

# The Role of ICT in Financial Inclusion for the Elderly in Thailand

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## **Abstract**

Thailand formally became an aging society in 2005 and will turn into an aged society in 2022 (NSO, 2016). This middle income Southeast Asian economy will become old before being rich. It also means a big challenge for the financial security which plays an essential role in sustaining people in their later life. Although Thailand has achieved considerable progress in financial inclusion as compared to other ASEAN countries, there are still some gaps to be filled and some groups to be concerned.

This study particularly looks at the group of elder people who have limited access to financial services and low level of financial inclusivity. The individual-level data from the World Bank Findex survey in 2017 in Thailand shows that on average, over 80 percent of respondents have an account. Among bank-account holders, however, more than half are 55 years old or above and more than a third (36.7 percent) holders are officially defined as the elder in Thailand. Moreover, the level of digital financial inclusion is still low in general, and owners of mobile phones do not always use the devices for financial transactions with mobile money accounts.

We built a measure of financial inclusion (FI) scores consisting of five different measures. The FI scores, with values ranged from 0 to 5, show positive associations with labor force participation, income level and education level of the respondents but are negatively related to their age or age groups. The older the people, the lower their FI scores are. Our econometric analysis confirms such negative effects and found a strong correlation between mobile phones and mobile money accounts which can increase the normalized FI scores by 0.48- 0.49 percentage points.

The results are further verified by an analysis on the ICT use in Thai households in 2016. The limited access to the internet and low utilization of ICT devices of the elderly explains well their use of internet banking or mobile banking transactions after controlling for socio-economic and demographic factors of their households. Once being an Internet user, the elderly is very much likely to use mobile/internet banking services, even more than younger groups. As a result, beside the importance of financial literacy, we emphasize the role of Internet access and digital technology to promote financial inclusion among the old age. Some public private partnerships to coordinate policy makers and ICT service providers are required to enhance the future financial environment for old age risk management.

*Keywords: Aging society, elderly, financial inclusion, internet banking, ICT, Thailand*

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### **1. INTRODUCTION**

The important role of financial inclusion in economic development has received consensus in development theory (Aghion & Bolton, 1997; Galor & Zeira, 1993) and it is also recognized as an important vehicle to promote inclusive growth and reduce poverty (Loukoianova et al., 2018). Subsequent research provides useful insights on how financial inclusion can influence economic growth and development, by raising aggregate savings for long-run economic growth (Aghion, Boustan, Hoxby & Vandenbussche, 2009), by diversifying loan portfolios of financial institutions through increasing investible surplus and improving the penetration of credit (Bayoumi & Melander, 2008) and also by facilitating participation by different segments of the economy in the formal financial system (Cecchetti & Kharroubi, 2012). Another important finding on the cause of development leading to an all-inclusive financial system. (Sarma & Pais, 2011) that levels of human development and financial inclusion in a country move closely with each other, along with other socio-economic and infrastructure related factors such as literacy, urbanisation and physical infrastructure for connectivity and information.

Financial inclusion is the process of ensuring that individuals especially poor people have access to basic financial services in the formal financial sector (Allen et al, 2016; Ozili, 2018). It has received as much attention from policy makers as in academic literature. Financial inclusion has also been identified as an enabler for 7 of the 17 Sustainable Development Goals (SDGs) to leave no one behind. Therefore, it is considered a major strategy used to achieve SDGs (Sahay et al, 2015; Demircuc-Kunt et al, 2017) and helps to improve the level of social inclusion in many societies (Bold, et al, 2012) beside poverty reduction and other socio-economic benefits (Chibba, 2009, Neaime

and Gaysset, 2018; Sarma and Pais, 2011; Kpodar and Andrianaivo, 2011). In Asia and the Pacific, where poverty and income inequality remain a stubborn challenge, financial inclusion is often considered as a critical element that makes growth inclusive (Park & Mercado, 2015). Therefore, in many countries, policy makers continue to commit significant resources to increase the level of financial inclusion to reduce financial exclusion and emphasize on the role of financial innovation and technology in promoting financial inclusion (Donovan, 2012; Ozili, 2019; Gabor and Brooks, 2017; Ozili, 2018).

Much progress has been made in financial inclusion in many parts of the world, including Asia and but gaps remain large in in low- and middle-income countries where nearly half of the adult population still does not have a bank account, and only less than 10 percent of the population borrowed from formal financial institutions in 2016. Some particularly disadvantaged groups often face even greater challenges in accessing financial services such as women and young adults (age 15–24). However, the elder group of the population is sometimes ignored or underestimated on their needs for financial inclusion. Older people may be particularly vulnerable to the economic fluctuations like recession, yet they may be disadvantaged further by poor understanding of the financial impact on their well-being from social care agencies Lee-Ann (2012).

Thailand has been ranked on the 5<sup>th</sup> among the top quartile in financial inclusion among countries in Asia Pacific along with Japan, South Korea and Singapore and is considered in the frontier benchmark of the region (Loukoianova et al., 2018). The Global Findex report in 2017 reports the rates of access to formal financial services at 82 percent while the central bank of Thailand calculated an access level of 97 percent in 2016 through a household financial access survey (BOT, 2017). The World Bank (2019) also affirms a widespread financial access in Thailand and highlights a very close gender parity in financial access among Thai men (84 percent) and women (80 percent) who have an account at a financial institution according to the Global Findex (Demirguc-Kunt, Klapper, Singer, Ansar, & Hess, 2018). The key concern, however, according to the World Bank, is the not very good performance on measures of the utilization and quality of financial services for which hope can be put on fintech innovations that could play an important role in filling these gaps. As in the Asia and the Pacific region, the use of financial technology (Fintech) exhibits large gaps between the rich and poor, and between rural and urban areas (Park & Mercado, 2015).

Along with the economic development process, Thailand also formally became an aging society in 2005 with the proportion of population with age from 60 at 10.3 percent. The latest survey of the National Statistical Office (NSO) in 2017 reported the amount of 11,312,447 people with the age over 60 in Thailand, equivalent to 16.7 percent of the population. According to the Active Aging Index of Thailand, Thai society will turn into an aged society in 2022 with 20 percent of its population aged over 60 and in 2042 it is projected to be a super-aged society with 20 percent of its population aged over 65.

The challenges that an aging society posed to economies have been documented in many developed countries and also in developing countries. Financial services and aging social security systems play a major role in sustaining people in their later life. However, in many low- and middle-income countries, these systems are far from adequate, and social security will always be one among multiple strategies. The World Bank Group has put forward an ambitious global goal to reach Universal Financial Access (UFA) where everyone can have access to financial services by 2020. Similarly, in Asia and the Pacific, the provisions for both young and old-age populations, e.g., retirement pensions; and stronger rule of law, including enforcement of financial contracts and financial regulatory oversight, will broaden financial inclusion, thereby contributing to poverty reduction and lower income inequality (Park & Mercado, 2015).

Financial inclusion has been an important policy in the financial system in Thailand and the Bank of Thailand conducted surveys on financial access every three years at the household level. The objective of the household survey is to assess and monitor the level of financial access which serve as valuable inputs for the formulation of appropriate financial inclusion policies. The latest survey, undertaken in 2016, covered 10,866 households across Thailand. The survey measured access to eleven key financial services commonly provided by financial institutions. Overall, Thai households had better access to financial services with access level at 97.3% in 2016 compared to 95.8% in 2013. Among these households, 86.3% used financial services while 11.0% chose not to use financial services (voluntarily self-excluded) (BoT, 2017). It is also found that while commercial banks and Specialized Financial Institutions (SFIs) remained primary service

providers of financial services, non-banks such as village funds and electronic payments (e-Payments) providers played increasing roles. It is also found that a slightly higher percentage of households accessing financial services through mobile applications and internet banking reflects an increasing willingness of households to use technology. In addition, data from the elderly survey of the NSO reveals that the ratio of elder persons living alone rather than with family members or caregivers has surged in recent years to 10.8 percent in 2017 from 8.7 percent in 2015 and merely 3.6 percent in 1994. Similarly, there is the higher share of the elder living with spouse than with children which implies that more independence in conduction financial transactions of this group is required.

To the author knowledge, there has not been any study specifically look at the financial inclusion of the older people in Thailand. All of the surveys completed so far are at the household level and therefore make the separation of the elderly financial inclusion impossible. As financial transactions are still essentials in daily lives of the old age, either receiving incomes from different sources or making payments, savings, a thorough study looking at this specific group is important for policy makers and financial sectors to design and implement appropriate measures tailored made for this targeted group.

