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Enhancing Financial Inclusion for the Elderly Population Through Digital Banks and Digital Payments

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Abstract

The global population is experiencing a profound demographic shift, with developed nations witnessing a significant increase in the elderly population. This trend of population aging is posing challenges and opportunities in various domains, including financial inclusion and technological innovation. In the realm of financial services, the rise of Fintech has revolutionized the landscape, offering digital payment solutions and digital banking services.

Using data from 2012-2021 this study employs panel regression analysis to investigate the influence of the elderly demographic on the adoption of digital payment systems in 28 developed countries. Then drawing upon the Technology Acceptance Model (TAM) as a foundational framework, this study proposes a novel conceptual model to analyze digital banks and digital payments through the lens of various influencing factors that consider the unique characteristics and challenges faced by the elderly population. These factors include Perceived Usefulness (PU), Perceived Ease of Use (PEU), Aptitude for Learning (AFL), Self-Efficacy (SE), Uncertainty Avoidance (UA), Social Influence (SI), Data Security and Privacy Risk (DS), Promotions and Incentives (P&I), Brand Image (BI), and Intention to Use (I). These factors collectively shape the elderly's willingness to adopt and utilize FinTech payment methods as part of their financial routines.

The findings from this research not only contribute to a deeper understanding of the factors shaping technology adoption among the elderly in developed nations but also have significant implications for policymakers and financial service providers aiming to enhance financial inclusion and promote the use of digital payment and banking solutions among this demographic.

Key Words: Elderly population, financial inclusion, Fintech payment systems, TAM

1. Introduction

Globally, there is a widespread phenomenon of population aging. with individuals aged 60 and above at 12 percent percent are expected to exceed 20 percent by 2050, posing challenges for advanced economies (AEs) and Emerging Market and Developing Economies (EMDEs) (*Doerr, S et al., 2022*). This demographic shift impacts the financial sector, necessitating adaptations in the banking industry.

Simultaneously, rapid technological growth aligns with the aging society, with digital payment systems bridging these trends. FinTech payment solutions streamline costs, enhance efficiency, ensure regulatory compliance, and diversify the financial landscape (*Omarini, 2022*). The emergence of cutting-edge technologies, notably big data, blockchain, Artificial Intelligence (AI), cloud computing, and robotics, has been instrumental in propelling this transformation.

The digital payments sector is currently expanding rapidly, primarily due to the escalating adoption of e-commerce and mobile payment solutions, coupled with the surge in contactless payments provoked by the COVID-19 pandemic (*Statista.com, 2023*). Established FinTech companies such as PayPal, Revolut, and Wise, as well as large technology companies including Meta, Apple, and Google, have intensified competition for traditional banks. The surge in digital payments has led to a decline in consumer demand for cash (*Rogoff, 2014*). The Digital Payments segment represents the largest category in the FinTech market followed by Digital banks (Neo banks), with a total transaction value projected to reach US$9,471.00bn and US$4,533,000bn respectively in 2023.

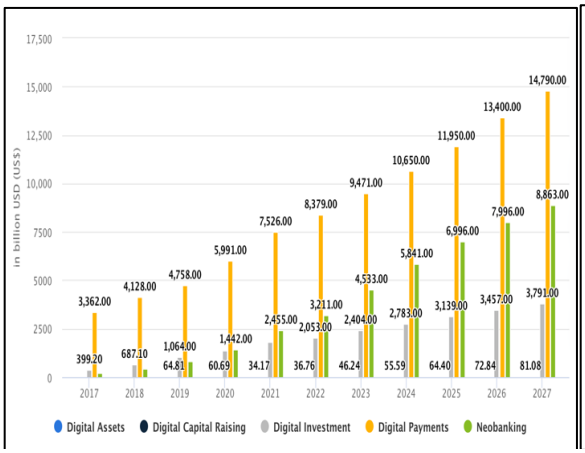

Figure 1

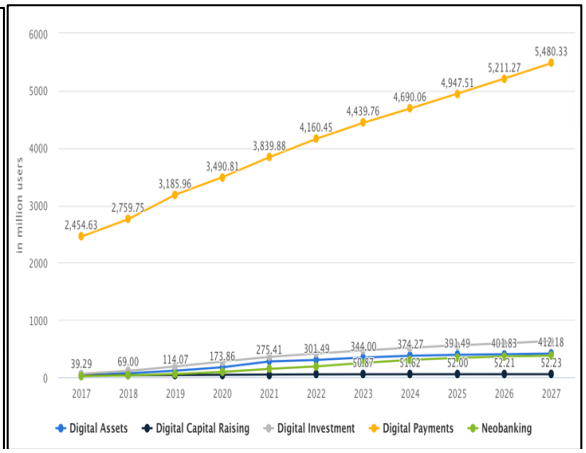

Figure 2

Figure 1: Worldwide Fintech transaction values by segment
Figure 2: Worldwide FinTech users by segment
Source: Statista website

