COVID-19 Pandemic vs. Trends of Digital-banking Usages in Bangladesh-economy: Looking thru Consumer Choice Theory Lens

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Abstract
Today humankind lives-in world of business-mentality with technology-driven-lifestyles where services are carried-out in competitive and rationality manner. Banking-services are no exception. It is carried-out in competitive-mode that has resulted usages of digital-banking – Bank-led and Mobile-led digitals. However, COVID-19 has interrupted entire human-system. It puts strains on markets, governments, businesses, and individuals. But COVID-19 has increased usages of digital-banking, a product in bank-sector, in Bangladesh-economy. This study undertakes interpreting the episode COVID-19 vs. Digital-banking-usages under Consumer Choice Theory. Customers are identified in two categories and their efficiency-cost are measured and utilized for analysis purposes. Here adverse-user faces lower efficiency-price than equilibrium-price and advantageous-user faces least expected cost. Thus digital-banking- progression is an outcome of market-economics, not something else. Finally, the findings can be helpful to policymakers as well as to digital-banking service-providers for enhancing its services in market system, which may lead human-society to be cash-less-society country-wise soon.

Keywords: Digital-banking usages, COVID-19, Consumer Choice Theory, market-economics outcome and Bangladesh-economy

Introduction

Today's humankind lives in world of business-mentality with technology-driven lifestyles where services are carried out in multi-faucet, competitive and rationality manner [1]. Time values in this technology-driven world are counted more than ever before. Like any other society country-wise, Bangladeshi-society is no exception. Thus, decision-factors mainly convenience and cost-effectiveness have led individuals and businesses welcoming ICT-usage in many-folds. As a result, meeting society needs, service sector like banking has been modernized.

In Bangladesh, besides traditional banking, Bank-led and Mobile-led digital-banking have been playing significant roles in the economy. More specifically, ATM card, Debit card and Credit card etc. and now Agent Banking are in "Bank-led" category whereas bKash, Rocket, Nagad, UCash, MyCash, TCash and Sure Cash are in "Mobile-led" category [2]. These are new-ways of financial-services in today's Bangladesh-economy. The titles of these products vary in world-economy country-wise, however, its purposes and functions are more or less same globally (Rahman, 2018). Today On-the-go or digital-banking is an important product in financial sector of Bangladesh. Here Mobile-led category, especially, bKash is known to the majority of the population no matter whether they reside in city or urban or in rural areas.

While this progression was going on, the nation suddenly witnessed the consequences of the COVID-19, which initially started in Wuhan City of China. In Bangladesh, the first outbreak of the COVID-19 was on March 08 of 2020 and it went on to August of 2020 with considerable number of confirmed cases on daily basis (Daily Star, 2020). The second outbreak of the COVID-19 started from September of 2020, and it has been going on [3]. It has put unprecedented strains on markets, governments, businesses, and individuals. But simultaneously COVID-19 has facilitated the digitization-progress, especially, usages of digital- banking in Bangladesh. This development raises question: was this upward trend of usages digital banking an outcome of market economics or something else?

This study takes on the challenges to answer the question posed. It further cross-examines this progression using the Theory of Consumer & Behaviors. The expected findings of this study can be educational to the readers, particularly, to students for better understanding of this reality. It can also facilitate opening up doors for future research in the subject area country-wise in world- economy.

Literature Review

The outbreak of COVID-19, which initially appeared in Central China sometime end of December 2019 and spread to 216 countries resulting in over 8.3 million confirmed cases and over 450,000 deaths worldwide [4, 5]. Given widespread and continuous transmission of corona virus, the World Health Organization (WHO) declared it as a pandemic on March 11, 2020. The COVID-19 and its consequences have been around for about

two-years with little variation country-wise globally.

In Bangladesh, the pandemic-crisis has been around for over a year. Here city areas are more vulnerable than that in rural areas (The Daily Star, 2020). Academic institutions all over this country are still under lockdown. In initial stage of COVID-19, lockdown was deemed here to be the first and foremost step of government facing the crisis nationwide. However, it has interrupted social & educational system and human lives in multi-faucets. It has triggered several channels including labor-markets, supply-chain and patterns of consumptions, which have affected the country's economy [5]. It has disrupted the food supply and supplies of other essential goods & services that are mostly needed for survival and for advancing lives. With government's prompt efforts, the facilitations of ICT utilization, especially, digital-banking in the form of mobile-led or bank-led has helped in the process of meeting the challenges. This development has been helping the standard supply-chain and extending helps who needs most monetarily to move forward slowly but steadily, which has kept the market system running.