This study also explores the possibility of using the information and communication technology among the elder group for financial services given a very small share of access to computers, the internet or social media at merely 4 percent (NSO, 2015). The Bank of Thailand governor in 2018 also emphasized the connection between technology disruption, aging society, and growing income inequality as structural challenges to many emerging economies, including Thailand. In his words, *“inclusivity is a prerequisite for long-term sustainable growth. Any policy or action that does not pay attention to inclusivity can threaten long-term growth and stability.... unbanked and underserved people need to have access to financial services, which can help them raise their standards of living. The emergence of FinTech and TechFin firms, along with their diverse platforms, can offer more targeted financial products at lower costs and improve financial access, especially to the underserved people.”* (Bank of Thailand, 2018). There have been several projects such as the launch of Promptpay in 2017 where funds can be transferred to a recipient's preferred bank account in real time and at virtually no cost. By

July 2018m, there had been over 43 million registered user accounts and over 3 million transactions per day, paving the way for many other digital payment features, including cross-bank bill payment and services (BoT, 2018).

Given the importance of financial inclusion for the elderly, this study aims at:

- Examining the level of financial inclusion of different age groups in Thailand
- Identifying the main determinants of financial inclusions among the old age
- Exploring the potentials of digital financial technology such as mobile phone and mobile money/banking to promote financial inclusion for the elderly in Thailand

It is expected that the results of this project can be useful for those who work on the issue of aging, for financial service providers, for policymakers and other government stakeholders. It will highlight the opportunities and challenges related to financial services in older age. At the same time, financial institutions can take those finding to design age-friendly products and services to better serve the old persons. Therefore, some new public-private partnerships might be beneficial in enhancing the future environment for old-age risk management.

The next section summarizes relevant empirical studies on financial inclusion for the old age and the role of digital banking in facilitating financial inclusion. Section 3 describes our data and methods. The results and discussions are combined in section 4 before some conclusion and policy recommendations are drawn.

## 2. RELEVANT EMPIRICAL STUDIES

### 2.1 On the financial inclusion for the elderly

In 2016, approximately 12.4 per cent of the population in the Asia Pacific region was over 60 years old and it is projected to increase to more than a quarter or 1.3 billion people by 2050 according to the report on aging by the United Nations ESCAP in 2017. The ratio is various across the region with some significant ageing populations in countries like Japan and the Republic of Korea, but lower in the Central Asia.

Aging is a product of successful development. Increased life expectancy, better family planning mechanisms, and higher quality of life all contribute to growth in the elder proportion of the population (Park & Mercado, 2015) and there also seems to be a linear relationship (although not causality) between GDP per capita and the level of population ageing. However, some countries in the Southeast Asia, particularly ASEAN countries in the middle-income range have become old before becoming rich (UNDP, 2017). Aging is advancing fast in developing countries, even in countries with large populations of young people. While it took the United Kingdom 80 years to increase the 60-over population from 7 to 20 percent of the total, the same proportional shift will take place in Thailand in just over 30 years, Malaysia 22 years and Vietnam only 19 years. How are those economies ready in providing financial services to a rising elder group?

In the case of Malaysia, given the current situation of the country's social security framework with weaknesses in incomplete benefit coverage, low mandated savings level, and inadequate disbursement options and a lack of an enabling political environment, Holzmann (2014) suggested on Malaysia's old-age financial protection system within the context of the country's broader social security framework with two key options for Malaysia's Employees Provident Fund-the country's central pension pillar. First, it needs to move from a mere retirement savings investment fund to a fully-fledged pension fund that offers some minimum annuities. Second, it also needs to move the benefits toward a Non-Financial Defined Contribution scheme with the fund's resources used as its major reserve fund, so as changing the way old-age income support is provided.

In a more developed aging economies, the issues have been studied with some micro-level solutions in providing financial literacy. Lee-Ann (2012) explored the

importance of financial education for social workers working with individuals and families who are financially vulnerable frequently have little financial knowledge in the UK. The elderly would need information and advice to enable them to develop improved financial literacy. This may be compounded further by increasingly strict eligibility criteria, which restrict access to services, leading to increasing numbers of older people who need to fund their own care. Learners and practitioners need to develop their own financial literacy skills so as to better enable them to support those elderly that they work with. Similarly, in the US where many older households have done little or no planning for retirement, and a substantial population seems to under-save for retirement, Lusardi and Mitchell (2008) devised on planning and financial literacy and showed that women display much lower levels of financial literacy than the older population as a whole. In addition, women who are less financially literate are also less likely to plan for retirement and be successful planners. It is, therefore, of particular concern on the relative position of older women, who are more vulnerable to old-age poverty due to their longer longevity..

At a cross-country level, there is a diversity in policy practice in social inclusion and ageing across different regions of the world. Warburton, Ng, and Shardlow (2013) provide various examples to illustrate the multifaceted nature of the concept of social inclusion in the context of global demographic ageing. Social inclusion incorporate core issues in ageing such as civil engagement, an ageing workforce, age-friendly communities, and civic involvement. There are some particular challenges to implementing social inclusion policies, particularly across some of the East Asian countries, and the impact of global financial crises on work and retirement.

## **2.2 On ICT development and financial inclusion**

An analysis of the first Global Financial Inclusion (Global Findex) Database in 2011 provides a new set of indicators that measure how adults in 148 economies save, borrow, make payments, and manage risk. Demirguc-Kunt and Klapper (2012) show that 50 percent of adults worldwide have an account at a formal financial institution, though account penetration varies widely across regions, income groups and individual characteristics. In addition, 22 percent of adults report having saved at a formal financial

institution in the past 12 months, and 9 percent report having taken out a new loan from a bank, credit union or microfinance institution in the past year. Although half of adults around the world remain unbanked, at least 35 percent of them report barriers to account use that might be addressed by public policy. Among the most commonly reported barriers are high cost, physical distance, and lack of proper documentation, though there are significant differences across regions and individual characteristics. Later Demirgüç-Kunt, Asli & Klapper, Leora et al, 2013) suggested that for the half of all adults around the world who remain unbanked, barriers to account use, such as cost, distance, and documentation requirements, which may shed light on potential market failures and provide guidance to policymakers in shaping financial inclusion policies.

Some successful experiences with financial inclusion reported in developing countries are associated with the use of information and communication technology (ICT)-based branchless banking cost for all members of an economy, favoring mainly low-income groups. Diniz, Birochi, and Pozzebon (2012) demonstrate one of these experiences in Brazil, an ICT-based network responsible for delivering financial services to tens of millions of poor Brazilians in Autazes - a county in the Amazon region not served by banks until 2002. It was concluded that although access to financial resources is a fundamental way to promote local development, such access should be accompanied by other inclusive mechanisms.

The 2017 Global Findex data reflect the continued evolution of financial inclusion and recent progress driven by digital payments, government policies, and a new generation of financial services accessed through mobile phones and the internet (Global Findex, 2018). The power of financial technology to expand access to and use of accounts is demonstrated most persuasively in Sub-Saharan Africa, where 21 percent of adults now have a mobile money account—nearly twice the share in 2014 and easily the highest of any region in the world. While mobile money has been centered in East Africa, the 2017 update reveals that it has spread to West Africa and beyond. financial education to be effective. A more recent study by (Demirguc-Kunt et al., 2018) proved that digital technology is also transforming the payments landscape. Globally, 52 percent of adults

have sent or received digital payments in the past year, up from 42 percent in 2014. Technology giants have moved into the financial sphere, leveraging deep customer knowledge to provide a broad range of financial services. Payments made through their technology platforms are facilitating higher account use in major emerging economies such as China, where 57 percent of account owners are using mobile phones or the internet to make purchases or pay bills—roughly twice the share in 2014.

Similarly, it is found that socio-cultural and psychological factors are crucial in determining whether a person will use mobile money (Amoah, Korle, & Asiamah, 2020) by conducting a cross-sectional design to obtain primary data on 733 households from the GAR of Ghana to determine the drivers of mobile money use. They found that technology savvy cohorts (youthful age cohorts), available services such as phone credit recharge, education and income are among the key determinants of mobile money use in Ghana and there was a statistically significant difference in gender use of mobile money, albeit, marginal. The findings imply that consistent use of mobile money to access social and economic services can go a long way in promoting financial inclusion, financial empowerment and general wellbeing of people.

### **2.3 The case of Thailand**

As for Thailand, the 2014 Global Financial Inclusion Database (Global Findex) conducted by the World Bank to assess the financial access level of 140 countries across the world revealed that 78.1% of Thai households had deposits accounts with financial institutions. This is higher than the 70.5% average level of other countries in the upper middle-income group. Among ASEAN countries Thailand ranked third after Singapore (96.4%) and Malaysia (80.7%) (Global Findex 2015). In addition, the World Bank survey also indicated that there was no gender inequality in accessing to financial services in Thailand. The percentages of females and males having deposits accounts with financial institutions were at 75.4% and 78.1%, respectively.

Another study conducted by FinScope in Thailand in 2013 revealed that 74 percent of the adult population had access to a bank account, with 23 percent using other formal financial services and only 1 percent using informal services. Thus, credit access in

Thailand is considered to be quite inclusive and available. However, there are still improvements that can be made in regards to broadening financial access for the remaining 1%. Thus, financial inclusion and widespread accessibility do not necessarily account for the whole adult population spanning across all levels of incomes (NSO, 2014).