Based on the existing literature, it is evident that digital payments and digital banks play a crucial role in the advancement of FinTech advancement. While these digital payment systems offer convenience for individuals adept in technology usage, they present notable challenges for those accustomed to traditional brick-and-mortar banking, especially the elderly population. Notably, the adoption of FinTech decreases with age. World Bank data encompassing 136 countries reveals that over 40 percent of individuals below the age of 40 embrace digital payment platforms, whereas less than 25 percent of those aged 60 and above engage in digital transactions.

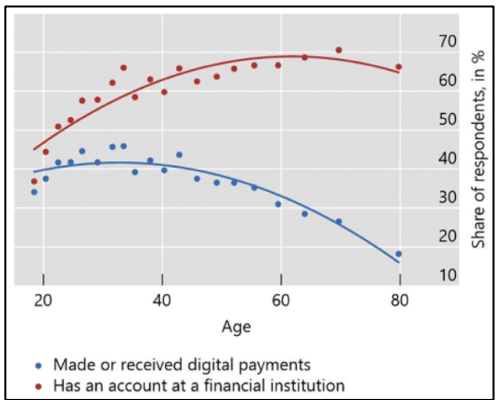

Figure 3: users with digital payment transactions, or accounts with traditional financial institutions, 2017, by age
Source: World Bank, Findex, Doerr, S et al., 2022

This growing disparity in technology adoption across age groups could potentially give rise to a "digital divide" among generations (*UN, 2020; WEF, 2021*). This age-based technology gap could lead to a "digital divide," stemming from factors like older individuals' reluctance to adopt new tech, data privacy concerns, health-related limitations, cognitive challenges, and generational differences in tech exposure (*Doerr, S et al., 2022; Czaja et al., 2006*).

In an era marked by rapid technological advancements and evolving financial landscapes, the pursuit of financial inclusion has emerged as a paramount objective for governments, financial institutions, and societies worldwide (*Oxili,2018*). Hence, the first part of this research paper conducts a regression analysis on cross-country survey data to investigate the impact of the elderly demographic on the adoption of digital payment systems in developed countries. Subsequently, the study aims to recognize the factors that drive digital payment adoption among older generations, addressing the issues related to the digital divide, and enhancing financial inclusivity. The study focuses on nations with a GDP per capita exceeding 35,000 US dollars and a Human Development Index (HDI) value surpassing 0.85, thus ensuring the representation of economically and socially advanced societies.

2. Relationship between Digital payment adoption and older generation

This study employs Digital payments per person and Aged population 65+ as dependent and independent variables respectively. Whereas GDP per capita, Internet penetration and No of Bank branches per 100,000 are used as the control variables. The secondary data are collected from World bank data for 28 developed nations (Appendix1) for the period 2012-2021.

This data is transformed into a logarithm for each variable. By using logarithm, "the model can be linear and can avoid heteroskedasticity problem" (*Shawa and Shen, 2013*). In order to examine the impact of the elderly demographic on the adoption of digital payment systems the following model will be applied

$$Y_t = C_0 + \alpha \lg(\text{Agedpop})_t + \beta \lg(\text{GDP PP})_t + \gamma \lg(\text{IntPen})_t + \delta \lg(\text{BankBr})_t + \varepsilon_t$$

Where Y is Digital payments per person, ε is an error term, $\alpha, \beta, \gamma, \delta$ parameters to be estimated

A pre-requisite when analyzing time series data is checking stationarity, as non-stationary data can lead to counterfeit results. Using panel data for 28 developed countries from the years 2012 to 2021 the present study conducts the Phillips Perron (PP) unit-root test for 'trend" and "trend and intercept" at the level and first differences of the variables.

