

## RESEARCH ARTICLE

# Ensuring risk-free e-banking services in Russian-economy: Policy guidance

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**Received:** April 21, 2022;

**Accepted:** June 16, 2022;

**Published:** June 21, 2022.

**Citation:** Rahman AM and Islam S. Ensuring risk-free e-banking services in Russian-economy: Policy guidance. *Front Manage Bus*, 2022, 3(2): 207-218. <https://doi.org/10.25082/FMB.2022.02.002>

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**Abstract:** In today's e-banking, customers compete for comparative time-saving-options. Banks compete for maximizing profits. But many factors are unpredictable. These are perceived risks factors (PR) that undermines growth trends of e-banking in economy country-wise such as Russia. Bank-deposits, bank-accounts are covered by Deposit Insurance System (DIS) in Russian-economy. However, PR-factors are not covered. It causes abuses. Addressing the *dilemma*, application of Akim's model – *Voluntary Insurance* (VI) as a product can be instrumental attracting more individuals using e-banking. Welfare Analyses are used as guidance for ensuring efficiency-cost or competitive pricing of the VI so that it becomes appealing to both customers and Banks. When bank is an insurance-provider, under asymmetric-information, existence of adverse-selection-group is detected where estimated welfare-cost associated with inefficient pricing created by adverse-selection is small. However, advantageous-selection-group in market results opposite. The findings can be helpful in policy-design ensuring risk-free digital-banking, which can attract policy-practitioners in Russia. Using customers-opinions can facilitate empirical studies.

**Keywords:** e-banking, perceived-risk, voluntary insurance, adverse-selection, advantageous selection

## 1 Introduction

Today humankind lives in world of business-mentality where services are carried out in multi-faceted, competitive and rationality manner. Time values in today's world are counted more than ever before no matter where an individual resides. Thus, decision-factors mainly expediency and cost-effectiveness have led individuals or businesses welcoming usages of ICT in multi-faucets. As a result, in technology-driven world country-wise, service sector like banking has been modernized. Similarly, customers compete for comparative time-saving-option(s) marginalizing its operating costs. In this progression, Russian economy is no exception [1]. Besides traditional banking in Russia-economy, Yandex Money, MTS-Money, Fancy, Megafon, Yandex and Mobile Wallet, *etc.* are new ways of financial services [2]. However, it faces more fraudulent transactions than that in any other country [3].

There is no doubt that digital banking is an important product in financial sector without boundaries. However, it is characterized by evolving many factors that are often unpredictable [4]. It faces serious pitfalls being it riskiness. Customers compete for time-saving options. 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, account hacked, *etc.* [1, 5, 6].

In Russia, the main financial regulator is the Central Bank of the Russian Federation. It is also called Central Bank that oversees the monetary policy and regulates the financial industry in Russian-economy ([www.cbr.ru/eng](http://www.cbr.ru/eng)). This Central Bank is the main licensing authority for banks, insurance companies, broker-dealers, investment advisers, payment systems, *etc.* [7]. Since digital transformation significantly contributes financial sector globally, like in many countries, banks and other credit institutions in Russia are taking absolute advantages. The current ongoing Russia-Ukraine war has been positively influencing the growth trends of digital-banking usage in both countries ([www.cbr.ru/eng](http://www.cbr.ru/eng)).

With this progression, since the beginning, financial institutions have been facing greater competition and more demanding customers that have facilitated today's fintech in Russia. It

has been constantly experimenting with adoption of modern technologies and business models in Russian-economy. This makes sense when we raise question how attractive the customer base of digital transformation, especially, digital banking in Russia where there is currently internet penetration rate is 76 percent with more than 146.7 million citizens [7].

In this progression, the Deposit Insurance System (DIS), adopted by the Russian Federation in late 2003, was a significant development ([www.cbr.ru/eng](http://www.cbr.ru/eng)). It was certainly not a novelty by international standards [8]. This mandatory Russian DIS was established by the Federal Law Nr. 177-FZ of December 23, 2003 ([www.cbr.ru/eng](http://www.cbr.ru/eng)). The objectives of the DIS were in threefold: i) protecting the rights and legal interests of depositors, ii) strengthening public confidence in the Russian Federation's banking system, and iii) re-intermediating savings by the population into the domestic banking system. Another objective of the law, albeit not explicitly mentioned, was the need to enhance competition by creating a level playing field between state-owned banks and private-sector credit institutions [7, 8].

However, Russian DIS failed to ensure customer's total risk-free digital-transactions in digital-banking [2, 7]. Today digital-customers face perceived-risks no matter where they reside even though here over 76 percent of its population use internet services [1, 9]. Also, on this aspect, Russia does not have strict laws or approach(s) that can marginalize the magnitudes of "perceived risk" [2, 7].

