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MIDDLE EAST UNIVERSITY
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The Impact of Virtual Banking Services Cost on Profitability

Applied Study on Jordanian Commercial Banks

أثر تكلفة الخدمات البنكية الافتراضية على الربحية

دراسة تطبيقية على البنوك التجارية الأردنية

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This Thesis was submitted in fulfillment of the requirements for

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Department of Financial and Accounting Sciences

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Declaration of Originality

I do hereby declare and attest to the fact that this is an original study based solely upon my own scholarly work at Middle East University and that I have not submitted it for any other college or university course or degree.

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Dedication

I dedicated this thesis to my dad soul who was encourage me to take this step where I decided to get master's degree as well as my mom, and I will not forget my husband efforts and how he was encouraging me in order to waiting this thesis to be finalized.

Researcher

Lubna Al-Amawi

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Researcher

Lubna Al-Amawi

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List of Abbreviation

Abbreviation	Explanation
ASE	Amman Stock Exchange
OPM	Operating Profit Margin
ATM	Automated Teller Machine
NFC	Near-Field Communication
NPM	Net Profit Margin
ROA	Return on Asset
ROE	Return on Equity
IT	Information Technology
PC	Personal Computer
ICT	Informational Communication Technology
APP	Application
V-Banking	Virtual Banking
BCBS	Basel Committee on Banking Superviion
FATF	Financial Action Task Force
IFRS	International Financial Reporting Standard
VIF	Variance Inflation Factor
OLS	Ordinary Least Squares
MBanking	Mobile Banking
E-Commerce	Electronic Commerce
E-Service	Electronic Service
E-Banking	Electronic Banking
E-Payment	Electronic Payment
E-Shopping	Electronic Shopping
E-Wallet	Electronic Wallet
E-Satisfaction	Electronic Satisfaction
EcoSystem	Economic System
Soci-Economic	Social & Economic
SMS	Short Messaging Services

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The Impact of Virtual Banking Services Cost on Profitability Applied Study on Jordanian Commercial Banks

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Abstract

The study aims to examine the impact of virtual banking services cost on profitability of Jordanian commercial banks listed in Amman stock exchange market (ASE). To achieve the study objective, data was collected from 13 commercial banks were covering the period from 2010 till 2019, with 130 views surveys for the whole study period. Multiple regression was used to analyze data and test the study hypotheses. Profitability was measured using Net Profit Margin and Tobin's Q, while virtual banks services were measured through ATMs, Smart Cards, and Mobile & Internet Banking Services. Furthermore, the study used control variables, such as liquidity and financial leverage, to control the relationship between virtual banks services cost with banks' profitability. Additionally, main findings of the study revealed a statistically significant positive impact of the virtual banking services cost on commercial banks' profitability.

Based on the above results, the study offers several recommendations, the most important of which is that the banking sector should pay more attention to disclosing more and clearer information about the virtual banking services cost and encouraging main actors of the sector to invest in and further develop their virtual banking services.

Keywords: Virtual services, Profitability, ATMs, Smart Cards, Mobile banking, Internet banking**.**

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الاستاذ الدكتورة: أسماء العمارنة

الملخص

هدفت هذه الدراسة إلى معرفة أثر تكلفة الخدمات البنكية الافتراضية على الربحية، وذلك في البنوك التجارية المدرجة في بورصة عمان، ولتحقيق أهداف الدراسة، تم جمع بيانات (13) بنك تجاري في بورصة عمان، للفترة من 2010 إلى 2019، وبلغ عدد المشاهدات الكلية المستخدمة في التحليل 130 مشاهدة خلال فترة الدراسة كاملة، وقد وتم استخدام الانحدار المتعدد لاختبار فرضيات الدراسة. وقد تم التعبير عن ربحية البنوك من خلال مقياس هامش صافي الربح ومقياس توبن (Tobin's Q). في حين تم التعبير عن تكلفة الخدمات البنكية الافتراضية من خلال أجهزة الصراف الالي، والبطاقات البنكية الذكية، والموبايل والانترنت البنكي. كما استخدمت الدراسة عدة متغيرات ضابطة مثل: السيولة ونسبة المديونية وذلك لضبط العلاقة بين تكلفة الخدمات البنكية الافتراضية وربحية البنوك. وقد أظهرت نتائج الدراسة وجود أثر إيجابي ذو دلال إحصائية لتكلفة الخدمات البنكية الافتراضية على ربحية البنوك التجارية.

وفي ضوء نتائج الدراسة، قدمت الدراسة مجموعة من التوصيات أهمها ايلاء المزيد من الاهتمام من قبل القطاع المصرفي للإفصاح بوضوح عن تكلفة الخدمات المصرفية الافتراضية وتشجيع القطاع المصرفي للاستثمار بالخدمات المصرفية الافتراضية والعمل على تطويرها.

الكلمات المفتاحية: الخدمات الافتراضية، ربحية البنوك، أجهزة الصراف الالي، البطاقات الذكية، الموبايل البنكي، الانترنت البنكي.

Chapter One

Research Background and Importance

(1-1) Introduction

(1-2) Research Problem and Questions

(1-3) Research Importance

(1-4) Research Objectives

(1-5) Research Hypotheses

(1-6) Research Model

(1-7) Conceptual definitions

(1-8) Research Limitation

Chapter One

Research Background and Importance

(1-1) Introduction:

Banks play the crucial role in economic activities and in the achievement of economic growth of any country worldwide. The banking sector greatly contributes to facilitate transactions through receiving deposits from the banks clients, directing them towards better investment of their deposits, acquiring shares in local companies, and many more. These roles played by the banking sector come in conjunction with the commercial banks seeking to achieve and enhance their profitability.

Balkan (2021) study focuses on the role of technological development in changing the society, economics, banks, and banking transactions, starting from branches, which were conventional distribution channels, towards Automated Teller Machines (ATMs), Mobile, Internet Banking and Mobile Banking.

It is a fact that a strong financial sector as a driving forces to achieving economic growth, since strong financial sector and financial institutional networks motivate the people to save, invest, borrow and plan for their future, and this cycle of saving, investing and lending is very important for emerging countries to sustain economic growth (Kapadia & Vaghela, 2018).

Digital transformation is a key villar in virtual banking services since the modern ever-changing technological environment forces all banks and financial institutions to adopt and employ digital transformation in the form of virtual banking to better satisfy the new generation of user of financial services (Kitsio et al., 2021).

Bakhait et al. (2016) aims at measuring the effect of the relationship between electronic banking services and banks profitability by measuring the relationship between electronic banking services (provision, cost, and speed) and profitability (rate of return

on assets and rate of return on equity). The study concluded that there is a statistically significant relationship between provision, cost and speed of electronic banking services and the profitability of the commercial banks.

A virtual bank is a bank which conveys retail banking services through the internet or different types of electronic channels rather than physical branches. This covers all online transactions whether it is using the web, e-mail, or ATMs. It Is the utilization of financial technology and advancement to offer another sort of customer experience (Fathima, 2020).

The intrinsic value of virtual banking services to socio-economic development is now well recognized and focused on by the policy makers in both developed and developing countries. They promote cashless economics to obtain transparency and connectivity, since services are delivered through mobile phones. The internet or credit cards are the score of cashless economies (Sandhu & Arora, 2020).

The introduction and development of new delivery methods for depositor services in the banking sector, such as automated teller machines (ATMs), online banking and phone centers, may produce greater economies of scale than traditional branching network (Le & Ngo, 2020).

(1-2) Research Problem and Questions:

Problem statement stems from identifying the gap in previous studies regarding the impact of virtual banking services cost on profitability. The financial sector is considered a highly significant player, considering its contribution to the economic, social, and political conditions.

Also, banks are considered the backbone of financial economy in all countries; they invest and spend huge amounts of money in technology to replace the traditional service

and reduce their cost of operation to face the continuous completion to satisfy the emerging demands and expectation of service quality, speed, and costs.

Through the researcher's work in a bank, it has been noticed that there are difficulties in operating day-to-day operations and that there is an impact of the cost on virtual services provided by banks; accordingly, this study aims to find answers to the following questions:

First Main Question:

1. What is the impact of virtual banks services cost on Commercial Banks' profitability measured by Net Profit Margin?

   Based on the component of Virtual banks services cost, the first main question can be divided into three sub questions:

   1.1 Is there an impact of Mobile & Internet Banking Cost on Commercial Banks' profitability measured by Net Profit Margin?

   1.2 Is there an impact of ATMs Cost on Commercial Banks' profitability measured by Net Profit Margin?

   1.3 Is there an impact of Cards Cost on Commercial Banks' profitability measured by Net Profit Margin?

Second Main Question:

1. What is the impact of virtual banks services cost on Commercial Banks' profitability measured by Tobin's Q?

   The following sub-questions are derived from the second main question:

1.1 Is there an impact of Mobile & Internet Banking Cost on Commercial Banks' profitability measured by Tobin's Q?

1.2 Is there an impact of ATMs Cost on Commercial Banks' profitability measured by Tobin's Q?

1.3 Is there an impact of Cards Cost on Commercial Banks' profitability measured by Tobin's Q?

(1-3) Research Importance

1. Theoretical Importance

The importance of this study stems from the significance of the studied variables with main focus on reducing the cost of traditional services and increasing the utilization of virtual services (which facilitate accessibility) as a method to increase profitability. This topic is vital to the companies, especially with Jordanian Commercial banks expanding towards the virtualization of their activities, which promoted the researcher to investigate this new approach.

2. Practical Importance

The practical importance of this study is represented by how the Jordanian commercial banking will take benefit from applying the virtual services and customers as well, in addition to increasing its utilization instead of physical services.

(1-4) Research Objectives

The main objective for this study is to study the impact of virtual banks services' cost on profitability, this main objective will be achieved by:

A. Provide a theoretical framework for the study variables (Virtual bank services Cost and bank’s Profitability).

B. Identifying the level of relative importance of Virtual banks services on Jordanian Commercial Banking.

C. Determine the Impact of virtual banks services cost on Commercial Banks' profitability.

(1-5) Research Hypotheses

- **$H_0$1:** There is no significant impact of virtual banking services cost on profitability "measured by net profit margin".
    - **$H_0$1-1:** There is no significant impact of Mobile & Internet Banking Costs on profitability "measured by net profit margin".
    - **$H_0$1-2:** There is no significant impact of ATMs Costs on profitability "measured by net profit margin".
    - **$H_0$1-3:** There is no significant impact of Cards Costs on profitability "measured by net profit margin".
- **$H_0$2:** There is no significant impact of virtual banking services cost on profitability "measured by Tobin's Q".
    - **$H_0$2-1:** There is no significant impact of Mobile & Internet Banking Costs on profitability "measured by Tobin's Q".
    - **$H_0$2-2:** There is no significant impact of ATMs Costs on profitability "measured by Tobin's Q".
    - **$H_0$2-3:** There is no significant impact of Cards Costs on profitability "measured by Tobin's Q"

(1-6) Research Model

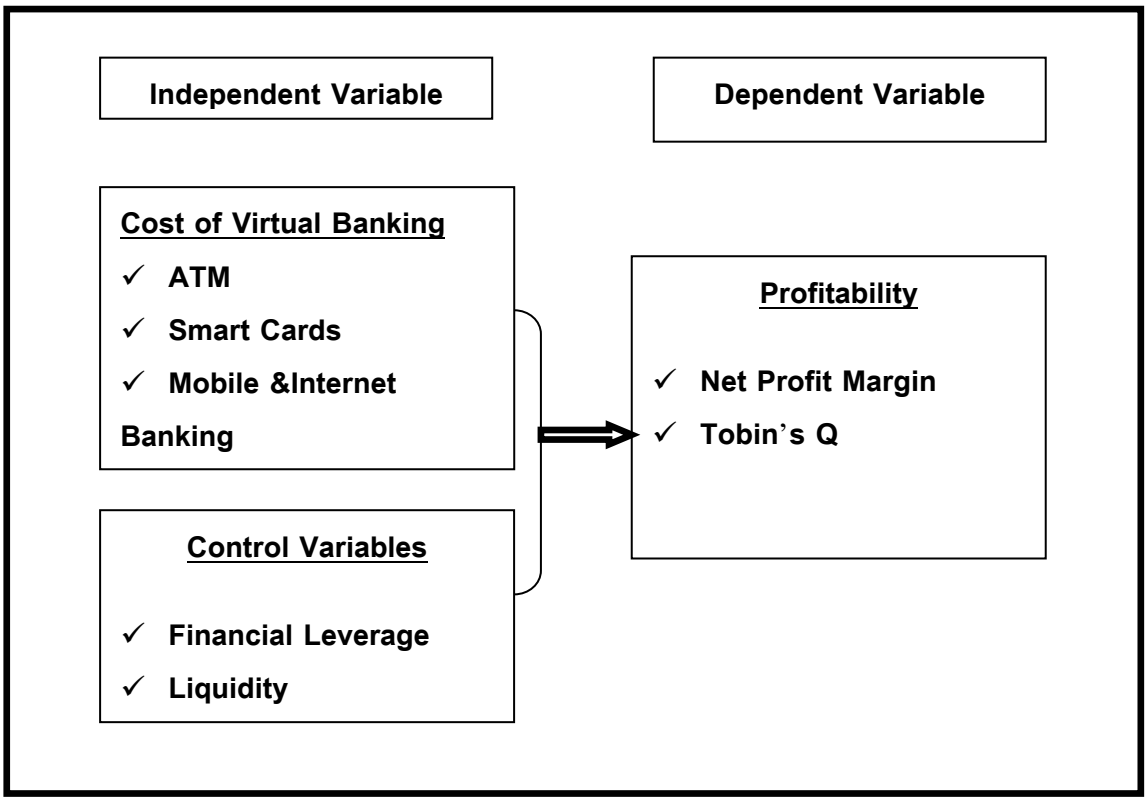

Figure 1.1: Schematic Diagram of the Study

Source: Prepared by the researcher according to (Buddhika & Gunawardana, 2020; Fathima, 2020).