By so doing, Coronavirus has transformed more than just our shopping habits (The Daily Star, August 30, 2020). It has been fundamentally changing some of the keyways dealing with money itself. On the rare occasions when people have ventured outside to visit shops in recent months, they've shunned cash for fear of spreading the virus, instead tapping their card or phone at the checkout. Mainly in city areas of Bangladesh, a surge in home-delivered groceries and Uber has further propelled the rise of digital payments. In the initial stage of the COVID 19 nationwide,

hundreds of bank branches were temporarily closed, and ATM withdrawals were collapsed where these constraints had further influenced the usages of mobile-led or bank-led digital-banking services. So, it would not be overstated that the facilitation of digital banking has kept the market economics lives in Bangladesh.

Few studies, either in empirical or theoretical or in report format, have been conducted on COVID-19 vs. its impacts on global economy or any economy country-wise [5, 7, 8]. Many studies have done on the progression of usages digital-banking influenced by the COVID-19 in many countries such as Bangladesh [6]. As reported, here two big issues, having lending rate capped in place and the ongoing COVID-19, have hit hard the business of banks in Bangladesh. Most banks have experienced a decline in its revenue earnings (The Business Standard, 2020). However, the ongoing digitization becomes as major tool helping banks coping with the challenges by improving operational efficiency and by minimizing operational cost [9]. Bank sector has seen this as a helpful effort for generating further revenues in many countries like Bangladesh (Nesa J. 2020). As reported by the Business Standard, bank sector sees it as "blessing" for digitization country-wise. This is because the pandemic has pushed banks to go for expanding its digital banking services [9].

However, no study until now has been conducted on interpreting the whole episode, COVID-19 vs. Digital-banking, in-terms of Market Economics, especially, under Consumer Choice Theory. In other words, the outcome of our Web Navigation for this study suggests that no contribution in relevant literature is found particularly seeing the episode thru Consumer Choice Theory lens.

The current study takes on the tasks cross-examining and interpreting the episode, COVID-19 vs. Digital-banking usages-progression in Bangladesh, in terms of market economics. The findings can fill the gap in literature. It can further be educational to readers, especially, to service- providers of digital-banking either through Mobile-led or Bank-led in Bangladesh-economy and beyond. It can be helpful for business-opportunities in the post-COVID-19 in Bangladesh.

1. Objectives of the Study
i) To answer whether digital-banking progression, during COVID-19, was an outcome of market economics in Bangladesh-economy

ii) To interpret the episode, COVID-19 vs. Digital-banking progression in Bangladesh- economy, using Theory of Consumer Choices

Methodology
In aim to understand the progression-trends of digital-banking-services in Bangladesh-economy, first, this study uses Graphical Techniques based on data-statistics collected from the Statistics Dept., Bangladesh Bank [2]. Accordingly, Figure 1 is created with monthly total transaction-numbers of digital-banking in two categories "Mobile-led" and "bank- led" digital-banking services. The bar-chart (Fig 1) of the two categories side by side helps to understand and to compare the trends of digital-banking progression. This data statistics also captures the transaction-numbers of digital-banking during the COVID-19 crisis. It uses effective statistical techniques to capture the period "first confirmation and then spread" for better understanding in aim to establish the theoretical arguments.

Secondly, this study uses the Consumer Choice Theory in aim to capture or understand individual's preferences of using digital-banking services during any crisis such as the COVID- 19 pandemic crisis in Bangladesh. It helps to identify equilibrium market price for the services. For identifying efficient price in digital-banking-services market, it identifies two types of customers, namely adverse-users and advantageous-users. So that it can be helpful understanding efficiency costs or prices of different types of preferences for digital-banking services in world-economy country-wise.

Digital-banking: Type & Trend of Progression in Bangladesh-economy
In 2006, the Certified Government Auditing Professional (CGAP) distinguished two broad models of digital financial services (DFS) [9]. One model is led by banks and the other one is led by nonbanks. Customers quickly realized that many of

the so-called bank-led models were not actually led by banks. Rather, nonbanks were taking the lead in establishing and implementing DFS, even though banks remained the legal providers of these services. Rahman referred them as "bank-based or bank-led" vs. "nonbank-based or Mobile-led" digital-banking models in Bangladesh [10]. This title may vary from country to country. Thus, there may be many more models exist in world-economy country-wise. However, the purposes of these creations are mostly same country-wise.

With this clarity, this study elaborates on each-category and then compares their performances emphasizing pandemic-crisis period in Bangladesh-economy as follows.

