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Original Paper

Ensuring Risk-Free Digital-Banking in US-Economy: Application of Akim's Model

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Abstract

Humankind today lives with technology-driven lifestyles where services are carried-out in a competitive manner in economy country-wise such as the United States. In this progression, banking services are no different. It has resulted digital-banking in US-economy where few banks do not have physical branches. Under Bank Laws, Federal Deposit Insurance Corporation (FDIC) has been protecting bank deposits. However, e-banking is characterized by evolving many factors that are often unpredictable. It faces serious pitfalls being it riskiness in digital banking – bank-led and mobile-led digitals. These weaknesses cause abuses. Customers face perceived risks. It undermines growth-trends of e-banking. Dealing with the challenges in US-economy, application of Akim's model-Voluntary Insurance (VI)—a proposed product in today's e-banking, can be impetus for policy-design, which can boost number of users. Welfare Analyses have guided setting insurance-price ensuring customer's efficiency-cost so that VI becomes appealing. It can present cash-less society sooner than delaying.

Keywords

digital banking, e-banking perceived-risk, adverse choice/selection, advantageous selection, voluntary insurance

1. Introduction

Today humankind lives in world of business-mentality with technology-driven lifestyles where people do services in competitive manner. Time values in this modern world are more than ever before no matter where they live. Thus, decision-factors namely expediency and cost-effectiveness have led

individuals, organizations, and business entities to use ICT in multi-faucets. As a result, in modern-world country-wise, customers compete for comparative time-saving-option (s). Similarly, service sector like banking services is modernized, which has resulted-banking, known as *Internet-banking* and *Mobile-banking* in US-economy. This digitization includes mobile apps, online deposits, e-bill payments and more.

With this progression, the US Government has acted keeping up its two goals in policy-agenda 1) economic development and 2) seeking for being cashless society in *priority*. In policy design, two phenomena have been the key drivers of digital transformation in US-economy (Knaack & Gruin, 2017). *First*, a complex shadow banking system appeared as banks looked evading credit restrictions implemented following the implementation of crisis stimulus package. *Secondly*, the rise of using technology such as AI (such as FinTech), which allows financial institutions to automate operations like data processing and administrative tasks. The purpose of deploying such knowledge was to cut day-to-day manual tasks in financial sectors.

This has led to US's emergence as an important market for digital financial services both in size and as a source of digital financial innovation (Knaack & Gruin, 2017). Customers are also extremely interested in digitalized banking services. Actually, *at least* three in four Americans have used a bank's mobile app to conduct their daily banking tasks (Startup, 2022). In this journey, besides few traditional banks with branches in few regions have online portals. However, there are *at least* fifteen banks that have limited to no physical branches. They exist only in the digital realm and offers online banking through their website and mobile banking using their app. These banks are Ally Bank, Axos Bank, Bank5 Connect, Capital One 360 Banking, Chime, Discover Bank, Discover Bank,Go2bank, Money Lion, N26, One Finance, OnJuno, SoFi, TIAA Bank, Quontic Bank and Varo Bank (Statista, 2022c; Smart, 2022).

In US-economy, the Federal Reserve Bank oversees monetary policies and regulates financial-sector. With global progression of digital transformation, banks and other credit institutionsin the US-economy are taking absolute advantage. In competitive markets, meeting customers' demands, today the financial sector of the UShas FinTech (Hsiao & Tsung-Sheng Chang, 2014). It has been constantly experimenting with adoption of modern technologies and business models (Smart, 2022). Having affordable smart phones availability in US-economy, internet penetration rate was around 75percent in 2019 through mobile phone (www.statista.com) where US's mobile payments penetration rate is the third highest in the world (Statista, 2022c).

However, digital-banking progression in economy country-wise is characterized by evolving factors that are often unpredictable (Rahman, 2018). It faces serious pitfalls being it riskiness. Customers compete for time-saving options (Cheng et al., 2014). Banks compete for marginalizing its operating costs then enhance revenues. Most cases, customers do not read terms & conditions of services and they do not save contract-copy. These weaknesses cause abuses. Customer faces perceived risk such as hidden charges, *extra* fees to accounts (Rahman, 2018).

On this aspect, digital-banking services in US-economy is no exception. Here banks that uses online implement the same security protections as those with physical branches. Customers' money is safe if the digital bank display Member FDIC in its banking products or simply put it is a member of FDIC. Otherwise, deposit-money is at risk if a bank does not have such a logo. Since 1933, the Federal Deposit Insurance Corporation (FDIC) has been protecting deposits of up to $250,000 (Britannica, 2022). This includes savings accounts, checking accounts, certificate of deposit and money market deposit accounts (www.statista.com). The FDIC does not insure funds deposited with a credit union. The National Credit Union Administration (NCUA) supplies similar coverage when it comes to credit unions. Also, the perceived risk factors are not covered under the provision (Statista, 2022c; Startup, 2022).

However, since customers do not exactly remember the total amount s/he currently has in account, receiving email on any transactions including deducting bank-account charges cause panic to corresponding accountholders. All these perceived risk-factors have been undermining the prospects of having cashless-society in economy country-wise such as USA.

Thus, risk-factors are still barriers in digital-banking progression (Startup, 2022) where the United States is becoming multi-cultures country. Today digital-customers face perceived-risks no matter where they live even though here around 70 percent of its population uses internet services *via* mobile phone (www.statis.com).

Addressing the issues, Akim Rahman (Rahman, 2018) proposed *Voluntary Insurance* in literature as a new product in digital banking services. Underpinning Akim's model, relevant policy designs including reasonable cost or price setting of insurance can ensurerisk-freedigital banking (Rahman, 2020). On the same token, it can open doors for entrepreneurs that have new insurance companies in operation. The future digital finance will lead significant changes in business arenas as well as in human behaviors no matter where we live.

Thus, policy design including setting cost or price(s) of the VIcan be a crucial in world of digital-banking country-wise eventually. So, policymakers' attentions now for ensuring total risk-free digital-banking in US-economy are important, which is the thrust of this study.

2. Literature Review

Today's world-economy country-wise such the US-economy enjoys perceived usefulness, perceived ease of use, relative advantage, subjective norms of digital-banking services. Here self-efficacy, performance expectancy and easing conditions are few for affecting users' adoptions (Yuan *et al*., 2014). In addition, perceived risk (Cruz *et al.*, 2010; Chen, 2013), initialtrust (Zhou, 2011, trust (Koo *et al*., 2010), innovation attributes and knowledge-based trust (Lin, 2011) are also confirmed to have positive or negative effects. Thus, it is well recognized in literature that the "perceived risk" is having a significant negative and direct effect on consumers' adoptions of digital banking (Rahman, 2018; Cheng *et al.*, 2014; Lee, 2009; Kuisma *et al.*, 2007).