(1-7) Conceptual definition

Virtual bank services: A new method of providing various financial services such as (ATM, Smart Cards, Mobile banking, & Internet banking) to facilitate accessibility and provide a wide range of online business (Bataev, 2017)**.**

Commercial Banks: They are banks that depend on receiving money from depositors and investing or granting them to borrowers in exchange for interest rates determined by the central bank according to the market situation. These other ones are divided into several types. The main difference between the types of commercial banks is due to the administrative system that they follow (Union of Arab Banks, 2018).

ATM: (Automated Teller Machine) A smart machine which giving the people the ability to perform payments, withdrawal with and without cards rather than teller which most of them has recently supported with NFC feature in addition to utilize it for bill payment and other functions (Berhanu, 2021).

Smart Cards: A card with physical or virtual issuance that can be utilized for purchasing, cash withdrawal and many functions to facilitate accessing to the customers' account and provide more convenience. (Berhanu, 2021).

Mobile banking: A tool used to serve the customers better (Okudjeto & Acquah, 2021) installed in the phone and tablet to provide security access of electronic payment. (Wiercioch ,2021).

Internet Banking: A website that allow the customers to manage their accounts and utilize the various financial services. (Pokachalova & Eremina, 2021).

Profitability: The payments occurred during a determined period where they positively affect the profitability based on many factors. (Kolan & Elango, 2021).

Higgins et al. (2016) defined the profitability as the evaluation of a company's return on investment, focuses on a company's sources and levels of profits and involves identifying and measuring the impact of various profitability drivers.

Profitability measured using many ratios such as: accounting-based performance which is Net Profit Margin (NPM) and market-based performance, which is Tobin's Q. (Araujo, 2020),

Cost: A subject use for observation achievement and helping to take managerial decisions properly which is the most important aspect allowing the companies to achieve an efficient competitive where many methods exist to calculate the cost of various services and products. (Shlaka & Khudadad, 2015)**.**

Liquidity Ratios: One of the methods indicates of the company's profitability level, for that reason the firms are seeking to maintain the higher liquidity assets level, considering that it assists a lot of parties to get the right decision. The liquidity ratios contain current and quick ratios where they indicate the ability of the firm to meet its short-term obligations. (Madushanka & Jathurika, 2018).

Quick Ratio: one of the liquidity ratios utilized to calculate the company's liquidity position where it indicates the firm ability to meet the short-term obligations by utilizing the most liquid assets**.** (Madushanka & Jathurika, 2018).

Financial Leverage: It is one of the important financing modes which reflect the finance business needs by debited or credited fund that utilized to enhance the firm operational activities or production, or to purchase a new asset, considering that financial leverage assists the firm to achieve its target and maximize the shareholders' value as well. (Iqbal & Usman. 2018).

(1-8) Research Limitation:

Data extraction: The banks approached for the purposes of this research did not disclose clear data about the cost of their virtual services; therefore, the researcher relied on the explanations provided in financial reports as a source of information, and discussed the collected data with the financial managers of the banks investigated to verify therewith the collected data in order to reflect the cost of the mentioned virtual services.

Chapter 2: Literature Review & Previous Studies

(2-1) Introduction

(2-2) Literature Review

(2-3) Previous Related Studies

(2-4) Distinguishes the study from previous studies

Chapter Two

Literature Review and Previous Studies

(1-1) Introduction:

This chapter discusses the various existing theories related to subject matter of this study, which address the relationship between virtual banking services cost and profitability. Additionally, this section will help the readers understand the concepts related to virtual banking services cost and profitability, and expand their knowledge regarding what opinions different researchers and authors hold regarding the topic of the research.

(2-1) Literature Review:

(2-2-1) Introduction:

Advancements in electronic business, information, and communication technology have made fundamental changes in the way business operations are run. As a result, internet technology holds the potential to fundamentally change banks and the banking industry, with predictions that the internet will destroy old models of how bank services are developed and delivered. The widespread and accessible internet banking is expected to affect the mixture of financial services produced by banks. The most important problem when implementing a virtual financial activity is the right choice of strategy and a model of the virtual bank (Bataev, 2017).

(2-2-2) Financial Institution's Technological Innovation Development:

In 1846, when the banks used telegraph, the first wave of technological innovation began, at a time when the only communication channel with the clients was still the branches. The rising need for mechanization was translated into the sharp increase in financial transactions, which eventually improved productivity given the introduction of

numerous machines and devices, which an indicator of profitability and credit-related risk. In the late 19950s, up to the end of 1980s, the second wave began with the introduction of information technology in the financial institutions sector which led to standardizing the offered services due to decision-making centralization enhancements. This was followed by a boost in IT investments, especially that IT heavily contributed to reducing the cost, which in turn attracted investors to this thriving sector. In fact, the first innovation that strengthened the relationship between the bank and the client was the development of ATM networks that led to the birth of the term "Information Technology". Internet development; specially the banking services offered via Internet, as well as the "dissemination" phase, together contributed to accelerating information flow transmitting through channel distribution as well as product payment methods development, in addition to (Data Warehouse) in order to gather customer information that save the time needed (Romdhane, 2021).

(2-2-2-1) Digital Transformation

According to Asfour & Haddad (2014), banks initiated the shift to digitalization that facilitate the multiple services using the internet while the customers are expecting more interaction and services. The digital transmission was already existing in the financial institutions sector through call centres followed by online branches, as services are almost identical to those offered by physical branches. Virtual banks offered smart phone applications "Mobile Banking" as an important approach where the customers can deal with their accounts using their smart phones anytime anywhere. Furthermore, they can perform all their daily financial transactions and other features, which is currently prompting traditional banks to be more digitalized as well.

(2-2-2-2) Digitalization Development and Importance

According to Boskov. (2019), rapid changes and development in technology, especially in the financial industry, have facilitated access to financial services and tools, besides reducing the cost.

Banks are related intermediaries in online transactions and business. Now most of the electronic payment systems that exist in the Jordanian commercial banks, such as on-line electronic fund transfer and transactions, Mobile banking, Credit and Debit cards, plus online banking and many more, consider safety measures and provide proper infrastructure for such services, in addition to real time and financial inclusion pressure. The virtual bank is utilized without the need of cash, coins or bills while using these types of banks performing by virtual or cashless. Kamboh and Leghari (2016).

While increasing the utilization of the virtual services, banks must understand the customer's needs and reasons for the adoption of virtual banking and its services, as the banks are continually seeking for appropriate and efficient channels to provide their services through in order to maximize their profitability besides shareholder's equity where the virtual banking services play a vital role to lower the cost and achieve the main target.. (Boateng, 2020).

(2-2-2-3) The Impacts of Digitalization and COVID-19 on Banks

According to Balkan, (2021) the technological development and changes led to shifting the financial transactions from branches, which were the traditional distribution channels, toward ATM in the beginning, internet banking, mobile, Mobile devices, and other various distribution channels.

Virtual banking facilitates easy access and offers advantages by reducing the cost and enhancing productivity growth rate by enabling services without the need of physical branches, which would eventually increase the banks' profitability. Virtual access to financial services is now more crucial, with fierce competition even heightened by the unbeatable force of social media, which is also a product of technology development that banks need to keep up with. Moreover, the emergence of COVID-19 has contributed to expanding the bank's relationship with the customer, and technical advancement and the power of the internet have influenced both the bank and its customers as well. Using virtual banks services depends on customer behaviour, ease of use, and expected needs. By changing the industry behaviour along with performance, banking demand and supply have developed, mainly effected by COVID-19 pandemic that still exist, resulting in the spread of information technology and digitalization at banks strategy level, while considering pre-COVID-19 risks. Recent developments, culminated by the emergence of COVID-19, have turned digitalization in the financial institutions into a necessity and a must rather than an option, with more efforts required in this regard to ensure their competitiveness. (Romdhane, 2021).

(2-2-2.4) Digitalization of Banks and Banking:

Development in the digital communication enabled communication with people all over the world. Digital banking has taken the shape of a distribution channel which provides ease of access and cost advantages along with productivity growth by allowing banking services to be delivered without the need for a physical branch or staff. This situation has increased the profitability of the banks by having the banking system getting a head in the competition (Balkan, 2021).

Digitalization means converting the data, sound, text, photos, and all kinds of information to "Bits", and converting them into computer language via micro-

processors. Digitalization has transformed both the business processes and the way of doing business in banking as in all sectors by making use of the opportunities of technology (Zelan, 2018).

(2-2-2-5) Banking Services in the Digital Age:

Digital technology is considered as a revolution for companies as for as the banking sector is concerned, in the banking sector. The digital transition has already been underway for several decades, with call centers being the early form of such transition, followed by the creation of online branches offering almost the same services, and finally and more recently the introduction of mobile banking applications on smart phone, through which customers are able to manage their account online, and performs all daily banking operations, such as adding a recipient or making a transfer. The adoption of virtual banks services has driven organizational motivation, increased competition, and forced traditional banks to adapt with the advent of virtual entrants (Selase & Selase, 2019).

(2-2-2-6) Attracting and Retaining Clients through Digital Channels:

In order to meet the expectations of their clients and to meet new needs, today's banks must adapt their strategies and comply with new standards. Therefore, they are required to meet various criteria that have now become crucial for their customers. This necessitates more flexibility in adapting the organization and internal processes to increase efficiency through automation and digitalization of processes and being socially active by improving their brand image among their clients and employees through using the social media (Krings, 2020).

(2-2-2-7) Advantages and Disadvantages of Digital Banking:

Advantages of digital banking include reasonable cost and reasonable price, through offering services using digital channels via the internet to the customers at more affordable prices. The decrease in the costs of incurred by banks by utilizing the power of the internet is reflected in the service price, since the cost is minimal in electronic channels. Another advantage is convenience in offering new services; banks using electronic channels can offer more new services to their customers in the market more easily. Also, banks can provide third-party services, such as e-commerce, tax payments and invoice payments, more easily through digital banking, where the bank can collect and process customer information and report them effortlessly. This proves that digital baking has the potential to increase customer satisfaction, loyalty, and profitability (Balkan, 2021).

Also, digital banking has several advantages for both the banks and their clients, including new improved user experience, an efficient and effective operating model for the bank, providing new opportunities for the client to interact with the bank via digital communication channels, a huge choice of customized products and services at affordable prices, transparent pricing, security of banking operations and instant service at a high quality (Fedorova, 2019).

While digitalization has become an urgent need rather than a luxury, it has certain disadvantages affecting digital banking. These disadvantages mainly revolve around the threat of increased customer security and fraud risks and theft of financial information from any platform (Balkan, 2021).

Digital transformation means a total transformation of the economic and organizational activities of the bank, its process, and competencies in order to provide the

bank's customers with an improved user experience to meet their needs (Vagonova et al., 2019).

With the help of mobile smartphone applications of banks, it is possible to manage cards, accounts, order bank statements, and other financial services. Internet banking is a website where a bank customers can manage their accounts and use financial services by creating new ways of using financial products and services in the modern financial market (Bykanova et al., 2020).

(2-2-2.8) Banking Incentives for Digital Transformation:

Digitalization, like any process of transition to a new innovative level of development of public relations in various domains of the economy, requires some regulatory control. Such a complex of measures requires significant financial investment in the technical domain and a completely different approach to human resources (Pokachalova et al., 2021).

Still this transition to digital platforms and the use of high-tech solutions in the cultural sphere requires possession of digital skills and digital competence, bringing other challenges to be addressed, such as lack of financial resources and budget financing within the framework of the system for ensuring the fulfillment of the tasks (Dugusheva, & Simaeva, 2019).

(2-2-2.9) Digital Transformation in the Banking Sector:

Digital transformation is considered a profound modification of economic and organizational activities, business processes, competencies and business models that take full advantage of the change and opportunities of digital combinations in a strategic and priority manner. The development and usage of digital platforms based on innovative

digital technologies has become the main direction of development of the digital economy based on key information and communication technologies- Mobile communication & Social networks (Bykanova et al., 2020).

In the banking sector, the concept of digitization can be defined as the introduction and strengthening of the use of digital technologies by banks to create a new digital business model and provide opportunities for generating new sources of income and creating values (Fedorova, 2019).

(2-2-2-10) Digital Transformation and Strategy in the Banking Sector

Digital transformation in the banking sector is a continuous process that affects both the internal and external environment, processes, and existing methods, in order to serve remote areas without physical branches differentiation from competition or reduction of operating costs. The modern, ever changing technological environment forces all economic units to make digital transformation to enable banking organizations to offer new service channels through new electronic platforms (e-banking, virtual banking, and service points) to reduce operating costs (Kitsio et al., 2021).

It is generally accepted that digital banking enables customers to have access to banking service without investment or infrastructure required from banks, offering multiple benefits for banking institutions and their customers. In this case, digital technologies save time, reduce operating costs, and optimize monitoring, risk management and control methods (Sloboda et al., 2018).

(2-2-2-11) Change in the Banking Profession:

Several research studies have shown that the introduction of new technologies leads to the emergence of new banking professions and a new definition of banks, their

dimensions, and their tasks. In this innovative context, the banking profession has changed regarding the responses to be provided to the clients through mobile applications that can be developed on the bank's tablets. In addition, digital technologies will benefit agencies in reducing administrative costs due to the automation of certain products, optimizing the time spent using the tools available to their sales staff (Audrin & Davoine, 2017).