Bank-led Digital-banking

Even though internet came in Bangladesh in 1996, its usage started in banking sector sometime early in year 2000. Internet Banking is gaining popularity where the recent addition is Agent Banking. A number of private and state-owned commercial banks have become online now based on the demand and requirement of fast banking [3].

Internet Banking is one of the few web-based applications that benefit the users or customer and banks in world-economy country-wise. It refers to systems that enable bank-customers to access accounts and to general information on bank products & services through a desktop or laptop or mobile phone or other intelligent devices. Internet banking means a kind of self-help financial services including account information inquiry, account transfer & payment, online payment, agency services, etc.

The first commercial bank that has launched internet banking in Bangladesh is Standard Chartered Bank. Now many banks have launched Internet Banking in Bangladesh. Amongst those HSBC, City Bank, BRAC Bank, Bank Asia, Southeast Bank, AB Bank, Eastern Bank Ltd, Mercantile Bank, Premier Bank etc are in action already [10]. Some of them are

known as online-banking, some of them are known as Internet Banking, offering numerous facilities. Like City Bank has the facility of account check and statement print including query about check book information. The top five popular internet banking services are: City Touch, EBL Sky Banking, MTB Smart Banking, SC Mobile Banking and Brac Bank Mobile [3].

Bangladesh has done tremendous job in bank-product innovation and in banking-process innovation in recent days. But in model innovation category and information category, Bangladesh is behind the international standard [6]. Here financial sectors are more concerned about Core Banking System (CBS), mobile-app development, alternative delivery channel, cards operation etc. At the present, Bangladesh has around 600,000 credit card users and as of 1st quarter of 2018, total number of plastic cards in circulation was 13,023,769 [6]. As of January 2018, there are approximately 17.61 lakh users of internet-banking. Most of the users adopt internet-banking for fund transfer operation. About 7.18 lakh transactions including 2,175 crore Taka were performed through the internet banking platform in January 2018

as reported by the Bangladesh Bank [3].

Figure 1 shows that bank-led was significantly falling behind of mobile-led during COVID-19 when it come total number of transactions of digital-banking in Bangladesh where total number of transactions in month of July 2020 was the highest.
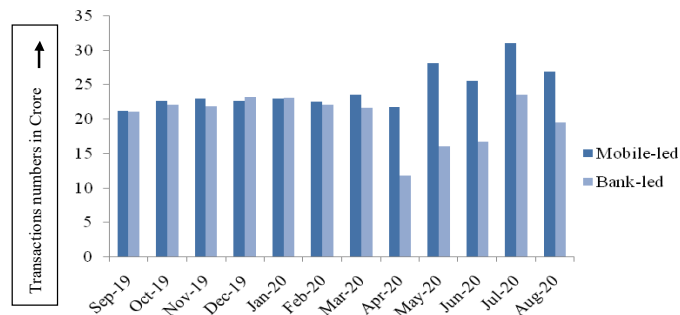

Figure 1: Mobile-led vs. Bank-led trends of transaction numbers in Bangladesh
Data Source: Bangladesh Bank, 2020

5.2. Mobile-led Digital-banking or Mobile Financial Services (MFS)
The MFS Guidelines in 2011 indicate that the journey of MFS platforms in Bangladesh started under a bank-led structure. According to the World Bank's 2017 Global Findex Database, financial inclusion in Bangladesh had increased from 3 to 21 percent and the DFS and MFS have played significant roles behind this [11]. bKash is the leading MFS platform with the highest number of users. Tweaking the level-playing field, Nagad, a digital financial service

platform was launched in 2019 under the authority of Bangladesh Post Office that offers higher transaction ceilings for consumers.

Figure 1 shows that mobile-led banking significantly leads the trends of number of transactions of digital-banking during the COVID-19 pandemic in Bangladesh where number of transactions in month of July 2020 was the highest.

The graphical presentation above is based on data period ranging from September 2019 to August 2020. It is divided it into two sub-periods to reflect the impact of pandemic crisis in Bangladesh, which represents the impacts of the COVID-19 country-wise in global pandemic crisis. In the month of March, total transaction of mobile-led digital-banking in Bangladesh was 21.7 crore, which was the lowest and 31.05 crore was highest in the month of July of 2020. In contrast, in the month of April, total transaction of bank-led digital in Bangladesh was 11.80 crore and 23.56 crore was the highest in the month of July of 2020.

5.3. Recent Trends of Digital-banking uses (both bank-led & Mobile-led)
As recently reported by the BTCL and Bangladesh, only approximately 3% Internet users in the country have been using Internet banking services in Bangladesh-economy. An analysis of the

last three years' data, Table 1 reveals that the number of Internet banking customers in the country has been increasing rapidly, but it is insignificant compared to the total number of Internet users. The percentage of Internet banking customers among the total Internet users was 2.23% in February 2019, 2.61% in February 2020, and 2.99% in February 2021, Table 1.