Statista Research Department's data statistics (2022) [3] shows that over three months period (July to September of 2021), the value of unauthorized bank transactions that were made *via* remote banking services for physical entities in Russia amounted to nearly 1.7 billion Russian rubles. The fraudulent transactions conducted using ATMs and payment terminals were worth approximately 463 million Russian rubles [3]. However, in same time-period, the numbers of "unauthorized transactions" and "fraudulent transactions" in e-banking were extremely low in many countries including the USA, China *etc.* [3]. It puts the Russian-economy at the frontline when it comes impacts of perceived-risk-factors (PR) PR in today's digital-banking service-world country-wise.

Addressing the issues, *Voluntary Insurance* (VI) as a new product in digital-banking-world was first proposed in literatures by Akim Rahman [10, 11]. Underpinning Akim's model, relevant policy designs including reasonable cost or price setting of insurance can ensure risk-free digital banking. On the same token, it can open doors for *entrepreneurs* that can have VI as a new product in operation. The future digital finance will lead major changes in business arenas as well as in human behaviors no matter where we reside. Thus, policy design including setting cost or price(s) of *Voluntary Insurance* can be a crucial eventually. Accordingly, it warrants policymakers' attentions in Russia for adopting the proposal sooner than later. This study aims to use welfare analysis for policy-guidance on achieving beneficial social & economic outcomes for Russian society. So that policy-practitioners in Russia can be inspired for VI product or policy-adoption. Thus, this study proceeds with three specific objectives as follows:

(1) To attract Russian policy-practitioners' attentions adopting Akim's model – *Voluntary Insurance* (VI) in digital-banking services in Russian-economy.

(2) To examine the profitability of adopting voluntary insurance as a product in digital-banking of Russian-economy under welfare analysis.

(3) To hint on setting cost / price of VI-product in Russian-economy under welfare analysis.

(4) To layout foundations on how to apply or utilize economics tools, *especially*, welfare analysis where the policy has not yet been in practice.

## 2 Literature review

### 2.1 Survey on creditable sources on the topic

Perceived security is a belief that suggests that the online vendors will fulfill the security requirements such as authentication, integrity, encryption, *etc.* [12]. Accordingly, monetary transactions such as mobile banking require a wide range of security measures and security assurance, which have become increasingly more important with wider use of mobile banking services [13]. In terms of e-commerce, the perceived protection of confidential information is the perception of consumers regarding the extent to which the online vendors protect their private or personal information. This means that consumers will perceive greater risk if a system for protection of confidential information is not well-established by the vendors [12, 14].

On these security-issues in digital-banking, Russian-economy is no exception where besides traditional banking; Yandex Money, MTS-Money, Fancy, Megafon, Yandex and Mobile Wallet, *etc.* are new ways financial services [1]. Today digital banking is an important product in financial sector without boundaries. However, it is characterized by evolving many factors that are often unpredictable [10, 11, 15]. It faces serious pitfalls being it riskiness. Customers compete

for time-saving options. Banks compete for marginalizing its operating costs then enhance its 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, account hacked, *etc.* [4, 5, 10, 11]. It is well recognized in literature that the “perceived risk” is having a significant negative and direct effect on adoptions of digital-banking services [10–12, 16–18].

Addressing the digital *dilemmas* in financial sector globally, the application of Akim’s model – *Voluntary Insurance* as a product of banks sector in operation [10, 11] can be a 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 [5, 19].

However, relying on extensive Website navigations as of today, it would not be overstated that no bank or banks sector of a country or countries globally has yet introduced *Voluntary Insurance* protecting digital-banking services [19]. In this aspect, Russia is no exception. In today’s world, governments in almost all countries want to see effective utilization of technology facilitation in multi-faucets within its nation and beyond for greater interest of human society. Since year 2003, major Russian banks were openly appearing to be ready to embrace digital as a potential solution for maintaining and shoring up both revenues and relevance ([www.cbr.ru/eng](http://www.cbr.ru/eng)). Here Russia is categorized as a fintech-friendly jurisdiction with no unusually burdensome requirements on companies involved in this field of commerce [7]. In practice, the main regulator, the Central Bank, has also demonstrated an open-minded approach towards new financial technologies and maintains an informative website in English ([www.cbr.ru/eng](http://www.cbr.ru/eng)). In aim to a make a strong and secured digital services in Russian-economy, interested parties can engage with regulators in multi-faucets. Interested parties may engage with the regulator in many forums [7]. They are: Finopolis, an annual fin tech conference organized by the Central Bank in Sochi, the Association for Financial Technologies Development and in various smaller working groups ([www.cbr.ru/eng](http://www.cbr.ru/eng)).

There are some obstacles and uncertainties on security issues of digital banking that may impact certain business models, but it is expected to be changed soon because of recent efforts aimed to upgrade Russian regulatory framework for efficient digital economy [7]. It is also clear, big banks in Russia now lead the innovation race by leveraging existing relationships and data about their customers. For example, the largest banks are building their own financial marketplaces and *peer-to-peer* lending platforms. However, there are also many smaller companies and start-ups that are trying to challenge incumbents, especially in such areas as point-of-sale technologies and payment solutions [2].