(2-2-2-12) Service Innovations:

Service innovations like digital finance necessitate increase in interactivity and information intensity, still success of electronic service innovations depends on the perceptions and consumption patterns of e-banking due to networks impact on cost reduction, and the presence of direct relationship between banks, e-services customer base and banks adoption of advanced information technologies. It has been observed that customers attitude towards IT adoption varies between private and public banks due to factors like technology readiness, trust and efficiency in providing e-services (Arora & Sandhu, 2014).

(2-2-2-13) IT Impact on the Business Performance of Banks:

The most important asset that bank have is the relationship they maintain with their clients, the desire to satisfy and retain the aspirations of customer to the greatest extent possible encourages banks to improve the quality of their products and services. For a bank, the adoption of new electronic channels opens up new potential for them to expand its range of services to customers to differentiate itself from others (Romdhane, 2021).

As a result of massive investment in IT, a number of bank customers benefit from improved banking services though greater customization, lower transaction costs, and

lower search costs in doing so banks move from a product – centered approach to a customer-centered approach (Teru et al., 2017).

(2-2-3) Tends and Prospects for the Development of Virtual Banks:

The development of information technologies in the second wave of the 20th century and the beginning of the 21st century have led to the creation of knowledge-based economics based on the use of the modern achievements of science and technologies. The development of modern information and communication technologies has promoted the creation of a global computers network, allowing to form a common information space (Nikolova et al., 2016).

(2-2-3-1) The Concept Virtual Bank:

The concept of virtual bank appeared by an analogy with the virtual corporation. These banks are without branches and offices but having the legal address. The bank's website is the main and only department. It is possible to receive data on the interesting service or product to connect it, to use the bank's products, to control the account status, and to get advices from the bank's specialists on-line (Shevline & King, 2015).

(2-2-3-2) The Development of Virtual Banks:

The bank's management resorts to the utilization of financial technology and advancements to offer another sort of customer experience, since financial technologies have presented challenges to traditional banking model for financial transactions, so the top management of virtual banks ought to have the imperative IT information and experience to empower its operation and to release its capacities successfully and adequately. Taking into account to technology related risk, information security, system flexibility and business progression management of a virtual bank (Fathima, 2020).

Virtual banking process has changed the method for working of banks over the world as a new technology in a banking environment that permit bank customers to do banking transactions whenever and from wherever (Barquin & Vinyak, 2015).

(2-2-3-3) Evolution of Virtual Banking:

Today, since the banking industry is in the time of globalization, the banking sector has received globalization as the first strategic decision for accessibility and transfer of information. Consequently, banks have transformed themselves and are offering services through the internet from computerization to networking to ATM, and now E-Banking, utilizing the internet as remote conveyance channel for banking services, the use of PC and a browser to associate with the bank's website and to exploit the virtual banking capacities to reinforce customer relationship, moving from the confines of traditional branch banking looking for the comfort of remote electronic banking services to improve the business procedure achieving cost satisfaction for both service suppliers and bank's clients (Chauhan & Choudhary, 2015).

(2-2-3-4) Impact of Information Technology on Virtual Banking:

Information technology developments offer banking firms the opportunities to formulate their objectives and their business portfolios. Through the use of different distribution channels (ATM, Call Center, and Internet) to optimize cost allocation and respond to different consumer preferences by reflecting on the bank's value chain to isolate the least profitable functions and identify the key functions to redeploy the bank's activities (Romdhane, 2021).

(2-2-3-5) Survey on Virtual Banking:

Virtual banking includes internet banking, mobile banking and (ATM) automatic teller machine. Technology has revolutionized the banking operations across the globe and enhanced the quality of banking services. Internet security and customer's privacy are highly satisfied with all hi-tech products. The problem in using virtual banking is that lack of sufficient knowledge among people regarding the use of internet and computer (Sudesh & Bimal, 2014).

(2-2-3-6) Barriers Facing the Adoption of Virtual Banking Services:

The major barriers faced by banking industry in the adoption of virtual banking are security risk, lack of trust, lack of legal and regulatory framework, lack of ICT infrastructure, and absence of competition between local and foreign banks (Ayana, 2014).

E-Banking has enhanced the growth of the customer base for the banking institutions through enhancing banking services accessibility to a larger population in the country (Bichango, 2014).

(2-2-3-7) Virtual Banking and Online Business

Banks play important role in promoting online business, and act as strong and trustworthy intermediaries in the online transactions. They have further provided a foundation for online business, offering the necessary e-payment systems for the sector to flourish, including, but not limited to, Internet Banking, electronic fund transfers, plastic money (Credit Card and Debit Card) and Mobile Banking. These systems provide payment to online transactions like online purchases of products, mobile recharges, and ticket booking .Virtual banking, also known as online banking, is the services provided

to link the bank with clients, but with one and only difference, being that services are provided via the internet. This service does not need a brick-and-mortar system. Services, like account opening, fund transfer, payment services, and e-shopping, are being served online (sha & Mohammed, 2017).

(2-2-3-8) Virtual Banks and the Perceived Risk and Development:

With the industrial service evolution and financial development, services have gained more importance, considering the growing participation in commerce from different countries. It is now possible to notice how services have shown greater growth, and in the financial domain, one of the most highlighted services belongs to banking sector. This evolution concerns the transition of commercial relations for virtual environment (Akhagri et al., 2018).

Also, with the expansion of the internet and digital Media, organizations have adopted to new business alternatives and their relationship with customers (Gai et al., 2018).

Digital banking is part of a set of services that seek to use technology to approximate service providers with customers, digital banks use digitalization as a strategy to reinforce relationship with customers since it offers practicality, efficiency, less cost (Pinochet & Diogo, 2019).

(2-2-3-9) Advantages of Using Virtual Banks Services:

Virtual bank is characterized by the elimination of many bureaucratic formalities. In particular, the utilization of such network has made service offering much more easier compared to physical banks, for which reason it has become a more preferred option for people. The great difference between the virtual bank and the physical bank lies in the

extended wait period at the physical bank, so customers are now preferring to change to virtual banking. With no fees charged, they can access account anytime and make day-to-day transactions much easier, especially that e-banking applications and platforms offer a magnitude of options for the customer to run his/her/its regular financial transactions. The non-use of internet banking apps and self-service in the past was due to the lack of knowledge, information, difficulty in using these APPs, and fear regarding security especially with alder Clients (Namahoot, 2018).

(2-2-4) Effect of E-Banking on Financial Performance of the Commercial Banks:

With the rising cost of doing business in general, and banking business in particular, most banks find themselves struggling with high costs and wastages or inefficient use of resources, with increased competition in banking industry to satisfy their customers. One way for the banks to cut down costs resulting from reduced revenue and interest rate is adopting and adapting with electronic banking (Ugwueze & Nwezeaku, 2016).

Studies have showed that e-banking has positively influenced commercial banks financial performance when they have embraced e-banking, raising their effectiveness, efficacy, and productivity, resulting in an increase in profits of the commercial banks when embracing e-banking (Kiragu, 2017).

(2-2-4-1) Customer Satisfaction with E-Banking:

Electronic banking has many names like E-Banking, Virtual Banking, Online Banking, or Internet Banking. It is the use of electronic and telecommunication network for delivering various banking products and services. Through E-Banking, a customer can access his account and conduct many transactions using personal computer or Mobile Phone. Online Banking is an electronic payment system that enables customers to conduct

financial transactions on a website operated by the bank, such as virtual bank (Kolan & Elango, 2021).

(2-2-4-2) E- Banking System:

E-banking/Virtual banking has become the way for the development of banking system, and the role of electronic banking is increasing in many countries, offering more opportunities to create services processes that demand few internal resources and Lower costs as well as providing wider availability and possibility to reach more customers (Fantaye, 2017).

(2-2-4-3) Customer's Usage of E-Banking Services:

The intrinsic value of digital finance to socio-economic development is recognized and focused on by the policy makers because it promotes cashless economics to obtain benefits, represented in transparency and connectivity, since digital financial services delivered via mobile phones and the internet have the potential to bring greater efficiencies in meeting financial needs of individuals or businesses. Its benefits include improved access, reduced costs, improved gross domestic product, reduced operational costs and improved operational efficiencies (Sandhu & Arora, 2020).

(2-2-4-4) Importance of E-Banking within the Current Competition:

The importance of electronic based banking products and services is increasing day by day, since they provide relatively low risk, high return, low-cost advantages, and profitability to the banks adopting E-Banking. Electronic and internet banking applications affect the banks performance, but they require advanced technology to increase the overall profitability of the bank. It has been observed that technology, based and in particular internet banking products, reduce the operational risk of the banks,

increase the asset quality and operational profitability, and directly operational costs (Akhisar & Tunay, 2015).

(2-2-4-5) Benefits of Electronic Banking:

Electronic banking is spreading quickly in recent years as it leads to much lower costs and greater competition in the financial services. E-banking helps in attracting unbanked individuals into the banking system allowing them to improve money management with enhanced financial empowerment. For financial Institutions, it draws cash into bank accounts which can be translated into funds for lending investment. The adoption and growth of e-payment are found very important towards creating cashless society with its impact on bringing economic transparency efficiency and growth, for the customers it brings convenience, reliability, affordability, and usefulness of the system (Fantaye, 2017).

(2-2-5) Mobile Banking:

Mobile banking, also popularly known as M-Banking, is the delivery channel which opened up after the tremendous success of mobile. Banks started offering M-Banking during the late nineties and with the introduction of 3G mobile phones in early 2000, acceptance of M-Banking showed good growth rates. M-Banking customers could conduct banking transactions using short messaging services (SMS) or mobile internet. Instruction for banking operations is sent as (SMS) to a predefined number given by the bank. The provision of real-time updates of critical banking transactions is the main benefit of M-Banking. Like (ATM) cash withdrawal, a customer gets a mobile alert about its customer worldwide (Sudeep, 2011).

(2-2-5-1) Mobile Payment Usage Levels:

The development of electronic banking took place on a large scale at the end of the 20th century, completely changing the face of banking. The recent years have seen intensive development of financial services, including electronic services such as e-wallets related to the implementation of innovative solutions based on modern information technology (Phin, 2016).

Consequently, technological progress enables access to an increasing number of financial products and services in the electronic form. Access to modern banking products and services has been significantly facilitated transactions without the need to visit the bank branches, obtaining accurate information about customers, allowing the banks to have the opportunity to adapt their offers to the individuals and preferences (Wiercioch, 2021).

(2-2-5-2) Available Mobile Banking Applications:

Such applications include doing all banking activities virtually from mobile device, one can access all banking accounts with the bank, 24 hours a day, 365 day a year from anywhere. Banking transactions details, viewing of account balance, mini statement, self-transfers, ticket booking (Sha & Mohammed, 2017).

(2-2-6) Determinants of Bank Performance and Profitability:

Profitability of the banks has been categorized based on internal and external factors. The internal factors are those that are under the direct control of management and its ability to make quality decisions regarding credit risk, capital adequacy bank size, efficient management, and income source (Classens et al., 2018).

(2-2-6-1) Electronic Banking and Profitability of Banks:

The revolution and development in information communication and technology have greatly transformed the procedures and processes in the banking sector. ICT (Information and Communication Technology), (electronic banking, online banking, virtual banking) have brought different perspectives in assessing banks profitability and service delivers in the banking sector (Molla, 2017).

(2-2-6-2) Impact of Online Banking Adoption of Banks Profitability:

To enhance the banking performance and to satisfy future customers, the conventional banking systems are changing to digital banking system. Electronic banking is an electronic payment system that enables customers of a bank or other financial institutions to conduct a wide range of financial transactions through electronic means without visiting the physical banking hall. The electronic banking system will connect to or be part of the core banking system operated by a bank in contrast to traditional branch banking which was the traditional way customers accessed banking services (Olaiya & Adeleke, 2019).

(2-2-6-3) Impact of Mobile Transactions on Bank Profitability

Impact of mobile banking transactions on bank profitability has been investigated by the researchers and scholars. Using data from different banks, they found positive and statistically significant relationship between automated teller machine of old and new generation banks, which indicated that ATM is a major factor that contributes to better performance of the banks. The banking sector is convinced that by embracing new technologies, banks can become more responsive to customer demands and satisfaction.

Online banking offers ease of access, secure transactions, and 24 hours banking options, ensuring published day-to-day operation of all banking transaction (Islam et al., 2019).

Automated routine bill payments reduce physical presence in bank premises. In addition, internet banking delivers ease in transactions and reduce banking cost. It is noteworthy that digitalization in banking is not only restricted to online banking or mobile banking, but also the execution of new technologies to transform the existing banking business module into a new banking business model (Kamb & Wafula, 2015).

(2-2) Previous Related Studies:

This study considers the potential link between the virtual banking services cost and profitability. A wide stream of researches have documented that the influence of virtual banking services cost on profitability is noteworthy in the sense that high virtual banking services cost increasing profitability and reinforce the investor decision. Moreover, many of foreign and domestic studies provide evidence on the nature of this relationship.

Romdhane. (2021) study entitled: "Impact of information technology and digitalization on banking strategy pre-covid-19". This study aims at analyzing the impact of IT and the digitalization of financial services on the strategy and functioning of the banking sector, and to study the challenges banks are facing in managing the crisis of COVID-19. The study reached that the need for banks to combine physical proximity and digital offer as the solution for banks to consistently mitigate risks, since by adopting a more digitized and open behavior, the banks would be better equipped to counter threats and better prepared to transform them to opportunities. It is recommended that digitization could be the solution for banks that are always traying to mitigate risks and to reinvent themselves to face possible crisis similar to COVID-19 pandemic when having contingency strategic plans.