Addressing the digital *dilemmas* in financial sector globally, the application of Akim's model – *Voluntary Insurance* as a product of banks sector in operation (Rahman, 2018) can be win-win to parties involved. This addition to behavioral intention theories in literature, *especially*, literature in subject area of *entrepreneurship and innovation management* is now well recognized (Rahman, 2019; 2020, 2021, 2022). However, relying on extensive Web navigations as of today, it would not be overstated that no bank or banking sector of a country or countries globally has yet introduced *Voluntary Insurance* protecting digital-banking services. In this aspect, the US-economy is no exception. However, in today's world, governments in all countries want to see effective use of technology facilitation in multi-faucets within its nation and beyond for greater interest of human society.

Customers' bank accounts in many countries are insured by nation's Central Bank. For example, in the United States, banks that run online implement the same security protections as those with physical branches. Under the provision, money is safe here if the digital bank display member FDIC in its banking products or simply put it is as a member of FDIC, otherwise, money is at risk if a bank does not have such a logo (Britannica, 2022). Under the provision of the FDIC, deposits upto $250,000 is protected, which includes savings accounts, checking accounts, certificate of deposit and money market deposit accounts (Statista, 2022c). But the FDIC does not insure funds deposited with a credit union. The National Credit Union Administration (NCUA) supply similar coverage when it comes to credit unions (Statista, 2022c). However, it does not cover digital transaction, which faces perceived risk-factors such as psychological & privacy risk and time value, technological interruption etc. (Yuan *et al.*, 2014) where internet penetration rate was over 75 percent in 2019 through mobile phone (www.statista.com).Thus, it is reasonable raising question: can policymakers of US-economy be inspired adopting public policies of the VI for ensuring risk-free digital-banking?

This study takes on the challenges to layout the foundations of adopting the model-*Voluntary Insurance* for risk-free digital-banking in US-economy, which will be for the first-time in literature. Thus, the findings can be instrumental in policy-design for US-economy introducing a new product in e-banking services, which will be an example in world.

3. Why the United States?

After 1995, the Internet diffused rapidly in economy country-wise. Since a strong banking sector is important to every country stimulating economic growth and then keeping financial stability for its whole financial system, some countries were responding to this diffusion faster and some were slower (Statista, 2022c). Hence, information and technological revolution motivated banks to spend more on technology to maximize return and attract more customers who will not accept services less than above average. European as well as western countries have played significantly taking the advantages in this journey (Statista, 2022c).

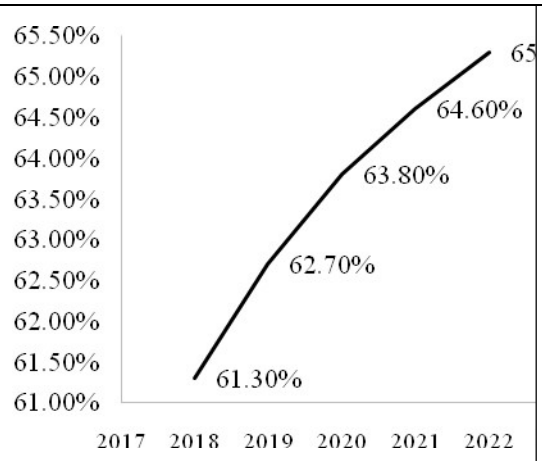


Figure 1. Share of Population Using Digital Banking in the US from 2018-2022

Source: Statista (2022a).

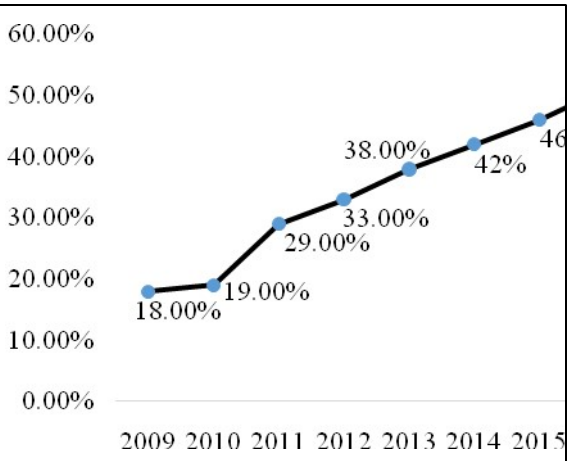


Figure 2. Share of Mobile Banking Users among Mobile Phone Owners in the US from 2009-2016

Source: Statista (2022b)

However, it faces serious pitfalls being it riskiness in digital services particularly bank-led digital services. Most cases, customers do not read terms & conditions of the services. Customers do not save service contract-copy in general. These weaknesses cause abuses. Customer faces perceived risk, which are undermining the trends of e-banking

Although internet banking in the United States has experienced a significant growth in recent years, it still regards to be its early stage of development compared to the internet banking adoption and use rate in US-economy (Cheng *et al*., 2014; Apay & Atak, 2013). In 2021, 64.6% of US Citizens used online banking (Safeatlast, 2022). It is expected that by 2022, the share will rise and reach to 65.3% (Safeatlast, 2022).

On mobile banking, major Mobile Banking in US are Ally, Bank of America, Capital One, Chase, BBVA USA, Wells Fargo, PNC, Discover and TD Bank. Experts predict that mobile payments will grow at a compound annual growth rate of 29% between 2020 to 2027, expecting to $8.94 trillion by 2027 (Spajic, 2022).

However, square mobile banking USA statistics show that 77% of survey consumers who have not used this method of payment list security as their primary reason. Mobile App fraud soared between 2015 and 2018. A study by RSA showed that mobile apps were the sources of 39% of fraudulent online transactions in 2018, up from 5% in 2015 (Spajic, 2022). Overall, mobile banking statistics from the USA show that the occurrence of fraudulent transactions originating from mobile apps grew an astonishing 600% during this period (Spajic, 2022).

When it comes digital banking for the interest of human-society, the US must aware that the direct and indirect costs of its regulatory digital-banking policies, aside real or perceived benefit of the policies. Specifically, these costs may evolve in multi-faucets such as 1) moral hazard; 2) perceived-risk and 3)

potential destabilizing effects resulting from a change in incentives on the risk-appetite faced by shareholders, bankers, depositors, and other creditors (Cheng et al., 2014). Despite recent growth trends of digital banking in US-economy, there is no insurance policy in place that covers perceived risk. In other words, digital-banking, particularly *internet-banking* face serious pitfalls being it riskiness. Customers do not read terms & conditions of services. These weaknesses cause abuses. Customer faces perceived-risk-factors. Dealing with determinant "perceived risk." the current author proposed in literature *Voluntary-Insurance* (Rahman, 2018) for economy country-wise. Adoption of the model "voluntary insurance" in digital-banking of US-economy deserves policymakers' attention for policy design meeting the challenges of perceived-risks.

