There is an age gap between young and mature people, whatever the gender, but it prevails for females with respect to account holding (whatever the period) and in the use of traditional services (before the pandemic). These results confirm our hypothesis *H2*.

In Table 6a and Table 6b, *Endogenous factors*, are negative in 2011 for traditional and digital services use, whatever the gender, but women self-select more than men. This result partially validates hypothesis *H3a*. It is not significant in 2021 for all aspects of financial inclusion and whatever the gender. There is no difference between women and men in their self-selection behaviour. However, *Endogenous factors* are negative for men in 2014 (model 2.b in Table 6b) with respect to traditional services and in 2017 for account holding: men are prone to self-selection. Hypothesis *H4* is not validated with regards to endogenous factors.

In 2011, *Exogenous factors* reduce the use of traditional services for both females and males, but women seem to be more discriminated than men. Over the period 2014-2021, these factors have a negative impact on women's account holding, whilst they have no impact on men's account holding, which suggests a discrimination against females. This result partially confirms hypothesis *H3b*. Conversely, men may experience discrimination when using traditional products, unlike women, because the *Exogenous factors* variable is negative in 2014 and 2021, whilst it is not significant for women (model 2b.14 and 2b.21 in Table 6a). Hypothesis *H4* is

rejected with respect to exogenous factors.

Exogenous and endogenous factors is positive for account holding in 2014 and 2021 for females and not significant for males. Hypothesis *H3c* is rejected. Regarding traditional use, these factors indicate the same sign for men and women in 2011 and 2017 (model 2b.11 and 2b.17): Both self-selection and discrimination behaviours are not distinct according to gender. Hypothesis *H4* is rejected with respect to exogenous and endogenous factors.

Table 6a. Estimation of the financial inclusion models on the "females" sub-sample (marginal effects).