Table 1: Internet Banking Transaction in Bangladesh-economy

Year	IU in millions	IBU in million	Share of IBU in IU %
Feb 19	92.06	2.05	2.23
Feb 20	99.98	2.16	2.61
Feb 21	112.72	3.38	2.99

Source: The Business Standard, https://www.tbsnews.net/economy/banking

IU = Internet users; IBU = Internet banking-uses

According to the Bangladesh Bank, the number of Internet banking customers in February this year was 33.82 lakh, which was 7.77 lakh more than that in February last year. In February 2020, the number of Internet banking customers increased by 5.56 lakh compared to February 2019 and reached 26.05 lakh. This shows that during the last year, the number of Internet banking customers has increased a lot compared to the previous year (2019).

Mobile banking is a system that allows customers of a financial institution to conduct a number of financial transactions through a mobile device such as a mobile phone or personal digital assistant. Mobile banking differs from mobile payments, which involve the use of a mobile device to pay for goods or services either at the point of sale or remotely. On mobile-led banking aspect, namely bKash, Easy cash, mCash, Mobile money SureCash and Nagad etc. are more in use than others where most rural-areas in Bangladesh where bank-led services are limited, are covered by its services.

Table 2: Mobile-banking services in Bangladesh

Description	No. in May 21	No. in June 21
No. of banks serving	15	15
No. of Agents in lac	111	112
No. of registered client in lac	995.88	1012

Source: Report on Mobile and Development Intelligence, bKash, 2021

The Table 2 clearly shows that because of recently increasing demand of using Mobile-led banking in Bangladesh, the number of service-providers (registered and non-registered) have been increasing significantly. In this progress, Fortune magazine ranked bKash among the top 50 companies in their Change the World list in 2017. According to Fortune, 22% of Bangladeshi adults use bKash with around 4.5 million daily transactions. As reported by the bKash, bKash aims to keep contributing to the nation's socio-economic development [12]. Fundamentally, this is facilitated by moving increasing numbers of people operating outside the formal banking facility into an expanding financial system. bKash also makes further use of this system: "All the little amounts can potentially add up to provide larger pools of capital to address larger problems. The organization is putting all the little idle bits of capital to use to move the country's economy forward.

Summary on Trends of Digital-banking during COVID-19
During the COVID-19 crisis, the utility of these platforms was maximized by paying salaries of readymade garments (RMG) workers along with disbursing stimulus packages and safety net fund to remote areas [6]. In RMG sector, MFS platforms are being profoundly used to pay the wages of workers. Introducing interoperable digital payment systems in RMG would facilitate making payments both for the industry as well as for the workers.

The dream of shifting towards a digital economy is deeply seated in the vision of 'Digital Bangladesh' which has reflected on the increasing digital transactions within the country. Since the month of March 2020, the pandemic-crisis has steered the nationwide social and economic lockdowns and pushed the economy on the verge of collapsing. However, this has led to a sharp rise in the use of digital-payments during the COVID-19. Here total number of users are the combination of two groups population a) those who did not use the digital-banking before and now their preferences are for it because of COVID-19 and b) those who used the digital-banking before and now their preferences for it have been expanded further as much as possible because of the COVID-19. Amidst the pandemic, mobile financial services have witnessed overwhelming demands backed by the inability to make physical payments and the need for safe and secure transactions without boundaries. On top of this, the Government has facilitated digital-payment methods to mitigate the economic-impact on the sufferers of COVID-19. It has further influenced the trends of transactions no matter whether the "help" recipients were in rural area or city areas.

This data-statistics clearly shows that during COVID-19, the number of users of bank-led & Mobile-led digital-banking have been increasing significantly. Main reasons of this progressions are a) inclusion of new-users who did not use before but now because of corona-crisis and b) existing customers who are using more now than before because of COVID-19 consequences.

This clearly identifies two types of customers a) adverse-user and b) advantageous-users of digital-banking-service in Bangladesh-economy. This finding will be useful in the next-section to establish efficiency-price of adverse-users and advantageous-users in market-system for establishing equilibrium prices.