PP Test	Dig. Payment transaction PP	Aged population 65+	GDP per capita	Internet penetration	Bank Branches per 100,000
At level					
Intercept	8.6927	86.1670*	28.1493	40.3733	89.9926*
Trend and intercept	53.9980*	62.1830*	41.9633*	44.2801	19.2428
At first difference					
Intercept	94.9271*	41.2681	63.9658*	96.1850*	11.8589
Trend and intercept	127.556*	49.9279*	49.3090*	95.9891*	65.9298*

Table 1: Results of Phillips Perron (PP) Unit root test

Source: Author's calculations

The findings from the Phillips-Perron (PP) unit root test reveal that the population aged 65 and above exhibits stationarity at the level for both "trend" and "trend and intercept." Simultaneously, digital payments and GDP per capita demonstrate stationarity at the level for "trend and intercept." Conversely, the number of bank branches displays stationarity at the level of "trend" alone. In contrast, internet penetration is stationary at the first difference for both "trend" and "trend and intercept". Therefore, it can be deduced that the time series data for both the dependent and independent variables exhibit stationarity at mixed levels.

Dependent variable is lg(Digpaym)

Variable	Coefficient	Std.Error	t-Ststistic	Probability
lg(Agedpop)	-0.2862	0.0327	-8.7362	0.0000
lg(GDP PP)	0.0658	0.0289	2.2760	0.0244
lg(IntPen)	0.3004	0.0749	4.0064	0.0001
lg(BankBr)	-0.0608	0.0156	-3.8946	0.0002
C	0.7001	0.3888	1.8007	0.0740
R Squared	0.6345			
Adj. R Squared	0.6237			
F-Statistic	58.6067			
Durbin-Watson stat	0.2706			

Table 2: Coefficient results of Panel least square regression analysis

Source: Author's calculations

The results clearly indicate that the increase in the aged population above 60+ and no of bank branches have a negative impact on digital payment transactions in developed nations. However aged population above 60+ has a bigger impact where a 1% increase will decrease digital payment transactions by 0.2862. Since the above literature clearly illustrates that the aged population continue to grow in the future it is important to identify which factors that motivate this demographic group to adopt digital payments and digital banks.

The findings evidently demonstrate that a rise in the elderly population aged 60 and above, and an increase in the number of bank branches, negatively influence digital payment transactions within developed countries. Notably, the impact of the aging population aged 60 and above is more pronounced, resulting in a decline in digital payment transactions, estimated at 0.2862 for every 1% increment. Given the evident and anticipated growth of the elderly population, it becomes extremely important to identify the underlying factors motivating this demographic cohort to embrace digital payment platforms and digital banking solutions, as elucidated in the existing body of literature.

3. Literature Review and Conceptual Model

Various behavioral decision theories and intention models have been developed in scientific literature to analyze how individuals respond to innovation, primarily rooted in social psychology studies (*Pavlou, 2002a*). Fishbein and Ajzen's Theory of Reasoned Action (1975) is a comprehensive model explaining behavior based on the interrelation of beliefs, attitudes, intentions, and actions. This theory considers two main variables for intention: attitude towards the behavior and the subjective norm, indicating the normative influence of third parties. In contrast, Ajzen's Theory of Planned Behavior (1991) posits that specific beliefs significantly influence both behavioral perceptions and actual behavior. The TPB model encompasses three

belief types: behavioral beliefs affecting attitudes, normative beliefs shaping subjective norms and control beliefs determining behavioral control. Based on the TRA concept, Fred Davis, Bagozzi, and Warshaw developed the Technology Acceptance Model (TAM) in 1989 to address the limitations and lack of a theoretical model and illustrated, that behavioral intention was not shaped by a generic attitude toward behavioral intention, but by specific beliefs related to technology use. TAM is considered one of the most influential models of technology acceptance, with two primary factors influencing an individual's intention to use new technology: Perceived Ease of Use (PEU) and Perceived Usefulness (PU). On the other hand, the Unified Theory of Acceptance and Use of Technology (UTAUT) was developed by Venkatesh in 2003 by combining eight previously developed theories with the aim of measuring the level of acceptance and use of technology, and including performance expectancy, effort expectancy, social influence, and facilitating conditions. Social Cognitive Theory which emerged from social learning theory, was developed by Albert Bandura in 1986 and identified that people learn from their own experiences and by observing the experiences of others (*Lazaro, R. T. et al, 2020*).