Sample	**Account holding (model 1b)**				**Use of traditional services (model 2b)**				**Use of digital services (model 3b)**			
Year	**2011**	**2014**	**2017**	**2021**	**2011**	**2014**	**2017**	**2021**	**2011**	**2014**	**2017**	**2021**
Model	**(1b.11)**	**(1b.14)**	**(1b.17)**	**(1b.21)**	**(2b.11)**	**(2b.14)**	**(2b.17)**	**(2b.21)**	**(3b.11)**	**(3b.14)**	**(3b.17)**	**(3b.21)**
Age: *Youths (15-34)*	-0.1372***	-0.0113	-0.0348***	-0.0388***	-0.0340***	-0.0653***	-0.0318*	-0.0092	0.0229*	0.0180*	0.0040	0.0844***
(ref.: *Mature ≥ 35)*	(-7.5911)	(-1.1493)	(-2.6544)	(-3.6941)	(-2.5855)	(-4.5476)	(-1.9175)	(-1.0737)	(1.8260)	(1.6841)	(0.3875)	(4.8169)
Education: *Primary*	-0.1281***	-0.0067	-0.0261	-0.0490***	-0.0148	-0.0072	0.0171	-0.0104	-0.0951***	-0.0342*	-0.0347*	-0.1949***
(ref.: *Tertiary*)	(-3.7489)	(-0.3408)	(-1.1676)	(-3.1399)	(-0.7053)	(-0.2332)	(0.5168)	(-0.7329)	(-4.8418)	(-1.7248)	(-1.8271)	(-6.3440)
Education: *Secondary*	-0.1119***	-0.0002	-0.0430**	-0.0417***	-0.0311*	0.0097	0.0125	-0.0144	-0.0652***	-0.0154	-0.0193	-0.0675***
(ref.: *Tertiary*)	(-3.8235)	(-0.0095)	(-2.0049)	(-3.2278)	(-1.7572)	(0.3345)	(0.4080)	(-1.1404)	(-4.1141)	(-0.8721)	(-1.1911)	(-3.0757)
Income: *Poorest Q1*	-0.1669***	-0.0245*	-0.0548***	0.0146	-0.0569**	0.0053	0.0058	0.0092	-0.1357***	0.0064	-0.0257	-0.1229***
(ref.: *Richest Q5)*	(-5.5577)	(-1.7332)	(-2.6850)	(0.9465)	(-2.3531)	(0.2429)	(0.2422)	(0.7022)	(-5.5110)	(0.4483)	(-1.5717)	(-4.0300)
Income: *Middle(Q2+Q3+Q4)*	-0.0896***	-0.0111	-0.0179	0.0036	-0.0080	0.0069	-0.0038	0.0047	-0.0560***	-0.0045	-0.0094	-0.0373*
(ref.: *Richest Q5)*	(-4.4639)	(-1.1013)	(-1.1645)	(0.2967)	(-0.5492)	(0.3906)	(-0.1851)	(0.4286)	(-4.3041)	(-0.3921)	(-0.7617)	(-1.7500)
Job status: *Self-employed*		0.0244**	0.0387**	0.0482**		0.1094***	0.0517***	0.0162		0.0046	-0.0002	0.0334
(ref.: *Unemployed*)		(2.1739)	(2.4805)	(1.9826)		(6.7551)	(2.6740)	(0.8606)		(0.3158)	(-0.0164)	(0.6707)
Job status: *Employee*		0.0106	0.0098	0.0725***		0.0154	-0.0157	0.0166		-0.0114	-0.0074	-0.0132
(ref.: *Unemployed*)		(0.8780)	(0.6285)	(4.8615)		(0.8510)	(-0.8615)	(1.1715)		(-0.8186)	(-0.5912)	(-0.4069)
Endogenous factors		-0.0142	0.0078	0.0063	-0.1824***	-0.0463	0.0374*	0.0065	-0.1834***	0.0101	-0.0112	-0.0049
(ref.*: No endogenous factors)*		(-0.8578)	(0.4293)	(0.2842)	(-11.1918)	(-1.6119)	(1.6984)	(0.2980)	(-11.8620)	(0.4672)	(-0.7396)	(-0.1189)
Exogenous factors		-0.2454***	0.0497**	-0.3087***	-0.2053***	-0.0114	0.0503	0.0223	-0.0929***	0.0045	0.0542***	-0.0796
(ref.*: No exogenous factors)*		(-5.9230)	(2.0320)	(-8.7574)	(-4.0842)	(-0.3125)	(1.5233)	(0.5495)	(-3.0317)	(0.1627)	(2.9319)	(-0.9449)
Exogenous & Endogenous factors		0.2506***	-0.0271	0.3233***	0.1351**	0.0519	-0.0838**	-0.0065	0.0153	-0.0022	-0.0237	0.0839
(ref.*: No exo/endo factors*		(5.8757)	(-0.9434)	(8.6296)	(2.2926)	(1.3219)	(-2.1496)	(-0.1590)	(0.3533)	(-0.0734)	(-1.0817)	(0.9703)
Informal loan: (ref.:	0.0391*	0.0147	0.0049	0.0069	-0.0436***	0.0532***	-0.0055	0.0375***	-0.0079	0.0115	-0.0028	0.0349**
No informal loan)	(1.7499)	(1.4022)	(0.3632)	(0.7015)	(-2.7954)	(3.5271)	(-0.3311)	(4.3309)	(-0.5509)	(0.9710)	(-0.2569)	(2.0056)
Country: *Algeria*	0.0017	-0.0229	0.0147	-0.0240	0.0631***	0.0108	0.0683**	0.0046	0.2182***	0.0608***	-0.0161	
(ref.: *Palestine*)	(0.0640)	(-1.3770)	(0.5367)	(-1.3467)	(2.8890)	(0.2850)	(2.1105)	(0.2889)	(11.4493)	(3.0074)	(-0.8767)	
Country: *Egypt*	0.0165	-0.0278**	0.0402*	-0.0312*	-0.0298	0.1025***	-0.0437*	0.0081	-0.1015***	0.0345**	0.0023	-0.1744***
(ref.: *Palestine*)	(0.3794)	(-2.2528)	(1.7307)	(-1.7729)	(-1.1541)	(3.9712)	(-1.9050)	(0.5606)	(-3.7324)	(1.9890)	(0.1527)	(-5.3274)
***Country**: Jordan*	0.0373		0.0749***	0.0317**	0.0160	0.1278***	-0.0142	0.0162	-0.0477**	0.0160	0.0011	0.0210
(ref.: *Palestine*)	(1.3689)		(2.9993)	(2.2782)	(0.7253)	(4.4798)	(-0.5379)	(1.1973)	(-2.3258)	(0.8090)	(0.0636)	(0.9366)
Country: *Lebanon*	0.1469***	-0.0129	-0.0077	-0.0424***	-0.0170	0.0897***	-0.0482*	-0.0112	0.0425**	0.0184	-0.0537**	0.0609**
(ref.: *Palestine*)	(4.2376)	(-0.9079)	(-0.2677)	(-2.7184)	(-0.7217)	(2.9877)	(-1.7593)	(-0.7396)	(2.1329)	(0.8676)	(-2.1391)	(2.2455)
Country: *Tunisia*	0.1241***	-0.0138	-0.0099	-0.0065	0.0340	0.0781***	0.0021	0.0386***	-0.0651***	0.0343*	-0.0552***	0.0428*
(ref.: *Palestine*)	(3.8979)	(-1.1712)	(-0.3612)	(-0.3942)	(1.4832)	(2.9272)	(0.0742)	(2.8623)	(-2.9146)	(1.9352)	(-2.6408)	(1.7071)
Observations	1,392	1,353	1,357	1,984	2,898	1,620	1,243	1,983	2,887	1,621	1,353	1,489