COVID-19 vs. Digital-banking: Application of Consumer Choice Theory

In Market Economics, most often economists use the terms supply and demand. The concept of a market is a way in which an economic activity is organized between buyers and sellers through their choices and interactions with another. It is not always necessary to have a media of exchange or currency in any market system as long as both buyer and seller or parties involved agree to exchange their product or services without reservation. Thus, exchange of goods or services, with or without money, is a transaction [13]. It can also be said that demand in market is determined by many factors [14]. Thus, when there is a change in demand of a product due to one or more than one factors, other than price, results lead the shift of demand curve. When factor(s) positively influences the demand of the product, demand curve shifts outward from its original position. It indicates that consumers face at higher price and purchase more units of the product. Conversely, demand curve shifts inward from its original demand curve indicating that consumers face lower price but purchase less.

For example – demand for leather jacket during winter leads higher demand and consumer faces higher price, which leads demand-curve shift outward. Conversely, demand for ice-cream during winter leads lesser demand and consumers face lower price, which pushes demand-curve inward [1].

The economic lockdown, especially, closure of traditional banking, physical distancing measures, patchy social protection system, the elevated level of informality, complicate the task. Like in many countries, the government of Bangladesh has been leveraging mobile technology to help its citizens in both domestic and internationally. Government has helped citizens quickly & efficiently distributing emergency financial supports through phones [6].

On COVID-19 vs. Digital-banking perspective, planning strategically to be on safe-side from the danger of the pandemic, an individual like most humans prefers to use mask, sanitizer etc. as protectors. On the same token individual prefers to use digital banking when s/he faces choices of monetary transactions. Beside other factors, to be on the safe-side during COVID-19, individual, either new one to digital-banking or the one who was using it before has preferred to use digital transaction in its preferences for making survival needs available to individual or to family. This was the common scenario of customers in Bangladesh-economy like any other country-economy in the globe.

With the reality of Bangladesh-economy, demand for usages of digital-banking increases during COVID-19 despite the fact that it incurs higher costs or prices for using digital-banking services. It is like, in summer season, market price or cost for buying a leatherjacket is incredibly low because the demand of leader-jacket in jack-market tends to zero. But because of winter, despite

price or cost of leader-jacket increases, demand for leader-jacket increases too. On digital- banking service cases, new users face extra cost for internet services, bank accounts fees (ex. yearly fees) or charges for using agent(s) for completion of mobile-led banking. Similarly, the ongoing users face higher costs or prices because of higher demand of internet and higher demand for digital-banking services than that before. In this scenario, consumer who is now protected from the COVID-19 or the bank or the product such as digital-banking services or the technology gains further advantage that has resulted increased returns to parties involved.

Looking thru Consumer Choice Theory Lens

The Consumer Choice Theory interprets how a consumer or individual decides to spend consumer or individual's money based on individual preferences and budget constraints. As a branch of microeconomics, consumer theory shows how individuals make choices, subject to factors such as: how much income they have available to spend, that means budget, the prices of goods & services and the necessity of the product or services. Also, understanding how consumers operate or consumers' behaviors makes it easier for vendors to predict which of their products will sell more and enables economists to get a better grasp of the shape of the overall economy.

A. Theoretical framework: Equilibrium Price vs. Equilibrium Number of Digital transaction

Setup & notation

First this study considers the COVID-19 situation where individual has choice or preference to use digital-banking or other option(s) for completing a monetary transaction. In other words, here a consumer has absolute freedom in choices or preferences underpinning individual's budget constraint or constraint of COVID-19 exposures. In this setup consumer or individual can come from either avenue – new to digital-banking or the one who is not new but have been with digital-banking choices. On the other hand, Banks and MFS – the service providers of digital-banking, are producers or sellers in the market where digital-services are products. Here service-providers charge fees or prices for the services underpinning government regulations. On the same token, users of digital-banking are the consumers or buyers of digital- banking-services in Bangladesh-economy. Accessing to digital-banking-services, customers are required to have access to internet, computer, mobile phone etc., which incurs extra costs for the customers, which is together the market price of the product, digital-banking-services. Obviously, no charges for bank-led digital-banking transaction but in case of mobile-led banking such as bKash, certain amounts are charged when sending cash to recipient. However, in most cases, paying bills such as utility-bills etc. thru bKash, there is no charge.

These are merely normalizations and straightforward to relax where bank (s) can handle customer's access to bank-led digital

services just like it handles its customer account fees. Similarly, MFS can handle customer's access to mobile-led banking services based on fees in percentage of total amount in each transaction. These are the common practices in digital banking system in Bangladesh-economy.