Various scholars have employed these theoretical models to investigate the influential factors of digital payments and mobile payment adoption among the elderly population. This literature review offers insights into the factors influencing the adoption of online payment systems among middle-aged and elderly populations. It highlights the research conducted by *Jinwei Xie (2023*), which identifies age, gender, occupation, residence, income, and financial stability as significant determinants of adoption. Additionally, technological advancements, particularly mobile phone availability and internet access, are found to positively impact adoption, especially in urban areas. *Liébana-Cabanillas et al. (2014)* expand on this by incorporating trust and risk into the Technology Acceptance Model (TAM). Their study reveals that external influences, such as social image and subjective norms, play a crucial role in shaping the intention to use virtual payment systems. Perceived usefulness is positively related to intention, while perceived risk shows a negative relationship due to uncertainties and potential negative consequences. The study also observes age-related differences in these relationships. *Cheng-Chia et al. (2023)* take an integrated approach, combining TAM with the Theory of Reasoned Action, the Diffusion of Innovations theory, trust, and perceived risk, to examine older adults' behavioral intentions regarding mobile payments. They find that attitude significantly influences adoption, with perceived usefulness, ease of use, and observability positively affecting attitudes and, consequently, intentions. Trust emerges as a critical factor shaping perceived usefulness and ease of use, while performance and financial risks influence trust. *Klas Håkan Alm's (2022)* study explores the relationship between perceived security and the intention to adopt mobile payments among older adults in Thailand and Sweden, using the TAM framework. It discovers that perceived security negatively impacts adoption in both countries, with variations in the fear of losing money between Sweden and Thailand.

This study identifies unexplored variables in the context of technology adoption among older users. It emphasizes the importance of assessing their technological aptitude and self-efficacy, as well as considering cultural dimensions like Uncertainty Avoidance. While prior studies have explored the direct relationship between trust and fintech services, there is a notable gap in investigating the potential moderating effect of trust on other variables. To address these unexplored areas comprehensively, we present a conceptual model below, aiming to analyze the factors that influence technology adoption among older generations.

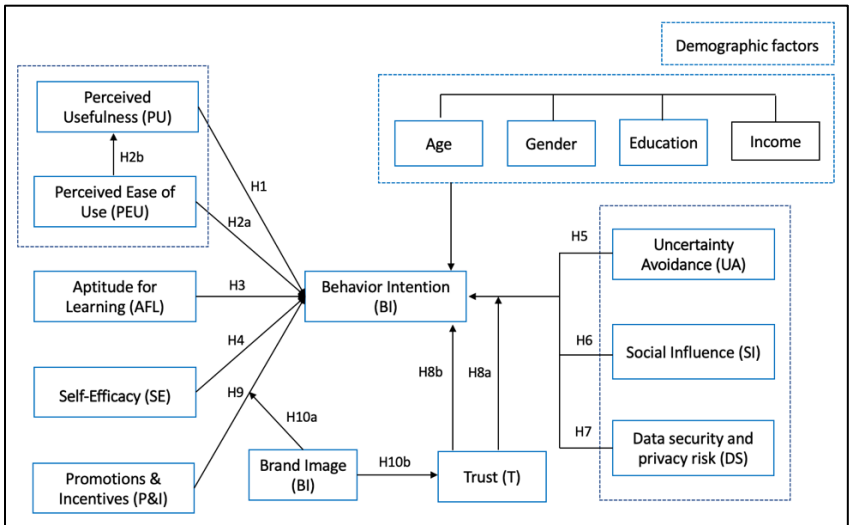

Figure 4: Proposed conceptual model

Source: Author's creation

Furthermore, previous research has entirely overlooked the examination of digital banking adoption among older users. Therefore, this novel framework can serve as a valuable tool to investigate the influential factors shaping the adoption of digital banking services among older generations.

These reviews contribute to shedding light on potential government and policy implications, providing guidance to authorities and offering insights for future researchers seeking to conceptualize, differentiate, and comprehend the underlying technology models and theories that may influence the adoption of technology, both in the past and in the future.

Appendix 1: No of developed nations used in the regression analysis

Switzerland	Irelend	Canada	Israel
Norway	Germany	Liechtenstein	Malta
Iceland	Netherland	Luxembourg	Slovenia
Hong Kong	Finland	United Kingdom	Austria
Australia	Singapore	Japan	UAE
Denmark	Belgium	South Korea	Spain
Sweden	New Zealand	United states	France

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