Note: Endogenous and exogenous factors are omitted in model 1b.11. No information about *Job status* in 2011. *Self-employed* only includes farmers in 2021 and *Country* (Algeria) is omitted because it does not contain any observation on digital services. Robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors from Global Findex (2011, 2014, 2017 and 2021).

Table 6b. Estimation of the financial inclusion models on the "males" sub-sample (marginal effects).

Sample	**Account holding (model 1b)**				**Use of traditional services (model 2b)**				**Use of digital services (model 3b)**			
Year	**2011**	**2014**	**2017**	**2021**	**2011**	**2014**	**2017**	**2021**	**2011**	**2014**	**2017**	**2021**
Model	**(1b.11)**	**(1b.14)**	**(1b.17)**	**(1b.21)**	**(2b.11)**	**(2b.14)**	**(2b.17)**	**(2b.21)**	**(3b.11)**	**(3b.14)**	**(3b.17)**	**(3b.21)**
Age: *Youths (15-34)*	-0.0232	-0.0119	-0.0137*	-0.0340**	0.0002	-0.0309***	-0.0142	-0.0125	0.0119	-0.0033	0.0113	0.0466**
(ref.: *Mature ≥ 35)*	(-0.8791)	(-1.6322)	(-1.6674)	(-2.4896)	(0.0143)	(-2.5833)	(-1.2025)	(-1.2724)	(1.1739)	(-0.4889)	(1.4988)	(2.4650)
Education: *Primary*	-0.2337***	-0.0043	-0.0024	-0.0119	-0.0132	-0.0461**	-0.0256	-0.0369**	-0.1027***	-0.0435***	-0.0082	-0.1063***
(ref.: *Tertiary*)	(-4.9813)	(-0.2612)	(-0.1536)	(-0.4690)	(-0.7241)	(-2.1482)	(-1.2214)	(-2.2025)	(-6.4326)	(-3.6842)	(-0.7055)	(-3.2040)
Education: *Secondary*	-0.1825***	0.0087	-0.0117	-0.0146	-0.0269*	-0.0413**	-0.0367*	-0.0367**	-0.0721***	-0.0203**	-0.0048	-0.0540*
(ref.: *Tertiary*)	(-4.3620)	(0.5629)	(-0.8055)	(-0.5926)	(-1.6894)	(-2.1542)	(-1.8445)	(-2.3631)	(-5.2727)	(-2.1466)	(-0.4888)	(-1.7854)
Income: *Poorest*	-0.2869***	-0.0204*	-0.0114	-0.0167	-0.0719***	-0.0104	-0.0109	-0.0088	-0.0421**	-0.0135	-0.0192*	-0.1084***
Q1 (ref.: *Richest Q5)*	(-6.8065)	(-1.6807)	(-0.9718)	(-0.8699)	(-3.7975)	(-0.6258)	(-0.5843)	(-0.6514)	(-2.5570)	(-1.4274)	(-1.9435)	(-3.9233)
Income: *Middle(Q2+Q3+Q4)*	-0.1502***	-0.0008	-0.0129	-0.0332**	-0.0265**	-0.0070	-0.0131	-0.0195*	-0.0157	-0.0123*	-0.0168**	-0.0884***
(ref.: *Richest Q5)*	(-4.9366)	(-0.0979)	(-1.3224)	(-1.9894)	(-2.1286)	(-0.5215)	(-0.8773)	(-1.6588)	(-1.3849)	(-1.7007)	(-2.3281)	(-3.9765)
Job status: *Self-employed*		0.0338***	0.0067	0.0546*		0.0822***	0.0511***	0.0155		0.0213**	0.0106	0.0631
(ref.: *Unemployed*)		(3.2099)	(0.5384)	(1.6654)		(5.1216)	(2.7601)	(0.6710)		(2.2474)	(1.0197)	(1.2016)
Job status: *Employee*		0.0058	0.0407***	0.0395***		-0.0075	0.0635***	0.0249**		-0.0031	0.0241**	0.0500***