The current study benefited from this study in the method of formulating the independent variable and benefiting from the results of the study.

Balkan (2021) study entitled: "Impacts of Digitalization on Banks and Banking. In The Impact of Artificial Intelligence on Governance". This study aims to focus on the role of technological development in changing the society, economics, banks, and banking transactions from branches which were conventional distribution

channels towards automated teller machines (ATMs), mobile, internet banking and mobile devices. Furthermore, development in the digital communication enabled the communication with people all over the world. The researchers go further to any that digital banking had taken the shape of a distribution channel, providing ease of access and cost advantages with, providing growth by enabling banking services to be delivered without branch & staff, increasing profitability of the banks by making the banking system getting. It is recommended that banks should consider security risks posed by virtual banking and the competitive threat passed by new business models digital banking provides more affordable services than the traditional banking, thus reducing operational risks and providing uninterrupted services.

The current study benefited from this study in identifying the sub-independent variable of ATMs and its impact on cost and profitability.

Hima (2021) study entitled: "A Study on Correlation Between ATMs and Financial Performance of Select Banks with Reference to Virtual Banking". The aim of this research is to focus on the correlation between the established number of ATMs and selected Indian banks profit as a part of virtual banking study where it has mentioned that the accessibility of virtual banking services is being increased without going to the physical banks personally as the utilization and took the advantages of these services called Virtual banking.

The current study benefited from this study in identifying the sub-independent variable, virtual banking services ATMs, and its impact on cost and profitability, n addition to the way of formulating the study methodology.

Kitsio et al. (2021) study entitled: "Digital Transformation and Strategy in the Banking Sector". This study aims to illustrate that digital transformation in the banking sector in a continuous process that affects both the external and internal environment by redesigning internal processes and existing methods. This study examine, the acceptance rate of digital transformation in banking sector in Greece (161) employees at Greek banks competed the survey a multivariate regression analysis was implemented to analyze the items of technology acceptance model result showed that the perception of bank employee with regard to new technologies provides a practical contribution for executives of Greek banking organizations to schedule targeted educational programs to facilitate the transition to the new digital are for their employees. It is recommended that future research should consider re-investigating the attitude of employees and degree of their acceptance of new technologies.

The current study benefited from this study in identifying the independent variable related to virtual bank services and determining the method of measuring these variables.

Kolan & Elango (2021) study entitled: "Customer satisfaction with e-banking services". This study aims to illustrate advantages of adopting virtual banking regarding paying invoices to finish and foreign recipients easily and securely, to check account balances and transactions, ordering new cards, with draw a loan granted to make mutual fund subscriptions E-Banking allows access to services by obtaining bank identifiers. Users of virtual banking can perform the following transactions:

- Payment of bills.
- Transferring funds to any part of world.
- Checking the balance.
- Downloading and printing statements.

- Opening various accounts.
- Requesting cheque books.

It is recommended that banks should concentrate on all the age group of customers, since different education group of customers have different perception towards internal banking, so it is important to educate senior citizens about the usage of internet banking services.

The current study benefited from this study in identifying the impact of electronic banking services and the benefit in formulating the literature.

Fathima (2020) study entitled: "Challenge management of banking services – with special reference to virtual banking service challenges". This study aims to show that virtual banking, mobile banking, and internet banking provide bank transactions elsewhere than in-branch premises with accommodation, speed, productivity and adequacy, these virtual banks have opened another universe of conceivable outcomes and brought major charges in giving wide range of services that are completely secure and useful to utilize with confidence in them to attract and hold customers. The researcher adds that the point of these services is to satisfy customers through making them able to access and do economic transaction from their web empowered PC systems with net association with banks web locals whenever 24 hours. It is recommended that for these virtual services there is the need for having able frameworks on persistent bases to guarantee that V-banking would create on sound lines to avoid risk to financial dependability.

The current study has benefited from this study in determining the independent variable in virtual banking services and determining the most appropriate approach to be followed.

Supreet & Sangeeta (2020) study entitled: "Customers' usage behavior of e-banking services: Interplay of electronic banking and traditional banking". The aim of this research is to investigate the customers' utilization of electronic banking services in multi channels, as the banks still have a big opportunity to spread technology and getting the fruitful advantages where the needs to virtual banks services easier and more secured still exist in order to complete the reliance on electronic media, therefor virtual finance is very important to fulfil emerging economic development objective.

The current study benefited from this study in identifying electronic banking services and the most important sub-independent variables, in addition to formulating the study's literature, defining concepts for the dimensions of the independent variable, and determining the most appropriate approach.

Natalia et al. (2020) study entitled: "Digital Solutions in Educators' Training: Concept for Implementing a Virtual Reality Simulator". This research discussed virtual implementation and development in banking sector in terms of pandemic, in addition to the concept of "digitalization" and "digital transformation" resulting from banking activity processes transformation. The researchers determined the most popular banking channels within COVID-19, they have also searched about the effected of Russian banking industry extent contributed to banking business transformation including its virtual services and products. The mainly reasons behind increasing the banks interest in ecosystems are due to traditional banking services competitions and seeking for additional incoming sources, plus the diversification via non-banking services sale.

The current study benefited from this study in identifying the method of switching to electronic banking transactions and determining the most appropriate approach.

Sandhu & Arora (2020) study entitled: "Customers usage behavior of e-banking services: interplay of electronic banking and traditional banking". This

study aims to show that digital finance which is facilitated by electronic banking is very important for realizing the developmental objectives of emerging economic. Furthermore, the researcher noticed that success of service innovations in the field of electronic banking depends on the perceptions and consumption patterns of the intended users of such services. Results showed that E-Banking usage is still low, banks are required to benefit more from the advancing technology to reap its benefits, they should not ignore the importance of employees, and the need for making electronic banking simpler and more secured to achieve complete reliance on electronic media. This study investigates customer's usage of electronic banking services in a multi-channel context. With the inclusion of technology, banks should not ignore banking are found complementary to each other. Still, there is the need for making electronic banking simpler and more secured as these are the major. It is recommended that banks need to exploit benefits offered by technology in general and virtual banking in specific, but customers rely on both the traditional channels of branch banking as well as on electronic channels of e-banking, making the banks invest hugely on both technology and manpower.

The current study benefited from this study in identifying the formulation of the independent variable by its dimensions, identifying the procedural concepts of the dimensions of the independent variable related to electronic banking services, and determining the most appropriate approach.

Bykanova et al. (2020) study entitled: "Digital transformation of the Russian banking sector in terms of pandemic". This article discusses the issues of development and implementation of digital technologies in the banking sector in the context of pandemic, defying the concepts of digitalization and digital transformation processes of banking activities. It was found that the Russian banking industry and the main electronic

banking products and services contribute the transformation of the banking business, among the most promising are virtual and digital cards, digital signature, and the development of open banking. Fifteen companies and virtual banks have been identified. Particular attention is paid to the analysis of transformation strategies. It is recommended the creation of digital platforms, especially financial ecosystems to serve the financial and non-financial needs of customers due to the competition in the market of traditional banking services, and the need for searching for additional sources of income and diversification. Since innovative digital technologies have provided a variety of opportunities for the development of the banking industry towards digital banking and the creation of platforms to serve the customers' needs.

The current study benefited from this study in identifying the formulation of the independent variable by its dimensions and identifying the procedural concepts of the independent variable's dimensions related to electronic banking services and its impact on cost and profitability, in addition to the funny formulation of the study methodology and benefited from the study results.

Le & Ngo (2020) study entitled: "The determinants of bank profitability: a cross – country analysis". The aim of the study was to investigate the determinant of bank profitability in (23) countries from the period (2002-2016) using the system generalized methods of moments. Results indicate that the number of bank cards issued, the number of ATMs and the number of Point-of-Sale terminals can improve bank profitability, it is suggested the need for further expansion of these delivery channels, while the market power has negative impact on bank profitability, this means that competition improves bank profitability. It is recommended that less concentrated

banking system improves bank profitability, and greater financial development have positive impact on bank profitability.

The current study has benefited from this study in determining the dependent variable of our study by identifying profitability methods, and it was used in some paragraphs to build the theoretical framework and formulate the study tool.

Asare (2019) study entitled: "Evaluating the impact of interest margin on the profitability of banks in Ghana". This study aims at examining the impact of interest margin on the profitability of banks in Ghana, secondary data was collected from the annual reports from the Ghanian banks during the period (2013-2017). Data was analyzed using person correlation. Results of data analysis revealed the presence of positive relationship between interest rate margin and bank profitability (ROA & ROE). It is recommended that for banks to make more profit, there is the need to raise interest margin through effective and efficient means of decreasing interest expense and increasing interest income. Also, the banks need to put measures in place to ensure they grow their banks by increasing the size to get more clients to deposit with them.

The current study benefited from this study in determining the dependent variable and profitability measurement methods, plus it was used in some paragraphs to build the theoretical framework and formulate the study tool.

Dovash (2019) study entitled: "Impact of online banking adoption on banks profitability: Evidence from Bangladesh". This study aims to indicate that the rise in information technologies has transformed banking industry worldwide, and to stay competitive, banks are introducing internet banking with the motive to achieve higher productivity and efficiency, reduce cost and increase profit, performance of the banks was measured through return on asset (ROA) and return on equity (ROE). Secondary data was

collected from annual report of (30) listed banks. The results revealed that ROA and ROE of banks with online banking is higher compared to banks without online bank. It is recommended that the ease and benefit of using online banking will bring customers toward the adoption of online banking, lowering costs for banks and the customers.

The current study benefited from this study in identifying the formulation of the independent variable related to virtual bank services and the procedural concepts for the dimensions of the independent variable related to electronic banking services plus its impact on cost and profitability, in addition to the funny formulation of the study methodology and benefited from the study results.

Kapadia & Vaghela (2018) study entitled: "The Impact of Internet Banking on Financial Performance of Selected Commercial Banks in India". This study aims to show that strong financial institutional network motivates clients to save, invest, borrow, and plan for their future, and the penetration of internet has opened new horizons for the financial service industry, offering their services through electronic medium because of its impact on financial performance. It is recommended conducted further studies including private sector commercial banks and considering a larger sample size based on the comparison of public and private commercial banks.

The current study benefited from this study in identifying the formulation of the independent variable by its dimensions and the procedural concepts of the independent variable dimensions related to electronic banking services and its impact on profitability plus the funny formulation of the study methodology and benefited from the results of the study.

Ozili (2018) study entitled: "Impact of digital finance on financial inclusion and stability". This study provides a discussion on some issues associated with digital

finance, a domain which has not been critically addressed in the literature, since digital finance and financial inclusion have several benefits to financial services users. Furthermore, the researcher adds that digital finance providers governments and the economy, increasing access to finance among poor individuals, reducing the cost of financial intermediation for banks and services providers. It is recommended that efficiency in the provision and use of digital financial services should be suited to customers' needs and delivered at a cost that is affordable to digital finance clients.

The current study benefited from this study in the construction of the theoretical framework and the formulation of the study tool.

Harelimana (2018) study entitled: The automated teller machines and profitability of commercial banks in Rwanda. This study aims to address Automated Teller Machines and profitability of the commercial banks through the period (2010-2016). With the aim to assess the use of ATM and its contribution to the profitability in bank of Kigali, the researcher employed the quantitative and qualitative methods for data collection, including questionnaire for collecting primary data. Study population consisted of users of ATM, and the number of the respondent was (200). Result showed that the bank still faces obstacles due to lack of financial education (information, training of customers about how to use ATM cards. Also, result showed the presence of correlation between ATM and ROA, ROE and net margin, lower cost, differentiation, and accessibility are factors determinants level of satisfaction of ATM users. It is recommended that the government of lowlands to employ financial education for the population to be familiar with the new technologies like ATM to promote the financial services accessibility. This will contribute to the profitability of financial institutions.

The current study benefited from this study in determining the dependent variable for profitability, measuring the dependent variable, and it was used in some paragraphs to build the theoretical framework and formulate the study tool.

Fantaye (2017) study entitled: "Factors affecting customers intention to adopt ATM banking system". This study aims at examining the factors affecting customer's intention to adopt (ATM) banking system in Ethiopian banking industry. The study applied mixed research design and collect data through the use of primary and secondary data sources, involving the use of questionnaire and interviews, while the secondary data was obtained from reviewing journals and literature relevant to the subject matter of the research. Study sample consisted of (385) customers, simple and multiple regressions were used to find out the relationship between the dependent variable intention to adopt (ATM) banking system and the independent variables, attitudes, subjective norms, perceived behavioral control, perceived ease of use, and perceived usefulness. Results of data analysis showed that attitudes and subjective norm have significant impact on intention to adopt ATM-Banking. It is recommended performing awareness creation tasks to improve client's knowledge on utilizing ATM-banking packages, and making ATM always functional, with frequent monitoring and maintenance of ATM features to attract more clients.

The current study benefited from this study in identifying the formulation of the sub-independent variable of ATM banking system plus the way of formulating the study methodology and benefited from the study results.

Sha & Mohammed (2017) study entitled: "Virtual banking and online business. Banks and Bank Systems". This study aims at examining the efficient utilization of Mobile Banking by the banks clients who have all the infrastructures, at

present banks have e-payment systems like internet banking, electronic fund transfers, plastic money, credit card and debit card, and mobile banking, since these systems provide payment to online transactions like online purchases of products and other services. The results showed that the majority of sample clients selected for the study owned a mobile as their mode of access to banks, and they are well aware of mobile banking. It is recommended that banks need for designing various products for clients to access through the mobile and use this medium in banking and online business.