The latest report on the proportion of using ICT among Thai households in 2018 showed that there have been a substantial difference between the urban and rural areas. During 2014 – 2018 the proportion of computer users in municipal area had 47.8% in 2014 and decreased to 35.2% in 2018, while the proportion of computer users in non-municipal area had 30.4% in 2014 and decrease to 22.7% in 2018. At the same time the proportion of Internet users in municipal area had increased from 44.9% in 2014 to 66.1% in 2018 and in non-municipal area had increased from 26.9% in 2014 to 49.3% in 2018. While the proportion of mobile phone users in municipal area was 83.9% in 2014 and increased to 91.5% in 2018 and in non municipal area it was 71.8% in 2014 and increased to 87.9% in 2018 (NSO, 2018). With regards to the Internet using by age group, during 2014-2018 all age groups showed upward trends. In 2018 the youth age group between 15-24 years was the group that used Internet most at 91.4% while and age 50 years and over had the lowest proportion of Internet at 21.2%.

As for the old-age people who are over 60 years of age, the latest survey on the use of internet among the elderly in Thailand in 2014 revealed that only 3.3 percent of the older persons have used internet and three fourth of those people live in provinces with high rate of internet usage, namely Phuket, Chonburi and Bangkok metropolitan with the respective rate of 22.5 percent, 11.4 and 10.9 percent. Meanwhile the three provinces with the lowest internet use in 2014 were Buriram (0.08 percent), Surin (0.13 percent) and Srisaket (0.26 percent) (NSO, 2015). The study also used the binary logistic model to examine the factors affecting internet use by the elderly such as age, gender, marital status, education level, household income and work status as well as the use of computers, tablets or smart phones, the access to internet and the co-living with others using internet.

Population aging has been discussed in Thailand over the decades, and ten years the communication technology of telephone was discussed. (Knodel & Chayovan, 2008) acknowledged a rapid pace in Thailand posing important challenges for the government and society as a whole. On the positive side, the material well-being of older persons in Thailand has been improving. Older Thais live in better-quality houses with far more appliances and amenities compared to a decade or two ago. The recent spread of telephones improves their ability to maintain contact with children and relatives who live elsewhere. Other concerns, given current widespread reliance on children for material support, is that future elderly will have far fewer children to depend on. Hopefully efforts by family and state will complement each other and allow Thailand to adapt constructively to the inevitable ageing of its population.

One may question the importance of financial inclusion as well as the use of ICT among the elderly in Thailand because mutual support among family and communities is one of the typical characteristics of Thai society such that the access of the elderly to those services may not seem to be in an urgent need. For example, the Bureau of Empowerment for Older Persons and academics of educational institutes are responsible for providing knowledge to agencies and networks involved, by organizing meetings in the community to promote an understanding of the concept and operating model of the center. The recognition of Outstanding Older Persons of the Year, selection and awarding Outstanding Families with three generations (young, working and older adults) living together in the same family to encourage community-wide participation, thereby enhancing the sense of self-pride among older persons (Jitapunkul & Wivatvanit, 2008). However, the most recent survey of the old people in Thailand in 2017 show that among over 11.3 million old-age people, 10.8 percent are living alone and over 20 percent of them are living with spouse only. If we make a loose assumption that the spouses of the old age are at a similar age range, it would mean that over 30 percent of the elderly in Thailand are not living with younger generations. Keeping those number in minds, we may need to reconsider the importance of being independent in conducting financial services and the use of technology in their daily life. This study is aimed to fill that gap with the case of Thailand to extend the literature on aging, financial inclusion and technology.

### 3. DATA AND METHODOLOGY

#### 3.1 Data

To serve the research objectives, this study employs two sets of data, namely:

1. The Global Financial index with a selection for Thai data only in 2017 and
2. Thailand's national survey on the use of ICT in Thai households in 2016.

The Global Financial index (Global Findex) is a survey dataset covering almost 150,000 people in more than 160 economies in the world, which has been carried out by Gallup, Inc. (a part of Gallup World Poll) since 2005, 2014 and more recently in 2017. It sampled approximately 1,000 people in each country, using randomly selected, nationally representative samples. The target population is the entire civilian, noninstitutionalized population age 15 and above (Global Findex, various years). Apart from a set of indicators which was collected in 2014 (for example, information on the access to and use of accounts, credit, payments, and savings) the 2017 edition includes more updated indicators on the access to and the use of formal and informal financial services as well as new information on the use of financial technology (fintech), including the use of mobile phones and the internet to conduct financial transactions in the 2017 dataset.

The 2017 Findex allows some calculations of indicators such as:

- share of adults with an account (of which the percentage with financial institution account (formal) or mobile money account)
- digital payment in the past year including made or received digital payment, used an account to pay utility bills, to receive private sector wages or government payments.
  - Use the internet to pay bills or to buy something online
  - Use a mobile phone or the internet to access an account
  - Use a debit or credit card to make a purchase
  - Domestic remittances, saving (at financial institutions, saving clubs) or credit (from financial institutions, used a credit card, borrowed from family or friends)

The methodology applied in with this Findex dataset would include descriptive analysis and econometric analysis methods using financial inclusion measures as dependent variables. The measurement of financial inclusion is illustrated in section 3.2.

### 3.2 Construction of financial inclusion measures

Financial inclusion goes beyond the simple supply-side perspective of services being accessible to encompass involvement from the consumer's side, following OECD/INFE (2016). By this broader definition, a financial inclusion index is based on two components: holdings of financial products and active consumption of financial products. Regarding product holdings, measurement focuses on four financial products: (a) savings or retirement products; (b) payment products such as current account or mobile money (excluding credit cards and other types of accounts that offer payment facilities such as savings accounts); (c) insurance products; and (d) credit products, such as a credit card or mortgages.

The active consumption component of financial inclusion consists of three indicators: (a) whether consumers are aware of available financial products; (b) whether they are making conscious choices among financial products; and (c) whether they have turned to family or friends to help them save money or make ends meet.

**Table 1: Computing Financial Inclusion (FI) indicators**

Indicator	Name of variables used	Meaning	Value
1. Have an account	account	Has an account at the financial institution or non-financial institution	Binary variable, taking value of 1 if any product is held, otherwise 0
2. Saved in the past 12 months	Saved, fin15, fin16, fin17a, fin17c	Savings in any forms or for any purposes	Binary variable, taking value of 1 if any product is held, otherwise 0
3. Borrowed in the past 12 months	Borrowed, fin19, fin20, fin21a, fin21b, fin21c	Any credit products such as credit cards, house/land mortgage, bank loans, etc from any formal or informal institutions	Binary variable, taking value of 1 if any product is held, otherwise 0
4. Possible source of emergency fund from family or friends	fin26, fin28	Possible coming up with emergency fund and the main source of such fund comes from family or friends	Binary variable, taking value of 1 if any product is held, otherwise 0
5. Sent or received domestic remittances in the past 12 months	fin24, fin25	Either sent or received domestic remittances in the past 12 months	Binary variable, taking value of 1 if any product is held, otherwise 0

*Source: Author's own compilation adopted from OECD/INFE (2016)*

In the dataset of the Findex, those indicators are not all available and it is necessary to adapt similar ones. In this study, the score for financial inclusion is calculated from 5 questions with answers as dummy variables (value 0 or 1) as shown in table 1 above. Therefore, the value of FI scores ranges from 0 to 5 with equal weights between indicators. Details of the calculation are as follows but the measure from OECD/INFE is included in Appendix Table A1 for reference or comparison.

### 3.3 Empirical model for econometric analysis

We apply a multivariate analysis in this study with the ordinary least-squares method being applied to different models, both basic and extended. Firstly, by adopting the process from Morgan and Trinh (2019), we normalize/standardize the FI score with value range from 0-5 points, into z-score using the following formula:

$$FI\ z - score = \frac{FI\ score - mean(FI\ score)}{Std.\ Dev\ (FI\ score)}$$

In the econometric model with FI z-scores as a dependent variable, we estimate basic models and extended models. In the basic models, control variables include gender, education level, income level, labor force participations, and age with different measurements (level and categorial dummies). In the extended models, we add two variables representing the utilization of ICT of the users into the basic model such as owner of mobiles phones and whether the respondents have a mobile money account.

Basic models:

$$FI\ z - score_i = \beta_1 + \beta_2 Gender_i + \beta_3 Educ_i + \beta_4 Income_i + \beta_5 LaborForce_i + \beta_6 Age_i + \varepsilon_i$$

Extended models:

$$FI\ z - score_i = \beta_1 + \beta_2 Gender_i + \beta_3 Educ_i + \beta_4 Income_i + \beta_5 LaborForce_i + \beta_6 Age_i + \beta_7 Mobilephone_i + \beta_8 MobileMoneyAccount_i + \varepsilon_i$$

### 3.4 Supplementary analysis with household survey data on the use of ICT

Finally, to verify the role of ICT on financial inclusion, we take a further step by analysis the individual-level survey of ICT uses in Thai households conducted by the NSO in 2016 (NSO, 2017). This is national-representative survey conducted in Thailand every two years for households. The available dataset in 2016 can help to shed lights on

the analytical results obtained from the Findex data. To make it compatible with the Findex data, we limit the sample to only respondents aged 15 years and over. In particular, we will focus on the elderly aged 55 years old or above and explore their use of internet banking or mobile banking together with their use of ICT devices, access to the Internet with an aim to provide insightful policy suggestions for this elder group.