(ref.: *Unemployed*)		(0.6144)	(3.0639)	(2.8020)		(-0.5274)	(3.0029)	(2.5232)		(-0.3496)	(2.3937)	(2.6130)
Endogenous factors		0.0058	-0.0269**	0.0004	-0.1084***	-0.0540**	0.0182	-0.0090	-0.0913***	-0.0098	-0.0063	0.0730
(ref.*: No endogenous factors)*		(0.3428)	(-2.2425)	(0.0117)	(-9.1179)	(-2.5646)	(1.1488)	(-0.4306)	(-8.7108)	(-0.8288)	(-0.7563)	(1.2872)
Exogenous factors		0.0168	0.0051	-0.0256	-0.1073***	-0.0618*	0.0311	-0.2848***	-0.0728***	-0.0378	0.0131	0.0556
(ref.*: No exogenous factors)*		(0.8177)	(0.3089)	(-0.4195)	(-3.0252)	(-1.9085)	(1.3051)	(-7.0030)	(-3.1554)	(-1.6425)	(1.1347)	(0.6560)
Exogenous & Endogenous factors		-0.0091	0.0270	0.0092	0.0810**	0.0742**	-0.0484*	0.2870***	-0.0067	0.0374	-0.0117	-0.0359
(ref.*: No exogenous & exogenous)*		(-0.4187)	(1.4655)	(0.1474)	(2.0546)	(2.1490)	(-1.7880)	(6.7357)	(-0.2184)	(1.5731)	(-0.8491)	(-0.4149)
Informal loan: (ref.:	-0.0878***	0.0152*	0.0108	-0.0004	-0.0375***	0.0606***	0.0304**	0.0097	-0.0331***	0.0123*	0.0057	0.0686***
No informal loan)	(-2.8248)	(1.9054)	(1.3676)	(-0.0310)	(-2.8499)	(5.0671)	(2.5199)	(1.0223)	(-2.7537)	(1.7264)	(0.7978)	(3.6858)
Country: *Algeria*	0.0194	-0.0104	0.0242	-0.0014	0.0433**	0.0239	0.1090***	0.0783***	0.2126***	0.0241**	-0.0093	
(ref.: *Palestine*)	(0.5349)	(-0.8615)	(1.5583)	(-0.0538)	(2.4463)	(1.0157)	(5.1767)	(2.6525)	(14.7059)	(2.0226)	(-0.8979)	
Country: *Egypt*	0.1361**	-0.0426***	0.0403***	-0.0515**	-0.0038	0.0347*	-0.0307	0.0750***	-0.0224	0.0149	-0.0030	-0.0952***
(ref.: *Palestine*)	(2.0706)	(-3.1166)	(2.6488)	(-2.1690)	(-0.1810)	(1.8055)	(-1.4671)	(2.7039)	(-1.0617)	(1.4222)	(-0.2899)	(-3.1220)
Country: *Jordan*	0.1916***	-0.0505***	0.0454***	0.0797***	0.0304*	0.0957***	0.0364**	0.0877***	-0.0002	0.0052	-0.0212*	0.0917***
(ref.: *Palestine*)	(4.4854)	(-3.3756)	(3.2194)	(3.6862)	(1.6563)	(4.8417)	(2.2584)	(3.0699)	(-0.0141)	(0.4496)	(-1.9431)	(3.3331)
Country*: Lebanon*	0.3431***	-0.0136	-0.0297	-0.0693***	0.0293	0.0700***	-0.0260	0.0291	-0.0024	0.0011	-0.0160	0.0064
(ref.: *Palestine*)	(8.0524)	(-1.1931)	(-1.3454)	(-2.8116)	(1.5899)	(3.5031)	(-1.2377)	(0.9798)	(-0.1332)	(0.0920)	(-1.4298)	(0.2096)
Country: *Tunisia*	0.2883***	0.0074	0.0153	0.0183	0.0303	0.0396**	0.0181	0.0782***	0.0239	0.0253**	-0.0049	0.0577**
(ref.: *Palestine*)	(6.7537)	(0.7476)	(0.9669)	(0.8258)	(1.6264)	(1.9706)	(0.8897)	(2.8096)	(1.3546)	(2.3607)	(-0.4608)	(2.1666)
Observations	914	2,293	2,145	1,548	3,042	2,293	1,975	1,548	3,030	2,291	2,144	1,233