The current study benefited from this study in identifying the formulation of the independent variable which is virtual bank services and the method of formulating the study literature.

Bakhait et al. (2016) study entitled: " Effect of the electronic banking services on profitability of the commercial banks". This study aims at measuring the effect of the relationship between the electronic banking services and banks profitability by measuring the relationship between the electronic banking services (provision, cost and speed, and profitability (Rate of Return on Assets and Rate of Return on Equity)). The study problem is to examine the impact of electronic banking services on the profitability indicators in commercial banks in Libya. This has been done by analyzing the data collected by questionnaire from banks employees and analyzing the banks financial statement during the period from (2008-2016). The study reached the results that there is a statistically significant relationship between provision, cost and speed of electronic banking services and the profitability of the commercial banks. It is recommended that the commercial banks have to be in line with the global development in the field of electronic banking.

The current study benefited from this study in identifying the study variables and the relationship between the dependent and independent variable used.

Akhisark, et al. (2015) study entitled: "The effect of innovation on bank performance: the case of electronic banking services". This study investigates the effects of the bank's profitability performance of electronic- based banking services. The effects of return on assets and on equity performance were analyzed in (23) developed and developing countries, electronic banking services during the period (2005-2019). Results of the analysis showed that bank profitability of developed and developing countries affected from the ratio of the number of branches to the number of ATMs is highly significant. Also, it was found that the number of issued bank cards and debit cards, and the ratio of ATM to the number of branches effect profitability positively, and customers are most familiar with electronic banking applications as ATMs which reducing operational costs. It is observed that developing and developed electronic banking services affect bank performance significantly regarding profitability.

The current study benefited from this study in identifying the independent variable of electronic banking services and its impact on the banks' profitability, in the way of formulating the study methodology and benefiting from the study results.

Korankye (2014) study entitled: "The Impact of e-banking on customer service and profitability of banks in Ghana". This study aims at examining the impact of e-banking on customer service and profitability of banks in Ghana. Random sampling was used to select ten banks and (250) customers from Accra city. The study found that E-banking and information and communication technology has impacted positively on customer service and profitability of banks, with the presence of a number of challenges. It is recommended that there should be 24/7 monitoring of the ATMs, so that any failure

is addressed as soon as possible to guarantee customer retention, and the government should provide adequate regulatory framework that will ensure customer protection security of transactions to achieve competitive advantage through providing training programmer on ICT organized by the banks to ensure that their employees are always abreast with current trends and programs in ICT.

The current study benefited from this study in identifying the independent variable, the impact of electronic banking services on the profitability of banks and benefiting from the study results.

Asfour & Haddad (2014) study entitled: "The impact of Mobile Banking on enhancing customers' E-satisfaction: An empirical study on commercial banks in Jordan". This study aims to show that recently banking services began via mobile on a large scale and became one of the latest services offered by commercial banks in Jordan. The researchers have linked banking services via mobile to influence on customers E-satisfaction, for customers to getting banking service on customers E-Satisfaction, for customers to getting banking service on their own without the need for assistance from the bank employee. The researchers have used seven dimensions that are very important to provide the services, they are reliability, flexibility, privacy accessibility, ease of navigation, efficiency, and safety. Study sample consisted of (360) clients who use banking services via mobile in the Jordanian banks. Results showed that there is a statistically significant impact of the overall dimensions of mobile banking service on customer E-Satisfaction.

The current study benefited from this study in defining the sub-independent variable related to mobile phone electronic services and determining the methodology of the study.

Beihami, et al. (2013) study entitled: "The effect of using electronic banking on profitability of bank". This study aims to illustrate that electronic virtual banking is the use of electronic means to transfer funds and other financial transactions directly from one account to another, rather than check or cash, loading to reduce bank costs, since electronic banking can increase bank incomes. The focus of their research was on electronic banking represent in (Automated Teller Machines, Bank Cards, Internet banking, Mobile Banking) and role of these electronic banking devices in increasing bank incomes. Data for conducting the research was collected from the financial statements of the selected banks in Kurdistan province, and from a questionnaire which consisted of (42) questions distributed to (147) individuals. Results of data analysis revealed the presence of a positive and strong relationship between electronic banking and its components (ATM, Bank Cards, Internet Banking, Mobile banking, Point of Sale) with bank incomes. Finally, results showed that (ATM) has the maximum influence on customers E-Satisfaction, for customers to getting banking service on their own without the need for assistance from the bank employee. During the period of June 2007. The result showed that about (57%) of the Indian commercial banks are providing transactional internet banking services. The univariate analysis indicates that internet banks are largest banks and have better operating efficiency ratios and profitability as compared to non-internet banks. Also, it was found the internet banks rely more heavily on care deposits for funding than non-internet banks do, and internet banking has a significant and negative association with risk profile of the banks, and banks in all size categories offering internet banking were generally more profitable and tended to rely less heavily on traditional banking activities.

The current study has benefited from this study in identifying the independent variable formulation of virtual banks services and its sub-variables (ATMs, bank cards,

Internet bank, and mobile banks) plus its impact on Bank profitability and on the construction of the theoretical framework in addition to formulation the study tool.

(2-3) What distinguishes the study from previous studies?

In the light of the previous studies, the researcher has noticed that profitability and the Virtual banks services cost are very important factors, hence they gained the attention of many researchers. Furthermore, there are no sufficient studies on the used variables. However, it should be taken into consideration that virtual bank services are new concept; therefore, more research to give the Arabia region enough results with variables combination.

For this reason, this study links two variables; the independent variable being the cost of virtual banks services, while the dependent variable being profitability, with main focus on how virtual bank services can be utilized to maximize profitability. Furthermore, the independent variable of the study is a relatively new and important topic as mentioned above, and the researcher will apply it on the Commercial Banks operating in Jordan.

Chapter 3: Research Methodology

(3-1) Introduction

(3-2) Study Population and Sample

(3-3) Study Type

(3-4) Data Collection Sources

(3-5) Variables Measurement

(3-6) Empirical Model

(3-7) Statistical Techniques Used

Chapter Three

Research Methodology

(3-1) Introduction

This chapter discusses and presents the study methodology used to verify the impact of virtual banking services cost on profitability, population and sample of the study, data collection sources, period of the study, study model, variables measurements, and data analysis techniques.

(3-2) Study population and sampling:

The study population consists of all commercial banks operating in Jordan and listed on the Amman Stock Exchange over a period of ten years, from 2010 to 2019. The reason for choosing the banking sector, and not selecting other sectors, is due to the role of this sector in the Jordanian economy. Where the banking sector plays a major role in supporting the national economy in Jordan, and it is relied upon as a basic pillar to achieve development goals. The Jordanian banking sector was able to achieve sustainable growth rates at all levels (Department of Statistics, 2020).

The assets of banks operating in Jordan at the end of the twelve months of 2018 increased by (4.7%) to reach (53.3) billion dinars, while credit facilities grew by (3.9%) to reach (27.1) billion JD, and deposits with banks increased by (3.8%) to reach (35.1) billion JD. This means that the Jordanian economy is based on banks, which are the largest sector in size, and the main financier of the development process in the Kingdom, as banks constitute more than (95%) of the sources of financing in Jordan, and the assets of banks in Jordan constitute (171%) of the gross domestic product, while deposits constitute (113%), and credit facilities constitute (87%), which reflects the financial depth and the great relative importance of banks (Central Bank of Jordan, 2019). The Jordanian banking sector is based on a strong infrastructure, including a prudent and experienced supervisory

environment through the Central Bank of Jordan, which is considered one of the most important regulatory institutions operating in the Kingdom, as well as regulatory legislation that keeps pace with the best international standards and practices, and is in full compliance with the supervisory requirements issued by international organizations such as The Basel Committee on Banking Supervision (BCBS) and Financial Action Task Force (FATF), in addition to full compliance with international financial reporting standards (IFRS) (Central Bank of Jordan, 2019). The study period has been chosen to include the most recent ten years; this is because choosing a longer period may affect the results of the analysis, especially in light of the economic conditions during this period, which included the global financial crisis, and other economic events such as the Corona pandemic. In addition, Islamic and foreign banks were not considered in this study as they governed by different legislations. Furthermore, foreign banks are subject to the inspection of the competent supervisory authorities in the country of its head office or regional office, in addition to the inspection of the Central Bank of Jordan (Banking Law No. 28 of 2000). The number of commercial banks listed on the Amman Stock Exchange reached (13) until the end of 2019 (https://www.ase.com.jo/ar). Banks in the sample were selected based on the following criteria:

a. The bank is listed on the Amman Stock Exchange during the study period (from 2010 to 2019).

b. The bank has not stopped trading during the study period.

c. Availability of all required data for each bank.

After implementing the above-mentioned study sample restrictions, not any bank was excluded from the study population. This is due to the availability of all the data necessary to measure the study variables, and accordingly, the study sample has become (13)

commercial banks listed on the Amman Stock Exchange. That is, (100%) of the study population, with total observations (130) during the period from 2010 to 2019.

(3-3) Study Type

Applied in nature, exploratory in purpose, and the commercial banks in Jordan will be analysed as a single bank level.

(3-4) Data Collection Sources

1- For the secondary data collection: the data of this study was obtained from the annual reports of the sampled commercial banks listed on Amman Stock Exchange during the period (2010-2019), where these annual reports were available on the website of Amman Stock Exchange.

2- For the primary data collection included: books, research and scientific journals, arab and foreign in addition to research publications that debated the impact of virtual banking services cost on profitability.

(3-5) Variables Measurement

(3-5-1) Measurement of Dependent Variable

- **Profitability**

Hanafi, (2021), Malik et al. (2020) and Sakanko and David, (2019) concluded that banks with higher (mobile and internet banking, ATMs, and Cards) costs are more likely to have higher the bank's commissions and interest, which leads to higher profitability growth for these banks. In this study profitability is measured using two ratios: accounting-based performance which is Net Profit Margin (NPM) and market-based performance, which is Tobin's Q, according to (Wardani, 2011; Kamel and Awadallah, 2017; Tejedo-Romero and Araujo, 2020), which will be computed as follows:

$$NPM_{it} = NI_{it} / IC_{it}$$

Where,

- **NPM_{it}:** represents net profit margin ratio for bank i in year t.
- **NI_{it}** : represents net income for bank i in year t.
- **IC_{it}:** Interest, commissions and other income for bank i in year t.

$$Tobin's\ Q_{it} = (M V_{it} + TD_{it}) / TA_{it}$$

Where,

- **Tobin's Q_{it}:** The second measure of profitability.
- **MV_{it}:** market value of equity (JD) for bank i in year t
- **TD_{it}**: represents total debt for bank i, in year t.
- **TA_{it}**: represents total assets for bank i, in year t.

(3-5-2) Measurement of the Control Variables.

This study included in the regression model the financial leverage and liquidity as a control variable. Because it's a widely applied measure within the virtual banking services cost literature that serves as a proxy for a bank's ability to generate profitability (Fliginskih et al., 2020; Ngwa, 2020; Fliginskih et al., 2020).

- **The financial leverage**

Yousef and Hama (2020) and Sakanko and David (2019) argued that banks suffer from high obligation tend to that the banks having low level of virtual banking services cost, which leads to decreased profitability growths. The financial leverage of banks in the study will be measured as follows:

$$\mathbf{FLEV_{it} = TD_{it} / TA_{it}}$$

Where,

- **$FLEV_{it}$:** represents the debt to total assets ratio of bank i in year t.
- **TD_{it}**: represents total debt for bank i in year t.
- **TA_{it}**: represents total assets for bank i in year t.

- **Liquidity**

The extant literature considers liquidity as a manifold term and provides various definitions to it, as it varies according to the nature and field of study in which it is presented. Kamel and Awadallah (2017) and Isnalita and Romadhon (2018) documented that the liquidity is the bank's ability to face the payment of short-term financial obligations, and that the high ratio of liquid assets in the bank leads to more information disclosure in order to differentiate themselves from other banks that have a lower Liquidity. In this study the liquidity will be measured by the Quick ratio depending on (Sakanko and David, 2019; Yang et al., 2018), which will be computed as follows:

$QUICK_{it}$: represents current assets (less inventories) to current liabilities for bank i in year t.

(3-6) Empirical Model

In order to test the main hypothesis and sub-hypotheses: the following model is used according to (Hanafi, 2021; Malik et al., 2020; Ngwa, 2020; Fliginskih et al., 2020; Mbah and Obiezekwem, 2019; Sakanko and David, 2019; Malik et al., 2020; Yousef and Hama 2020; Kamboh and Leghari, 2016).

Where,

$$NPM_{it} = \beta_0 + \beta_1 MBI\ Costs_{it} + \beta_2 ATMs\ Cost_{it} + \beta_3 Cards\ Costs_{it} + \beta 4\ Quick_{it} + \beta_5 FLEV_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots (1)$$

$$TOBINSQ\ it_{it} = \beta_0 + \beta_1 MBI\ Costs_{it} + \beta_2 ATMs\ Cost_{it} + \beta_3 Cards\ Costs_{it} + \beta_4 Quick_{it} + \beta_5 FLEV_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots (2)$$

Where:

NPM $_{it}$: represents net profit margin ratio for bank i in year t as a first measure of profitability.

TOBINSQ $_{it}$: represents total debts plus market value of equity to total assets for bank i in year t as a second measure of market capitalization.

