

**Amity Journal of
Insurance Banking and Actuarial Science
(AJIBAS)**

Volume 4 – Issue 1



Amity School of Insurance Banking and Actuarial Science

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Amity Journal of Insurance Banking and Actuarial Science

RNI UPENG04306

ISSN 2581 6373

RNI Registration NO: UPENG/2018/74978

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From the Desk of Editor

It gives me an immense pleasure to release the Volume 4 First Issue (Jan – June 2022) of Amity Journal of Insurance Banking and Actuarial Science (AJIBAS). This issue of AJIBAS consists of six articles on the recent developments in Banking and Insurance Industry. Broad themes of these research papers are Payment Systems, Digital Banking, Cryptocurrency , Fintech ,Cyber insurance ,Asset Liability Management and Interest rates in economy. I hope the readers will enjoy reading these articles while learning the new concepts and procedures being followed by the corporate houses in achieving customer satisfaction and business enhancement.

We would like to express our gratitude to Honorable Founder President D. Ashok K Chauhan for his constant motivation and inspiration. We are grateful to our respectable Chancellor Dr. Atul Chauhan for his continuous guidance. Our sincere thanks to Vice Chancellor Dr. Balvinder Shukla for continuous guidance and motivating in publication of compendium of papers.

Editor

A.P.Singh

A Study of Payment and Settlement Systems in India- Products, Growth and Future in Indian Banking Sector

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Abstract

The advent of information and communication technology has transformed the financial services sector, especially the banking sector. With the potential for fame and competition, most of the institutions have recognized the importance of the electronic banking idea and are adopting the new technology. Bank receipts and payments are now handled online due to electronic banking. Customers benefit from electronic banking as it allows them to get high quality services. It makes it easier for consumers to be more satisfied, lowers costs, improves efficiency, and allows a wider range of banking activities. The authors attempt to demonstrate the scale of innovation and concept changes taking place in Real Time Gross Settlement, Mobile Banking, National Electronic Fund Transfer, and Electronic Clearing Service, which have marked a significant step in payment systems through electronic modes. For the years 2006 to 2017, the authors looked at RTGS and mobile transaction volumes.

Keywords - Banking, Information, Communication Technology, RTGS, NEFT and Electronic Clearing Service.

Introduction

In India, the payment system has traditionally been dominated by banks. Electronic payment systems have existed and evolved thanks to new technology and laws. Electronic payment systems are increasingly being adopted in India, ranging from closed systems such as pre-loaded cards to semi-closed systems such as Paytm, MobiKwik, and Tez such as e-wallets, payments banks, and payment modes such as NEFT, RTGS, and IMPS.

In the early 1990s, banks shifted their focus to Internet-based electronic banking. This time around, a technological revolution and fierce competition have played a key role in the global adoption of electronic-based financial services

(Muraleedharan, 2014). The Internet bubble at the turn of the century led to the belief that research possibilities had evaporated. ISSN 2456-7078 ISSN 2456-7078 ISSN 2456-7078 ISSN 2456-7078 ISSN 2456- 1 Internet-Based Enterprise Impact Factor- 4.520 VOL-1, ISSUE-11, Jan-2018 As a result, Web-based businesses and Internet players have become increasingly important to exist. was forced to compete. At this point, the rapid expansion of e-banking around the world had saved e-commerce from its stagnation (Zoltan et al., 2008). The current situation has led to the rise of e-banking due to high-speed broadband Internet access and the expansion of the Internet user population. As a result, many benefits have compelled people across the world to use e-banking. Payment and settlement systems that are both

efficient and secure are important components of a well-developed financial system. In the context of payment and settlement systems, RBI focuses on moving towards a cashless society and enhances the efficiency and security of electronic transactions while improving operational ease.

Review of Literature

According to John Simpson (2002), the United States is well ahead of the rest of the world in terms of e-banking adoption. The findings of the study showed that when banking services are supplied through a branch network, the expenses are reduced, and the income of the bank is maximized. As per the report, the bank should make necessary efforts to reduce operating expenses to increase operating revenue. Tulani Dubey et al., (2009) conducted research to determine the extent to which commercial banks in Zimbabwe have implemented and used online banking. According to the report, people used internet banking to check account balances, pay utility bills and transfer cash. They also found that the perceived benefits of using online banking were cost savings, increased customer loyalty, and the ability to recruit new consumers. The category of electronic-based financial services has been described by Gordon and Natarajan (2014). The following are some of the electronic-based financial services offered by Indian banks: Electronic Funds Transfer (EFT), National Electronic Funds Transfer (NEFT), Real-time Gross Settlement System (RTGS), Debit Cards, Credit Cards, Internet Banking, Mobile Banking, Telephone Banking, Electronic Clearing Services and Automated Teller Machines (ECS). Kumar (2006) observed that the introduction of online banking in recent years has been a game-changing innovation in the banking business. With

the added convenience of money transfer feature, the consumer can access his account from anywhere, even from his home computer. Internet banking is predicted to be even more cost-effective for banks, as compared to ATMs. Customers can also use value-added services such as paying insurance premiums, paying utility bills, and booking train tickets using internet banking. The purpose of this article is to discuss technological advancements and their impact on the Indian banking industry. Secondary data was collected for 10 years, from 2007 to 2017, from the Reserve Bank of India's annual report. The statistical tool for examining data is trend analysis. The Indian banking business has undergone many technological developments that provide high-quality services to customers. According to research by the Internet and Mobile Association of India (IAMAI), electronic banking channels were chosen by 23% of online users in India, and ATMs were preferred by 53% of individuals.

Types of Electronic Banking Services in India

Customers can make use of various electronic-based services provided by the banks. The following are some of the electronic-based financial services offered by Indian banks (Jasdeep Kaur, 2015):

Automated Teller Machines (ATMs): These days, ATM machines are located almost everywhere, providing additional services like balance enquiry, cash withdrawal, cash deposit and many more. It can be accessed through ATM or Debit card.

Electronic Fund Transfer (EFT): This service allows customers to send money to customers of other banks. This cuts down on the time taken to transmit money. The EFT feature is now available

in two different modes. They are as follows:

National Electronic Funds Transfer (NEFT):

This is the fastest way to transfer funds. In this way the money is sent to the beneficiary's account on the same day. It is provided by automated branches of various banks.

Real-time Gross Settlement System (RTGS):

This system connects inter-bank and inter-branch transactions. The 'Bank-Customer' network has been upgraded. Transactions in this system are completed as soon as they happen in real-time.

Debit Card: This is a multi-purpose card that can be used for a wide variety of things, such as making purchases at various business centers. A specific amount is automatically deducted from the user's account on scratching the card at the debit card machine. This minimizes the chances of having excess cash on hand.

Credit Card: Credit is given to customers using credit cards. A credit card differs from a debit card in that the latter does not withdraw money from the customer's account after each purchase. The credit limit can be renewed at the current interest rate of the provider.

Internet Banking: Banking transactions that take place in a virtual environment on the website of a bank or financial institution are called Internet banking. The basic nature of net banking encourages bank customers to access their accounts online. Customers can use Internet Banking to conduct financial transactions from the comfort of their homes without visiting the bank.

Mobile Banking: The term refers to banking operations performed through mobile phones. Customers can do all banking transactions using their mo-

bile phones. SMS banking and Wireless Protocol (WAP) banking are two types of mobile banking services.

Telephone Banking: It refers to the delivery of various types of banking services through the phone to the consumers. An automated voice recognition system is used in telebanking services. Telephone banking services include checking account balances, obtaining data on recent transactions, making e-bill payments and transferring cash between users' accounts.

Electronic Clearing Services (ECS): It is an electronic technology to transfer funds from one bank account to another. Banks can use ECS to make payments like dividends, interest, salary, and pension, among other things. Payment of utility bills, EMIs on various loans, and Systematic Investment Plan (SIP) programs can be done through ECS. Consequently, ECS can be used for both credit and debit transactions.

After going through the literature based on the topic the following questions arises.

Research Questions

What are payment and settlement system in India?

What are the various kind of product in Indian banking sector?

What are the technical changes in banks during the 2007 to 2017?

OBJECTIVES OF THE STUDY

1. To examine technical changes in banks from 2007 to 2017.
2. To compare the number of electronic transac-

tions done by the bank's customers/

Research Methodology

The purpose of this article is to discuss technological advancements and their impact on the Indian banking industry. The secondary data was collected from the annual reports of the Reserve Bank of India during the ten years from 2007 to 2017. The statistical tool for analyzing data is trend analysis.