4. Objectives of the Study

This study continues with three specific goals. They are

a) To apply Akim' s model VI for ensuring risk-free digital-banking in US-economy

b) To inspect the benefits adopting VI in e-banking of US-economy under welfare analysis

c) To hint on setting price or cost for insurance that ensures efficiency under welfare analysis of e-banking sector in US-economy

5. Methodology

For setting up the basis of the model-*Voluntary Insurance* (VI) in US-economy, this study uses the Consumer Choice Theory (Rahman, 2019). For policy guidance, adoption of VI policies or VI as a product in e-banking services, this study conducts Welfare Analysis of adopting VIin US-economy. So, it assesses probable cost or prices for the VI as a product.

This study uses adequate structure to allow meaningful welfare analysis, with fewer assumptions. These assumptions come at the cost of limiting the welfare analyses to only those associated with the probable pricing or cost for the VI. The Section 7 begins by showing how standard consumer and producer theory can be applied to welfare analysis of insurance markets with selection (Akerlof, 1970; Stiglitz, 1987).

With knowledge on how demand varies with price and how information changes prices, which affects the costs of insuring (endogenous) participants, this studysuppliesgraphical representation of welfare cost of inefficient pricing arising from selection. The graphs illustrate, besides others, how the qualitative nature of the inefficiency depends on whether the selection is "adverse" or "advantageous" in this study.

6. Elaboration of the Concepts

This section incorporates elaboration of concepts including the proposal *Voluntary Insurance* as follow

6.1 Digital banking: What is it?

The term digital banking combines online and mobile banking services under one umbrella. In other words, bank-led transaction or mobile-led transaction or a combination of the two is known as "On-the-Go or digital banking in today's economy country-wise. In other words, Digital banking = Online banking + Mobile banking.

In this mathematical representation, online banking means accessing banking features and services *via* bank's website using computer. Here customer can log into his/her account to check balance or paybill. Features can also be used applying for a loan or credit card in many banks *via* online banking portal. On the other hand, Mobile banking means using an app to access many of those same banking features via mobile devices such as smartphones or tablets. These apps are proprietary, issued by the bank where a customer hold shis/her account, and usually use the same login information as customer's online banking portal. The mobile banking has similar features like features helped by online banking. Mobile banking also often has convenient features like peer-to-peer payments (Forbes, 2022). Banks also may use their mobile apps to send customers banking alerts such as fraud detection and low balance notifications.

In US-economy, digital banking takes place *via* two sources. They are brick-and-mortar banks and credit unions, and online banks (Forbes, 2022).

Brick-and-mortar banks and credit unions

These traditional banking institutions usually offer online access and a proprietary mobile app to make everyday banking functions as accessible as possible for their customers. These institutions carry their own FDIC and NCUA insurance, which insures depositors' funds up to $250,000 per depositor, per bank, for each account ownership category (Statista, 2022).

Online banks

Many online banks in the United States came in market in recent years (Forbes, 2022; Statista, 2022). These online banks supply services to those who do not need a branch for their banking functions. In some cases, they may be affiliated with a traditional brick-and-mortar bank, and it serves as its online division. Or they may run solely online.

These online banks offer slimmed-down banking functions, low-to no-fee structures and higher-than-average interest rates in exchange for no in-person branch experience. These banks, with online & mobile-only product offering, can reduce operational costs. It can help more people to have access to banking services even in under banked and unbanked communities. Some of these online banks, like Ally, has started as lenders and are offering a wide range of services like online brokerage accounts, loans, and credit cards, etc.

Some of these banks are not fully chartered banks but partner with larger banks to provide essential services like checking and savings functions, along with insurance to protect depositors.

6.2 Perceived Risks in Digital-banking Services

The concept "risk" is shaped around the idea that any customer behavior involves risks in the sense that customer's actions may create consequences, which the customer cannot expect with certainty (Bauer, 1960). Thus, "Perceived risk" is powerful explaining customer's behaviors. This is because customers are more motivational to avoid mistakes than maximizing utility of using bank-led e-banking (Mitchell, 1999; Florea, 2014; Rahman, 2018; Ahmadksath, 2022). Risk is often present in choice-situation as customers cannot always be certain that a planned-use of bank-led e-banking will achieve full-satisfaction. So, the online shoppers perceive greater risk when paying online-bills even though goods are non-standardized and often sold without warranties (Zeithaml, 1981; Murray *et al.*, 1990). With this reality in today's business-mentality human-society, perceived risk is regarded as being a composite of various categories of risks. In literature, nine types of perceived-risks are recognized in e-banking services (Featherman & Pavlou, 2003; Lee 2009; Florea, 2014; Rahman, 2020). For better understanding, first, the definition of perceived risk, its distinct types and other factors that influence today's individual's behavior are outlined as follows

Perceived risk - It is an abstract concept that suggests future foreseeable for current state by predicting unfavorable circumstances and its negative impacts individuals may face. They may face risk ofa) financial b) performance c) time d) social e) psychological and f) security (Littler & Melanthiou, 2006). Based on sources of risk, the perceived-risk-factor categories are as follows

1. Psychological risk
2. Trust factor
3. PIN fraud risk
4. Security / privacy risk
5. Financial risk
6. Performance risk
7. Customer dispute
8. Social risk
9. Time risk

6.3 What is Voluntary Insurance? How Does it Work?

Addressing issues, *especially*, perceived risk-factors that undermine the growth trends of digital-banking in economy country-wise, Akim Rahman (Rahman, 2018) proposed *Voluntary Insurance* as a product of digital-banking in literature. The financial sector can introduce it as a product in operation where bank or third-party can collect premium ensuring secured services. The way it can work is that customer's participation will be voluntary. And bank will attach insurance to customer's account, if and only if, customer wants it for digital services. Since the program will be designed in a way of transferring the risk away from its premium-payers, it will ensure premium-payers with a sense of certainty. Here premium-receivers will take *extra* measures for ensuring risk-free digital-banking services. For example, e-banking transactions or digital transactions using cards can be protected by

setting two identifications such as password and a finger-scan. Overcoming the risk of heist or hacker's access to bank accounts, under the proposal, similar own set up identifications can be used. In global banking cases such as remittances, the program can ensure risk-free e-banking services.