MBI Costs $_{it}$: represents ratio of Mobile & internet banking Costs to the total assets of bank i in year t.

ATMs Cost $_{it}$: represents the ratio of ATMs Cost to the total Costs of bank i in year t.

Cards Costs $_{it}$: represents the ratio of Cards Costs to the total Costs of bank i in year t.

FLEV $_{it}$: represents the debt to total assets ratio of bank i in year t, as a measure of financial leverage.

Quick $_{it}$: represents current assets (less inventories) to current liabilities for bank i in year t. as measure of liquidity.

ε_{it}: represents standard error.

(3-7) Statistical Techniques Used

The researcher dealt with the data collected for the purposes of this study by the following financial and statistical analysis programs:

- Excel

- E- views

To use the following statistical purposes:

1- A descriptive statistic for all study variables through a number of parameters such as minimum, maximum, mean and standard deviation.
2- Test whether there is multicollinearity problem exists between the variables.
3- Test whether there is autocorrelation problem exists between the variables.
4- Test the correlation matrix and Variance inflation factor (VIF) between the variables.
5- Because the study data are cross-sectional and over a period of years (2010-2019), with 130 firm-year observations, the appropriate regression model is the multiple regression using the method of ordinary least squares (OLS).

Chapter 4: Research Analysis and Results

(4-1) Introduction

(4-2) Descriptive Statistics

(4-3) Robustness Tests

(4-4) Hypotheses Testing and Results Discussion

Chapter Four

Research Analysis and Results

(4-1) Introduction

This chapter gives a collective and integrated insight into the examination of empirical data derived from the variables presented in the previous chapter and attempts to address the hypotheses established in the preceding section.

(4-2) Descriptive Statistics

Descriptive statistics for all study variables were run through a number of parameters such as minimum, maximum, mean, and standard deviation as shown in table (4.1).

Table 4.1: Descriptive statistics of the Jordanian commercial banks' variables, 2010-2019, with 130 firm-year observations

Continuous variables	Minimum	Maximum	Mean	Std.Deviation
Mobile & Internet Banking (JD)	487,572	21,141,035	5,274,038	5,215,002
Mobile & Internet Banking to total assets	0.0003	0.0078	0.0024	0.0021
ATMs Costs (JD)	323,324	40,197,000	5,756,388	8,690,386
ATMs Costs to total Costs	0.0137	0.3622	0.0817	0.0908
Cards Costs (JD)	64,106	34,045,596	5,454,038	9,270,005
Cards Costs to total Costs	0.0021	0.12471	0.0957	0.0269
NPM	0.0139	0.4683	0.2839	0.0934
Tobin's Q	0.9043	1.1984	1.0069	0.0604
Financial Leverage	0.8091	0.9350	0.8606	0.0258
Quick ratio	0.1188	0.5171	0. 2989	0.0850

Table (4.1) provides the results of the descriptive statistics for the study variables regarding 130 firm- year observations of 13 commercial banks listed on ASE during the

period (2010-2019). As shown in Table (4.1), the first measure of market profitability is Tobin's Q, has a minimum value 0.904, and the maximum value is 1.198, with an average of 1.006, and the standard deviation is 0.060. This indicates the variation among Jordanian commercial banks in investment opportunities, as a result of their different size of these banks. Enache and Hussainey, (2020) and Zhao and Murrell, (2016) support this view by arguing that when there is a decline in the value of Tobin's Q to be less than one, the market capitalization is less than the value of its assets, while, when the rise in the value of Tobin's Q is greater than one, this means that the market capitalization of the company is greater than the value of the cost of replacing its assets. On the other hand, the other profitability measure, Net Profit Margin ratio, has a minimum value of 1.3%, and the maximum value is 46.8%, with an average of 28.3%, and the standard deviation is 9.3%, which indicates that banks within the sample face on average a better period with a positive percentage of net income to net interest and commissions income.

As shown in Table (4.1), the mean value of for mobile and internet banking is 5,274,038 JD, and that the largest mobile and internet banking is returns to Jordan Ahli Bank, with 21,141,035 JD, and the lowest mobile and internet banking is due to Arab Banking Corporation (Jordan), with 487,572 JD, and the standard deviation the mobile and internet banking 5,215,002 JD. For the purposes of statistical analysis of hypotheses, the researcher actually used in the study model the mobile and internet banking to total assets, which is shown in the same table above.

On the other hand, the average Quick ratio of these banks is 29.9%. It can be noticed from the table that banks within the sample take either increasing their liquidity to denote a better and higher liquidity of the bank or reducing their information asymmetry. Petersen and Plenborg (2006) and Ajina et al. (2015) support this view by suggesting that the corporate increases investors' confidence by improving their disclosure liquidity on the

one hand and reducing the information asymmetry on the other hand. As revealed in Table (4.1), the mean value of ATMs Costs is 5,756,388 JD, and that the largest ATMs costs is returns to the Arab Bank, with 40,197,000 JD, and the lowest ATMs costs is due to Invest Bank, with 323,324 JD, and the standard deviation ATMs costs is 8,690,386 JD. For the purposes of statistical analysis of hypotheses, the researcher actually used in the study model ATMs Costs to total bank costs, which is shown in the same table above.

As exposed in Table (4.1), the mean value of cards costs is 5,454,038 JD, and that the largest cards costs is returns to the Arab Bank, with 34,045,596 JD, and the lowest cards costs is due to Invest Bank, with 64,106 JD, and the standard deviation cards costs are 9,270,005 JD. For the purposes of statistical analysis of hypotheses, the researcher actually used in the study model cards costs to total bank costs, which is shown in the same table above. However, the financial leverage of these banks, which showed the proportion of bank's assets that are financed through debt ranges from 80.9% to 93.5%, with an average of 86.1%.

(4-3) Robustness Tests

Before beginning to estimate regression models and hypothesis testing, the characteristics of the data must be verified to check their appropriateness for testing the hypotheses by performing the following tests:

(4-3-1) Multicollinearity:

The problem of multicollinearity arises when the explanatory variables are significantly correlated with one another, indicating that they measure the same thing (Gujarati, 2015). The multicollinearity tests are carried out to inspect the correlation among independent variables and control variables.

(4-3-1-1) Correlation between independent variables and control variables

Table (4.2) provides a correlation matrix among independent and control variables. According to (Ghozali, 2012), Multicollinearity problem will be present when the independent variables are highly correlated (r=0.9 and above), whereas (Gujarati, 2015) considered multicollinearity problem exists when correlation constant is more than .80 or .90. However, the table presents that correlation among independent variables and control variables are less than 0.8 or .90, and there are no signs for multicollinearity.

Table 4.2: Pearson rank correlations for the independent and control variables

Variables	Mobile & Internet Banking to Tassets	ATMs Costs to total Costs	Cards Costs to total Costs	Financial Leverage	QUICK Ratio
Mobile & Internet Banking	1				
ATMs Costs	0.366**	1			
Cards Costs	0.451**	0.305**	1		
Financial Leverage	0.025	0.079	0.016	1	
QUICK Ratio	0.108	0.119	0.025	-0.202*	1

Notes:
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

(4-3-1-2) Variance inflation factor test

Nonetheless of the real fact that the matrix may be used to determine possible multicollinearity issues between explanatory variables, the absence of high correlation doesn't continuously mean that there's no multicollinearity (Gujarati, 2015).

To deal with this problematic, the multicollinearity was tested by outcome the variance inflation factor values for independent variables relevant to the model. The values of the tolerance factor closer to zero and variance inflation factor greater than 10 will show the presence of multicollinearity in the model (Gujarati, 2015).

Table 4.3: The Collinearity Statistics for the independent and control variables

Variables	Collinearity Statistics	
	Tolerance	**VIF**
Mobile & Internet Banking	0.672	1.487
ATMs Costs	0.415	2.412
Cards Costs	0.492	2.031
Financial Leverage	0.943	1.060
Quick Ratio	0.929	1.077

The tolerance factors, as can be seen from table (4.3), vary from (0.415) to (0.943). Similarly, the results of variance inflation factor range from 1.060 to 2.412, which shows no signs of multicollinearity among independent and control variables.

(4-3-2) Outliers

Predictive analytics may be used in a data collection to gain a sense of what the data looks like in a usual situation and to identify if an observation is noticeably different (or outlying) from this pattern. A data set may contain one or more observations with exceptionally large or very tiny values (Bryman and Cramer, 2011; Heeringa et al., 2017). These excessive numbers are referred to as outliers. Outliers can be identified in a variety of ways. Outliers were detected in this study using Cook's distance, which calculates the difference between the regression coefficient acquired from the entire data and the

regression coefficients gained from the sample after excluding a case from the estimate process (Chambers, 2017). Moreover, any case that has a value of Cook's distance of more than 1.0 is considered as a might be outlier as (Ratner, 2017) suggested. Table (4.4) reflects the outcome of Cook's distance calculation. As can be seen from table (4.4), the maximum value for Cook's distance for the Model (1) is 0.315, and maximum value for Cook's distance for the Model (2) is 0.079. According to (Ratner, 2017), there are no outliers due to the notion that maximum value of Cook's distance for the (130) firm-year observation is lower than benchmark (1.0).

Table 4.4: Cook's Distance

	Minimum	Maximum	Mean	St. Deviation
Cook's Distance Model (1)	0.000	0.315	0.12	0.037
Cook's Distance Model (2)	0.000	0.079	0.006	0.011

(4-3-3) Normality

The normal distribution known as the rectangular distribution, contains values that are equally distributed in the range between the smallest value and the largest value. The normal distribution is not only symmetrical, but bell-shaped, a shape that (loosely) suggests the profile of a bell (Heeringa et al., 2017). Being Melville Bell -shaped substance that most values of the continuous variables will be gathered around the mean. In spite of the fact that a normal distribution can reach from negative infinity to positive infinity, the Melville Bell -shaped of the normal distribution makes it very unlikely that highly large values or extremely small values will occur (Chambers, 2017). This research examined data from a large sample, this condition may not distort the final result as significant departure from non-N may be negligible because a sample size more than 100

observation (Tabachnick and Fidell, 2007; Hair et al., 2010a; Hair et al., 2010b; Chambers, 2017).

(4-3-4) Autocorrelation test

The problem of autocorrelation of residuals appears in the model if the residuals are not independent from each other or contiguous residues are correlated; this affects the validity of the linear regression analysis, and the effect of the independent variables on the dependent variable is highly amplified as a result of that correlated. To verify the existence of this problem in the study model, the (Durbin Watson) test was used, as this test is one of the most used methods for statisticians. In addition, the value of this test ranges between (0 to 4). Gujarati (2015) indicated that the result is close to (0) indicates a strong positive correlation between the contiguous residues, while a result close to (4) indicates a strong negative correlation. Additionally, that the optimal result ranges between (1.5 to 2.5) (Gujarati, 2015). which indicates that there is no autocorrelation between the contiguous values of the variables, whenever the calculated (D-W) value is close to (2), the problem of autocorrelation is not existence.

Table 4.5: The Durbin Watson tests for autocorrelation

Model	D-W
Model (1)	**1.933**
Model (2)	**1.818**

From the above table, it is noticed that the (D-W) statistic calculated for the study model close to (2), which means that there is no autocorrelation problem in the study models.

(4-4) Hypotheses Testing and Results Discussion

In order to answer the research questions and examine the impact of virtual banking services cost on profitability in commercial banks listed on Amman stock exchange and to judge the validity of the previously stated hypotheses, a multiple regression analysis is performed.

The first main hypothesis:

H_{01}: There is no significant impact of virtual banking services cost on profitability **"measured by Net Profit Margin"**.

Table 4.6: Multiple Regression results for the first main hypothesis.

Variables	Coefficient	p-Value
Mobile & Internet Banking	747.360	0.009
ATMs Costs	14.136	0.024
Cards Costs	8.178	0.000
Financial Leverage	-0.417	0.002
Quick Ratio	14.750	0.000

Model	R Square	Adjusted R Square
1	0.350	0.324

F-statistic	Sign. F
13.375	0.000

Dependent Variable: Net Profit Margin

Table (4.6) represents the results of the regression between profitability and the combination of the independent variables using control variables. The results reveal that the model is strong with 35.0% R Square and 32.4% Adjusted R Square, meaning that all

the independent variables explain 32.4% of profitability variation across control variables for the total sample in the Jordanian commercial banks. In addition, table (4.6) shows that the value F-statistic is 13.375, with Sign. F is 0.000, and hence the model as a whole is significant at 1% level. As a result of these statistics, the study rejects the null hypothesis, **and accepts the alternative hypothesis** that states: there is significant effect of virtual banking services cost on profitability "measured by Net Profit Margin". This result is consistent with prior studies in similar areas such as those of (Sakanko and David, 2019; Malik et al., 2020; Kamboh and Leghari, 2016)

Test the first sub hypothesis

$H_{01\text{-}1}$: There is no significant impact of Mobile & Internet Banking Costs on profitability **"measured by Net Profit Margin"**.

As Table (4.6) shows, the coefficient value of mobile & internet banking is 747.3 and its positively associated with profitability measured by Net Profit Margin for the Jordanian commercial banks. It appears also from the table that the p-value is 0.009, which is less than 0.05, and then the effect is statistically significant. As a result of these statistics, the profitability measured by net profit margin is affected positively by mobile and internet banking costs. This indicates that banks with higher mobile and internet banking costs are more likely to have higher the bank's commissions and interest, which leads to higher profitability growth for these banks. Sakanko and David, (2019) and Malik et al. (2020) support this view by arguing that the mobile and internet banking as a source of increasing profitability in banks. As a result of these statistics, this study rejects the null hypothesis, **and accepts the alternative hypothesis** that states: there is a significant effect of Mobile and Internet Banking Costs on profitability "measured by Net Profit Margin".