Customers’ bank accounts in many countries are insured by nation’s Central Bank. For example, in Bangladesh, bank depositors’ deposits are insured under “Bank Deposit Insurance Law, 2000”. However, this kind of provision country-wise does not cover banking transactions no matter whether they are big banks, regional and community banks, commercial banks, credit unions and credit cards (Future digital finance, 2020). On this issue, banking provisions of Russia is no different. The provision of the deposit insurance system in Russian banking system covers bank account, and bank deposit [8]. However, it does not cover digital transaction, which faces perceived risk such as psychological, social / privacy, customer dispute and time value, technological interruption, *etc.*

Thus, efforts for inspiring policymakers in Russia for designing public policies are needed. So that banks sector becomes obligated adopting *Voluntary Insurance* policy in digital banking services for ensuing risk-free digital transaction. This study takes on the tasks by laying out the foundations of adopting the model – *VI* product for ensuring risk-free digital-banking in Russian-economy. It then spells out expected beneficial social and economic outcomes for both customers and banks using welfare analysis. So that it becomes appealing to policy-practitioners adopting *VI* product or policy in e-banking services in Russian-economy.

## 2.2 Elaboration of the concepts

For further clarity, this section elaborates concepts including *VI* product as follow

### 2.2.1 Digital or e-banking: What is it?

In today’s world, digital banking is a combination of online banking and mobile banking.

In other words, Digital banking = Online banking + Mobile banking. Customers can manage bank accounts, transfer funds, deposit checks, and pay bills, *etc.* by using online banking. Most banks and credit unions, beside traditional, let customers access their bank accounts *via* the internet.

Like in many other countries, Mobile-only banks in Russia are revolutionizing personal banking, offering an alternative to traditional brick-and-mortar banks with fast, secure, and easy to use apps for iOS and Android. Mobile banks offer competitive banking services such as current accounts,

savings accounts, loans, insurance, and debit/credit cards, often at a cheaper rate than traditional banks. These mobile-only banks, also known as challenger banks, should not be confused with an online account from traditional bank. It is 100% app-based, offering more transparency and convenience with fewer restrictions and waiting times than common banks.

In Russian-economy, mobile banking typically operates across major mobile providers through one of two ways: SMS messaging and mobile web. It is like online account access from a home-based computer. This option allows for checking balances, bill payment and account transfers simply by logging into the user’s account *via* a mobile web browser or by dialing targeted phone numbers. Here banks sector is operated providing services in multi-faucets meeting customers’ needs. Besides bank branches, Tinkoff, VTB, Lockobank and Sberbank, *etc.* in Russia are the *latest* of the progression where customers use them for banking-services no matter where they reside ([www.cbr.ru/eng](http://www.cbr.ru/eng)). These financial-service providers here act as a catalyst for economic development of unbanked population by providing prompt, fast and safe banking products, and services. Customers here enjoy user-friendly setup compared to that of other kind digital-banking option.

**2.2.2 Perceived risks in digital-banking services**

The “risk” concept is shaped around the idea that customers’ behaviors involve risks in the sense that any customers’ actions may create consequences that they cannot anticipate anything approaching with certainty [20]. “Perceived risk” is powerful in explaining customers’ behaviors because customers are more often motivated to avoid mistakes than to maximize utility using e-banking [4, 10, 11, 19]. Risk is often present in choice-situation as customers cannot always be certain that a planned-use of e-banking will achieve absolute-satisfaction. Online shoppers perceive greater risk when paying online-bills even though goods are non-standardized and often sold without warranties [10, 11, 21, 22]. Underpinning this reality in today’s competitive markets, perceived risk is regarded as being a composite of several categories of risks. In literature, several types of perceived risks have been identified in e-banking services [17, 19, 23].

The distinct types are perceived risk factors 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.

**2.2.3 Lessons-learnt**

In literature, on customers’ preferences, a comparison-study in Bangladesh-economy, between mobile-led and bank-led options was carried out by Akim Rahman [19]. It is assumed to be served as *lessons-learnt* for better understanding of factors that has resulted a higher trend of bKash (mobile-led) usage over bank-led usage digital in Bangladesh.

There are more than thirty million customers who use bKash for digital-transactions and accordingly there are over 0.2 million agents located around Bangladesh (The Daily Star, 2021). Here trend of bKash-users has been growing geometrically. However, trend of bank-led-users has been growing *mathematically* – very slowly in city areas & it would not be overstated claiming it does not exist in rural areas, even though bank-sector promotes it desperately curtailing the magnitudes of its operating cost [19]. For clarity on whether perceived risk factor has overall played significantly undermining the growth of the trend of bank-led digital-banking, the author used a comparison in Table 1.