Demand for digital-banking-services

It is assumed that demand curve for digital-banking- services is DD, and this DD curve shifts outward due to COVID-19, which is shown by dashed line DD′ in Figure 2. It is further assumed that each customer makes a discrete choice of whether

to buy or use digital-banking-services or not where demand is a function of the relative price P or cost C for the services. Also, it is assumed that banks or MFS cannot offer different prices to different customers. To the extent that banks or MFS or Internet Service provider can make prices depend on observed characteristics. It is assumed that if customers choose to buy or use the services, they buy or use it at the lowest price at which it is available. So, it is sufficient to characterize demand for digital-banking services as a function of the lowest price P, which ensures a competitive market price of digital-banking-services. It is noted here that the market P includes consumer's all cost such as internet fees/transaction, time value, other fees, if any for completion the transaction. Mathematically, D =f (P) or D = f (C) where D = demand for digital-services and P or C = price or cost for having digital services in choices for digital- transaction.

Supply and equilibrium

It is assumed that there are N ≥ 2 service-providers or banks or MFS 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 the purposes of further our economic analysis.

It is further assumed that when multiple banks or MFS set the same price, individuals or number of transactions that are decided to purchase digital services at this price choose a bank or an MFS randomly. It can also be assumed that the only costs

of providing services to individuals i or it can also be considered as number of transactions i. Here X-axis represents number of transaction-services provided by banks or MFS. Y-axis represents price or cost for the digital services per transaction. For example, Internet usages or minute charges, individuals time value and other fees, if any.

Figure 2 shows that the market of digital-banking services where supply curve intersects with initial demand curve (D) at point E1 which shows corresponding equilibrium digital-transactions number Qeq corresponding to equilibrium price Peq. In other words, in this digital-banking- service market, advantageous-users of digital-services buy the services and bank, or MFS sell or supply the digital-services to the buyers or users of the services. Advantageous-users are those who have been using it for a lengthy period i.e., in this case, they started using before COVID-19 appearance. In this case, the users are advantageous-users, and they are taking advantages.

Now because of COVID-19, demand curve for digital-banking services shifts outward just like demand curve for leatherjacket during winter shifts outward. It results higher demand for services in digital-banking service-market, which leads higher prices or cost for accessing digital-banking-services. This is because beside advantageous users (who have already been using digital-banking services and participating in the market) the new users are in market because of COVID-19. It has resulted higher demand for digital-banking-services, which leads higher price or cost for the services in the competitive market where many banks or MFS along with Internet service providers are participating. In this competitive digital-banking-service market, Q*eq represents equilibrium number of transaction or individuals who use digital-banking service corresponding to equilibrium prince or cost P*eq.

In this setup, it is clear that P*eq > Peq and Q*eq > Qeq, which suggests because of COVID-19, the demand for digital-banking-services increases, which leads higher prices or cost for the services.
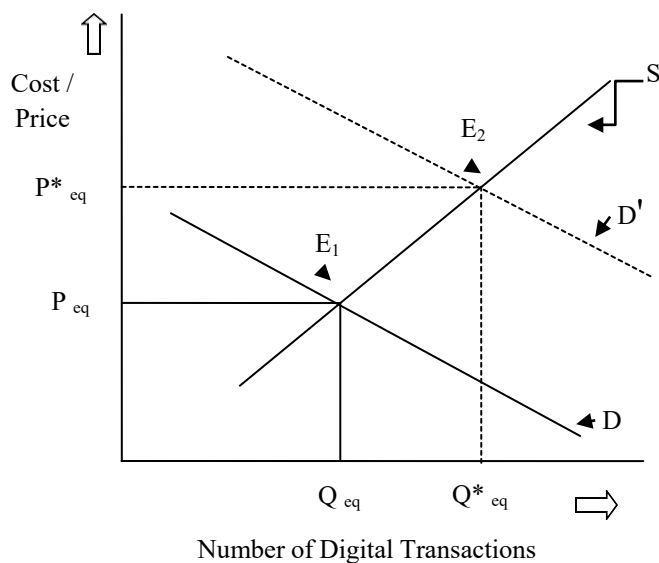
D = Demand for digital-banking services including internet

D' = New demand line for digital-banking services in presence of COVID-19. (Note: here demand line shifts outward because of COVID-19, which raises higher demand that raises prices or cost for the services.

P = Price of digital-banking services including internet price

C = Cost for the services including charges for Internet

Q = Number of transactions or individuals who use digital-banking services

Q_{eq} = equilibrium of number of trans

Q^{*}_{eq} = number of trans relates to new **D´** due to COVID-19

E_1 & E_2 →Intersection of D-S & D´- S

Figure 2: Digital-banking Services Market

B. Graphical Representation of Adverse-user and Advantageous-users of Digital-banking

With the above framework, a graphical representation of adverse-user and advantageous-user of digital-banking-services are shown as follows

This presentation can be helpful understanding the efficiency costs or prices of diverse types of preferences for digital-banking services in world-economy country-wise.