#### 4. RESULT DISCUSSION

##### 4.1 Descriptive analysis on financial inclusion for the elderly in Thailand

We use the sample of 1,000 respondents from the Findex survey 2017 in Thailand and found a large proportion of people having account and almost exactly having it at the financial institutions 812 versus 809 respondents, so that we can basically define the two as one. However, among those bank-account holders, there are only 57 people, equivalent to 7%, owning a mobile money account. Meanwhile there are 3 individuals who has mobile money account elsewhere other than financial institutions.

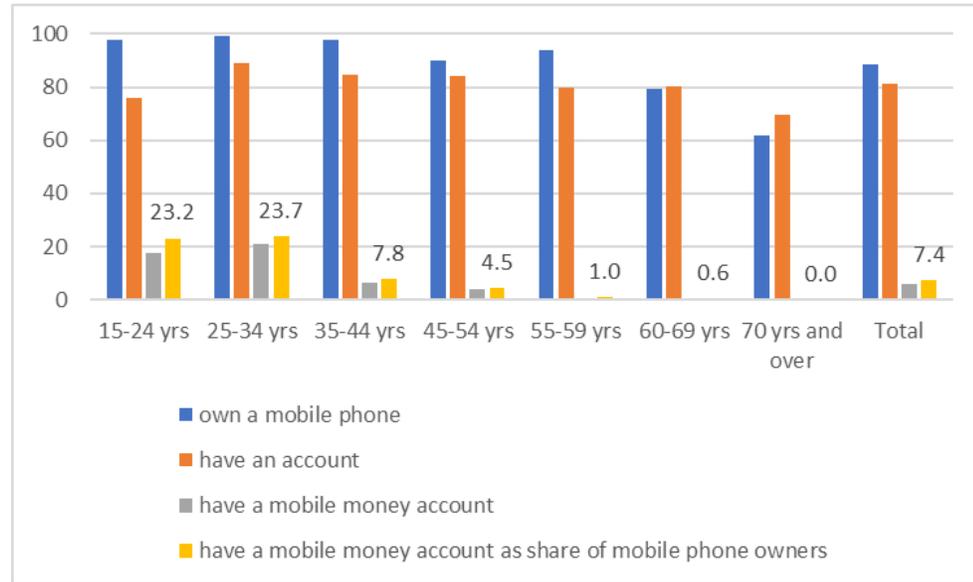
Among 188 respondents who do not have an account, more than half (50.5%) are the elderly 55 years or above. The disaggregation by age group also shows that more than a third (36.7%) of non-account holders are 60 years or over.

The ratio is also disaggregated by age group, and it is very clear that younger people seems to possess mobile money account than the old. Highest ratio of over 23% belong to the two youngest groups aged 15-34 years while the middle-aged groups (35-44 and 45-54 years old) have only 7.8% and 4.5% respectively. More elder account holders age from 55 years and above clearly show an insignificant number of mobile money account.

Ironically, 88.5% of the respondents own a mobile phone and even 84% of the account holders is also a mobile phone owner. Unfortunately, the Findex survey did not specify whether the mobile phone was also a smart phone, we assume at the time of the survey in 2017, a majority of mobile phone has been smart allowing users to conduct financial transactions. In other words, the two pre-requisite or basic conditions for mobile money transactions are clearly insufficient for such services to be conducted. Figure 1 below demonstrate the above indicators by age group. The premium working age group 23-34 years old show the highest share of people with mobile money account (23.7%) while

the elder groups have very negligible minimum shares. When comparing the ratio across groups between the number of mobile money account holders to the number of mobile phone owners, a similar pattern can be observed, i.e the ratio declines as groups are older.

**Figure 1: Shares of having an account, money mobile account and a mobile phone**



*Source: Author's own calculations from Findex 2017 for Thailand*

#### *Gender analysis and labor force participation*

Within the sample of 1,000 respondents in the Findex survey 2017, we do not find a fair sample in terms of gender where 63% are female and the rest are male. However, within the female sub-sample, there is a larger share of women in the age group of 60-69 years old, 20% versus 18.7% among men. However, the overall share of the elderly aged 60 years and above in the two sub-samples are more even at around 29%.

The overall sample indicates a proportion of 73.7 percent of respondents participating in the labor force. The adult working-age groups (25 years old and above) often shows a larger share than the overall. The highest is observed in the age bracket 25-24 years old at 90.83%, followed by the 35-44 and 45-54 bracket with 86.8% and 81.3% respectively. As the retirement age in Thailand is regulated at 60 years old for both men and women, we found that there is a large number of old persons still in the labor force, 66.8% of the 60-69 group and 37.4 of the 70 years old and over group.

It is interesting to note that, within this sample, there is a substantial difference in the labor force participation between gender across age groups and such gaps seem to be wider as we move to higher age brackets. For example, at premium working age from 25-54, men have a fairly higher participation rate than women counterparts, 93% versus 89.4% within the 25-34 bracket, 88% versus 86% within the 35-44 bracket, 84.7% versus 79.7% within the 45-54 bracket. Such gap becomes increasingly higher, more than 20 percent among older people and reaching almost 30 percent among the highest age group of 70 years old and over. These numbers suggest that elder men are more economically active than elder women. Does this also imply a gender difference in financial inclusion between the elderly? This is an interesting question which is worth for investigating.

#### *Mobile phones and mobile money accounts*

In examining the use of mobile phones or internet to access one's account at a financial institution, we found a small share of 16.8% of the sample doing so. This share is higher among those who are still in the labor force 18.4% but only 11.6% among non-labor force participants. A similar pattern is observed on the use of mobile phones or internet to check account balance with a moderate level of 19.5% using such internet banking. A higher share of 21.7% for labor force participants and a much smaller share of 12.2% among those who are not in the labor force. A further look at the group of elder people aged 60 years and over, the share of using mobile phones and internet access for financial account access or checking balance is much lower at only 5% and 3.2% respectively. Unsurprisingly, only 2.2% of those elderly who are not in labor force actually use internet banking for balance checking.

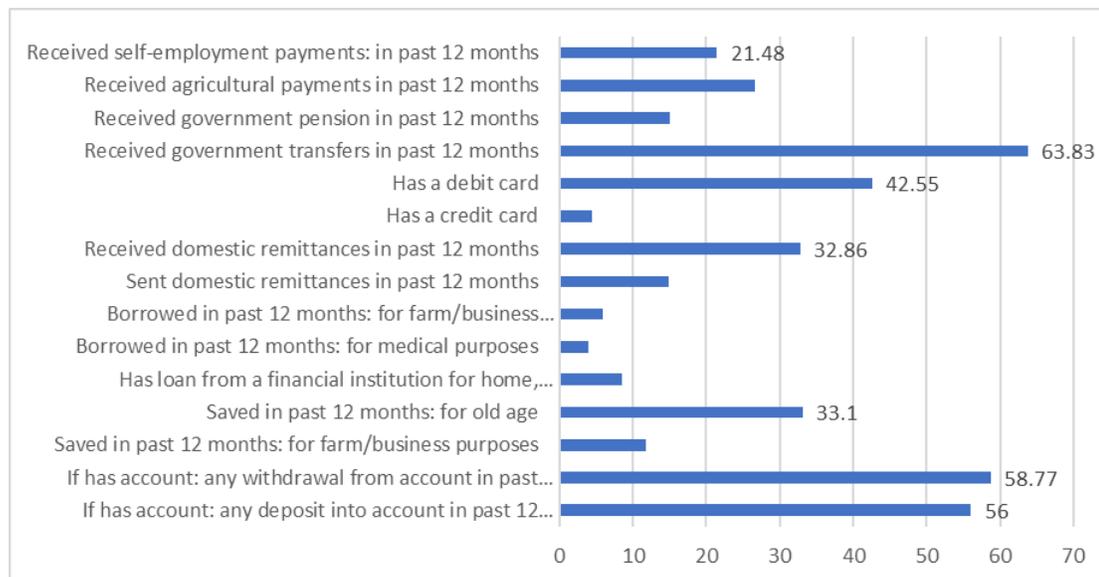
#### *Education level and income level*

The question of financial illiteracy drives us to look into the education level of respondents to explore if there is a correlation between variables. Our analysis clearly shows that the more educated and the richer are more likely to have a mobile money account or to use mobile phones or internet to access to their account at a financial institution. For example, the two richest quintiles (the top 40% of the sample) account for 43% and 26.7% of the total mobile money account owners, equivalent to 70% of the total.