Voluntary Insurance (VI)

It is clear now perceived-risk factor plays an influential role in setting the stage for the proposal, *Voluntary Insurance*-a product in e-banking services. It is palatable assuming that e-banking-customers are risk-averse, *i.e.*, they prefer certainty to uncertainty when it come banking. Figure 3 illustrates the risk preferences of a risk-averse banking-customer.

In a world of uncertainty, a customer's actual utility that he receives from digital services will never fall on the TU (X) but on the chord (the bold line) as shown in Figure 3. X_g, in Figure 3, stands for a service outcome in which customer may use a certain level of service X while X_f stands for a negative outcome in which customer may use less of service X. If there is a level of uncertainty that a customer may not useX_g unitsof service X, the utility that this customer receives will lie somewhere on the chord (the bold line). The chord stands for the expected utility (EU) of using service X, which lies in the concavityof the curve because it is the average probability that the customer will use service X or not. As a result, an individual will never receiveTU (X_a) but EU (X_a).

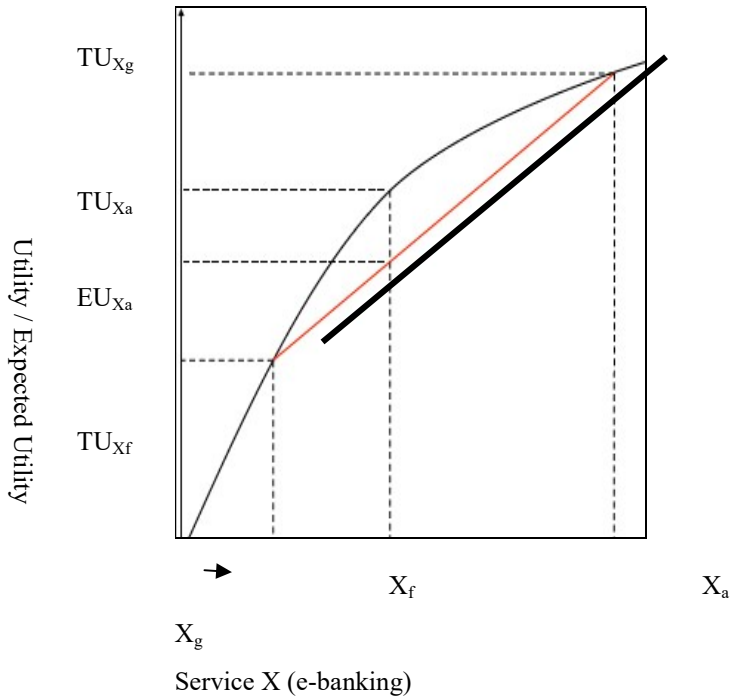


Figure 3. Risk Aversion Scenario

Source: Rahman, 2018.

7. Prospects of VI in US-Economy Underpinning Akim's Model

Once policy-practitioners recognize the importance of the proposed VI product under Akim's model and introduce banking-provisions that authorize the VI as a new product, it may spread from bankers to customers in US-economy. This process of life cycle of the VI product can be described using the "S-curve' or diffusion curve. This S-curve maps the growth of revenue or productivity against time. In the early stage of this progression, growth will be slow as the new product sets up itself. At some point, customers will begin to demand. So, the product growth trends will increase rapidly. These new incremental changes to the product will allow the growth to continue. Toward the end of its life cycle, the growth will slow down and may even begin to decline. In later stages, no amount of new investment in that product will yield a normal rate of return. However, it will set up a secured bank-led e-banking through bankers who introduce this new product, which can present a Cashless US-society soon.

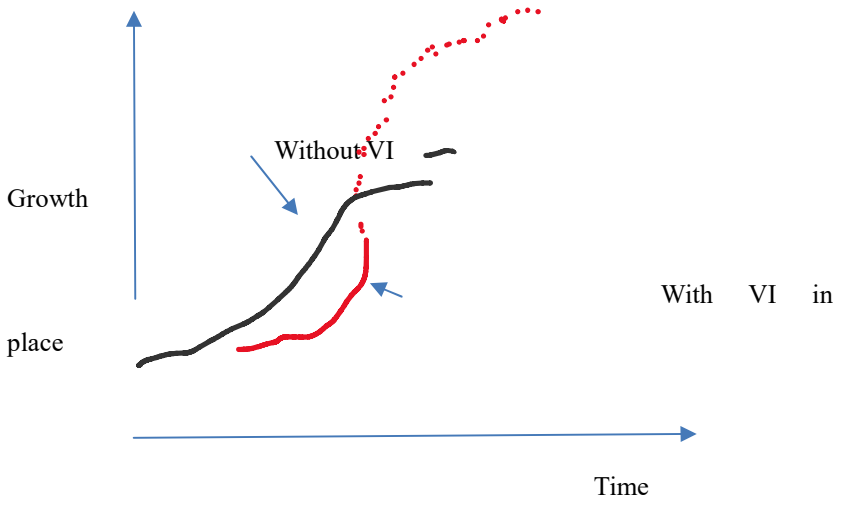


Figure 4. Impacts of VI in US-Economy through Digital Banking

This successive S-curve will come along to replace traditional banking and will continue to drive growth trends upward where the VI is likely to have "product life", i.e., i) a start-up phase ii) a rapid increase in revenue and iii) eventual decline. But it will never get off the bottom of the curve and will never produce normal returns. In these advances, it will play vital roles presenting a secured system of bank-led e-banking, which is needed attracting today's probable customers.

Overall, this progression will welcome cashless society sooner than delaying in the economy country-wise (Covergenius.com, 2022). In Fig. 4, the first curve shows a growth evolved from today's mixed of traditional & digital banking services in US-economy. The second curve shows, with introducing VI in digital-banking services, that currently yields lower growth but will eventually overtake the current growth rate and will lead to even greater levels of growth. When time comes, the digital-banking arena progression in US-economy will be an example in world where country-wise

economy may follow the United States footstep when it comes efforts for e-digital. Thus, someday economy country-wise can present cashless human-society.

8. Policy Adoption: Application of Akim's Model And outcome under Welfare Analysis

For examining benefits of bank(s) that adopts Voluntary Insurance (VI) in economy country-wise such as US-economy, this section is designed as follows

It is important for customers as well as for banks to get full information about the economic benefits of adopting VI in digital banking-services. This is because the insurance premiumwill go out from customer's pockets. In returns, it will ensure secureddigital transactions where VI will destabilize all risk including perceived risk factors, thus customers can be risk-free. Since money is going out from pocket, risk-adverse may not choose insurance in his or her preferences. It is like some people may not choose even traditional banking because of bank-account fees, bank charges etc. in general no matter where we live in the globe. So, a theoretical framework for effective cost or price ofthe VI is developed and justifiedas follows

8.1 Model

Setup & notation:

First this study considers a situation in which customers of digital-banking are faced with choices: a) signing up for insurance contract or not where signing up offers high coverage (say contract H) that ensures risk-free digital-banking b) Not signing up for insurance offers i.e. no coverage (contract L) but the contract facilitates digital-banking services, the one customers are doing now in economy country-wise such as the United States of America.