Data Analysis and Interpretation

The Indian banking business has undergone many technological developments that provide high-quality services to customers. According to research by the Internet and Mobile Association of India (IAMAI), electronic banking channels were chosen by 23% of online users in India, and ATMs were preferred by 53% of individuals.

The deployment of ATMs, credit cards, and debit cards in India is shown in the table below. India has a large number of ATMs as well as valid debit and credit cards.

Year	No. of ATMs (Actual)	Outstanding Debit Cards (in Millions)	Outstanding Credit Cards (in Millions)
2011-12	87,355	263.80	17.67
2012-13	1,05,784	314.44	18.85
2013-14	1,41,516	372.51	18.69
2014-15	1,76,410	500.08	20.36
2015-16	1,93,768	643.19	22.75
2016-17	2,05,860	761.12	28.32

Source: Report on Trend and Progress of Banking in India from 2011-12 to 2016-17, retrieved from www.rbi.org.

In terms of the number of ATMs installed, 87,355 ATMs were operational in 2011-12 as compared to 2,05,860 ATMs (235.66 per cent) in 2017. From 2011-12 to 2016-17, there has been a gradual increase in the number of ATMs. deployed.

From 2011 to 2017, the number of outstanding valid debit cards has increased, indicating that the issue of debit cards is on the rise. Except in 2013-14, the issue of credit cards has followed the same upward pattern. As a result, it can be seen that debit cards are more expensive than credit cards. According to this data, debit cards are preferred over credit cards by customers in India.

Information technology along with payment and settlement systems in India are shown in the table below.

Payment Transfer Statistics (Volume in Millions)

Services	RTGS	NEFT/ EFT	Credit Cards	Debit Cards	CTS	Mobile Banking	IMPS
2007-08	5.84	13.3	228.2	0.1	-	-	-
2008-09	13.4	32.2	259.6	127.7	-	-	-
2009-10	33.2	66.3	234.2	170.2	-	-	-
2010-11	49.3	132.3	265.1	237.1	160.4	2.7	-
2011-12	55.0	226.1	320.0	327.5	180.0	5.2	0.1
2012-13	68.5	394.1	396.6	469.1	275.0	8.9	1.2
2013-14	81.1	661.0	509.1	619.1	589.3	16.8	15.4
2014-15	92.8	927.5	615.1	808.1	964.9	39.5	78.4
2015-16	98.3	1252.9	785.7	1173.6	958.4	110.6	220.8
2016-17	107.03	1622.1	1087.1	2399.3	1111.9	102.4	506.7

RBI's Report on Trend and Progress of Banking in India from 2007-08 to 2016-17, retrieved from www.rbi.org.

In 2016-17, 108 million transactions (1832.7 percent) were processed by RTGS as against 5.84 million transactions in 2007-08. In 2016-17, 1.6 billion transactions (12196 percent) were processed using NEFT, compared to 13.3 million transactions in 2007-08.

During the 2016-17 financial year, credit cards were used for 1.1 billion transactions (476.4 percent), while debit cards were used for 2.4 billion transactions. This represents a significant change as

compared to credit and debit card transactions of 228.2 million and 0.1 million respectively during the period 2007-08.

During 2016-17, RBI conducted 1.1 (693.2 percent) billion transactions using CTS, compared to 0.16 billion transactions in 2010-11.

The number of mobile banking transactions made by consumers increased dramatically to 102.4 million in 2016-17 from 2.7 million in 2011-12.

During the financial year 2016-17, the instant payment system processed 506.7 million transactions. There were only 78.4 million transactions in 2011-12.

Observations and Recommendations

Compared to western banks, the electronic banking services of Indian banks will have to cover a significant distance. The success of electronic banking services is influenced by a sufficient number of users and adequate infrastructure. However, compared to foreign banks, Indian banks get only a limited number of internet transactions. Although many security measures exist, India lacks authenticity, which is critical for electronic banking. Customers who wish to use electronic banking services should fill out the required application form online and submit a copy to the bank providing the service (Mahmood Shah and Steve Clark, 2006). The use of electronic banking services is governed by a contract between the consumer and the bank. The personal data of the customers, which is available in the application forms, is thus held with the service provider bank. The terms and conditions of the Agreement are heterogeneous as the Service Provider Bank may change or extend any of them at any time.

Domestic customers with access to electronic banking services are reluctant to use the electronic banking services of the Indian banking sector for these reasons. As a result, electronic banking is a valuable service for domestic customers. NRIs are more comfortable with electronic banking services, as accessing their bank accounts is an expensive and time-consuming process for them which are valid in India (Amit Sachan and Anwar Ali, 2006). Electronic banking services in India are in their infancy while new technologies are being launched for secure transactions. Customers are becoming more comfortable with electronic banking, and it continues to grow, especially in urban and metropolitan areas (Rahman, 2012). Finally, electronic banking appears to be a potential delivery strategy for Indian banks. In a country like India, where smartphone users are expanding rapidly, mobile banking holds promise as a more effective delivery mechanism (IBEF, 2016). Despite the problems faced by the electronic banking idea, it is recognized that electronic banking has the potential to provide enormous benefits to institutions. However, Indian banks should be aware of the dangers of electronic banking and the techniques to overcome them. Many Indian banks have set up electronic banking services, forcing them to diversify their offerings to compete with each other. This necessitated a shift away from standard financial services and towards highly tailored offerings. The promise of electronic banking rests on the supply of personalized Internet-linked services that are appreciated and specialized by customers, and this, in turn, enables them to differentiate themselves from wholesale. This will allow them to invest in new technology to build a stronger customer connection while simultaneously modifying it regularly to meet the needs of their customers (Maheshwari, 2012).

Few Indian banks have recently announced plans to implement e-money and e-cheques. Computers or smart cards can be used to store e-money. Customers can use their e-money to buy low-cost items through the internet. E-checks can be compared to paper checks, except that they can be passed from buyer to seller via the Internet. It is electronically backed by the seller and sent from the buyer's bank to the seller's bank for electronic collection (Mudassir Masihuddin et al., 2017). Due to the widespread deployment of technology in banks, customers can now access financial services directly and easily. (Matthew Joseph et al., 1999) predicts that traditional ATMs will be phased out in favor of biometric ATMs worldwide. Checks should be exchanged through RTGS, NEFT and other electronic fund transfer methods. Smart cards with microprocessors or tamper-proof memory chips will be used to replace traditional plastic cards. UBS Pay software allows you to enter and manage payments without connecting to the Internet. The web calculator is used for stock exchange transactions. It helps in quick and easy calculation of brokerage costs as well as execution of stock trading strategies. PayPen makes scanning payment slips fast and easy. Within a second, the payment slip by hand can be imported into the bank's electronic banking system or payment software using rapid touch.

Conclusion

In terms of diversity and creativity, the Indian financial sector has seen a significant change over time. The existing payment system should be upgraded to a position where it is ready to face future difficulties. This can be accomplished through standardization, interoperability, consolidation, building, and sharing of a common

infrastructure, all of which are fueled by product and distribution channel advances. There is a need for further capacity building in this area both in terms of systems and human resources and RBI needs to take this process forward. Apart from the need to avoid and restrict cyber-crimes and security concerns, maintaining flawless business continuity plans requires special attention.

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A Study of Cryptocurrency and Digital Banking Currency: Challenges and Opportunity

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Abstract

Cryptocurrency is a sophisticated digital money obtained through cryptography; many digital currencies are decentralized organizations based on blockchain technology, which is an appropriated record authorized by a separate organization of computers. And many modern technologies are having a transformational impact on the global financial system, with cryptocurrencies taking the lead in this regard. Cryptocurrency has a number of potential advantages, including increased speed and efficiency in processing payments and transfers, particularly across borders, and hence increased financial inclusion. The purpose of this paper is to summarize the differences between traditional cryptocurrency and digital currency and a comparison study on it along with its feature differences and how do centralize digital currency function differently from traditional cryptocurrency.

Objectives:

- To understand the concept of crypto currency and Digital Currency (Rupee)
- To study about the Blockchain
- To analyze the legal status, challenges and opportunities of both Cryptocurrency and Digital Currency (Rupee)

Introduction

Cryptocurrency is an advanced or virtual money that is gotten by cryptography, which makes it almost difficult to fake or double spend. Numerous cryptographic forms of money are decentralized organizations of blockchain innovation — a conveyed record authorized by a unique organization of PCs. A characterizing element of digital forms of money is that they are by and large not gave by any focal power, delivering them hypothetically safe to government obstruction or control. A cryptographic money is a type of digital

asset of an organization that is disseminated across an enormous number of PCs. This decentralized design permits them to exist outside the control of state-run administrations and focal specialists. Specialists accept that blockchain and related innovation will upset numerous ventures, including money and regulation.