Note: Endogenous and exogenous factors are omitted in model 1b.11. No information about *Job status* in 2011. *Self-employed* only includes farmers in 2021 and *Country* (Algeria) is omitted because it does not contain any observation on Fintech use. Robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Source: Authors from Global Findex (2011, 2014, 2017 and 2021).

6. Conclusion and Policy Implications.

Probit regression models (with interaction variables) on four pooled samples in six MENA countries over a decade tested four hypotheses on the gender gap and the age gap, as for financial inclusion (access and uses) and the factors of exclusion before and during the pandemic according to gender.

Our results on the full sample show that the gender gap persists with respect to account ownership and deteriorates over time, especially during the pandemic. There is also an age gap (young vs. mature) prevailing for females over males, with regards to account ownership and use of traditional services. The financial inclusion of young people, more for women than men, has improved with the use of digital services during the pandemic.

The lack of financial inclusion of women can be due to exogenous factors on the supply side (discrimination by financial institutions) and endogenous factors on the demand side (self-selection), and the latter prevails, due to the absence of need for financial services and the lack of money. Men are also prone to self-selection, though to a lesser extent than women. There is discrimination against females over 2014-2021 with respect to account holding, but males can also be discriminated against regarding their use of traditional services, unlike women. Both self-selection and discrimination behaviours are not clearly distinct according to gender. Males are no more financially included than females and *H4* is rejected.

Noteworthy is that the absence of both age gap and gender gap concerning the use of digital services suggests that Fintech is favourable to financial inclusion.

Financial inclusion is conducive to growth (OECD 2022). Although financial inclusion improved for youths and women before the pandemic, gaps remain - especially for less educated youths, who are out of the workforce. Exogenous and endogenous factors of financial exclusion must be better investigated, in order to lift the barriers. Supply-side disaggregated data (Alonso & Dezso 2024) should focus on average banking conditions, which discriminates according to age and gender. Policies should promote robust legal frameworks, innovative technologies and synchronised efforts to achieve an inclusive financial system (Gibson et al 2024). Making financial inclusion more wide-ranging to target underserved categories is also the role of microfinance. Tailored digital or traditional financial services (WEF 2024) should adjust to youth categories and gender, including a full payment system, enhanced banking infrastructure, appropriate regulations and efficient user protection safeguards. However, financial inclusion is no panacea and cannot substitute for inclusive labour market policies, in as much as income is the main condition fostering financial inclusion.

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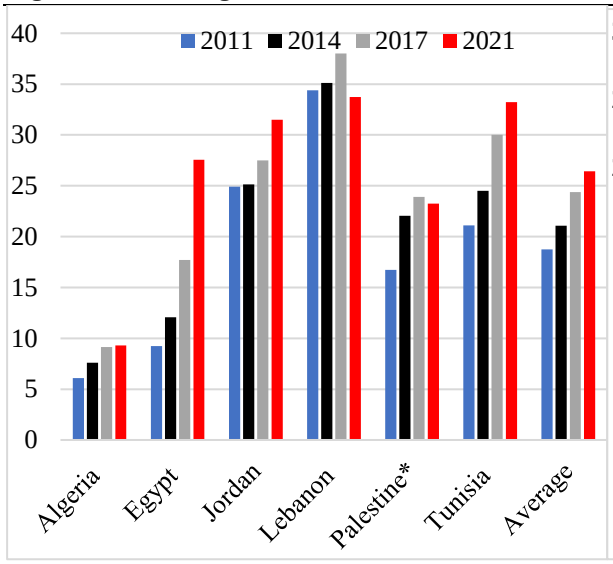
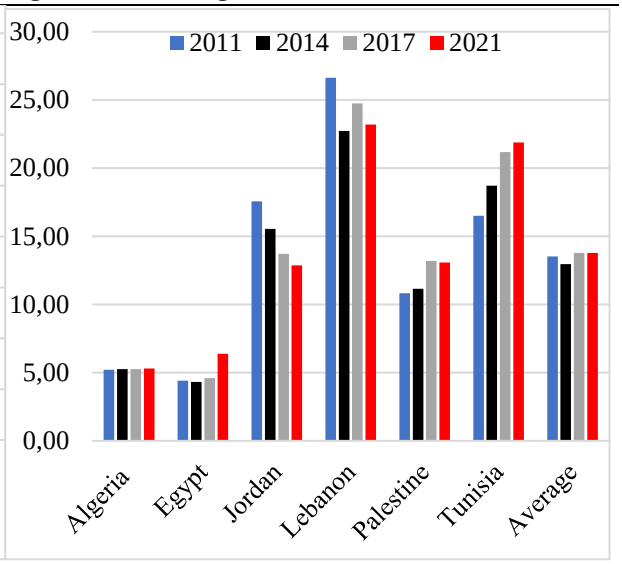
Appendix.