For further simplification, this study assumes that contract L is no insurance, but customers are helped for free access to e-banking. And contract His full insurance and customers are easedrisk-free e-banking services. These are merely normalizations and straightforward to relax where once the VI product is in place. Here bank (s) can manage the insurance matter just like it manages its customer-account supporting fees with the bank.

Another important assumption is that the characteristics of the contracts as given where premium of insurance to be decided endogenously. It is a reasonable characterization of insurance markets with variation across individuals only in pricing of the contracts and not in offered coverage. This analysis is therefore in the spirit of Akerlof (1970) rather than Rothschild and Stiglitz (Rothscild & Stiglitz, 1976) who endogenous the level of coverage.

Demand for insurance **-** This study assumes that each customer of digital banking makes a discrete choice of whether to buy insurance or not. Since we take as given that there are only two available contracts for e-banking services and its associated-coverage-demand is only a function of the relative price "p." We assume that banks cannot offer different prices to different customers. To the extent that banks can make prices depend on observed characteristics. We assume that if customers choose to buy insurance, they buy it at the lowest price at which it is available. So, it is sufficient to characterize

demand for insurance as a function of the lowest premium, i.e., price "p." *Mathematically*, D =f(p) where D = demand for insurance and p = premium amount or price for insurance services. Since it will be mostly digital services, the price or premium amount will be small no matter where what economy we talk about.

Supply and equilibrium–Our further assumption is that there are N ≥ 2 identical risk neutral insurance service-providers or banks in digital-banking cases that set prices in a Nash Equilibrium. There might have both imperfect and perfect competitions in VI-product market. But we choose to focus on the case of perfect competition as it stands for a natural benchmark for welfare analysis of the efficiency cost of selection (Mankiw, 2008).

We further assume that when multiple banks set the same price, individuals who decide to buy insurance at this price choose a bank randomly. We assume that the only costs of supplying contract Hto individuals" i " are insurable total cost is TC. Here average cost (AC) curve is decided by the costs of the sample of individuals choose contract H. *Symbolically*, AC = TC / i where AC reduces as i increases (i = number of customers).

To characterize equilibrium, we make two further assumptions. First, we assume that there exists a price$\bar{p}$ such that $D(\bar{p} > 0$ and MC(p) <p for every $p > \bar{p}$. In other words, we assume that it is profitable and efficient to provide insurance to those with the highest willingness to pay for it. Secondly, we assume that if there exists $\underline{p}$ such that $MC(p) > \underline{p}$ then $MC(p) > p$ for all $p < \underline{p}$. That is, we assume that $MC(p)$ crosses the demand curve at most once. It is easy to verify that these assumptions guarantee the existence and uniqueness of equilibrium. In particular, the equilibrium is characterized by the lowest break-even price P^* = AC (P).

8.2 Measuring Welfare

We measure Consumer Surplus (CS) by the certainty equivalent. The certainty equivalent of an uncertain outcome is the amount that would make an individual indifferent between obtaining this amount for sure and obtaining the uncertain outcome. An outcome with a higher certainty equivalent thus supplies higher utility to the individual. This welfare measure is attractive as it can measure monetary units. Total surplus (TS) in the market is the sum of certainty equivalents for consumers and profits of the firm or bank that supplied insurance. Throughout this analysis, we ignore any income effects associated with price changes.

8.3 Graphical Representation

With the above framework, a graphical representation of adverse-choice or adverse selection and advantageous-selection are shown as follows

This presentation can be helpful understanding the efficiency costs or prices of each type of selection of the insurance for ensuring risk-free digital banking in global economy such as the US-economy.

Adverse- selection cases

In Fig5, y-axis stands for price or cost of contract Handx-axis stands for quantity, i.e., share of individuals in the market with contract H where maximum quantity is Q_{max}. The demand curve denotes

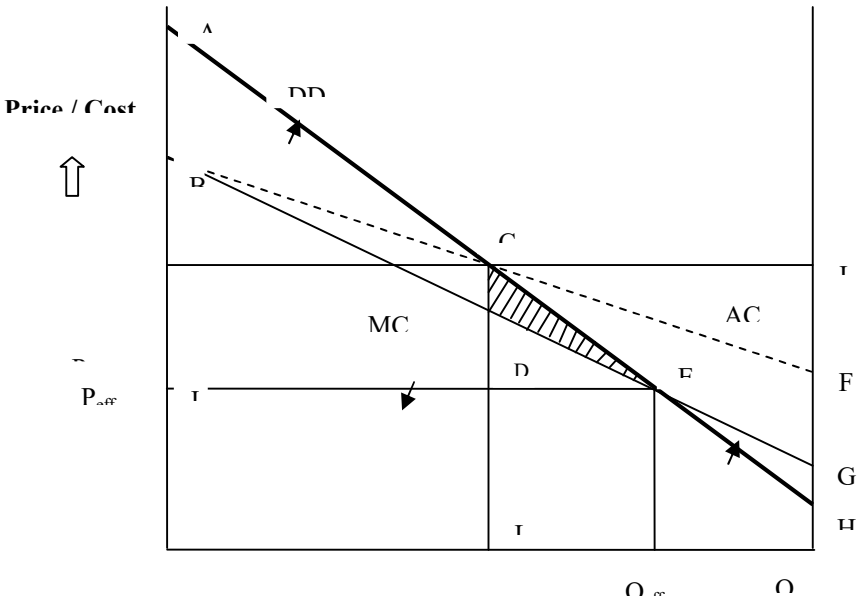
demand for contract H. Similarly, average cost (*AC*) curve and marginal cost (*MC*) curve denote average and marginal incremental costs to the insurer from coverage with contract Compared to contract L.

The key feature of adverse selection is that individuals who have the highest willingness to pay for insurance are those who, on average, have the highest expected costs. This is shown in Figure 5 by drawing a downward sloping MCcurve, which says MC is increasing in price and

decreasing in quantity, i.e., number of individuals. As price falls, the marginal individuals who select contract Hhave lower expected cost than infra-marginal individuals, leading to lower average costs.