- The benefits of digital currencies incorporate less expensive, liquidity and decentralized frameworks that don't fall at a weak link.
- The hindrances of digital currencies incorporate their cost instability, high energy utilization for mining exercises, and use in crimes.

Cryptocurrencies are advanced or virtual monetary standards supported by cryptographic frameworks. They empower secure web-based instalments without the utilization of outsider mediators. "Crypto" refers to the different encryption calculations and cryptographic strategies that protect these sections, like circular

bend encryption, public-private key matches, and hashing capacities.

Cryptographic forms of money can be mined or bought from digital currency trades. Not all online business destinations permit buys utilizing digital currencies. As a matter of fact, digital forms of money, even famous ones like Bitcoin, are not really utilized for retail exchanges. Notwithstanding, the soaring worth of digital currencies has made them well known as exchanging instruments. Somewhat, they are likewise utilized for crossline moves

Blockchain

Fundamental to the appeal and usefulness of Bitcoin and other digital currencies is blockchain innovation. As its name demonstrates, blockchain is basically a bunch of associated blocks or a web-based record. Each square contains a bunch of exchanges that have been autonomously confirmed by every individual from the organization. Each new square produced should be checked by every hub prior to being affirmed, making it exceptionally difficult to manufacture exchange histories.

1. The items on the internet based record should be settled upon by the whole organization of a singular hub, or PC keeping a duplicate of the record
2. Specialists say that blockchain innovation can serve different ventures, for example, inventory network, and cycles like web-based casting a ballot and crowdfunding. Monetary foundations like JPMorgan Chase and Co. (JPM) are trying the utilization of blockchain innovation to bring down exchange costs by smoothing out instalment handling.
3. However digital currency blockchains are pro-

foundly secure, other crypto vaults, like trades and wallets, can be hacked. Numerous digital currency trades and wallets have been hacked throughout the long term, here and there bringing about huge number of dollars' worth of "coins" taken.

4. Some economists thus consider cryptocurrencies to be a short-lived fad or speculative bubble.

Types of Cryptocurrencies

Cryptocurrency is intended to fill in as a mechanism of trade. The quantity of cryptographic forms of money accessible over the web is north of 1600 and developing. Another cryptographic money can be made whenever. By market capitalization, Bitcoin is presently the biggest blockchain network, folly Ripple, Ethereum and Litecoin.

- **BITCOIN (BTC):** One of the most generally known monetary standards, Bitcoin is viewed as a unique digital currency. It was made in 2009 as an open-source programming. Utilizing blockchain innovation, Bitcoin permits clients to make straightforward shared exchanges. Everything clients can see these exchanges; in any case, they are gotten through the calculation inside the blockchain. While everybody can see the exchange, just the proprietor of that Bitcoin can unscramble it with a "private key" that is given to every proprietor. Dissimilar to a bank, there is no focal authority figure in the Bitcoin. Bitcoin clients control the sending and getting of cash, which considers mysterious exchanges to happen all through the world.
- **ETHEREUM (ETH):** Ethereum is a sort of cryptographic money which was proposed in

late 2013 by VitalikButerin, a digital currency specialist and developer. It was at first delivered on July 2015. It is an open-source stage in view of blockchain innovation. While following responsibility for money exchanges, Ethereum blockchain moreover centers around running the programming code of any decentralized application, permitting it to be utilized by application engineers to pay for exchange expenses and administrations on the Ethereum organization.

- **LITECOIN (LTC):** Litecoin was sent off in October 2011 as an option in contrast to Bitcoin. Like other cryptographic forms of money, Litecoin is a shared digital currency and open-source programming project delivered under the MIT/X11 permit. Its creation and move depends on an open-source cryptographic convention and it is totally decentralized.
- **RIPPLE (XRP):** Ripple is an ongoing gross settlement framework, cash trade and settlement network made by Ripple Labs Incorporation, a US based organization. Swell was delivered in 2012 that goes about as a digital money also, a computerized instalment network for monetary exchanges. It's a worldwide settlement network that is intended to make a quick, secure, and minimal expense strategy for moving cash. Swell considers any kind of money to be traded, from USD and Bitcoin to gold and

EUR and associates with banks, in contrast to different monetary forms. Ripple likewise varies from different kinds of computerized monetary standards because it's essential centre isn't so much

for individual to-individual exchanges, rather for moving amounts of cash for a bigger scope.

Legal Status of Cryptocurrency in India

The legitimate status of Cryptocurrency and related crypto instruments fluctuates significantly from one country to another and is yet vague or changing in large numbers of them. Though most of nations don't make the use of Cryptocurrency itself unlawful, its status as cash (or a ware) fluctuates, with contrasting administrative ramifications. While certain states have unequivocally permitted its utilization and exchange, others have prohibited or limited it. Similarly, different government offices, divisions, and courts have arranged Cryptocurrency's in an unexpected way.

The European Union has passed no regulation comparative with the situation with Cryptocurrency as a money yet has expressed that VAT/GST is pertinent to the change between customary (government issued money) and Cryptocurrency. Countries incorporate where Cryptocurrency authorized are United States, France, Ireland, Russia, Ireland, Japan, Switzerland, Singapore, Norway, Germany, South Africa, Costa Rica, Jamaica, Kyrgyzstan, Venezuela, Brazil, Argentina, Chile, Philippines, Israel, Lebanon, Turkey, Hong Kong, Czee Republic, Venezuela, Turkey, Uzbekistan, Costa Rica, Mexico, Namibia, Lebanon, Ukraine, Denmark, Finland, Iceland, Sweden, Bosnia, Bulgaria, Greece, Italy, Lithuanian, Malta, Macedonia, Portugal, Herzegovina, Spain, Belgium, Luxemburg and Netherlands

Cryptocurrencies are completely prohibited and exchanges in light of Cryptocurrency are unlawful in nations like Nepal, China, Pakistan, Taiwan, Cambodia, Indonesia, Bangladesh, Iran,

Saudi Arabia, Colombia, Ecuador, Bolivia, Egypt, Morocco and Algeria.

However, in India, Canada, Jordan, Vietnam, and Thailand Cryptocurrency is legitimate yet there is a financial boycott forced. The State Bank of Vietnam has proclaimed that the issuance, supply and utilization of Cryptocurrency and other comparable virtual money is unlawful as a mean of instalment and dependent upon discipline going from 150 million to 200 million VND, yet the public authority doesn't boycott Cryptocurrency exchanging as a virtual merchandise or resources.

Coming to India starting around 2012 Cryptocurrency's has been accessible in India. On 1 February 2018, Finance serves Arun Jaitley, in his spending plan discourse expressed that the public authority would do all that to stop the utilization of Cryptocurrency and other virtual monetary forms in India for criminal purposes. He repeated that India doesn't perceive them as lawful delicate and will rather empower blockchain innovation in instalment systems. According to the Indian government individuals utilizing these kinds of monetary forms ought to take certain caution because there is no legitimate insurance for these monetary standards. Furthermore, no assistance can be acquired by the people from the public authority side if some extortion is looked by individuals.

In mid-2018 the Reserve Bank of India (RBI) declared a prohibition on the deal or acquisition of cryptographic money for elements managed by RBI In 2019, a request has been filed with the Supreme Court of India testing the lawfulness of digital currencies and looking for a course or request limiting their exchange. The Indian government is drafting the administrative structure for digital forms of money. On February

25, the Supreme Court gave the government a month to concoct crypto guideline. The court will then, at that point, hear the petitions against the crypto banking boycott by the country's national bank, the RBI.

In February 2022, Budget where the Finance Minister Nirmala Sitaraman announced a tax of 30% on the long-term gains in cryptocurrencies, and just few days prior of the Budget the Prime Minister of India (Shri Narendra Modi) in a press conference also urged the public to reduce trading in Cryptocurrencies, specially he mentioned to the youth. Later, we observed certain actions which were negatively impacting the cryptocurrency.

Central Bank Digital Currency (CBDC)

In the Union Budget, Finance Minister has declared that the advanced rupee will be presented by RBI in 2022-23 utilizing blockchain and different innovations. The advanced rupee or Central Bank Digital Currency (CBDC) will give a major lift to computerized economy and India would be the principal significant country to send off its money in such a way authoritatively.