**Table 1** Position in consumer’s preferences mobile-led (bKash) vs. bank- led “Digital-banking”. (Source: Rahman (2020) [19])

Determinant	b-Kash	Bank-led
	Position	Position
Confirmation by making phone call (s)	1 <sup>st</sup> (+)	1 <sup>st</sup> (-)
<b>Perceived risk factors</b>		
Psychological risk	4 <sup>th</sup> (+)	4 <sup>th</sup> (-)
Privacy risk	2 <sup>nd</sup> (-)	2 <sup>nd</sup> (+)
Financial risk	3 <sup>rd</sup> (-)	3 <sup>rd</sup> (-)
Performance risk	6 <sup>th</sup> (+)	6 <sup>th</sup> (-)
Social risk	5 <sup>th</sup> (+)	5 <sup>th</sup> (-)
Access / Familiarity with Internet	2 <sup>nd</sup> (+)	2 <sup>nd</sup> (-)
Convenience for transaction	1 <sup>st</sup> (-)	1 <sup>st</sup> (+)
Bonus for digital banking	1 <sup>st</sup> (-)	1 <sup>st</sup> (+)
Confirmation <i>via</i> SMS	1 <sup>st</sup> (+)	1 <sup>st</sup> (+)
Focus option (phone call confirmation)	1 <sup>st</sup> (+)	1 <sup>st</sup> (-)
Focus of comparison effects	1 <sup>st</sup> (+)	1 <sup>st</sup> (+)
Know-how-skill	1 <sup>st</sup> (+)	1 <sup>st</sup> (-)
Self-image	1 <sup>st</sup> (-)	1 <sup>st</sup> (+)

In Table 1, the serial number or position of the factor in contribution reflects customer preferences in choosing bKash or bank-led digital banking in Bangladesh-economy. Here positive (+) sign means “positively influences” and negative (-) sign means “negatively influences” the choice of bKash or bank-led digital banking when a customer is decided for e-banking. It further shows mobile-banking is more appealing than that of bank-led digital because of perceived risk (PR) issue, which raises question: what is VI and how can it be instrumental?

### 2.2.4 Voluntary Insurance

Addressing issues of perceived risk-factors that undermine the growth trends of e-banking in economy country-wise, Voluntary Insurance (VI) as a product of digital-banking has been proposed by Akim Rahman in literature [10, 11]. 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 would work is that customer’s participation will be voluntary. Insurance will be attached 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, Credit Cards, Bank Cards, etc. can be protected by setting two identifications such as password and a finger-scan. Suppose a customer wants to use credit card where to access his account, the customer will have to use two identifications namely own setup password and previously chosen finger-scan say his thump or forefinger scan. Here finger scan in addition to password can be connected to the card system, which will make digital banking to be enhanced secure. Overcoming the risk of heist or hacker’s access, under the proposal, similar own set up identifications can be used. In global banking cases such as remittances, the program can ensure risk-free digital banking.

Here VI is proposed as a new product in e-banking services where perceived-risks play an influential role in setting the stage for the VI usage 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 and the proposed VI can ensure the certainty. That raises question: how the VI product would work?

On answering “how the VI product would work?” this section begins with by establishing the basis of the model VI in Russian-economy. It uses the Theory of Consumer Choice & Behaviors [5]. Figure 1 illustrates the risk preferences of a risk-averse banking-customer.

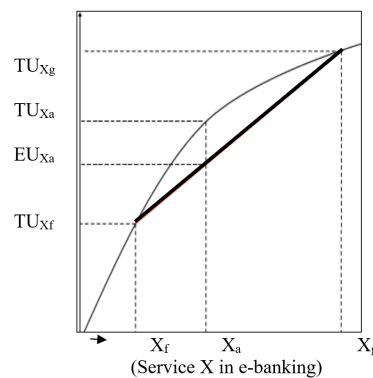


Figure 1 Risk aversion scenario [5]

In a world of uncertainty, a customer’s actual utility that he receives from digital services will never fall on the TU (X) but rather on the chord (the bold line) as shown in Figure 1. Xg, in Figure 1, represents a service outcome in which customer may use a certain level of service X while Xf represents a negative outcome in which customer may use less of service X. If there is a level of uncertainty that a customer may not use Xg units of service X, the utility that this customer receives will lie somewhere on the chord (the bold line). The chord represents the expected utility (EU) of using service X, which lies in the concavity of the curve because it is the average probability that the customer will use service X or not. As a result, an individual will never receive TU (Xa) but EU (Xa).

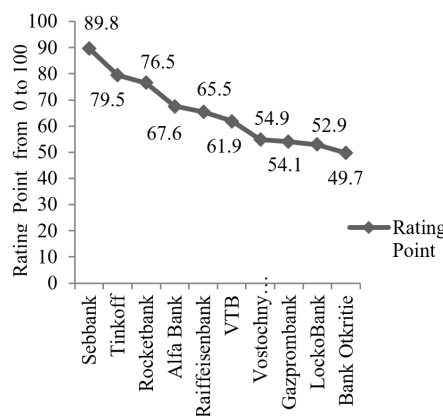
## 3 Why Russia?