The essence of the confidential information problem is that the bank cannot charge individuals based on its privately known MC. Banks are instead restricted to charging a uniform price, which in equilibrium implies average cost pricing. Since average costs are always higher than marginal costs, the adverse selection creates underinsurance, a familiar result first pointed out by Akerlof (1970). This under-insurance is shown in Fig 5. The equilibrium shares of individuals who buy contract H is Q_{eqm} (ACcurve intersects DD curve at point C). So, efficient number is (Q_{eff}>Q_{eqm}), this is because MC curve intersects DD curve.

In Fig 5, shaded area Δ CDE shows the welfare loss due to adverse choice. This is a loss of consumer surplus from individuals who are not insured in equilibrium because their willingness to pay is less than the average cost of the insured population. But it would be efficient to them to insure because their willingness to pay exceeds their marginal cost.



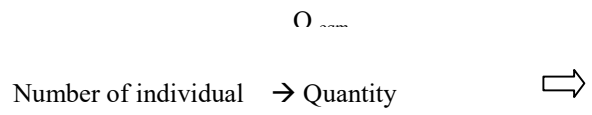


Figure 5. Efficiency Cost of Adverse Choice Under VI Policy

Let us evaluate and compare welfare under a different *scenario*. Suppose e-baking customers are mandated to sign-up for contract H. It would generate welfare = Δ ABE – Δ EGH. This can be compared to welfare at competitive equilibrium Δ ABCD. In this *scenario*, welfare at efficient allocation is Δ ABE and welfare from mandating everyone to sign up contract L (normalized to *zero*) or the policies subsidies or tax the equilibrium price.

Advantageous selection cases

The first theory of selection in insurance markets emphasized the possibility of adverse selection, and the resultant efficiency loss from underinsurance (Akerlof, 1970; Rothschild & Stiglitz, 1976). Consistent with this theory, several empirical analyses suggest that insurance markets such as health, the insured have higher average costs than uninsured (Cutler *et. al*., 2008; Meza, 2001). However, in life insurance market, there exists "advantageous selection." Those with more insurance have lower average costs than those with less or no insurance. Cutler, Finkelstein, and McGarry (2008) reviewed the evidence of adverse-choice and advantageous selection in different insurance markets.

The framework in this study, the graphical presentation in Fig6, makes it easy to describe the nature and consequences of advantageous selection. Here in *contrast* to adverse choice, with advantageous selection individuals who value insurance the most are those who have, on average, the *least* expected costs. This translates to upward sloping *MC* and *AC* curves (Figure 6). Here sources of market inefficiency arise because here i) Consumers vary in their marginal cost ii) Banks are restricted to

uniform pricing and iii) Equilibrium price is based on average cost.

However, with advantageous selection, the resultant market failure is one of over-insurance rather than under-insurance (i.e.,Q_{eff}<Q_{eqm}in Figure 6), as pointed out by de Meza and Webb (2001) in their study. In general, insurance providers have an added incentive to reduce price, as the infra-marginal customers whom they get as a result are good risks. The consequential welfare loss is given by the shaded area Δ CDE. It is resulted because of excess of *MC* over willingness to pay for individuals whose willingness to pay exceeds the average costs of the insured population. In Fig 6, welfare can also be evaluated in other situations i) mandating contract H(Δ ABE - ΔEGH) ii) mandating contract L (normalized to *zero*) and iii) competitive equilibrium (Δ ABE - Δ CDE) and efficient allocation (Δ ABE).

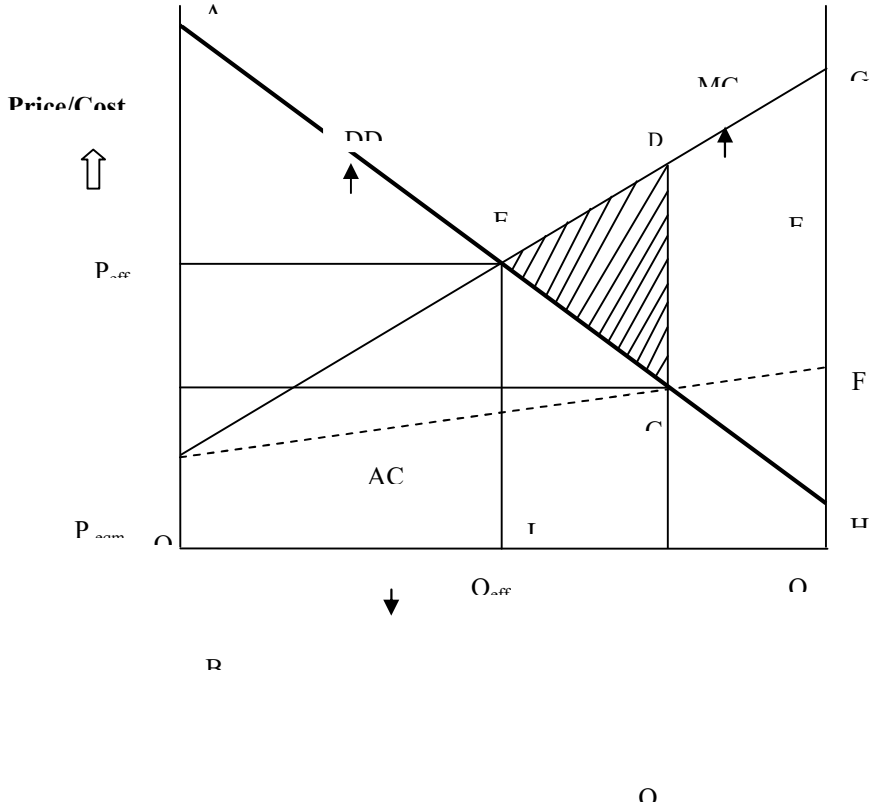


Figure 6. Efficiency Cost of Advantageous Choice under VI Policy

Graphical presentation summary and future study direction:

Analyses relate to Fig 5& Fig 6illustrate that the demand and cost curves are sufficient information for welfare analysis of equilibrium and non-equilibrium pricing of existing contracts. In other words, cases of different preferences and confidential information can have the same welfare implications if they

generate similar demand and cost curves.

8.4 Estimating Welfare under the Framework

Once again, in the bank-service Contract Form, a customer has options to choose the insurance (H) or not choose the insurance choice (L). In this case, bank itself is an insurance service provider to its customers who choose the choice. Bank deducts the amount from the customer's account. If a customer does not have account with the bank, but choose insurance, customer will bear insurance cost per transaction.

Within preferred arrangements, under our framework to estimate welfare in an insurance market requires data that allow estimation of the demand curve $D(p)$ and the average cost curve $AC(p)$. The marginal cost curve can be directly backed out from these two curves and does not require further estimation.