A CBDC is an electronic record or advanced badge of a country's true cash, which satisfies the fundamental capacities as a mode of trade, unit of record, store of significant worth, and standard of conceded instalment. Till December 2021, there are 87 nations (addressing more than 90% of worldwide GDP) investigating a CBDC, contrasted with just 35 nations who were thinking about a CBDC in May 2020. Out of these, 9 nations (Bahamas, 7 eastern Caribbean and Nigeria) have now completely sent off a computerized cash. Nigeria is the furthest down the line country to send off a CBDC, the e-Naira, the first external the Caribbean. Be that

as it may, the significant nations with the 4 biggest national banks (the US, the Euro Area, Japan, and the UK), are farthest behind. There are 14 nations, including China and South Korea, who are currently in the pilot stage with their CBDCs and setting up a potential full send-off soon.

In correlation with existing types of cash, the CBDC can offer advantages to clients regarding liquidity, versatility, acknowledgment, simplicity of exchanges with namelessness and quicker repayment. The reception of CBDC will improve and make it more straightforward for individuals to use with the supporting infra given by the govt. The improvement will make computerized monetary forms more open to individuals similarly as UPI made advanced cash simpler to utilize. We expect that RBI will use the current foundation through NPCI

Computerized Rupee can have many use case situations in true like programmable instalments for appropriations and use by monetary establishments for quicker loaning and instalments. We could see a realistic shift to credit only economy soon. As the use of the Digital Rupee builds, it could likewise help things like crossline settlements, a climate could be made for interoperability by which quicker ongoing settlement happens. Generally, the expense of exchanges would decrease for the public authority and organizations. For instance: a specialist in UAE gets half compensation as advanced cash, permitting him to send cash to family members in some other country more economically and proficiently. Charges for wiring cash frequently take up to 7% of the worth of an exchange, and the World Bank appraises that slicing expenses to 2%

could give \$16 billion a year lift to settlements to low-pay nations.

Review of Literature

Finance Minister Nirmala Sitharaman announced during her Budget 2022-2023 speech that digital assets such as cryptocurrencies and non-fungible tokens (NFTs), will be subject to a 30% tax on any income derived from their transfer. Most crypto and NFT investors were concerned about the future of their investments after the news, but industry insiders viewed it as a positive development. Cryptocurrencies would not be banned in the country due to any sort of taxation, but that does not mean they would be regularized. It will be interesting to observe how the government handles cryptocurrency in the country.

The finance minister also stated that the Reserve Bank of India (RBI) will launch its digital currency in the near future. The RBI's digital currency, known as the CBDC (Central Bank Digital Currency), has been in the works for several months and, according to Sitharaman, would be introduced in the next financial year.

“The introduction of a central bank digital money will give the digital economy a significant boost.” “Digital currency will result in a more efficient and cost-effective currency management system,” Sitharaman added.

Through digital transformation, the entire globe is transitioning from traditional wallets to digital wallets. A digital wallet can store both digital currency and a cryptocurrency that uses advanced blockchain technology. Yes, distinguishing between digital currency and cryptocurrency might be challenging for beginners. However, there are

significant differences in the digital wallet between these two currencies.

Digital currencies, which are the electronic equivalents of fiat money, can be used in contactless transactions between parties, such as sending money from one bank account to another. Digital currency is used in all online transactions; once you withdraw money from a bank or an ATM, the digital currency is converted into liquid cash. In other words, it is the electronic version of financial notes and coins that may be saved in a digital wallet is known as digital money. If necessary, the digital currency can be converted into physical cash by withdrawing cash from any ATM or bank. It's intangible cash with a two-party open-source contactless transaction flow.

Cryptocurrency is a sort of digital currency that is encrypted and remains very volatile in the worldwide investing market. Bitcoin, Ethereum, Dogecoin, and other cryptocurrencies have distinct names associated with the companies that created them. To ensure a smooth transaction flow, it was built using modern blockchain technology. In simple words, Cryptocurrencies, often known as digital coins, are a type of digital currency that is protected by encryption. These digital currencies are entirely privately held and manufactured (using advanced blockchain technology), and most countries have yet to regulate them.

Research Methodology

The research methodology used in this research is DESCRIPTIVE RESEARCH.

Whereas the research design was EXPLORATORY RESEARCH DESIGN, as it opens with a scope to explore further to this

existing literature of cryptocurrency and digital currency rupee. We have used all secondary data to add some more value to the existing literature on Crypto currency and Digital Currency. Since the concept very much new result being we couldn't fetch some more primary data from the population and hence the reason opens a wide scope for add literature for other researchers to collect some more data and try to reduce the research gap.

Analysis

Any currency held in digital form is referred to as digital currency. While the term is sometimes used to refer to currency that has no physical form and only exists online.

Cryptocurrency is solely a digital currency based on the blockchain storage format. Although the term can sometimes be used to refer to any currency protected by cryptography.

Major Differences:

Encryption: In the digital wallet, this is the key distinction between a digital currency and a cryptocurrency. The digital currency is not encrypted at all, whereas the cryptocurrency is heavily encrypted. In digital money, one must open an account with no security - your bank account could be hacked at any time, and you could lose all your funds. However, in order to secure all Bitcoins and Dogecoins from serious cyberattacks, one must create an account on a forum with a cybersecurity system.

Although digital currencies do not require encryption, all users should employ strong passwords and biometric authentication to protect their digital wallets and banking apps from hackers and theft. The same applies to Debit and credit

cards, which are essential for digital currency transactions.

Cryptocurrencies are protected by powerful encryption, and in order to trade in crypto, users must have a bank account with funds. This digital currency can then be swapped for cryptocurrency of the same value via an online exchange.

Authority: The Reserve Banks govern the whole banking system of the individual countries, and the digital currency has a centralized authority. Banks have the authority to thoroughly monitor everyone's transaction flow, whether it's a digital or physical wallet. In the case of cryptocurrencies, it is a decentralized system in which no third-party exercises jurisdiction over the investors.

Digital currencies are supported by a central bank, which in India will be the Reserve Bank of India (RBI), which controls both liquid cash and digital currency transactions. Cryptocurrencies, on the other hand, are a decentralized system that is not regulated by a central authority. However, all crypto transactions are recorded in a decentralized ledger that is available for all.

Currency Rate: In the worldwide market, the current rate of digital currency is almost steady and simple to deal with. Before engaging in any type of business, there is no need to conduct thorough research. However, the bitcoin market is quite volatile. It consists of possible risk that has not been thoroughly investigated before to any investment or large transaction between two companies. While completing a transaction, there is a chance that the rate of bitcoin will change suddenly.

Since they are widely acknowledged in the worldwide market, digital currencies are more

stable and easier to administer when it comes to transactions. Crypto, on the other hand, is extremely volatile, with rates fluctuating frequently.

Transparency: When dealing with digital currency, there is some transparency in the information. The amount, bank, time, and date are the only pieces of information that the receiver or sender of digital money will receive. However, the most crucial quality of cryptocurrency is its transparency. Blockchain technology records the complete dialogue between the two parties about all previous and present transactions. All private communications are kept between the dealers in strict confidence, and no one else has access to them.

The sender and receiver of digital currency transactions, as well as the bank, have access to transaction details. The public can see the specifics of crypto transactions thanks to the decentralized ledger.

Transaction fee: Every time you pay with digital money using a digital wallet, you'll be charged some transaction fee. However, there is no transaction fee scheme in place when dealing with cryptocurrency. The use of blockchain technology helps to cut costs and eliminates the need for third-party intermediaries. For investors dealing with large deals involving valuable assets, cryptocurrency is extremely handy.

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Impact of E Collaboration Between Traditional Banking and Fintech for Digital Transformation

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Abstract

Fintech companies and traditional banks both act as financial consultants. Banks have been in business for hundreds of years, but they still need to make major changes to meet the needs of today's customers. Technically, fintech offers users the most advanced features, and almost all of the same services offered by traditional banks. We cannot expect people to move from banks to fintech. But if fintech and banks can co-operate and work together, both will make a huge difference. There are immediate benefits to both parties if both parties are partners. Traditional banks benefit from the establishment and operation of fintech. They also build confidence in financial technology due to decades of customer loyalty, business size, and network established. Here are a few of the benefits of fintech's partnership with traditional banks:

- *Compared to fintech, banks have a higher deposit. If they work together, building better financial systems will be easier for banks.*
- *If fintech cooperates with banks, they will be regulated under the same government institutions that can help build trust.*
- *The financial system as a whole will improve due to the advanced technology that fintech can bring to banks.*

To meet the technological needs of consumers today, banks adopt fintech features to enhance user experience. As the entire financial system continues to evolve, the distribution of digital technology resources is increasingly a priority for banks. Your winning position is both a long-term partnership that includes innovation (fintech) and support and trust (banks) to build a digital future. This research paper traces the impact of the partnership between traditional banks and fintech on digital transformation.