Supply and equilibrium
We further assume that when multiple banks or MFS set the same price, individuals who decide to purchase digital services at this price choose a bank or an MFS randomly. It can also be assumed that the only costs of providing services to individuals i

are total cost (TC). Here average cost (AC) curve is determined by the costs of the sample of individuals choose digital services. Symbolically, AC = TC / i where AC reduces as i increases.

In order to straightforwardly characterize the equilibrium point, this study makes two further assumptions. First, it assumes 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, this study assumes, it is profitable (and efficient) to provide services to those with the highest willingness to pay for it. Secondly, it is assumed that if there exists $\underline{p}$ such that MC ($\underline{p}$) > $\underline{p}$ then MC (p) > $\underline{p}$ for all p < $\underline{p}$. It is assumed that MC (p) crosses the demand curve at most once. It is easy to verify that these assumptions guarantee the existence & uniqueness of equilibrium. Here equilibrium is characterized by the lowest break-even price P* = AC (P).
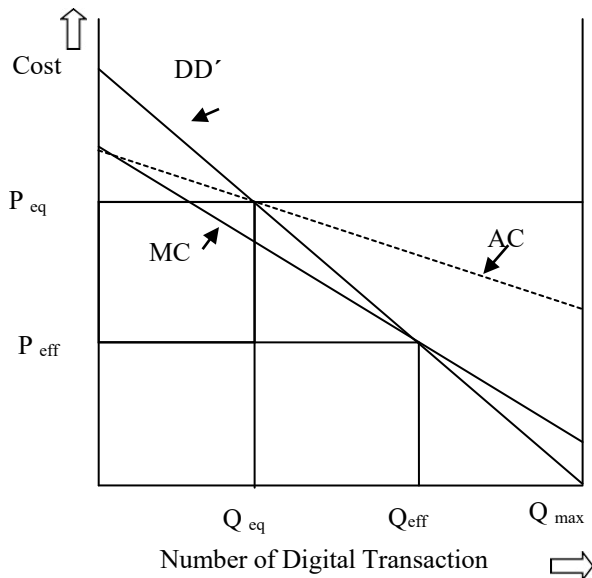
Figure 3: Efficiency cost / price of adverse user

With this setup

In Figure 3, AC curve intersects with new demand curve DD´ that shows equilibrium price Peq corresponding to equilibrium number of digital-banking transactions Qeq in case of adverse-users who did not use it before COVID-19 appearance. Now their preferences are for using digital-banking services in their choices. Here MC intersects with DD´ that shows the efficient Peff corresponding to efficient number of digital-banking Qeff.

Adverse-users of digital-banking-services
In Fig-3, y-axis represents price or cost of digital-banking services per transaction and x-axis represents quantity i.e., number of digital-transactions in digital-banking service-market where maximum possible quantity is denoted by Q max. The demand curve denotes demand for digital-banking-services. Similarly, average cost (AC) curve and marginal cost (MC) curve denote average and marginal incremental costs to the users.

The key feature of adverse-users is that individuals who have the highest willingness to pay for digital-services are those who, on average, have the highest expected costs or damages from the COVID-19. This is shown in Figure 3 by drawing a downward sloping MC curve, which indicates MC is increasing in price and decreasing in quantity. As price falls, the marginal individuals who choose to use digital banking 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, adverse-users create underuse of digital-banking services.

This under-user phenomenon is shown in Fig-3. The equilibrium shares of individuals who buy services is Qeqm (AC curve inter-
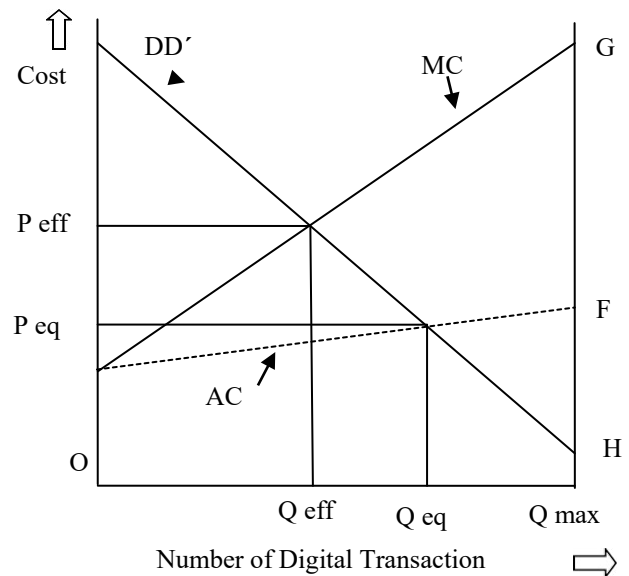

Figure 3: Efficiency cost/price of advantageous user

sects DD´ curve at point C). And accordingly, efficient number is (Qeff > Qeqm), this is because MC curve intersects DD´ curve.