To see this, note that $MC(p) = \frac{dTC(p)}{dD(p)} = \frac{d(AC(p) - D(p))}{dD(p)} = \left(\frac{dD(p)}{d(p)}\right)^{-1} * \frac{dAC(p) * D(p)}{d(p)}$

With these three curves—$D(p)$, $AC(p)$, and $MC(p$ — in hand, we can easily compute welfare under various allocations, as shown in Fig 5 and Fig 6.

We know that estimating demand curve requires data on prices and quantities (i.e., coverage choices) as well as identification of price variation that can be used tracing out the demand curve. This price variation must be exogenous to unobservable demand characteristics. To estimate the $AC(p)$ curve, we need, in addition, data on the expected costs of those with contract H, such as data on next risk realization and how it translates to insurer costs. With such data we can then use the same variation in prices to trace out the $AC(p)$ curve. Because expected cost is likely to affect demand, any price variation that is exogenous to demand is also exogenous to insurable cost. That is, we do not need a separate source of variation.

With sufficient price variation, no functional form assumptions are needed for the prices to trace out the demand and average cost curves. For example, if the main objective is to estimate the efficiency cost of inefficient pricing arising from selection, then price variation that spans the range between the market equilibrium price (point C in Fig 5 and Fig 6) and the efficient price (point E) allows us to estimate the welfare cost of the inefficient pricing associated with selection (area Δ CDE) without making any restrictions on the shape of the demand or average cost curves.

With pricing variation that does not span these points, the area Δ CDE can still be estimated, but will require some extrapolations based on functional form assumptions.

9. The Current Effort: How Can it be Instrumental?

The current effort is to bring the issue to policymakers' attentions so that proposed new product can be introduced in e-banking operation in countries such as the United States. This raises questions: how can this product be instrumental to banking–sector: online banking and mobile-banking in US-economy and to its citizens?

Answering the questions posed, it is palatable that transferring risk away from customers will directly help both e-banking sector and bank-customers. It can further attract new customers who were on the brink using e-banking but just felt it was risky. The model can ease the customers with incentives for increasing usages of digital services while keeping maximized utility of it. Furthermore, any new product, *obviously* legal one, is the lifeblood of business companies and societies. It can help diverse ways such as: i) ensured new value for customers, ii) improved society iii) continued existence of the company in competitive market and iv) created or helped new upward flow of economy by creating more employment opportunities.

Voluntary Insurance in place can ensure risk-free e-banking, which can guarantee elevated self-service-banking activities in economy country-wise such as USA. This can be beneficial to customers because it can ensure savings in the form of cost and time. Also, it helps a sense of relief of a user from psychological stress of perceived risk-factors in digital-banking services. Thus, customers will flock to it when they use banking services. By extra advancement of ICT usages, banking sector can be further competent cutting off its operating costs, meeting customers' needs and keeping up with global changes.

With this *win-win* setting for producer &customer (user) of the product in e-banking, financial sector globally is no exception. To sail through tough competition and to sustain revenues, financial sector in many countries such as the US are engaging more than that of other kinds of bank on adoption of IT in its operation (Finextra.com, 2020). However, it calls for effective efforts on attracting more customers meeting challenges in case the US is moving for being "cashless society" in the future.

10. Directions for Future Studies

The future study can be*at least* in three directions. They are

a) The relative welfare ranking of the alternatives (L or H) is an open empirical question. It can study assessing welfare under *alternative policy intervention* or *no intervention choice*.

b) Whether different preferences (L or H) and confidential information can have the same welfare implications if they generate similar demand and cost curves, which can be another direction for future study.

c) A test, whether insurance premium has any impact on the probability of VIpolicy adoption that influences e-banking adoption in US-economy, can be another avenue fora future study.

11. Conclusion

Now adding the *Voluntary Insurance*, a new product in digital services, can be impetus meeting the 21st Century challenges. This new and increasing value that can keep banks or firms be growing, which can ease economy for further booming in the US. If there is no new value to offer customers, banks or firms wilt and eventually die. Thus, US policy makers can play role for better-ness of its modern-society when it come e-banking. This is because there are always chances of getting hacked e-banking customer's

username and password. Thus, online banks pursue the same degree of risk-reducing security protections, such as multi-factor authentication, as brick-and-mortar banks do. The US Federal Reserve System's warning message "For those considering one of the many online banks available, be sure to inquire about FDIC or NCUA insurance" makes the choices of e-banking to be shaky, unless the proposed VI is in place. Despite rapid growth of e-banking globally, no country has insurance in place to cover digital-transaction. But it faces serious pitfalls being it riskiness. Customers do not read terms & conditions of services. These weaknesses cause abuses. Customer faces multi-faucets perceived risks. Application of Akim's model - *Voluntary Insurance* (VI), a new product in e-banking services, can be impetus for policy-design meeting the challenges, which can enhance number of e-banking users. In this study, Welfare Analyses have guided ensuring efficiency cost of competitive pricing of insurance so that the VI becomes appealing to parties involved. In case bank becomes insurance-provider, adverse selection in insurance market, welfare cost of inefficient pricing is quantitatively small and advantageous selection results the opposite.

Future study on the proposed VI in e-banking services can be in multi-faucets. They are i) assessing welfare under alternative policy intervention ii) examining whether insurance premium has any impact on the probability of VI policy adoption influences digital banking in US-economy and iii) examining whether different preferences (L or H) and confidential information can have the same welfare implications if they generate similar demand and cost curve.

References

Akerlof, G. A. (1970). The Market for "Lemons": Quality Uncertainty and the Market Mechanism. *Quarterly Journal of Economics*, *84*(3), 488-500. https://doi.org/10.2307/1879431

Ahmadksath. (2022). *E-banking consumer behavior*. Retrieved from https://www.scribd.com/doc/31035235/e-banking-consumer-behavior

Bauer, R. A. (1960). Consumer behavior as risk-taking. In R. S. Hancock (Ed.), *Dynamic Marketing for a Changing World* (pp. 389-398). Chicago: American Marketing Association.