Banks play a predominant and interventional role in Russian-economy and its decisive inputs in payment-systems and in money and capital markets is evidence of a growing and smoothly operating economy [2]. Here the development of the economy is dependent on the stability of the

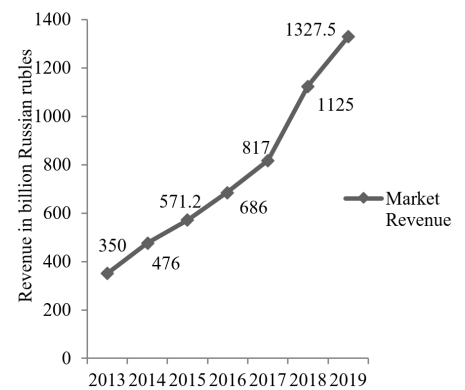
banking and financial system like any other countries. In support of DIS provision in Russian-economy, it was promoted that the DIS provision would facilitate (i) greater public confidence in financial institutions (ii) the need to protect small depositors and (iii) the benefits of leveling the playing field between the different classes of banks, particularly private and public, thereby bolstering competition in the financial sector ([www.cbr.ru/eng](http://www.cbr.ru/eng)). However, aside from real or perceived benefits of the DIS, there was increasing awareness of its direct and indirect costs. Specifically, these costs may evolve in multi-facets such as i) moral hazard ii) perceived-risk and iii) potential destabilizing effects resulting from a change in incentives on the risk-appetite faced by shareholders, bankers, depositors, and other creditors [24].

Digital Transformation is no longer a buzzword in world-economy country-wise. It is the profound transformation of business processes, competencies, and models to fully leverage the changes and opportunities of digital technologies and their impact across society, in a strategic and prioritized way. Accordingly, national Digital Strategy has been recently designed in Russia. Although it was not one of the government’s priorities up to now, the private sector has been trying to get on the train of digitalization and cultural shift as soon as possible ([www.cbr.ru/eng](http://www.cbr.ru/eng)). Succeeding in this task is far more than crucial. It is the only way to future development.

In Russian-economy, fin tech companies provide financial services using big data, artificial-intelligence (AI), machine learning, robotization, blockchain, cloud technologies, biometrics, etc. Here the business models range drastically from traditional payments and collective investments to such novel areas as crypto currencies, initial coin offerings (ICOs) and robo-advisers. Each business model is always subject to its specific set of regulations and licensing requirements. Given this fact, there is no universal fin tech license in Russia. Instead, each business model of fin tech is regulated separately. Some business models, such as payments, are subject to established regulations that were adopted several years ago, while many others are subject to no regulation at all or operate in the grey area of the law [7].



**Figure 2** Ranking of best mobile banking applications in Russia in 2019

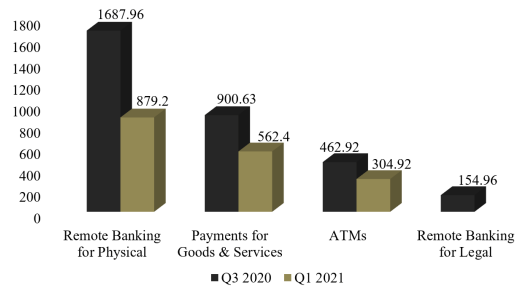


**Figure 3** Annual revenue of online payments in Russia from 2013 to 2019

Figure 2 and 3 show recent years digital-banking usages penetration in Russian-economy. Figure 2 shows that the Sebbank dominates the market. Figure 3 shows that the trends of market-revenue progresses were steady fast from year 2013 to 2019. Here the amount of individual bank accounts with the ability of the distance access through mobile devices increased more than by 20 times [1]. Every year increased banks start to offer mobile banking services. Despite this, the popularity of mobile banking applications is lower than the popularity of other banking services. Thus, the problem of mobile banking adoption by customers is still an important problem where perceived risk-factors dominate the issue [1].

Despite rapid growth of digital-banking in Russia, there is no insurance policy that covers PR, which is very often faced by customers in Russian-economy. In other words, digital-banking face serious pitfalls being it riskiness in Russian-economy [1, 2]. Figure 4 shows that over three months’ time-period, July to Sept of 2021, the impact of PR in e-banking was declining compared to that during same time-period in year 2020 in Russian-economy [3].

Here the value of unauthorized bank transactions that were made *via* remote banking services for physical entities in Russia amounted to nearly 1.7 billion Russian rubles. Fraudulent transactions conducted using ATMs and payment terminals were worth approximately 463 million Russian rubles [3]. Since the ongoing Russia-Ukraine War has been influencing growth trends of e-banking uses meeting the consumers demands in both countries, it is palatable that the impacts of the PR have been growing too. In other words, digital-banking faces serious pitfalls being it riskiness in Russian-economy [1, 2].