Figure A1. Banking infrastructure: ATMs



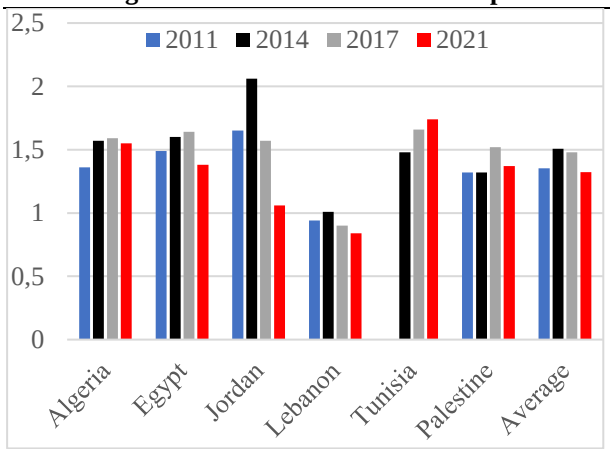
Note: Automated Teller Machines per 100,000 adults.
* West Bank and Gaza.

Figure A2. Banking infrastructure: Bank branches



Commercial branches per 100,000 adults

Figure A3. Mobile cellular subscriptions



Note: * % population aged 15+. ** West Bank and Gaza.
Source: Authors from World Development Indicators (World Bank WDI)

Table A1. Dictionary of variables.

	Name	Type	Definition	Units
Financial inclusion measures	*Account holding*	Discrete	*Has an account at a formal financial institution, a mobile money account or both =1 No=0*	Dummy (0,1)
	Traditional services at financial institutior	Discrete	*Yes, if Saving or Borrowings or both =1 No=0*	Dummy (0,1)
	Digital services by financial institution and/or Mobile money service providers		*Withdrawals, check account, pay bill send or receive money, wages, public or private transfers, Savings and loans via mobile money account and other digital services=1 No=0*	Dummy (0,1)
External funding sources	*Informal loan*	Discrete	*Borrowed from family or friends, an informal savings club or privat lenders =1 No=0*	Dummy (0,1)
Household characteristics	*Gender*	Discrete	*Female = 1* *Male = 2*	Binary (1, 2)
	Education level	Discrete	*Primary or less= 1* *Secondary =2* *Tertiary or higher= 3*	Ordinal (1, 2, 3)
	Income	Discrete	*Poorest 1st quintile = 1* *Middle (2nd +3rd+4th quintiles) =2* *Richest 5th quintile = 3*	Ordinal (1, 2,3)
	Job status	Discrete	*Employee*=1 *Unemployed = 2* *Self-employed = 3*	Ordinal (1,2,3)
	Age	Discrete	*Youth 15<Age<35 = 1* *Mature: Age >=35 = 0*	Dummy (0,1)
Exclusion factors	*Exogenous factors*	Discrete	*Yes, if Exogenous=1 (dominated by lack of money) No=0*	Dummy (0,1)
	Endogenous factors	Discrete	*Yes, if Endogenous =1 (dominated by financi costs too expensive in 2017and 2021, and cannot open an account (in 2014) No=0*	Dummy (0,1)
	Exogenous and endogenous factors	Discrete	*Yes, if Exogenous and endogenous =1 No=0*	Dummy (0,1)
Control variables	*Country Dummies*	Discrete	*Egypt=1* *Tunisia=2* *Jordan=3* *Lebanon=4* *Palestine =5* *Algeria=6*	Ordinal (1, 2, 3, 4, 5,6)

Source: Authors from the Global Findex database (2011, 2014, 2017 and 2021).