Britannica. (2022). The Editors of Encyclopedia. "Federal Deposit Insurance Corporation". *Encyclopedia Britannica*, *9*. Retrieved from https://www.britannica.com/topic/Federal-Deposit-Insurance-Corporation

Cheng, S., Lee, S. J., & Lee, K. R. (2014). User Resistance of Mobile Banking in China: Focus on perceived risk. *International Journal of Security and Its Applications*, *8*(2), 167-172. https://doi.org/10.14257/ijsia.2014.8.2.17

Cruz, P., Neto, L. B. F., Muñoz-Gallego, P., & Laukkanen, T. (2010). Mobile banking rollout in emerging markets: evidence from Brazil. *International Journal of Bank Marketing*, *28*(5), 342-371. https://doi.org/10.1108/02652321011064881

Chen, C. (2013). Perceived Risk, Usage Frequency of Mobile Banking Services. *Managing Service Quality: An International Journal*, *23*(5), 410-436. https://doi.org/10.1108/MSQ-10-2012-0137

Covergenius.com. (2022). *Insurance made for FinTech*. Retrieved from https://covergenius.com/fintech/

Florea, D. L. (2014). The formation of consumer's perceived risk and risk aversion in the context of innovation adoption: Qualitative research. *Network Intelligence Studies*, *2*(4), 223-231.

Forbes. (2022). Retrieved from http://www.forbes.com

Featherman, M. S., & Pavlou, P. A. (2003). Predicting e-services adoption: A perceived risk facets perspective. *International journal of human-computer studies*, *59*(4), 451-474. https://doi.org/10.1016/S1071-5819(03)00111-3

Hsiao, W. H., & Tsung-Sheng Chang, T. S. (2014). Understanding consumers' continuance intention towards mobile advertising: a theoretical framework and empirical study. *Behavior& Information Technology*, *33*(7), 730-742. https://doi.org/10.1080/0144929X.2013.789081

Knaack, P., & Gruin, J. (2017). *From shadow banking to digital financial inclusion: Regulatory framework contestation between China and the FSB* (No. 134). GEG Working Paper, Oxford, UK.

Kuisma, T., Laukkanen, T., & Hiltunen, M. (2007). Mapping the reasons for resistance to Internet banking: A means-end approach. *International journal of information management*, *27*(2), 75-85. https://doi.org/10.1016/j.ijinfomgt.2006.08.006

Lee, M. C. (2009). Factors influencing the adoption of internet banking: An integration of TAM and TPB with perceived risk and perceived benefit. *Electronic commerce research and applications*, *8*(3), 130-141. https://doi.org/10.1016/j.elerap.2008.11.006

Littler, D., & Melanthiou, D. (2006). Consumer perceptions of risk and uncertainty and the implications for behavior towards innovative retail services: the case of internet banking. *Journal of retailing and consumer services*, *13*(6), 431-443. https://doi.org/10.1016/j.jretconser.2006.02.006

Lin, H. F. (2011). An empirical investigation of mobile banking adoption: The effect of innovation attributes and knowledge-based trust. *International Journal of Information Management*, *31*(3), 252-260. https://doi.org/10.1016/j.ijinfomgt.2010.07.006

Mitchell, V. W. (1999). Consumer perceived risk: Conceptualizations and models. *European Journal of marketing*, *33*(1/2), 163-195. https://doi.org/10.1108/03090569910249229

Murray, K. B., & Schlacter, J. L. (1990). The impact of services versus goods on consumers' assessment of perceived risk and variability. *Journal of the Academy of Marketing Science*, *18*(1), 51-65. https://doi.org/10.1007/BF02729762

Mankiw, N. G. (2008). *Principles of Microeconomics*. Harvard University, 5th Edition, South-Western Cengage Learning, USA.

Rahman, A. M. (2018). Voluntary insurance for ensuring risk-free on-the-go banking services in market competition: A proposal for Bangladesh. *The Journal of Asian Finance, Economics and Business*, *5*(1), 17-27. https://doi.org/10.13106/jafeb.2018.vol5.no1.17

Rahman, A. (2019). *Microeconomics Basics–New Way Learning Microeconomics in the 21st Century Era*. Academic Publishing Company, Dhaka.

Rahman, A. M. (2020). Voluntary Insurance for Rapid Growth of On-The-Go Banking Services in World Economy: Seeking Attentions. *AIUB Journal of Business and Economics*, *17*(1), 27-40.

Rahman, A. M. (2020). bKash vs. Bank-led Option: Factors Influencing Customer's Preferences–Does it Warrant Voluntary-Insurance-Policy for Rapid-growth Digital-banking in Bangladesh-economy? *Journal of Banking and Financial Economics*, *1*(13), 44-62. https://doi.org/10.7172/2353-6845.jbfe.2020.1.4

Rahman, A. M. *et al.* (2021). Can Voluntary Insurance Ensure Risk-free Digital-banking in Chinese-economy: Seeking Attentions. *Journal of Chinese Economic and Business Studies*. Routledge Taylor & Francis Group, Volume 19, Issue 2, June 02, 2021. https://doi.org/10.1080/14765284.2021.1929792

Rahman, A. M. (2022), Customer's Opinions on Voluntary Insurance in Bank-led Digital-banking: Statistical Analysis for Policymakers' Attentions. *Athens Journal of Business and Economics*, *8*, 1-20.https://doi.org/10.30958/ajbe.X-Y-Z https://www.athensjournals.gr/business/2022-4610-AJBE-Rahman-05.pdf

Rothschild, M., & Stiglitz, J. (1976). Equilibrium in Competitive Insurance Markets: An essay on the economics of imperfect information. *Quarterly Journal of Economics*, *90*, 630-649.

Stiglitz, J. E. (1987). The causes and consequences of the Dependence of Quality on Price. *Journal of Economic Literature*, *25*(1), 1-48.

Safeatlast. (2022). *18 Online Banking Statistics You Need to Know in 2022*. Retrieved from https://safeatlast.co/blog/online-banking-statistics/#gref

Spajic, D. J. (2022). *Mobile Banking Statistics That Show Wallets Are a Thing of the Pas*. Retrieved from https://dataprot.net/statistics/mobile-banking-statistics/#:~:text=Experts%20predict%20that%20mobile%20%20payments.security%20as%20their%20primary%20reason, Accessed on 02/05/2022.

Statista. (2022a). *Share of population using digital banking in the United States from 2018 to 2022*. Retrieved from https://www.statista.com/statistics/946109/digital-banking-users-usa

Statista. (2022b). *Share of mobile banking users among mobile phone owners in the United States from 2009 to 2016*. Retrieved from https://www.statista.com/statistics/244414/percentage-of-us-mobile-phone-users-who-use-mobile-banking/

Statista. (2022c). Retrieved from http://www.statista.com

Startup. (2022). Retrieved from https://startup.info/

Smart. (2022). Retrieved from http://www.smart.info

Yuan, S., Liu, Y., Yao, R., & Liu, J. (2014). An investigation of users' continuance intention towards mobile banking in China. *Information Development*, *32*(1), 1-15. Zeithaml, V. A. (1981). How consumer evaluation processes differ between goods and services. *Marketing of Services*, *9*(1), 25-32.