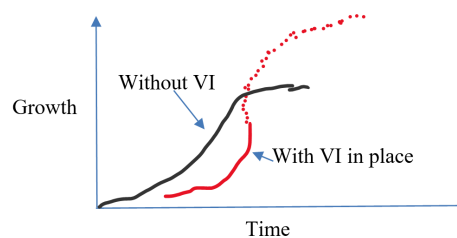
**Figure 4** Value of unauthorized bank transactions in Russia in 3rd quarter 2021 2021 (Source: Statista Research Dept, 2022; www.statista.com)

Figure 4 clearly shows that e-banking customers severely face the impact of perceived-risk. Dealing with the determinant “perceived risk”, application of Akim’s model *Voluntary-Insurance* [10, 11] can be instrumental in Russian-economy, which deserves policymakers’ attentions. This study puts forward efforts for that.

### 4 Prospects of the VI in Russian economy

Once policy-practitioners recognizes 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 be spread from bankers to customers in Russian-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 is slow as the new product establishes itself. At some point customers begin to demand and the product growth increases more 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 establish a secured bank-led digital banking through the bankers who introduce this new product, It can present a Cashless Russian-society sooner than delaying.

This successive S-curve will come along to replace the traditional banking and will continue to drive growth upwards where the VI is likely to have “product life” *i.e.*, a start-up phase, a rapid increase in revenue and eventual decline. But it will never get off the bottom of the curve and will never produce normal returns. In this progression, it will play important roles presenting a secured bank-led digital-transaction system, which is mostly needed to attract today’s probable customers.



**Figure 5** Probable impact of VI in Russian-economy through e-banking services

Overall, this progression will welcome cashless society sooner than delaying in the economy country-wise (Covergenius.com, 2022). In Figure 5, the first curve shows a growth evolved from today’s mixed of traditional & digital banking services in Russian-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 lead to even greater levels of growth. When time comes, this progression of digital-banking arena in Russian-economy will be an example in world-economy where country-wise economy may follow Russian’s footsteps when it comes efforts for digital-banking progression. Accordingly, someday world-economy can present cashless human-society.

### 5 Application of Akim’s model

For guidance in policy design – adoption of the VI policies including assessing amount of cost or prices of VI policy or product, this study carries out Welfare Analysis of the application of VI model in Russian Digital-banking system. With fewer assumptions about the underlying primitives, this study imposes enough structure to allow meaningful welfare analysis. These

fewer assumptions come at the cost of limiting the welfare analyses to only those associated with the probable pricing or cost for the VI. It begins by showing how standard consumer and producer theory, in microeconomics, can be applied to welfare analysis of probable VI market with selection [25,26].

Since welfare analysis requires knowledge on how demand varies with price and how information changes the price, which affects the costs of insuring participants, this study uses these insights to provide a particular graphical representation of welfare cost of inefficient pricing arising from selection. These graphs can be viewed as it is providing helpful intuition as follows

Besides other things, the graphs illustrate how the qualitative nature of the inefficiency depends on whether the selection is adverse or advantageous. In adverse-selection cases, inefficiency is the outcome of market failure because of asymmetric information. This uneven knowledge causes the price and demand for services in a market to shift. So, accurate information is essential for sound economic decisions. But the adverse-selection group will take preventive measure protecting the account. In advantageous-selection cases, since the account is insured, e-banking account-holder will not be enthusiastic taking preventive measures to protect the account, which causes welfare losses.

In aim to examine the benefits or profitability of bank(s) that adopts the VI in economy country-wise such as Russia, 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 *premium* will go out from customer's pockets. In returns, it ensures a safe & secured digital transaction where VI destabilizes all risk including perceived risk factors. Thus, customers can be risk-free. Since individual here requires directly spending money, risk-adverse may not choose insurance in his or her preference. It is like some people may not choose even traditional banking because of the bank-account fees, bank charges, *etc.* in general no matter where we reside in the globe.

## 5.1 Model

### 5.1.1 Setup & notation

First of this study considers a situation in which customers of digital-banking are faced with choices: i) signing up for insurance contract or not signing up offers high coverage say contract H ensures risk-free digital-banking ii) Not signing up for insurance offers *i.e.*, no coverage say contract L, but the contract facilitates digital-banking services.

To further simplify the exposition, we assume that contract L is no insurance, but customers are facilitated for free access to digital banking. And contract H is full insurance and customers are facilitated digital-banking services. These are merely normalizations and straightforward to relax where once the VI policy is in place, bank (s) can handle the insurance matter just like it handles its customer account maintaining fees with the bank.

Another important assumption is that we take the characteristics of the contracts as given where premium of insurance to be determined endogenously. It is a reasonable characterization of many insurance markets with variation across individuals only in the pricing of the contracts and not in offered coverage. This analysis is therefore in the spirit of Akerlof (1970) [25] rather than Rothschild and Stiglitz (1976) [26] who endogenous the level of coverage.

### 5.1.2 Demand for insurance

It is assumed 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 digital-banking services and their associated coverage, demand is only a function of the relative price  $p$ . It is assumed that banks cannot offer different prices to different customers. To the extent that banks can make prices depend on observed characteristics. It is assumed 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.