Test the second sub hypothesis

H_{01-2}: There is no significant impact of ATMs Costs on profitability **"measured by Net Profit Margin"**.

On the other hand, table (4.6) provides that the coefficient value of ATMs Costs is 14.136 and its positively associated with profitability measured by net profit margin for the Jordanian commercial banks. It appears from the table that the p-value is 0.024, which is less than 0.05; therefore, the effect of ATMs Cost is statistically significant. As a result of these statistics, the profitability measured by net profit margin is affected positively by ATMs Costs. This finding is in line with the view that the increased existence of ATMs Costs does contribute to higher level of bank's profitability through interest and commissions income. As can be concluded from table (4.6), this study **accepts the alternative hypothesis** that states: there is significant effect of ATMs Costs on profitability "measured by Net Profit Margin". This outcome is consistent with the findings of several studies (Hanafi, 2021; Malik et al., 2020). Nonetheless, this is inconsistent with other findings (Anggraini et al., 2020).

Test the third sub hypothesis

H_{01-3}: There is no significant impact of Cards Costs on profitability **"measured by Net Profit Margin"**.

It can be observed from table (4.6), that the coefficient value of Cards Costs is 8.178 and its positively associated with profitability measured by net profit margin for the Jordanian commercial banks. It appears from the table that the p-value is 0.000, which is less than 0.05, and then the effect is statistically significant. As a result of these statistics, the profitability measured by net profit margin is affected positively by cards costs. Fliginskih et al., (2020), Yousef and Hama, (2020) and Yang et al., (2018) support this view by arguing that pay more high costs for the cards to operate their payment-processing system and linking facility to processing of payments universal for the banks' customers, therefore expected to get additional income from both debit as well as credit cards, which in turn improves banks' profitability. This evidence is consistent with previous studies documented that Cards Costs improves the profitability (Fliginskih et al., 2020; Yousef and Hama, 2020). As can be concluded from table (4.6), this study rejects the null hypothesis, **and accepts the alternative** hypothesis that states: there is a significant effect of Cards Costs on profitability "measured by net profit margin".

As can be observed from Table (4.6), the debt to assets ratio as measure of financial leverage has a negative sign associated with profitability measured by net profit margin for the Jordanian commercial banks. It appears from the table that the p-value is 0.002, which is less than 0.05; therefore, the effect is negatively statistically significant. Which implies that the profitability is also affected negatively by financial leverage. It can be argued that banks suffer from high obligation tend to that the banks having low level of virtual banking services cost, which leads to decreased profitability growths. This

supports the results of other studies (Fliginskih et al., 2020; Yousef and Hama 2020; Sakanko and David, 2019) in that financial leverage is negatively associated with profitability. It can be observed from table (4.6), the coefficient value of quick ratio as a proxy of liquidity is 14.750 and its positively associated with profitability measured by net profit margin for the Jordanian commercial banks. It appears also from the table that the p-value is 0.000, which is less than 0.05; therefore, the effect of quick ratio as a measure of liquidity is statistically significant. Ajina et al. (2015) and Schoenfeld (2017) support this view by arguing that the increase in profitability reduces information asymmetry between both aware and unaware investors, which in turn improves future liquidity of firms. This outcome is consistent with the findings of several authors (Ngwa, 2020; Fliginskih et al., 2020; Mbah and Obiezekwem, 2019) which documented that a firm with high liquidity having more level of virtual banking services cost which in turn have more profitability in comparison to firms with low liquidity. However, this result contradicts the finding of other studies such as (Sakanko and David, 2019; Yang et al., 2018).

The second main hypothesis:

H_{02}: There is no significant impact of virtual banking services cost on profitability **"measured by Tobin's Q".**

Table (4.7) represents the results of the regression between profitability and the combination of the independent variables using control variables. Analogous to prior studies, the model has a high-explanatory power with 64.3% R Square and 62.8% adjusted R square, meaning that all the independent variables explain 62.8% of profitability variation across control variables for the total sample in the Jordanian commercial banks.

In addition, table (4.7) shows that the value F-statistic is 44.629, with Sign. F is 0.000, and hence the model as a whole is significant at 1% level. As a result of these statistics, the study rejects the null hypothesis, **and accepts the alternative hypothesis** that states: There is significant effect of virtual banking services cost on profitability "measured by Tobin's Q". This result is consistent with prior studies in similar areas such as those of (Sakanko and David, 2019; Malik et al., 2020; Kamboh and Leghari, 2016)

Table 4.7: Multiple Regression results for the second main hypothesis.

Variables		**Coefficient**	**p-Value**
Mobile & Internet Banking		6.876	0.000
ATMs Costs		0.237	0.003
Cards Costs		0.063	0.002
Financial Leverage		-8.760	0.916
Quick Ratio		0.136	0.000
Model	R Square	Adjusted R Square	
2	0.643	0.628	
F-statistic		Sign. F	
44.629		0.000	
Dependent Variable: Tobin's Q			

Test the first sub hypothesis

H_{02-1}: There is no significant impact of Mobile & Internet Banking Costs on profitability **"measured by Tobin's Q".**

As Table (4.7) shows, the coefficient value of Mobile & Internet Banking is 6.876 and its positively associated with profitability measured by Tobin's Q for the Jordanian commercial banks. It appears also from the table that the p-value is 0.000, which is less than 0.05, and then the effect is statistically significant. As a result of these statistics, the profitability measured by Tobin's Q is affected positively through mobile and internet banking costs. This means that banks with higher mobile and internet banking costs are more likely to take higher levels of commitment and accountability, and will have a greater ability to direct managers to implement good systems that allow bank customers to access their accounts and general information on bank products and services via the bank's mobile and website, which will encourage bank customers to make decisions that maximize shareholders' value. This finding is consistent with previous studies (Riyanto et al., 2019; Mustapha, 2018; Anggraini et al., 2020), which also provided evidence of the positive influence of this variable on profitability. However, this result contradicts the finding of other studies (Mustapha, 2018). As a result of these statistics, this study rejects the null hypothesis, **and accepts the alternative hypothesis** that states: there is a significant effect of mobile and internet banking costs on profitability "measured by Tobin's Q".

Test the second sub hypothesis

$H_{02\text{-}2}$: There is no significant impact of ATMs Costs on profitability **"measured by Tobin's Q".**

On the other hand, table (4.7) provides that the coefficient value of ATMs Costs is 0.237 and its positively associated with profitability measured by Tobin's Q for the Jordanian commercial banks. It appears from the table that the p-value is 0.003, which is less than 0.05; therefore, the effect of ATMs Cost is statistically significant. As a result of these statistics, the profitability measured by Tobin's Q is affected positively via ATMs Costs. Abbasi and Weigand (2017) and Abaenewe et al., (2013) support this view by arguing that, when profits increase, executives are motivated to create comprehensive systems that allow bank customers to enter the bank's bookkeeping system with a card containing a personal identification number, or by punching a special code number into ATMs linked to the bank's computerized records 24/7, in order to boost the bank's production even when the bank is closed. As a result, greater income is predicted, implying that banks' profits will increase, and shareholders' value will increase. As can be concluded from table (4.6), this study **accepts the alternative hypothesis** that states: there is significant effect of ATMs Costs on profitability "measured by Tobin's Q". This outcome is consistent with the findings of several studies (Hanafi, 2021; Malik et al., 2020; Riyanto et al., 2019).

Test the third sub hypothesis

$H_{02\text{-}3}$: There is no significant impact of Cards Costs on profitability **"measured by Tobin's Q".**

It can be observed from table (4.7), that the coefficient value of Cards Costs is 6.3% and its positively associated with profitability measured by Tobin's Q for the Jordanian commercial banks. It appears from the table that the p-value is 0.002, which is less than 0.05, and then the effect is statistically significant. As a result of these statistics, the profitability measured by Tobin's Q is affected positively by Cards Costs. This finding is in line with the view that the increased existence of Cards Costs does contribute to higher level of bank's profitability through interest and commissions income. This evidence is consistent with previous studies documented that Cards Costs improves the profitability (Siddik et al., 2016; Mwangi, 2012). As can be concluded from table (4.7), this study rejects the null hypothesis, **and accepts the alternative** hypothesis that states: there is a significant effect of Cards Costs on profitability "measured by Tobin's Q".

On the other hand, table (4.7) shows that the coefficient value of financial leverage is -8.760 and its negatively associated with profitability for the Jordanian commercial banks. It appears also from above table that the p-value is 0.916, which is more than 0.05, and then the effect is statistically insignificant. This evidence is consistent with previous studies (Abbasi and Weigand, 2017) that failed to document any significant relationship between financial leverage and the profitability. However, this result contradicts the findings of other studies (Fliginskih et al., 2020; Yousef and Hama 2020; Sakanko and David, 2019) where a negative relationship was observed between the financial leverage and the profitability. It can be observed from table (4.7), the coefficient value of quick ratio as a proxy of liquidity is 0.136 and its positively associated with profitability

measured by Tobin's Q for the Jordanian commercial banks. It appears also from the table that the p-value is 0.000, which is less than 0.05; therefore, the effect of quick ratio as a measure of liquidity is statistically significant. This outcome is consistent with the findings of several authors (Ngwa, 2020; Fliginskih et al., 2020; Mbah and Obiezekwem, 2019) which documented that a firm with high liquidity having more level of virtual banking services cost which in turn have more profitability in comparison to firms with low liquidity. However, this result contradicts the finding of other studies such as (Sakanko and David, 2019; Yang et al., 2018).

Chapter 5: Conclusions and Recommendations

(5-1) Conclusions

(5-2) Recommendations

Chapter Five

Conclusions and Recommendations

(5-1) Conclusions

This section presents the conclusions of the study. Based on the conclusions of the study, recommendations for commercial Jordanian Banks, regularity agencies and future studies are also provided. The conclusions regarding this effect were totally varied and mixed. This research was motivated by this ambiguity regarding profitability impact and especially in the Jordanian context. Therefore, the primary objective of this study is to investigate the impact of virtual banking services cost on profitability in commercial banks listed on Amman stock exchange during the period 2010 - 2019 and employed OLS regression to test the hypotheses of the study. The most important outcomes that were previously reached and discussed can be summarized through the following points:

1- There is significant effect of virtual banking services cost on profitability "measured by net profit margin" of the Jordanian commercial Banks listed on Amman Stock Exchange. This result is consistent with prior studies in similar areas such as those of (Sakanko and David, 2019; Malik et al., 2020; Kamboh and Leghari, 2016)

2- Mobile and Internet Banking Costs is affecting Profitability measured by Net Profit Margin positively. This indicates that banks with higher mobile and internet banking costs are more likely to have higher the bank's commissions and interest, which leads to higher profitability growth for these banks. Sakanko and David, (2019) and Malik et al., (2020) support this view by arguing that the mobile and internet banking as a source of increasing profitability in banks.

3- ATMs Costs is affecting Profitability measured by Net Profit Margin positively. As a result of these statistics, the profitability measured by net profit margin is affected positively by ATMs Costs. This finding is in line with the view that the increased existence of ATMs Costs does contribute to higher level of bank's profitability through interest and commissions income.

4- Cards Costs is affecting Profitability measured by Net Profit Margin positively. Fliginskih et al., (2020), Yousef and Hama, (2020) and Yang et al. (2018) support this view by arguing that pay more high costs for the cards to operate their payment-processing system and linking facility to processing of payments universal for the banks' customers, therefore expected to get additional income from both debit as well as credit cards, which in turn improves banks' profitability.

5- The debt to assets ratio as measure of financial leverage has a negative sign associated with profitability measured by net profit margin for the Jordanian commercial banks. Which implies that the profitability is also affected negatively by financial leverage. It can be argued that banks suffer from high obligation tend to that the banks having low level of virtual banking services cost, which leads to decreased profitability growths.

6- Profitability measured by net profit margin is affected positively through quick ratio as a measure of liquidity for the Jordanian commercial banks. Ajina et al. (2015) and Schoenfeld (2017) support this view by arguing that the increase in profitability reduces information asymmetry between both aware and unaware investors, which in turn improves future liquidity of firms.

7- There is significant effect of virtual banking services cost on profitability "measured by Tobin's Q" of the Jordanian commercial Banks listed on Amman

Stock Exchange. This result is consistent with prior studies in similar areas such as those of (Sakanko and David, 2019; Malik et al., 2020; Kamboh and Leghari, 2016)

8- ATMs Costs is affecting Profitability measured by Tobin's Q positively. This finding is consistent with previous studies (Riyanto et al., 2019; Mustapha, 2018; Anggraini et al., 2020), which also provided evidence of the positive influence of this variable on profitability. However, this result contradicts the finding of other studies (Mustapha, 2018).

9- Cards Costs is affecting Profitability measured by Tobin's Q positively. This finding is in line with the view that the increased existence of Cards Costs does contribute to higher level of bank's profitability through interest and commissions income. This evidence is consistent with previous studies documented that Cards Costs improves the profitability (Siddik et al., 2016; Mwangi, 2012).

10- There is no significant effect of financial leverage on profitability in the commercial Jordanian Banks listed in Amman Stock Exchange. This evidence is consistent with previous studies (Abbasi and Weigand, 2017) that failed to document any significant relationship between financial leverage and the profitability.