Keywords -Fintech, Digital Innovation, Blockchain, Financial Technology, Financial Services

Introduction

The concept of fintech is inconsistent. Following the Schueffel (2016) study, fintechs are described as “a new financial industry that uses technology to develop financial services” (page 15). These new solutions have gained hype after

European banks were hit by a number of issues that challenged their business model and have been affecting their profits to date (Cheng & Mevis, 2018). This is evidenced by the historic Euro Stoxx prices of banks that have not recovered prices before the crisis. Following the subprime crisis the central bank's strategy was to reduce monetary

policy to lower interest rates and increase interest rates. This policy has not only resulted in increased debt to create economic incentives (Spyromitrosa & Tsintzos, 2019) but also less opportunities for ordinary and high-income investors because interest rates on investment are much lower than before (e.g. LIBOR and EURIBOR are lower, most of which also have an impact on revenue and investment) (Kreidych, Roshchyna, & Kazak, 2018).

New fintechs ideas have emerged and become more interesting due to the dignity challenge created by traditional banks created by the subprime problem. Consumers once questioned the strategy of the financial industry and its impact on the global economy. Fintech companies have real implications because their technological solutions are widely accepted in banks or stores called blockchain case studies and even online security (Kshetri, 2017).

To understand how digital transformation can work in a bank, the priorities and objectives of commercial banks must be identified. Like any business, the bank aims to reduce costs and increase sales. In a network of branches, banks are under pressure from many investors and governments, their efficiency and profitability are closely monitored. In order to retain their customers and attract new opportunities, banking institutions improve customer experience and improve customer service consistently. In addition, they are developing new offerings for products and services. Their research and development services create new and digital banking systems: mobile banking, service automation, efficient customer database management. To ensure effective digital marketing and customer service strategies, banks

use classification and analysis to track the life cycle of their customers. Good customer experience and potential prospects are essential to providing good customer information and fair prices. The biggest problem for banks is to keep costs under control while developing new and digital services to increase customer loyalty. As new entrants to the market, Neobanks does not have the same challenges as traditional banks. They lure their customers with low fees that challenge them to generate income. Because of the low deposit, they need to grow and share their customer base to protect and develop the business.

Objectives Of The Study

- To study about the Fintech which have combine the core traditional banking and lending function with new financial technology.
- To analyze the impact of Fintech investments and E collaboration on adoption of new technology products by banks and its customers.
- To study how Fintech companies build trust among the customer for adoption of new digital and fintech products.

Literature Reiview

Kaur et al. (2021), stated that, the point of this qualitative study is to examine part of the internal banking efforts in transporting customers from branch banks to digital banks in India. In-depth planned discussions were led by bank executives representing senior executives from public and private banks in India. A quality content analysis method was used to separate the data. The different types of responses received during the interview were grouped into four main topics in terms of data reduction, demonstration, and conclusion drawing processes. In branch communication with

customers, branch digital transformation, customer focus efforts, and redefined work of branch staff have the potential to link customer migration to digital banks. Bhasin and Rajesh (2021), argue that, the Indian banking system undergoes a process of ongoing transformation from conventional banking to the integration of digital banking products and financial technology companies (Fintech). They create financial instability and change the nature of the payment system. Fintech is a new fashion statement in the banking and finance industry that needs to integrate traditional legal obligations and lending practices with new financial technologies. It is a winning situation in both Indian banks with a large customer base and a wide network of branches. Fintech companies, then, are very strong in technology, yet they need to build trust between customers in order to share new digital and Fintech products. This test paper follows the various difficulties and opportunities that the Indian banking system is facing in collaboration with the establishment of a joint venture with Fintech firms. Digital transformation will produce new social groups — part human, part human, or non-human — some of which already exist, while others can be predicted by introducing the latest advances in the field of brain clothing, robots, and software engineering. Financial technology (companies called FinTech (s)) play an important role here. It is an industry made up of various firms that integrate financial services and innovation technologies provided by financial service providers. Fintechs also provides a sustainable financial solution using microfinance among other things. Some Fintechs distribute insurance and other financial instruments or provide third-party services.

Research Methodology

The study is an attempt to understand that FinTech will enrich customer information in partnership with the banking sector. This study will also address the current strengths and weaknesses of both, FinTech companies and Banks, and how these players are likely to participate in the future. Many scholarly research papers, journals, business reports etc. are examined, scanned and compiled to understand the topic.

Research Questions

- How are traditional banks being disrupted by emerging fintech?
- What is the impact of fintech on banks?
- Is fintech a threat to traditional banks?

Effects of Fintech on the Banking Industry

The Fintech industry and banking industry incorporates the following technologies:

- Cloud technology and big data (Bigdata). Cloud technology provides access to data without having to install special applications on the device, allowing banks to offer their products anywhere in the world by integrating services into the network. Big Data, on the other hand, provides customers with personalized offerings aimed at analyzing unique and fast-paced digital information, its online sources, corporate archives, sensory reading, devices, etc. .;
- API (Application Programming Interface, i.e. application interface, application interface), integrated into client interaction software. An API is a collection of classes, processes, functions, structures and constants provided by an application, service, or operating system for use in external software products.

- social media and mobile communications with specialized apps. The integration of banking business and communication forums allows you to get information about customer preferences for the purpose of using it when proposing new financial products, establishing reliable relationships with each bank client, and accelerating the implementation of blockchain technology in relationships with customers.
- The great advantage of omnichannel banking is that customer problems can be solved very quickly. Using the Internet and TV, they can avoid communication between people at bank branches and reach their point quickly and effectively. Providing part of the services to digital tools such as chatbots will save costs and provide customers with a personalized service with digital financial services. This approach is flexible and adapts to the different needs of

customers. As an added benefit, you may have the opportunity to improve your banking experience and gain greater trust from your customers, resulting in fewer departures and better conversions.

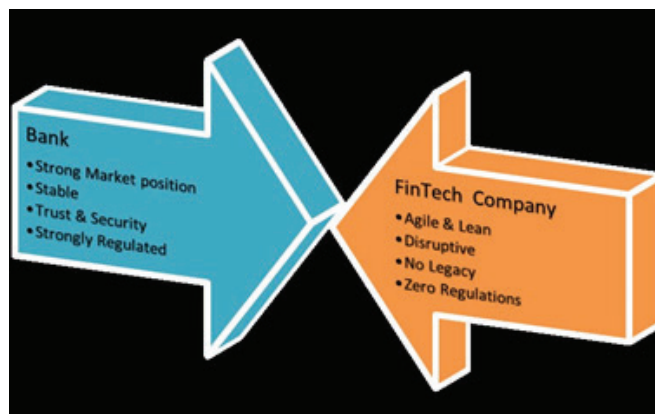
- Payment systems are customized with intelligent performance tools, which define the future of payments worldwide and on any device. By analyzing customer service history, disposal practices, and behaviors, we can predict their future performance and suggest payment methods with reduced payments. One of the most notable performances is voice activated. They need special measures of protection and reassurance, which are now one of the most important areas for growth. The most important resource now is financial data. Integrating payment solutions with other systems can help

to understand buying behavior to deliver relevant recommendations, increase retention and bring a better experience.

Observations

As mentioned earlier, the current wave of financial technology is not the same as before when it had a growing impact and was focused on the latter. FinTech is currently preparing to disrupt the bank's operations at its core and is on the verge of redefining the delivery of products and services to the financial world.

Financial services providers and banks are looking for a big change. New technological innovations, digital finance, high-tech customers, and the digitalization industry are challenging for existing business models. FinTech players are light assets, reliable and capable of high-tech technology. They have no legacy and no responsibility to control the movement. Banks are profitable in the form of a large customer base, business models tested time and level of business. However, they need to work with a strong control framework. An existing heritage system and culture may be an obstacle to adaptation.



The standard practice of providing a full range of products by banks needs to be reviewed. The USP needs to be built with the effective use of

available technology. Clearly, the future distribution of FinTech-based innovations and increased impact, will need Government support.