The middle-income group contributes only 16.7% of the total mobile money accounts. In the same line, more than half (53%) of respondents using mobile phones or internet to access to their account at a financial institution completed secondary education while 30% completed tertiary level.

This trend is somehow different among the elder group. With only 19 respondents aged 55 years or above, there are 15 people who did not complete primary education but did access to their account through mobile phones or internet. Since the sample size is small, it is difficult to make a conclusive assessment here. The household survey data of Thailand would be able to provide a more comprehensive factors which could be determinants of financial inclusion. We will include factors such as residential location (metropolitan and non-metropolitan), household status, demographic characteristics of the households.

**Figure 2: the use of financial transaction among the elderly in Thailand**



*Source: Author's own calculations from Findex 2017 for Thailand*

Figure 2 above shows some popularity levels of different financial transactions and types experienced by the elderly aged from 55 years, making a total number of 423 respondents. There are certain kinds of financial transactions which can be considered as priorities among the elder persons, such as withdraw from and deposit into account, savings for the old age, receiving government transfers, remittances and or self-employment payment or agricultural payments. Meanwhile, other services seem to be less

popular such as borrowing or saving for business purposes and using credit cards. We go one step further to explore how the old age conduct such transactions, using cash, bank account or mobile account or online instruments.

Firstly, for the borrowing behavior of the elder persons, respondents were asked if they borrowed from three different channels which they could take more than one. Out of 154 elder persons (equivalent to 36% of these age range in the sample) who did borrow in the past years, the statistics show that 49% undertakes the financial institution channels, a similar share of 46% also receives loans from family members or friends. Only about 9% of the borrowers receives loans from informal saving club. This fact indicates that there is still room for the formal financial sector to provide loans for the elderly. This is opposite to the saving behavior where a major share (65%) of elder savers keeps their assets with formal financial institutions rather than savings clubs.

**Table 2: The elderly borrowed and saved through different channels**

	No. of elderly	Channels		
		Formal FIs	Informal Savings clubs	Family and Friends
Borrowed in the past year	154	76	14	71
	36%	49%	9%	46%
Saved in the past year	192	124	40	
	45%	65%	21%	

*Source: Author's own calculations from Findex 2017 for Thailand*

**Table 3: The elderly received payments with different methods**

	No. of elderly	Received through		
		Formal FIs	Mobile phones	Cash/MTO
Received government transfer	270	164	1	96
	64%	61%	0%	36%
Received agricultural payments	113	28	1	82
	27%	25%	1%	73%
Received self-employment payments	55	4	0	48
	13%	7%	0%	87%
Received wage payments	76	25	0	47
	18%	33%	0%	62%
Received domestic remittances	139	86	3	50
	33%	62%	2%	36%

*Source: Author's own calculations from Findex 2017 for Thailand*

As for the channels that the elderly uses for their transactions, the Findex survey explored some options such as in cash, in card, through mobile phones or internet use with a financial institution account. Table 3 show a clear characteristic among the elder people that they receive any type of transaction through bank accounts or in cash. Mobile phone accounts are not popular among this age group. Analysis of the previous session indicates that a very small number of this aging group had a mobile money account or use internet to access their accounts. Except for the receipts of government transfers and remittances, a majority of respondents aged 55 years and above preferred cash to bank accounts in receiving payments of all types.

Table 4 below describes a tiny share of the elderly who used mobile phones or internet banking for their utility bill payment or sending domestic remittances. Paying in cash for utilities is dominant and only 73% percent of the elderly sending remittances through financial institutions and one fourth of such group is still using cash or money transfer organizations such as post office to make their transfers.

**Table 4: The elderly made payments with different methods**

	No. of elderly	Sent/paid through		
		Formal FIs	Mobile phones	Cash/MTO
Paid utility bills	369	22	0	344
	87%	6%	0%	93%
Sent domestic remittances	63	46	1	16
	15%	73%	2%	25%

*Source: Author's own calculations from Findex 2017 for Thailand*

There is also a small number of the old age who undertake online purchases which are paid in cash or online. The data shows only 5 out of 423 elder respondents buy something online using mobile phone or the internet and only one of those made an online payment while the other 4 paid in cash on delivery. Such numbers are very small to make a conclusion but clearly e-commerce is not in favor of elder people.

All in all, from the above descriptive analysis, it turns out very apparent that the elderly people have a need and demand for various type of financial services. Such services have been partly conducted through the banking system and rarely online using mobile phones and the internet. Given the physical limitations of this group, it is recommended that financial literacy on e-banking and e-commerce can be targeted.

In the next section, we will calculate some indicators which comprise financial Inclusion (FI) and examine the determinants of financial inclusion for the elderly and the role of ICT such as internet access, mobile phones and internet banking in promoting financial inclusion for this particular age group.

#### 4.2 Calculation of Financial Inclusion scores

**Table 5: Financial Inclusion Score by different categories**

Categories	Obs	Mean	Std.Dev.	Quantiles				
				Min	25th per	Median	75th per	Max
<i>By gender</i>								
Male	368	2.56	1.29	0	2	3	4	5
Female	632	2.47	1.34	0	2	3	3	5
<i>By education level</i>								
completed primary or less	594	2.21	1.28	0	1	2	3	5
secondary	328	2.82	1.29	0	2	3	4	5
completed tertiary or more	76	3.45	0.97	0	3	4	4	5
<i>By income quintile</i>								
poorest 20%	199	1.99	1.27	0	1	2	3	5
second 20%	202	2.39	1.24	0	2	2	3	5
middle 20%	186	2.47	1.38	0	1	3	4	5
forth 20%	191	2.63	1.36	0	2	3	4	5
richest 20%	222	2.99	1.17	0	2	3	4	5
<i>By labor force participation</i>								
out of workforce	263	1.94	1.24	0	1	2	3	5
in workforce	737	2.7	1.29	0	2	3	4	5
<i>By age group</i>								
15-24 yrs	91	2.64	1.4	0	2	3	4	5
25-34 yrs	109	3.15	1.22	0	2	3	4	5
35-44 yrs	167	2.8	1.25	0	2	3	4	5
45-54 yrs	210	2.68	1.26	0	2	3	4	5
55-59 yrs	128	2.38	1.38	0	1	2	3	5
60-69 yrs	196	2.11	1.24	0	1	2	3	5
70 yrs and over	99	1.74	1.12	0	1	2	3	4
<b>Overall</b>	<b>1000</b>	<b>2.5</b>	<b>1.32</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>5</b>

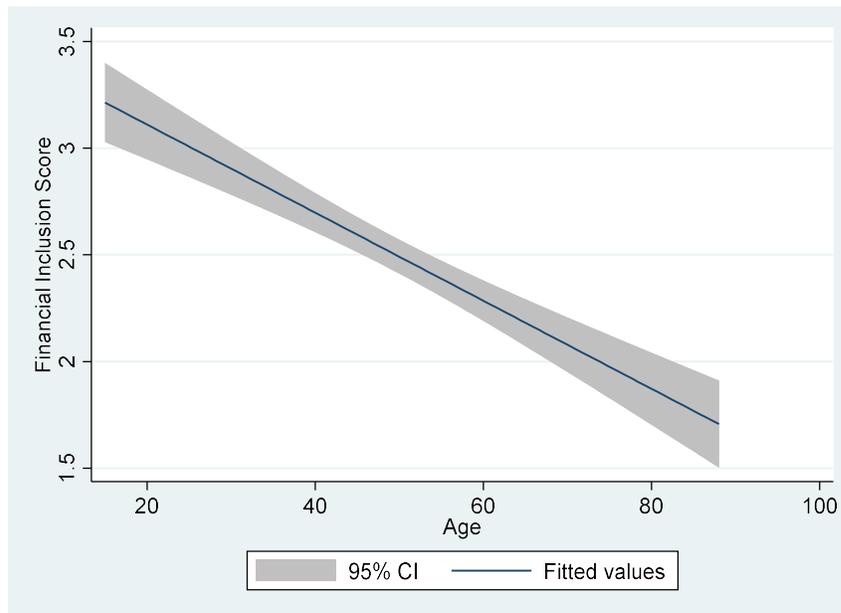
*Source: Author's own calculations from Findex 2017 for Thailand*

Overall, the average FI scores of the whole sample is 2.5 and standard deviation of 1.322. Table below disaggregates the FI scores by gender, education level, income quintile and labor force participation. It is very clear that women, on average have lower scores than men by almost 1 point, with a wider dispersion and a lower value of the 75th percentile. Similarly, respondents with higher education level seem to have better FI

scores on average. People with the tertiary education have an average score of 3.45 while their median is 4. However, there is less variations within this group compared to the two groups with lower education level.

In a similar trend, people from higher income groups tend to achieve higher FI scores. The mean difference between the poorest and the richest groups is exactly 1 point with the richest quintile group has both mean and median score at 3 points. Meanwhile, the score gaps between the other three groups in the middle are not very considerable. The labor force participation of respondents seems to be correlated with their FI scores as well. People in the work force, on average, achieve higher score (2.7) than their peer (1.94) who are out of the workforce.