### 5.1.3 Supply and equilibrium

Assumed that there are  $N \geq 2$  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 market. But we choose to focus on the case of perfect competition as it represents a natural benchmark for welfare analysis of the efficiency cost of selection [22].

This analysis further assumes that when multiple banks set the same price, individuals who decide to purchase insurance at this price choose a bank randomly. It can also be assumed that the



only costs of providing contract H to individuals  $i$  are insurable total cost is TC. Here average cost (AC) curve is determined 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. Second, we assume that if there exists  $p_*$  such that  $MC(p_*) > p_*$ , then  $MC(p) > p$  for all  $p < p_*$ . 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  $P^* = AC(P)$ .

## 5.2 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 provides higher utility to the individual. This welfare measure is attractive as it can be measured in monetary units. Total surplus (TS) in the market is the sum of certainty equivalents for consumers and profits of the firm or bank that provided insurance. Throughout we ignore any income effects associated with price changes.

## 5.3 Graphical representation

With the above framework, a graphical representation of adverse-selection and advantageous-selection are shown as follows. The graphical presentation facilitates for better understanding the efficiency costs or competitive prices of the VI in digital-banking services by incorporating customer-types in selection-choices of the insurance for ensuring risk-free digital banking. This individual-choice may someday present a cashless Russian-economy, which is a dream of today's Russian-society.

### 5.3.1 Adverse selection

In [Figure 6](#), y-axis represents price or cost of contract H and x-axis represents quantity *i.e.*, share of individuals in the market with contract H where maximum possible quantity is denoted by  $Q_{max}$ . 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 H relative 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 6](#) by drawing a downward sloping MC curve, which indicates MC is increasing in price and decreasing in quantity *i.e.*, number of individuals. As price falls, the marginal individuals who select contract H have 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, but are instead restricted to charging a uniform price, which in equilibrium implies average cost pricing. Since average costs are always higher than marginal costs, *i.e.* ( $AC > MC$ ), adverse selection creates underinsurance, a familiar result first pointed out by Akerlof (1970). This under-insurance is shown in [Figure 6](#). The equilibrium shares of individuals who buy contract H is  $Q_{eqm}$  (AC intersects DD at point C). Accordingly, efficient number is ( $Q_{eff} > Q_{eqm}$ ), this is because MC curve intersects DD curve.

In [Figure 6](#), shaded area CDE shows the welfare loss due to adverse selection. This represents 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.

To evaluate and compare welfare under a different *scenario*, suppose digital-banking customers are mandated to sign up for contract H. It would generate welfare =  $\Delta ABE - \Delta EGH$ . This can be compared to welfare at competitive equilibrium  $\Delta ABCD$ . In this *scenario*, welfare at efficient allocation is  $\Delta ABE$  and welfare from mandating everyone to sign up contract L (normalized to zero) or the policies subsidies or tax the equilibrium price. The relative welfare ranking of these alternatives is an open empirical question, which can be studied to assess welfare under alternative policy interventions (including no intervention option).

### 5.3.2 Advantageous selection

The initial theory of selection in insurance markets emphasized the possibility of adverse-selection, and the resultant efficiency loss from underinsurance 25,26. Consistent with this theory, many empirical analyses suggest that insurance markets such as health, the insured have

higher average costs than uninsured [27, 28]. 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) [27] provide a review of the evidence of adverse and advantageous selections in different insurance markets.

The framework in this study, graphical presentation in Figure 7, makes it easy to describe the nature and consequences of advantageous selection. Here in contrast to adverse selection, 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 7). Here source of market inefficiency arises 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.

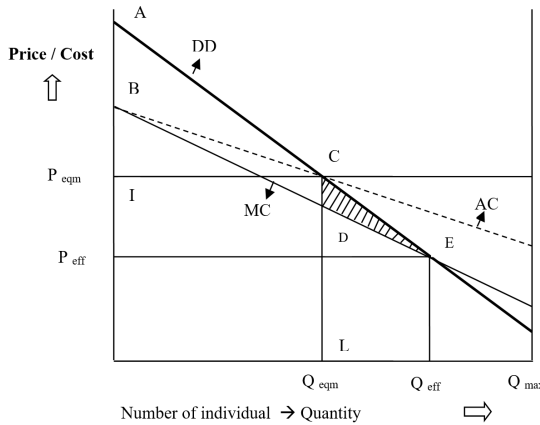


Figure 6 Efficiency cost of adverse-selection under VI Policy

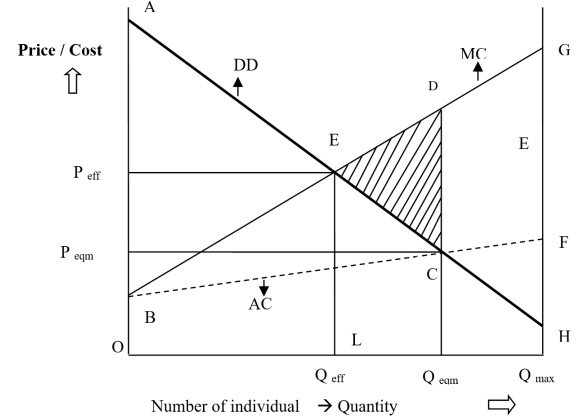


Figure 7 Efficiency cost of advantageous-selection under Voluntary Insurance Policy