Advantageous-users
The framework in this study, Figure 4 makes it easy to describe the nature and consequences of advantageous-users of digital-banking services. Here in contrast to adverse-users, the advantageous-users who value or have been using digital-banking since before COVID-19, the most are those who have, on average, the least expected costs.

This translates to upward sloping MC and AC curves (Figure 4). Here source of market inefficiency arises because of 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-users of digital-banking-services, the resultant market-failure is one of advantageous-users than adverse-users i.e., Qeff < Qeqm in Figure 4. In general, the service-providers here have an additional incentive to reduce price, as the infra-marginal customers whom they acquire as a result are relatively good risks.

Importance of the findings and plans in digital-banking progression
This contribution is one of a kind in a sense that it captures consumers' behaviors during COVID-19 crisis, which was in right-time for human-society we live in country-wise. It inspires government country-wise enhancing digital-services further, particularly in banking-sector, aiming to marginalize the crisis in terms of economics. It can further be guidance for policymakers as well as to market-system country-wise facing challenges like this-one in the future.

Since the study uses basic Microeconomics tools in completion the analysis, it can be instrumental in classroom-teaching for making clear understanding about the incident or event to students particularly to students who do not have background in subject area of economics. The findings can also be inspi-

rational to digital-banking service-providers for enhancing its services in market system, which may lead human-society to be cash-less-society country-wise soon. On top of this ongoing effort, government policies are relaxed when it come registration for agent- services in case of Mobile-banking. It is now handling by individual organization such as bKash. It is also possible, as bank-sector is interested to have a new product named Voluntary Insurance, proposed under Akim's Model (Rahman, 2018) for ensuring cash-less-services sooner than delaying in Bangladesh-economy, if it gets approved by the government of Bangladesh.

Conclusion

Today's humankind lives in world of business-mentality with technology-driven lifestyles where services are carried out in multifaceted, competitive and rationality manner. Banking services are no different. It is carried-out in competitive mode that has resulted digital-banking – Bank-led and Mobile-led digital uses in world-economy country-wise such as Bangladesh-economy. While this development was going on, slowly but steadily, the appearance of the COVID-19 pandemic in Bangladesh, like in any other country, shacked up the progression of economy. As a

result, the uncertainty for Bangladesh-economy has increased. Two big issues, i) lending rate cap in Bangladesh and ii) Covid-19, have hit the business of banks hard. Most banks experienced a decline in its revenue earnings. However, ongoing digitization becomes as major tool helping banks cope with the challenging situation by improving operational efficiency and minimizing expenditures. Bank sector has seen this as an opportunity for generating further revenues, which has pushed banks to go for expanding its digital-banking-services.

With this widespread scenario in banking-sector, this study takes the tasks to interpret the episode COVID-19 vs. digital-banking progression in terms of market-economics. Here digital- banking – Bank-led and Mobile-led digital serve as a product in competitive market where service providers (sellers) and users (buyers) face market price derived from product's market demand and supply. Now because of COVID-19, both adverse-users and advantageous-users are in market for the services, which results higher demand and higher price of digital-banking- services, which leads demand curve shifts outward from the original. Thus, progression of using digital-banking during COVID-19 is a phenomenon of market economics not something else.

On efficiency cost / price aspect on preferences of customers for digital-banking-services in Bangladesh-economy, market equilibrium price is higher than market efficiency price. The key feature of adverse-users is that individuals who have the highest willingness to pay for digital- services are those who, on average, have the highest expected costs or damages from the COVID-19. In advantageous users' cases, efficiency price or cost is higher than market equilibrium price /cost. Comparing with adverse-users, the advantageous-users who have, on average, the least expected costs. Thus digital-banking-progression in Bangladesh-economy during COVID-19 is an outcome of

market-economics, not something else. Even though the study uses a basic Microeconomics tool in analysis, it is one of a kind in literature based on the approaches utilized interpreting customers behaviors in terms of economics. It can be instrumental in classroom-teaching for making clear understanding about the incident or event to students. Finally, the findings can be helpful to policymakers as well as to digital-banking service-providers for enhancing its services in market system, which may lead human-society to be cash-less-society country-wise soon.

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