**Figure 3: Correlation between Financial Inclusion Score and Age**

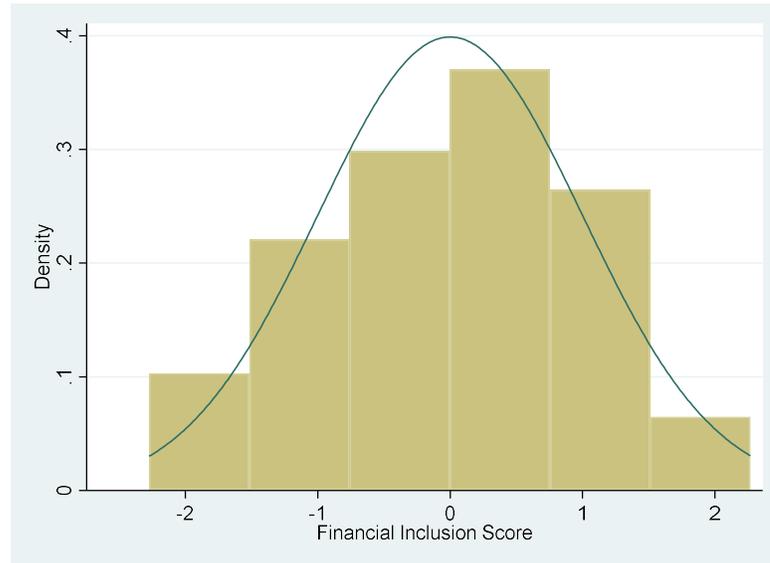


*Source: Author's own calculations from Findex 2017 for Thailand*

### 4.3 Econometrics analysis of FI score determinants

As discussed in the methodology section, we converted the FI score of the sample into z-score, so its distribution looks like a normal distribution as shown in Figure 4.

**Figure 4: Distribution of the Financial Inclusion Z-Score**



*Source: Author's own calculations from Findex 2017 for Thailand*

We apply a multivariate regression model as specified in the methodology session. With FI z-score as the dependent variables, a number of key control variables include gender, education level, income quintile, labor force participation and age or age group. Except Age as the only continuous variable, the others are either dummies or categorical variables. The age groups are also tried as alternative for the Age variables. That leads to different three models in table 3. With a defined target at the aging group, we separate such respondents by a dummy variable Aging60 with a value equal 1 if the respondent is 60 years and over while and 0 otherwise. Alternatively, we use another cut-off of 55 years old to see if there is any difference.

The results in all four tables suggested that there is no significant difference between men and women in their financial inclusion which is a very encouraging finding in Thailand given the disparity in many other parts of the world. As expected, education levels and income levels have a significantly positive effects on FI with increasing magnitudes as the levels progress. People in the work force are apparently more included financially than their counterparts who are out of the labor force.

**Table 6: Determinants of Financial Inclusion**

	Model 1	Model 2	Model 3	Model 4
<i>Gender (Female as reference)</i>				
Male	0.0262 (0.0617)	0.0165 (0.0616)	0.0258 (0.0615)	0.0244 (0.0615)
<i>Education level (primary or less as reference)</i>				
Secondary	0.216*** (0.0790)	0.223*** (0.0818)	0.248*** (0.0710)	0.226*** (0.0733)
Tertiary or higher	0.593*** (0.127)	0.622*** (0.129)	0.635*** (0.122)	0.615*** (0.123)
<i>Income quintile (poorest group as reference)</i>				
second quintile	0.175* (0.0933)	0.150 (0.0937)	0.149 (0.0937)	0.168* (0.0931)
middle	0.178* (0.0961)	0.137 (0.0974)	0.136 (0.0970)	0.164* (0.0960)
forth quintile	0.249*** (0.0966)	0.213** (0.0979)	0.210** (0.0977)	0.233** (0.0967)
richest	0.393*** (0.0982)	0.351*** (0.0990)	0.362*** (0.0987)	0.371*** (0.0984)
<i>Labor force participation (out of labor force as reference)</i>				
in the work force	0.434*** (0.0688)	0.383*** (0.0713)	0.415*** (0.0692)	0.424*** (0.0687)
Age	-0.00613*** (0.00224)			
<i>Age group (young group 15-24yrs old as reference)</i>				
agegroup2 (25-34 yrs)	0.218 (0.133)			
agegroup3 (35-44 yrs)	0.0414 (0.122)			
agegroup4 (45-54 yrs)	0.134 (0.124)			
agegroup5 (55-59 yrs)	-0.0430 (0.135)			
agegroup6 (60-69 yrs)	-0.152 (0.129)			
agegroup7 (70 yrs and over)	-0.287** (0.146)			
aging60	-0.254*** (0.0729)			
aging55	-0.240*** (0.0684)			
_cons	-0.352** (0.169)	-0.582*** (0.141)	-0.551*** (0.105)	-0.537*** (0.107)
R-squared	0.155	0.165	0.159	0.159
No. of observations	998	998	998	998

*t* statistics in parentheses

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

As far as the age is concerned, there is a statistically negative association between age of the respondent and her financial inclusion z-score. On average, as people become one year older, their FI will reduce by 0.006 percentage points. In other words, as one decade passes by, people's financial inclusivity will reduce by 0.06 percentage points while holding other factors constant. When respondents are categorized into age groups, we found no significant difference in financial inclusion under 70 years old, as compared to the reference group of young generations aged between 25 and 24 years old. This does not make much sense compared to the interpretation of age effects in model 1. Therefore, an alternative to this categorization is to define a dummy variable representing a group of older people with age 60 and over contrasting to a younger group. This measure shows a statistically significant result, where being an elder would reduce the FI score by 0.25 percentage points. Similarly, with a different cut-off at age 55, we also found a negative relationship between aging and financial inclusion with an effect of 0.24 percentage point.

Table 7 demonstrates regression results of our extended models where some ICT variables are included. First, we consider mobile phone as an essential equipment and conditions to get access to electronic banking and financial services. Its effect on FI z-score is highly significant as showed in model 5. Owners of a mobile phones can add up to 0.47 percentage points in FI z-score as compared to those without such device. Secondly, we look at the role of a mobile money account in determining financial inclusivity of respondents in Thailand. Again, we also found a strong positive effect where mobile money account owner can add a margin of as much as 0.49 percentage points to their FI z-score. Surprisingly, there is a very weak correlation between these two variables (correlation coefficient=0.07) as one may expect that owning a mobile phone is a prerequisite condition to obtain a mobile money account. That explains why even when we incorporate both variables into the models, they can maintain their own significance with similar magnitudes of the effects. Finally, we also include an interaction terms of these two variables but found no significant effect of such term.

**Table 7: Effects of mobile phones and mobile money accounts on financial inclusion**

	Model 5	Model 6	Model 7	Model 8
<i>Gender (Female as reference)</i>				
Male	0.0292 (0.0605)	0.0328 (0.0611)	0.0356 (0.0601)	0.0362 (0.0602)
<i>Education level (primary or less as reference)</i>				
Secondary edu	0.219*** (0.0703)	0.199*** (0.0717)	0.171** (0.0709)	0.171** (0.0709)
Tertiary edu or higher	0.639*** (0.121)	0.554*** (0.123)	0.558*** (0.122)	0.562*** (0.123)
<i>Income quintile (poorest group as reference)</i>				
second quintile	0.142 (0.0923)	0.160* (0.0931)	0.154* (0.0917)	0.155* (0.0919)
middle	0.115 (0.0961)	0.138 (0.0963)	0.117 (0.0954)	0.117 (0.0954)
forth quintile	0.200** (0.0964)	0.202** (0.0970)	0.193** (0.0957)	0.193** (0.0958)
richest	0.339*** (0.0978)	0.353*** (0.0981)	0.331*** (0.0972)	0.330*** (0.0973)
<i>Labor force participation (out of labor force as reference)</i>				
in the work force	0.394*** (0.0683)	0.407*** (0.0687)	0.386*** (0.0679)	0.387*** (0.0679)
aging60	-0.169** (0.0741)	-0.241*** (0.0725)	-0.156** (0.0737)	-0.157** (0.0738)
mobile phone	0.469*** (0.0992)		0.470*** (0.0985)	0.466*** (0.0991)
mobile money A/C		0.489*** (0.127)	0.482*** (0.125)	0.198 (0.914)
mobile*A/C interaction				0.288 (0.920)
_cons	-0.956*** (0.136)	-0.560*** (0.105)	-0.965*** (0.135)	-0.963*** (0.135)
R-square	0.180	0.171	0.192	0.192
No. of observations	991	998	991	991

*t statistics in parentheses*\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

#### 4.4 Analysis on Internet use, mobile phones and digital banking among Thai elderly

In this section, we take one more step to further look at the relationship between the use of internet, electronic ICT devices and mobile banking or internet banking to validate our above conclusion and to explore areas for policy targeting. We deployed in this section a household survey on the use of ICT in Thai households in 2016 which provides information at the individual level. We limit the sample to individuals aged from 15 years old or above, reducing the sample size to 171,763 observations, making it compatible to the Findex 2017. The same seven age groups are categorized. The sample across age group and residential areas is described in appendix table A1 exhibiting a fair distribution between urban and rural areas across age groups.