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 7), as pointed out by de Meza and Webb (2001) [28] in their study. In general, insurance providers have an additional incentive to reduce price, as the infra-marginal customers whom they acquire as a result are relatively good risks. The consequential welfare loss is given by the shaded area  $\Delta CDE$ . It is resulted because of excess of MC over willingness to pay for individuals whose willingness to pay exceeds the average costs of insured population. In Figure 6, welfare can also be evaluated in other situations i) mandating contract H ( $\Delta ABE - \Delta EGH$ ) ii) mandating contract L (normalized to zero) and iii) competitive equilibrium ( $\Delta ABE - \Delta CDE$ ) and efficient allocation ( $\Delta ABE$ ).

### 5.3.3 Graphical presentation summary and future study direction

Analyses relate to Figure 6 and 7 illustrate 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. This is essential for carrying out empirical approach under welfare analysis, which can be a direction for future research in this study. Also, a test whether insurance premium has any impact on the probability of the VI policy adoption that influences digital-banking adoption in Russia, can be conducted as a future study.

### 5.4 Potential moral hazard and future study

Thus far any potential moral hazard effects of the proposal “voluntary insurance” have not been discussed. Underpinning our setup of welfare analysis in this study, moral hazard does not fundamentally change the analysis, but it can only complicate the presentation. We have defined contract H to be full coverage and contract L to be no coverage but signup for using digital-banking services on his or her own risk. Here, moral hazard has no effect on the welfare analysis.

Future study on moral hazard issue can be conducted by making slight modification allowing contract L to include some partial coverage.

### 5.5 How can the current effort be instrumental?

The current effort is to bring the issue to policymakers’ attentions so that proposed new product can be introduced in digital-banking operation in economy country-wise such as Russia. This raises questions: how can this new product be instrumental to bank-sector and to society?

Answering the questions posed, it is palatable that transferring risk away from customers will directly benefit both bank-sector and bank-customers. It can further attract new customers who

were on the brink using digital banking but just felt it was risky. The model can facilitate the customers with incentives for increasing usages of digital-banking services while maintaining optimal utility of it. Furthermore, any new product, *obviously* legal one, is the lifeblood of business companies and societies. It can facilitate many ways such as: i) ensured new value for customers, ii) improved society and iii) continued existence of company in competitive market.

The *Voluntary Insurance* in place can ensure risk-free On-the-Go-banking, which can guarantee elevated self-service-banking activities in economy country-wise such as Russia. This can be beneficial to customers because it can ensure savings in the form of cost and time. Also, it facilitates 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 digital-banking, financial sector globally is no exception. To sail through tough competition and to sustain revenues, financial sector in many countries such as Russia are engaging more than that of other kinds of bank on adoption of IT in its operation [21]. However, it warrants for effective efforts on attracting more individuals as customers meeting challenges in case Russian-economy is moving for being "cashless society" in the future. Thus, findings can be a guidance for policy-practitioners' efforts for ensuring risk-free transactions of digital-banking services in Russian-economy so that the steady fast growth trends can be upheld. It can further be instrumental to digital-banking service-providers in market economy where future studies can be conducted in multi-faucets including empirical studies on "customers' opinions on how they prefer the VI.

## 6 Conclusion

Adding VI, a new product in digital services, can be impetus meeting today's challenges. This new and increasing value can keep banks or firms be growing, which can facilitate further booming Russian-economy. If there is no new value to offer customer, banks or firms wilt and eventually die-down. Thus, policymakers of Russian Federation can play role for better-ness of its modern-society when it come e-banking services. Bank Laws in Russia contains multi-faucets provisions. The adoption by the Russian Federation of a deposit insurance system (DIS) was a significant development. It covers bank-deposits, bank-accounts. But digital transactions are not insured in Russian-economy. In practice DIS intervenes to ensure that depositors do not suffer a loss if they file complaints. Despite rapid growth of digital-banking globally, no country has insurance in place to cover digital-transaction. But e-banking 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 – the VI, a new product in banking-services, can be impetus for policy-design meeting the challenges. Welfare Analyses are used as guidance for ensuring efficiency cost or competitive pricing of the VI so that it becomes appealing to parties involved. In a *scenario* where bank serves as an insurance-provider, the existence of adverse-selection group is detected where the estimated welfare cost associated with inefficient pricing created by the adverse-selection is quantitatively small with asymmetric information. However, the advantageous selection group in this insurance market results the opposite. Findings can be helpful in policy design ensuring risk-free transactions of digital-banking services in Russian-economy so that the steady fast growth trends can be upheld. Future studies can be conducted in multi-faucets including empirical studies on "customers' opinions on how they prefer the VI in digital-banking services.

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