Conclusion

It has rightly been said that; Digital input lowers entry barriers, causing long-standing boundaries between sectors to collapse. At the same time, the “plug and play” environment of digital assets causes value chains to be split, opening open-minded, fast-moving competitors. New entrants to the new market grow faster at lower costs than players die, and returns may grow faster as more customers join the network”(Hirt and Millmott, 2014). It does not predict bank death. The banking sector has shown remarkable resilience in the past. The FinTech transformation in which financial institutions and banks face new competitors with different and unique business models forcing the separation of the existing value chain. With technology-driven solutions, FinTech players offer alternative banking services including payments, insurance, investments, loans etc.

Banks have begun to strengthen their digital presence and FinTech companies have come up with products that are easier to use and more attractive than existing ones and have begun to gain much-needed influence. Adaptability, collaboration, and integration will be the hallmarks of success.

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Asset Liability Management: Dynamic Hedging Strategies

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Abstract

This report aims to study a survey that was conducted towards the end of 2015, just before the Solvency II regulations came in force. As in the survey report, we have tried to summarize industry attitudes at that point in time expecting that the companies have changed their hedging strategies according to the Solvency II regulations. This study discusses topics such as hedging techniques, hedging dynamics and risk appetite, based on the survey conducted, and try to discuss the survey conclusion by analyzing the report and with help of some suggestions.

Keywords – Solvency, Hedging, Risk Appetite, Regulations

Introduction

In this Report I have studied a survey that was conducted towards the end of 2015, just before the Solvency II regulations came in force. As in the survey report, I have tried to summarize industry attitudes at that point in time expecting that the companies have changed their hedging strategies according to the Solvency II regulations.

Some Key Highlights from the Survey itself are as follows:

- The key risks that were encountered by the respondents of the survey were Equity, Credit and Interest Rates Risk. Currency and Inflation were considered to be secondary.

- The ones that were dynamically hedged the most were Equity and Interest Rate risks, while for Credit Risk a static approach was considered more appropriate.
- Interest rates, inflation, and currency are the most likely to be fully hedged, although not across all responders. Tail hedging procedures are particularly common in equity and credit risks, with little mention of tail hedging in other risk variables.
- There were a variety of hedge management mechanisms in existence, as well as various levels of formal hedging documentation. However, there isn't much of a link between the dynamism of hedging and the level of management or the scope of formal policy. There

appears to be a lot of variety in the extent to which hedging documentation is detailed.

Review Of Literature

In an article about hedging strategies for Asset Liability Management by Emily Norris, she says that with any risk-management assessment, there is always the choice to do nothing, and that is what many people do. However, in situations of volatility, sometimes not hedging is devastating. Yes, there is a price to hedging, but what is the price of a major move in the wrong direction?

In a Research Paper by Ali Ozdagli and Zi Xuan Wang, they told us that life insurance companies being the largest institutional holders of corporate bonds, they tilt their portfolios

towards higher-yield bonds when interest rates drop. This tilt seems to be largely led by an increase in duration rather than credit risk and insurers do not seem to raise the credit risk of their bonds as interest rates drop.

Mr. Marshall C. Greenbaum says that Dynamic Hedging is effective. On the other hand, it comes with a slew of practical problems. In actuality, a dynamic hedger will take on risks such as “base risk” and “market gap risk,” to mention a few. When trying to recreate a guaranteed minimum benefit with other financial instruments, you must rely on purchasing and selling such instruments, which is known as the market gap risk. Your hedging programme will have a gain/(loss) impact if you can’t purchase or sell for a period of time.

In an article dated June 18, 2019, by Rachel Acers and Brittany Rollek, they say that In today’s rate environment, a well-designed hedging programme combined with sound fund

management can help institutions add more profitable assets on the margin while reducing risk exposure. Depositories could be forced to make costly changes to their lending programmes or funding methods to control risk and earnings volatility if they don’t have access to derivatives, all while passing the cost on to shareholders over time through narrower margins and lower returns on capital.

Aymeric Kalife and Saad Mouti wrote in an Actuarial Specialties article published on “The Actuary Magazine”. They said that Life insurers write long-dated guaranteed policies and attempt to hedge these guarantees using hedge assets (e.g., futures, options). As the guarantees embedded within the insurance liability hold a convex risk profile with respect to the underlying stock, insurance companies need to buy some convex equity hedge assets such as options (in contrast to linear instruments like futures) in order to match the liability risk profile to improve hedge effectiveness.

Hedging Techniques

1. Dynamic Hedging – it entails the methodical mirroring of market sensitivity incorporated in insurance obligations on a frequent basis (e.g., daily, monthly, etc). Dynamic hedging necessitates the use of technologies and skills to estimate the market sensitivity of liabilities and current hedge assets. Once these sensitivities have been assessed, the net sensitivities are mitigated through fresh derivative contracts. Typically, only the principal market components (e.g., delta and rho) are chosen for mitigation, while the rest elements are left unhedged. Dynamic hedging usually results in a non-zero profit or loss. The success (or ineffectiveness) of the hedging strategy, together with the volatility

of financial markets, influences the volatility of the profit or loss outcome. The level of bias in the outcome will be decreased if the liability options are priced accurately. In summary, under dynamic hedging, the volatility of profit and loss is a function of strategy effectiveness and market volatility (particularly volatility of unhedged market drivers), and the average of the profit and loss distribution is a function of the reliability of pricing the integrated liability derivative. Because dynamic hedging is often less expensive than static hedging,

insurers are likely to tolerate some volatility in exchange for cheaper hedging costs. Dynamic hedging is a hedging approach that entails rebalancing the hedge portfolio to ensure that the Greeks or sensitivity of the hedge portfolio's market value to impact on financial variables equals the Greeks or sensitivity of whatever is being hedged.

2. **Static Hedging** Almost all risks are protected by static hedging. Because exposures do not need to be monitored on a frequent basis, the technological requirements are substantially lower. The dynamic hedge risks (towards the extent that dynamic hedging is finally desired by the counterparty) are effectively passed on to the counterparty for a cost under static hedging.
3. **Structured Hedging** To improve hedge performance, a mix of dynamic and static applications is used, typically using short-dated market traded and OTC options.
4. **Macro Hedging** To control downside risk, this is normally done at the company or line of business level. May be added on with a single transaction. Can be strategic in nature, such as

providing protection against a market downturn hedging towards the end of the year.

About the Survey

Survey Methodology - The data for this study was gathered using a survey that was delivered to respondents in the second half of 2015 for completion. The poll was distributed to most of the UK's leading life insurers' ALM departments.

The survey's framework was created to capture the primary risks that life insurers in the UK face, as well as the numerous ways used to reduce them. It was also meant to document the governance around hedging choices and the extent to which they were made dynamically.

Survey Results - Although the response rate is deemed healthy for this sort of survey, it does not indicate the representative nature of the survey. Responses have come from businesses of all sizes in the United Kingdom and they provide a wide range of product options.

Hedging dynamism

The respondents were questioned about the level of dynamism they employed to hedge each risk element, which ranged from 'dynamic' to 'semi static' to 'static'. They were also asked whether the hedges had a comprehensive, tactical, or tail focus. The responses given below are shown as a percentage of individuals who consider the danger to be substantial. Aside from credit, most hedges are considered as 'dynamic,' highlighting the value of our attention as research working party. Equity risk is more likely to be managed dynamically. Static hedging is the most common method for hedging credit risk. For other hazards, there is some semi static management that is mostly driven by when

the hedge must be rolled; nonetheless, dynamic hedge management is the most prevalent.

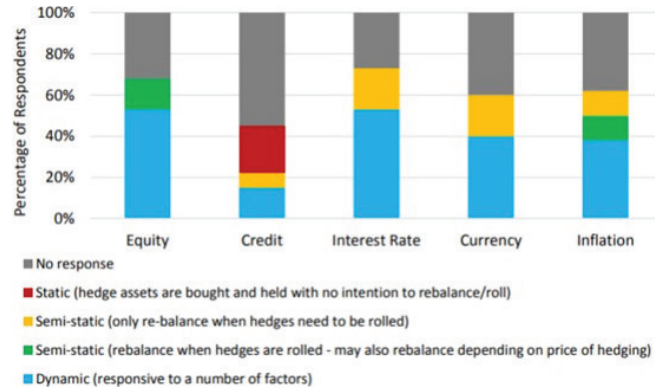


Figure 1.

A few observations were made on questions asked about the Hedging philosophy:

- At least a partial response was received from eleven of the sixteen companies.
- Out of these eleven, two of the companies said that they comprehensively hedged for all risks. Both of them were large companies.
- Again, two out of the eleven said they tail or tactical hedge for all the risks. These both were also large companies.