**Figure 5: Share of internet users and digital banking users by age group**

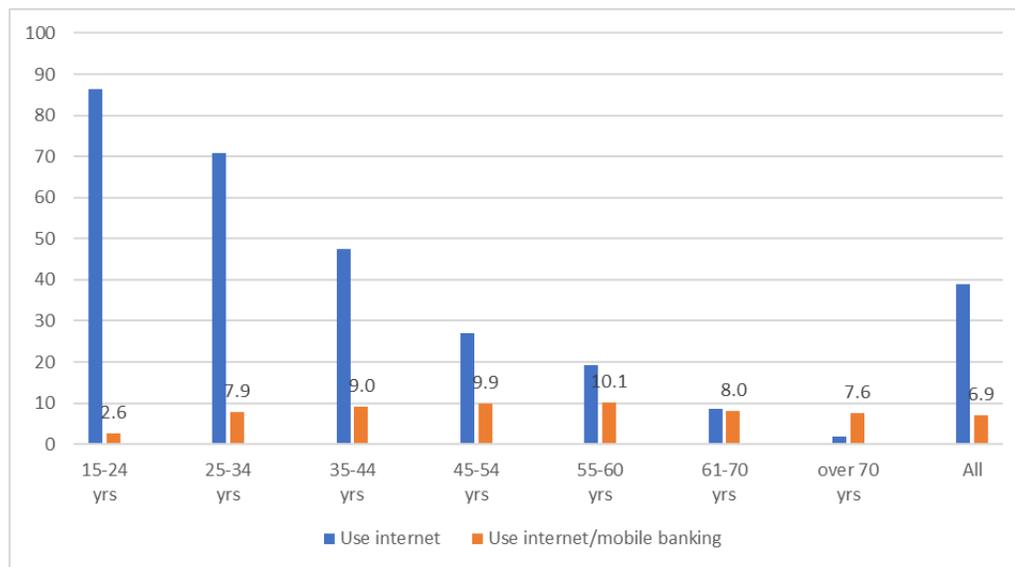


Figure 5 shows the proportion of internet users the whole sample and the share among those internet users who also use mobile banking or internet banking services. As expected, the proportion of internet users declines by age, highest among the youngest (15-24 years old with 87 percent) or the premium working age 25-34 years at 70.7%. In opposite, when people become older, less of them can use the Internet, with only 19.3 percent, 8.6 percent and 1.7 percent respectively in the three oldest groups 55-60, 60-70 and over 70 years old.). For the oldest group of citizens aged 70 years and over 70, the use of internet is very negligible. In particular, there is a considerable reduction in the shares

from the middle age group (45-54 years old) to the oldest working age group (55-60 years old) by almost 8% (from 27.09% to 19.34%) and further big drop to the beginning the retirement age by almost 11% to only 8.6%. This implies that for many individuals on average, retiring has caused a distance between themselves and their internet use. However, it should be noted that the three oldest age groups (from 55 years and above) account for 23.7% of this sample and they have very limited use of the Internet.

However, these three elder groups aged from 55 years and over, actually maintain some considerable proportions (7-10%) who are also digital banking service users. This ratio is higher than the population average (6.9%) and even surpass some younger groups. More impressively, the oldest working age group (55-60 years old) is, in fact, the group with the highest share of more than 10%. This finding is very critical within an implication that once the elder people can utilize (or have access) to the Internet, they are more likely to use it for digital banking services.

The highlight from the above figure induces an exploration on the reasons why not so many Thai people do not use (or do not have access) to the Internet. Overall, the whole sample shows only a fair share of 39% of Thai population aged from 15 years old, ever used the Internet. There are two key reasons accounted for the majority among non-users, namely they don't know how to use, and they don't see the need to use it (not interested/not necessary/waste time) as shown in table 9 beside a smaller number of people concerning on the expensive service rates, owning a device, network, etc., It is more noticeable that the reasons for not using Internet is more about the skills that they haven't got, and less about their interest in obtaining an access. Only 10-17% of the elderly who don't feel the necessity of or the interest in internet while the majority 62-87% simply don't know how to use.

The proportion of people unable to use the Internet is, however, not the same in different age groups, smaller in younger generations but higher in older groups, ranging from 63-78% among people aged 55 and over. Meanwhile the reason of being uninterested has declining shares by age. This is an avenue for more education and training opportunities opened for the elderly if we believe that internet usage can facilitate the use of digital banking and consequently improve financial inclusion among this older population.

As for training, we particularly interested if there is any difference across residential areas or gender among those without Internet access, particularly among the oldest three groups. The gender difference does exist with higher proportion bias toward women (3-4% more prevalent)

who have never used the Internet because they simply don't know how to use. A similarity is also found when comparing rural to urban areas with more disadvantages incurred by the rural elderly (2-7%) who don't know about Internet. The proportion tests confirm the highly statistical significance in the shares of "don't know" reason among male non-users versus their female peers and among urban versus rural elder residents, as in table 10, for each age group and for all three. Those findings can be paid attention when designing some type of training program to educate elderly people on how to use the Internet and its relevant benefits.

**Table 9: Internet using experience by age group**

Age group	Yes	Never, because	
		don't know how	not interested/not necessary/waste time
15-24	19,934 86.45	990 4.29	1,776 7.7
25-34	16,912 70.73	2,720 11.38	3,869 16.18
35-44	14,628 47.48	8,811 28.6	6,974 22.64
45-54	9,789 27.09	18,474 51.13	7,599 21.03
55-59	3,102 19.34	10,064 62.74	2,810 17.52
60-69	2,032 8.6	17,791 75.34	3,721 15.76
70 & over	341 1.87	15,859 87.15	1,977 10.86
Total	66,738 38.85	74,709 43.5	28,726 16.72

**Table 10: Internet using experience by age group**

age group	diff (men vs. women)	se	z	p-value	N
55-59	-0.042	0.007	-5.69	0.000	12939
60-69	-0.042	0.005	-7.97	0.000	21583
70 & over	-0.029	0.005	-5.97	0.000	17856
all 3 groups	-0.041	0.003	-12.40	0.000	52378
age group	diff (urban vs. rural)	se	z	p-value	N
55-59	-0.066	0.007	-8.99	0.000	12939
60-69	-0.067	0.005	-12.87	0.000	21583
70 & over	-0.024	0.005	-5.00	0.000	17856
all 3 groups	-0.041	0.003	-12.40	0.000	52378

To target the elder non-internet users more effectively, we also need to understand where they feel comfortable using the service. Statistics in table 11 describe the experience in using internet in various places. Among Internet-users in the high age range, it is indicated that using mobile devices and Internet access at home are the most popular way Thai elder people are using the Internet, in the measure of 80-90% and 70-76%) respectively. Using this service from the workplace is also popular for those in the working age 55-60 years but reduces sharply to 11-18% when people are older and get to their retirements. It suggests that for many individuals on average, retiring has caused a disruption in their internet access, and they have to use alternative channels to obtain the service.

The ICT community centers are one of the places that elder people visit to get access to the Internet but are more popular among the oldest than the younger groups (5 % versus 2.7-2.8%). The feasibility of this policy initiative needs more assessment with respect to the purpose of serving to the elderly. From those numbers, it is more evident that mobile device such as smart phones or tablets are the key channels to encourage older persons to use the Internet. As a result, the next trivial question is how elder person own a mobile phone and do they use it for browsing internet or banking services.

**Table 11: The use of internet in different places**

Place	All	55-60 years	61-70 years	over 70 years
1. home	68.9%	73.7%	75.8%	71.3%
2. work	37.3%	57.0%	17.8%	11.7%
3. school	17.8%	4.2%	0.9%	1.5%
4. Internet shop	7.8%	1.0%	1.0%	3.5%
5. ICT community centre	3.7%	2.7%	2.8%	5.0%
6. other's house	20.7%	14.5%	13.1%	12.9%
7. public place	3.9%	3.3%	2.6%	2.3%
8. any place (mobile device)	89.2%	87.8%	84.4%	78.9%
9. other	0.2%	0.3%	0.4%	2.3%
Min	1	1	1	1
Max	9	9	9	6
Average	2.53	2.48	2.01	1.92
No. of obs	66,738	3,102	2,032	341

Owing a mobile phone does seem to be very popular these days for individuals at different age, in cities or in rural areas. However, for the older Thais, possessing one does not seem to be obviously so. This survey data in 2016 shows that over 60% of the eldest group aged from 70 years and over does not have any mobile phones. The ratio is much smaller among 60-69 and 55-59 age groups, only 27% and 15% respectively. However, it is more interesting to understand why the elderly don't have one given various affordable types of mobile phones.