11- Quick ratio as a ratio of liquidity is positively associated with profitability measured by Tobin's Q for the Jordanian commercial banks. This outcome is consistent with the findings of several authors (Ngwa, 2020; Fliginskih et al., 2020; Mbah and Obiezekwem, 2019) which documented that a firm with high liquidity having more level of virtual banking services cost which in turn have more profitability in comparison to firms with low liquidity.

(5-2) Recommendations

Based on the previous results of the study, the researcher recommends the following, hoping that it will be of service to all parties benefiting from the virtual banking services cost and profitability, whether they are shareholders, investors, lenders, creditors, and other parties.

1- Banks should pay more attention to disclose more about its valuable tangible the virtual banking services cost to boost its reputation and provide a positive image and signal the good performance to its stakeholders, in addition, invites the decision makers in banks to give more emphasis to the new trends in disclosure such as employee information and value-added statements, more emphasis should also be given to the corporate governance code for banks in transparency and disclosure in Jordan

2- The study recommends that future studies should concentrate on this topic and other related topics because this topic is complex and difficult to cover in one study. Therefore, it is recommended to concentrate on market capitalization characteristics as context independent variable. In addition, the relationship between the different the virtual banking services cost attributes such as (Automated /Computerized Teller Banking) and profitability will be another research opportunity .

3- Finally, increasing the observations could also be useful in enabling the researcher to generalize the results and enhance the quality of the results. The researcher also recommends applying this study on industrial and service sectors and on other time periods.

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Appendices

Appendix 1: List of Commercial Banks

1-	Arab Bank
2-	Bank al Ethiad
3-	Jordan Commercial Bank
4-	Arab Jordan Investment Bank (AJIB)
5-	The Housing Bank for Trade and Finance
6-	Invest Bank
7-	Arab Banking Corporation -Jordan
8-	Societe Generale De Banque - Jordanie
9-	Bank of Jordan
10-	Cairo Amman Bank
11-	Capital Bank of Jordan
12-	Jordan Kuwait Bank
13-	Jordan Ahli Bank

Appendix (2)

The outcomes of the full sample

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
MobileB	130	487572.000000	21141035.000000	5274038.75206154	5215002.779150556
MobileBtoTASSE	130	.000295	.007770	.00244433	.002096740
ATM	130	323324.000000	40197000.000000	5756388.41600000	8690386.906310067
ATMtoToEx	130	.013664	.362233	.08168810	.090809289
Cards	130	64106.000000	34045596.000000	5454038.02307692	9270005.434704317
CardsToEx	130	.002099	.1247067	.09565146	.026998849
NPM	130	1.389564	46.316191	28.39992290	9.346587569
Tobin'sq	130	.904321	1.198474	1.00692763	.060430353
FLeverage	130	80.913151	93.503713	86.06435659	2.578334062
Quick	130	.118802	.517111	.29896684	.085007871
Valid N (listwise)	130				

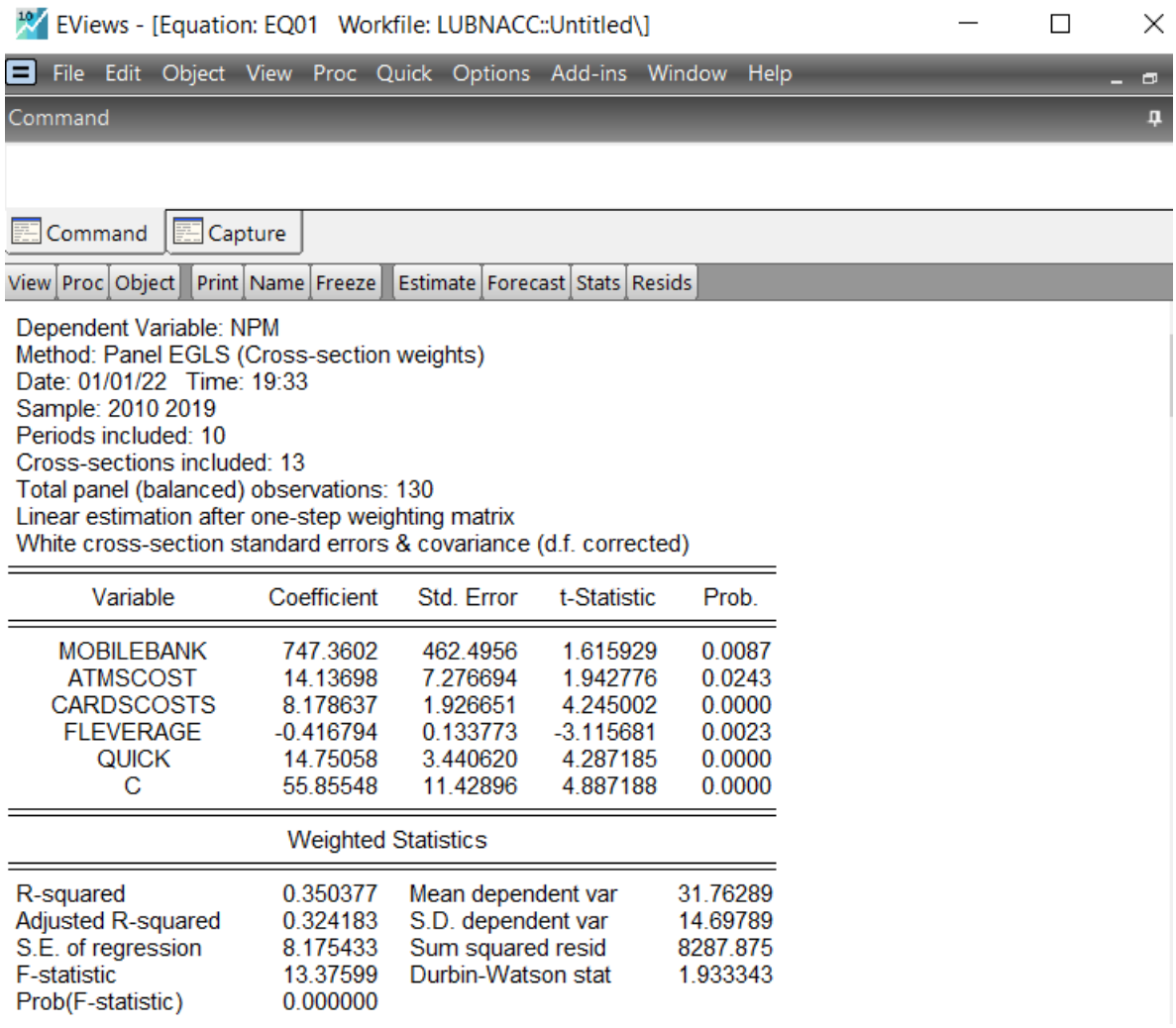
Correlations

		MobileBtoTASSE	ATMtoToEx	CardsToEx	FLeverage	Quick
MobileBtoTASSE	Pearson Correlation	1	.366**	.451**	.025	.108
	Sig. (2-tailed)		.000	.000	.775	.220
	N	130	130	130	130	130
ATMtoToEx	Pearson Correlation	.366**	1	.305**	.079	.119
	Sig. (2-tailed)	.000		.000	.374	.177
	N	130	130	130	130	130
CardsToEx	Pearson Correlation	.451**	.305**	1	.016	.025
	Sig. (2-tailed)	.000	.000		.859	.779
	N	130	130	130	130	130
FLeverage	Pearson Correlation	.025	.079	.016	1	-.202*
	Sig. (2-tailed)	.775	.374	.859		.021
	N	130	130	130	130	130
Quick	Pearson Correlation	.108	.119	.025	-.202*	1
	Sig. (2-tailed)	.220	.177	.779	.021	
	N	130	130	130	130	130

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Collinearity Statistics	
Tolerance	VIF
.672	1.487
.415	2.412
.492	2.031
.943	1.060
.929	1.077

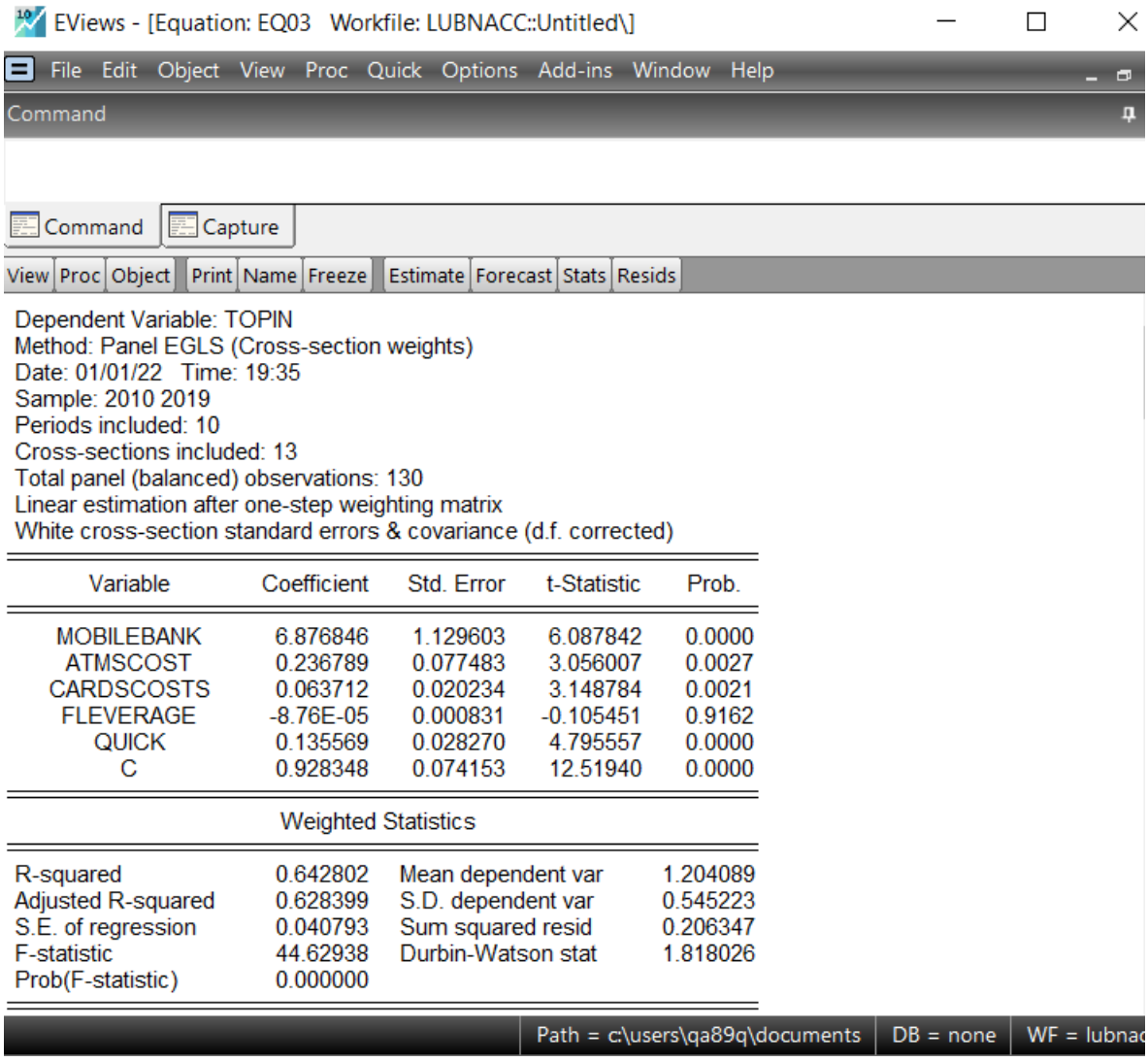


Dependent Variable: NPM
Method: Panel EGLS (Cross-section weights)
Date: 01/01/22 Time: 19:33
Sample: 2010 2019
Periods included: 10
Cross-sections included: 13
Total panel (balanced) observations: 130
Linear estimation after one-step weighting matrix
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MOBILEBANK	747.3602	462.4956	1.615929	0.0087
ATMSCOST	14.13698	7.276694	1.942776	0.0243
CARDSCOSTS	8.178637	1.926651	4.245002	0.0000
FLEVERAGE	-0.416794	0.133773	-3.115681	0.0023
QUICK	14.75058	3.440620	4.287185	0.0000
C	55.85548	11.42896	4.887188	0.0000

Weighted Statistics

R-squared	0.350377	Mean dependent var	31.76289
Adjusted R-squared	0.324183	S.D. dependent var	14.69789
S.E. of regression	8.175433	Sum squared resid	8287.875
F-statistic	13.37599	Durbin-Watson stat	1.933343
Prob(F-statistic)	0.000000		



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Dependent Variable: TOPIN
Method: Panel EGLS (Cross-section weights)
Date: 01/01/22 Time: 19:35
Sample: 2010 2019
Periods included: 10
Cross-sections included: 13
Total panel (balanced) observations: 130
Linear estimation after one-step weighting matrix
White cross-section standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MOBILEBANK	6.876846	1.129603	6.087842	0.0000
ATMSCOST	0.236789	0.077483	3.056007	0.0027
CARDSCOSTS	0.063712	0.020234	3.148784	0.0021
FLEVERAGE	-8.76E-05	0.000831	-0.105451	0.9162
QUICK	0.135569	0.028270	4.795557	0.0000
C	0.928348	0.074153	12.51940	0.0000

Weighted Statistics

R-squared	0.642802	Mean dependent var	1.204089
Adjusted R-squared	0.628399	S.D. dependent var	0.545223
S.E. of regression	0.040793	Sum squared resid	0.206347
F-statistic	44.62938	Durbin-Watson stat	1.818026
Prob(F-statistic)	0.000000		

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