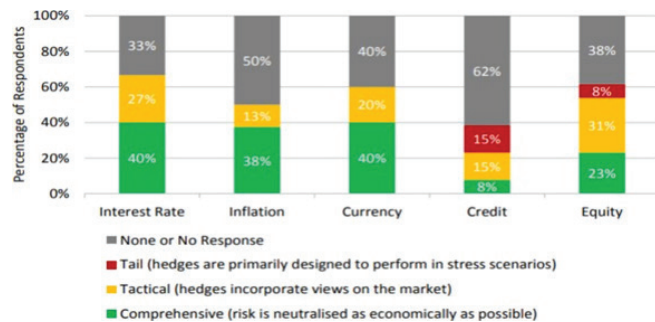


Figure 2.

Risk appetite

Consider a life insurance business that wants to reduce the cost of hedging liabilities by purchasing a large number of put options. A risk-reward target, such as maximization of the mean profit/loss (or minimization of the mean cost of

buying options), or a risk-reward objective, such as minimization of profit and loss dispersion, will dictate such a strategy. In stochastic control issues, the typical technique of the Hamilton-JacobiBellman (HJB) framework is used, together with numerical schemes. The optimal execution method, as shown in the Figure below, provides a relatively consistent trading tempo that is only little affected by the stock price movement in order to optimise mean profit/loss. The pace is fairly consistent at first, but gradually accelerates as maturity approaches, which is understandable given the predetermined quantity to purchase within a fixed time period, meaning the insurer must purchase at a quicker rate as time goes.

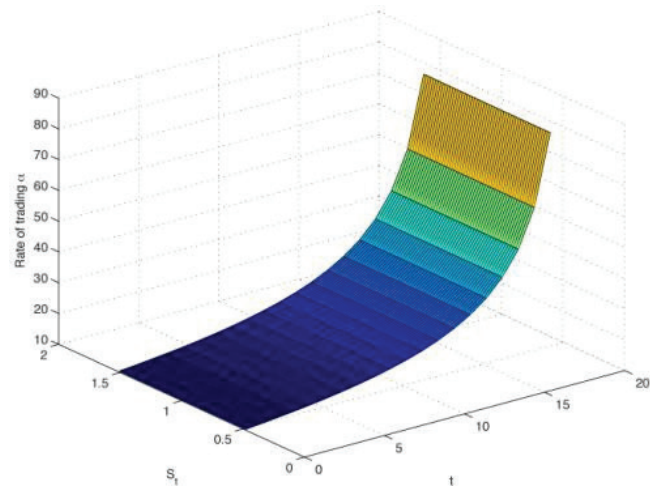


Figure 3.

If, on the other hand, profit/loss dispersion becomes a new driver of risk appetite, the best execution method is heavily influenced by the stock path, with a faster speed when the stock level is low compared to when the stock level is high (as illustrated in the Figure below). The cost of a put option rises in tandem with the price of the stock. The impact of the option volume trade on the option cost also influences the best execution technique. To minimise the hedging transaction cost, it is necessary to trade as quickly as possible.

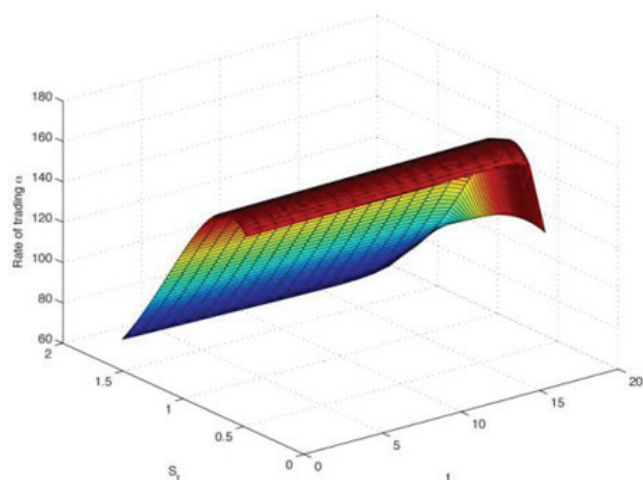


Figure 4.

Within the mark-to-market valuation framework under Solvency II, the size of hedging transactions may put significant constraints on an insurance company because of the higher cost of hedging liabilities that stem from their market impact. In that respect, the risk appetite has significant influence on the optimal transaction execution path.

Conclusion and Discussion

I hope that this survey report gives you some insight into how hedging is currently used in the UK life insurance business. Dynamic hedging techniques are dynamic in and of themselves, and we see a number of factors on the horizon that could lead to more significant changes in hedging practices in the future. It's fair to say that most of the industry's attention in the run-up to 2016 was focused on getting ready for the long-awaited introduction of Solvency II. Now that the regulatory landscape has settled, attention may shift to how to best manage balance sheet risk in light of this. Furthermore, many in the sector are still digesting and reacting to the significant pension market reforms, which have resulted in a considerably higher proportion of retirees wanting to stay

invested in their assets for longer periods of time, but also exposing them to a lot more market risk. To tackle this challenge, new product improvements in this sector will almost certainly necessitate more complex risk management and hedging strategies. This survey was released after the United Kingdom decided to leave the EU, with the possibility for drastically different economic outcomes than what there was now hanging in the balance. With this backdrop of change, there is a continuing need to both monitor changes in hedging practices and to try to generate debate, and where appropriate, support change, by finding potential adaptations to current hedging practises that could be beneficial in this changing world.

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Cyber Insurance in India – Challenges and Opportunities

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Abstract:

With the rise in digitization in the last decade and specially over the last 2 years, work from home owing to the pandemic has crucially changed the cyber security threat landscape. Consequently, technology has been playing a major role in re-defining the 'new normal' as businesses across the globe have become dependent on technology for running their day-to-day operations through a remote working model. A lot of data has been uploaded over the internet for smooth functioning of businesses during the lockdown to reduce physical interactions and a lot of digital money transactions/payments has been taking place. Data breaches, malware infections, phishing, ransomware and other cyberattacks have affected most of business organizations despite their following strong cyber-security protocols.

This study aims at checking the efficacy of Cyber Insurance in India and the challenges faced by the insurance industry. We will also try to explore the opportunities in the new scenario. This study deals with primary data collected from various individuals and secondary data from various insurance companies, brokers, government agencies and published articles and research papers.

Keywords: *Cyber insurance, Cyber-attack, cyber security, Privacy, Data security*

Introduction

Cyber-insurance is a risk management technique via which network user risks are transferred to an insurance company through insurance contract. Risks of this nature are generally excluded from traditional commercial liability policies.

Cyber insurance policy is a risk transfer mechanism used by organizations to protect themselves from losses and expenses arising due to cyber-attacks. Cyber-insurance is a specialty lines

insurance product designed to protect especially business organizations providing services to their clients from Internet-based risks, and more generally from risks relating to information technology, information privacy, information governance liability, and all other related activities. The cyber insurance market globally is estimated to exceed USD20 Billion by 2025. In India, close to 350 cyber insurance policies were issued in 2018. This is expected to increase as cyber security is becoming a board room agenda across businesses.

Cyber insurance products are created for

the protection of the costs like fees, legal costs, expenses that are occurred after any cyber breach or cyber-attack. Many organizations rely on technology based or internet to reach out to the customers to help grow and expand and reach their goals for digital marketing. This increases the risks of cyber threats. Any cyber-attack can lead to loss to different entities be it small or large entities. Companies or business organizations involved in online payments, storage of information, management of data, cloud services, payment gateways usage, etc. are very prone to cyber – attacks. The breaches being reported are rising very rapidly. One common example of security breach is unauthorized access.

Data security is a very crucial responsibility of the company as they have the access to customers confidential and private information. Cyber insurance serves as a mitigation strategy along with a risk management tool. In India most large corporations or MNC's do bring to light their expenditure on products of cyber security and different solutions to help in safeguarding their business but due to the dynamic nature of these risks and new ones emerging day by day it is very difficult to ensure proper, full and complete security. In a survey conducted the market globally for cyber insurance was to go up from 2017 – 2024 at a CAGR (Compound Annual Growth Rate) of 27% which means to about Rs. 22. 8 Bn from 4. 2 Bn. Till the year 2018 , 350 policies were sold but the rate of adoption was 40% if we compare from 2017 – 2018. The major new demand that is coming for this product is from financial services and banking and also IT along with demands from hospitality, manufacturing, retails, etc.