**Table 11: The use of internet in different places**

<b>Reason</b>	<b>55-59</b>	<b>60-69</b>	<b>70+</b>	<b>All 50+</b>
2. not necessary	75.0	70.8	60.3	65.6
3. expensive device	3.3	2.5	0.9	1.7
4. expensive service	0.8	0.6	0.2	0.4
5. don't know how to use	11.7	19.1	35.7	27.3
6. no network	0.4	0.4	0.1	0.2
7. poor signal	0.1	0.1	0.0	0.1
8. other	8.6	6.5	2.8	4.8
	100	100	100	100
No. of elder with no mobile phone	2,504	6,455	10,931	19,890
No. of elder	16,041	23,615	18,197	57,853
Share	15.6%	27.3%	60.1%	34.4%

It turns out that most of the elderly (60-70%) finds mobile phones unnecessary and the second important reason is they don't know how to use it, largely among the eldest 35.7% and 11-19% among the age range 55-69. Given various benefits of mobile phones in our daily life, we can assume that the elderly does not see those benefits of mobile phones for them, so that they don't need one. Only a very small share of this group seems to have a concern on the device price or the network service in making their decision to own a mobile phone. If we are going to introduce mobile banking services to the elderly, there will be two main tasks to teach them how to use the services and application and to

The questions in the Thai ICT survey also have details on which types of phone people are using and table 12 illuminates an important fact a large proportion of the elderly in Thailand are using only feature phone which cannot use with applications but rather basic functions like making and receiving calls/sms or basic/ low speed web browsing. There are 64,301 people in the sample who are still using feature phones only, of which the elder persons aged 55 years or older accounted for over three-fourths. In contrast, among 76,152 persons who only use smart phones,

**Table 12: Types of mobile phones owned by Thai elderly**

<b>Type of mobile phone</b>	<b>55-59</b>	<b>60-69</b>	<b>70+</b>	<b>All 55+</b>	<b>ALL</b>
feature phone	11,857 <i>18.4%</i>	20,102 <i>31.3%</i>	17,205 <i>26.8%</i>	49,164 <i>76.5%</i>	64,301
Smart phone	6,914 <i>9.1%</i>	10,104 <i>13.3%</i>	11,962 <i>15.7%</i>	28,980 <i>38.1%</i>	76,152
Both	226 <i>10.4%</i>	136 <i>6.3%</i>	39 <i>1.8%</i>	401 <i>18.5%</i>	2,166

The survey respondents were also prompted with a question of whether they used mobile banking with their mobile phones. The share of positive answer was very small for the whole population (4,701 out of 142, 619 mobile phone users,) equivalent to only 3.3%. with the highest ratios were among the prime age group 4.8-6%, lower among the middle age 2-3% and very small less than 1% for the old age. It should be noted that this survey was conducted in 2016, long before the first national digital payment system was introduced in Thailand in the end of 2017 and officially used in 2019 – the PromptPay QR code system<sup>2</sup>. It is estimated that there are over 49 million accounts registered with PromptPay in Thailand so far (Omise, 2021). More importantly, over 95% of mobile banking users also own at least one smart one smart phone, of which 5.5% even owns more than one. Having a smart phone is critically a pre-condition for people to engage in mobile banking services.

We dive into the benefits of mobile banking by comparing the payment method utilized users and non-users of this electronic banking service, even though its benefits and convenience is not limited to only payments. Respondents were asked on the most regular method they pay for goods and services in both online and offline shopping channels. It is very clear with the online shopping that, mobile banking users account for over 90% of all users of digital banking, and also equivalent to a share of 44% among the group of people having used mobile banking services. Meanwhile, non-users are more dominant in using the conventional method of payments such as ATM, bank transfer and credit cards. With offline shopping, the difference between the two group of users is negligible.

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<sup>2</sup> The Policy Guideline: Standardized Thai QR Code for Payment Transactions dated 17 April 2019 issued by the Bank of Thailand

## 5. CONCLUSION

Thailand formally became an aging society in 2005 and will turn into an aged society in 2022. Although Thailand has achieved considerable progress in financial inclusion as compared to other ASEAN countries, there is still some gaps to be filled and some concerned groups which might be excluded from the financial transactions. This study particularly looks at the target group of elder people who have limited access to financial services and very low level of financial inclusivity. On average, over 80% of respondents have an account at mostly financial institution or some non-financial institutions. However, among those non-bank-account holders (188 respondents), more than half (50.5%) are the elderly 55 years or above. The disaggregation by age group also shows that more than a third (36.7%) of non-account holders are 60 years or over.

The level of digital financial inclusion is still low with only 57 people, equivalent to 7%, owning a mobile money account. Even among owners of mobile phones, we found a small share of 16.8% of the sample doing so. This share is higher among those who are still in the labor force 18.4% but only 11.6% among non-labor force participants.

A further look at the group of elder people aged 60 years and over, the share of using mobile phones and internet access for financial account access or checking balance is much lower at only 5% and 3.2% respectively. Unsurprisingly, only 2.2% of those elderly who are not in labor force actually use internet banking for balance checking.

We built a measure of financial inclusion score consisting of 5 different measures, so its value rank from 0 to 5. The FI scores clearly associate positively with labor force participation, income level and education level but negatively related to age or age groups. The older the people, the lower their FI scores are. Our econometric analysis confirms such negative effects and also found a strong correlation between mobile phones and mobile money accounts and FI score.

One of the biggest challenges for the elder group to embark on the use of digital financial services is the limited use of the Internet. Results from the Thai household survey on ICT use provides explanations for not using the Internet which are more about the skills they do not have rather than their interest or the necessity of using such service.

Suggestions from the three oldest groups of the population contain a need for cheaper Internet fees (18-27%) beside cheaper mobile call rates (41-44%). As a result, together with financial literacy in particular rather than general education, we recommend the promotion of internet access among the elderly while emphasizing the role of ICT and digital technology to promote financial inclusion. Such action would definitely require a coordination between policy makers and service providers to target this group of elder citizens.

The increase in the adoption of ICT and the introduction of various Fintech products, overall financial inclusion has been improved in Thailand in recent years although disproportionately affects the elder group. These results suggest more custom-made products for this particular group. Some public private partnerships should be designed to enhance the future financial environment for old age risk management. The challenge is the aging social security systems play a major role in sustaining people in their later life.

It is quite certain that fintech innovations could enhance the quality and utilization of financial services (WorldBank, 2019) but it is also necessary to make sure that the benefits of financial inclusion brought by such innovations will not exclude financially vulnerable groups in the society, particularly in some aging societies, such as elder rural population, low-income households, elder women, and remote communities. A national strategy taking into account those who are marginalized can help policymakers identify inclusion gaps, improve monitoring, strengthen national focus, and facilitate interagency coordination. A national financial inclusion strategy can also help prioritize reforms and resource allocation and exploit policy synergies, including the interactions between macro and financial inclusion policies according to the IMF (2018).

## Appendix

**Table A.2. Computing financial inclusion indicators**

Indicator	Question number	Discussion	Method used
Holds payment product	Qprod1_b	Identifies payment products across country level data, such as prepaid cards, current accounts etc.	Binary variable: takes value of 1 if any product is held, otherwise 0
Holds savings, investment or retirement product	Qprod1_b	Identifies savings, investment and retirement products across country level data, such as pensions, investment accounts, savings accounts, savings clubs, bonds, crypto-assets etc.	Binary variable: takes value of 1 if any product is held, otherwise 0
Holds insurance	Qprod1_b	Identifies insurance products across country level data, such as car insurance, home insurance, etc.	Binary variable: takes value of 1 if any product is held, otherwise 0
Holds credit product	Qprod1_b	Identifies credit products across country level data, such as mortgages, credit cards, microloans etc.	Binary variable: takes value of 1 if any product is held, otherwise 0
Aware of at least 5 products	Qprod1_a	Counts all positive responses across Qprod1_a	Binary variable: takes value of 1 if at least five positive responses, otherwise 0
Recent financial product choice	Qprod1_c	Identifies individuals that have made at least one product choice	Binary variable: takes value of 1 for any recent choice, otherwise 0
Relying on family and friends	QF3 and QF12	Identifies people who turn to family or friends to save money for them, or to help them to make ends meet	Binary variable: takes value of 1 if saving through family and friends or turning to family and friends to make ends meet, otherwise 0

Source: OECD/INFE (2016)

**Table A1: Sample by age group and residential area**

Age group	Urban/Metropolitan	Rural	All
15-24	13,208	9,851	23,059
	13.7	13.1	13.4
25-34	14,029	9,883	23,912
	14.5	13.1	13.9
35-44	17,343	13,463	30,806
	18.0	17.9	17.9
45-54	19,800	16,333	36,133
	20.5	21.7	21.0
55-59	9,013	7,028	16,041
	9.3	9.3	9.3
60-69	13,140	10,475	23,615
	13.6	13.9	13.8
70 & over	9,934	8,263	18,197
	10.3	11.0	10.6
Total	96,467	75,296	171,763
	100	100	100

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