In 2014, cyber insurance was introduced

as a standalone product. Before that, in a very limited form it was covered as endorsements under the General liability policies, professional indemnity policies, etc. Till 2017, 250 policies of cyber insurance were sold. This rose 40% in the year 2018. The typical coverage that is offered in India is first party expenses which basically means fines and regulatory investigation which includes professional fees of the lawyers, admin costs, etc. Other expenses like IT Audit, crisis management, PR and media, is also part of the coverage. Cyber theft which basically includes E-theft loss, Fund transfer loss, cyber extortion is covered. Privacy and data liability like loss of confidential corporate information, multimedia cover like copyright issues, etc. are also covered under this including any interruption in the business like loss of income, system damage, costs of restoration, etc. The data aspects covered by the cyber insurance are payment card details, personal information regarding identity and health, confidential information regarding third party, data storage among others.

Objectives of the study

- To understand the basics of cyber-crimes and the need of cyber insurance.
- To study whether increasing cyber-attacks have led individuals and organizations to buy cyber insurance.
- To understand the challenges faced by insurance industry in providing Cyber Insurance to the satisfaction of consumers.
- to explore the opportunities (regarding Cyber Insurance products) arising out of increasing use of new technologies in the emerging scenario.

Research Methodology

Research design is a system of planned action that does need to be carried out in a series during the whole process of research targeting on the problems which need to be resolved. It enables a researcher from identifying the actual problem and the problem area to report writing with the help of collection, and interpretation of data.

The data collection was done mainly from primary sources with a sample size – 100 respondents. The main sources of the primary data is a survey conducted using a questionnaire on the platform of google forms. It was done online keeping in mind the pandemic.

Literature Review

In October 2020, the IRDAI (Insurance Regulatory and Development Authority of India) set up a committee for cyber- liability insurance under P Umesh.

According to the committee report, the number of internet users in India is currently estimated at 700 million. India was ranked as the second-largest online market worldwide in 2019, second only to China.[2]

In 2020, according to data proprietary to the team of Harvard Business review, the global insurance community saw the first cyber insurance program/ policy to exceed \$1 billion and the second. [9]

In 2018 alone, we (Munich re) estimated the economic damage from cyber-attacks at US\$ 600 bn According to the estimates from market research done by institute Cybersecurity Ventures, companies around the world fall victim to such attacks every 14 seconds on average in 2019.

With the increased use of new and upcoming technologies which are self-learning machines, cloud computing and digital ecosystems, new, better and faster communication standards like 5G has increased our dependence on such intelligent devices which are all parts of the global digital transformation of businesses and new age society. According to the data In 2017, 27 billion devices around the world were online, but this number is set to increase five-fold to 125 billion by the year 2030. With this increase in active devices the risk of getting hit by such cyber threats is also increasing. [10]

Insurance regulatory and development authority of India's panel report stated that "The Working Group believes that early standardization of cyber insurance in India, might impede innovation and hinder adaptation to evolving industry needs. It may lead to price-based competition instead of developing competencies for agility to design new products suitable to new environments," "Cyber insurance, at present, is much dependent upon support of reinsurers who instead of a standardized wording may prefer to use coverage and exclusions as per the latest developments in the market" [11]

"Phishing and malicious breach incidents involve the highest costs while cyber extortion incidents typically involve costs that are two orders of magnitude lower. Malicious breaches, most often target personal financial information. Personal identity information is mostly compromised in unauthorized contact/disclosure cases. An analysis of the perpetrators of cyber incidents shows that hackers, foreign nation states and terrorists have similar targets and employ similar methods. In the same vein, employees, vendors, consultants and trusted third parties also exhibit similar adversarial

tendencies.”[12]

According to India Insurtech landscape and trends report, There’s huge increase in global insurtech funding from about \$2 billion in the year 2016 to \$6 billion in the year 2020. This data shows that America accounted for largest share that is 68 percent in this global funding in the year 2020. Fastest growing continent –Asia till the year 2019 contributed around 60 percent in five year CAGR. As per the data our country, India had a very small base of such investment \$11million in the year 2016 which had a visible increase in the year 2020 and reached \$287 million. There’s an increasing trend which can be seen where turtlemint raised around \$30million in the year November 2020 and Digit raised around \$84 million in the beginning of 2021. General insurance industry is found to be the fastest and largest growing sector which accounts for 60 percent of global funding in the year 2020 and also has the highest CAGR of 65 percent. General insurance in India also shows rapid growth in the past few years accounting for 75 percent funding pool in the year 2020. It shows that B2C or business to customer had lead the path wherein the funding had accounted for 65 percent of the global funding in 2020 compared to how it accounted for 95 percent in 2015.[13]

Cyber Risk Insurance-An Indian Perspective- Jayendra Kumar, Sharmistha Mukhopadhyay, Dr. Priti Puri

With I T, Internet of Things , Cloud computing, Big data , Smart cities growing and revolutionizing life has become simpler by the new technologies that are being discovered and invented day by day to manage the explosion of data. There has been a rise in different online services like net banking , education services , I T , online retail

and shopping , booking tickets be it for movies or flights and we must say that this has definitely made our lives much simpler and easier. The employees make sure that these services run smoothly and in a timely manner with all their hard work . As they always say everything in this world has its pros and cons, so does this age of digitalization. In India there is a tremendous increase in the number of cyber – crimes. Since 2010, in India a 173 % rise in number of crimes will be expected according to PwC analysis.

Over the past decade, data breach has costed organizations millions of dollars. This directly should lead to a high demand and need for insurance protection against cyber – crimes. As CEO of Reliance General Insurance said that after some years, cyber insurance policy can be among the top liability covers that will be sold in India. Coming to how it has evolved, the R B I emphasized on the need to get cyber insurance for the Indian banks as a part of their Internet Banking Guidelines - 14th June 2001 to make sure that the customers are protected from the liabilities arising out of phishing. HDFC Ergo was the first company to basically issue cyber insurance. After that Bajaj Alliance General Insurance , TATA AIG and ICICI Lombard started to offer cyber insurance policy so that the needs of their customers and the target market could be satisfied. A cyber – crime survey report by KPMG in 2015 said that 72 % of the Indian companies faced cyber – attacks in 2015. Also it highlighted that only 41 % Indian organizations take into consideration cyber – attacks in their agenda for the board even though they are aware that a major threat that they can face is cyber – crime. Security managers feel that there is lack of awareness about cyber insurance or the ones that are aware don’t realize how important it

is. Rising number of cyber – attacks are leading to companies suffering a lot and heavy losses which are leading to business interruption and customer data loss. As a part of the risk management plan and business continuity planning of an organization they should be considering insuring their company against cyber insurance. In the digital revolution age cyber risk is becoming very prevalent especially when it comes to Internet of Things and smart cities. Healthcare, banking , agriculture , finance companies , manufacturing , government websites , educational institutes , are among the industries along with I T that are the targets for the cyber insurance market . Standards and proper regulations have to be set in accordance with both the insurance companies and the insured to set cyber insurance coverage and the criteria and conditions for which it may be implemented. As e commerce takes off and India goes digital there will be an increase in cyber risk leading to much higher demand for this type of insurance, says ICICI Lombard chief of underwriting and claims – Sanjay Datta .

Cyber Security Insurance Types:

Normally this insurance can be divided into two categories:

Cyber liability insurance –

This basically covers the cyber risks which are linked and connected with the information technology firms. It is an IT firms liability when it stores customers financial data along with personal data on the servers.

Individual cyber security insurance –

This insurance is basically for the people who are daily online users. The risk associated with different cyber activities for example malware attack , cyberstalking , identity theft , ID theft , loss

which is caused because of social media liabilities etc. are given coverage under this policy.

Scope (Coverage) Under the Cyber Security Insurance

Identity theft –This basically means the alteration or deletion or use of any kind of personal data which is stored on any of our computer. When a case is filed as the third party the prosecution costs which arise are covered. The transportation to the court cost is also covered.

Social media liability –This is basically any identity theft that occurs on the social media account.

When a legal case is filed against a third-party the prosecution costs are covered. Transportation cost to the court is also covered.

Cyber stalking – Cyber stalking basically means using digital media to frighten or harass a user. When a legal case is raised the cost which arises against a third party is covered.

Malware attacks –This is basically a computer program which comes in to the system through downloaded programs, file transfers, text, malicious activity on the electronic devices etc. The restoration cost of damage which has been done to electronic device which is caused by malware is covered. The transportation cost to the court is also covered.

IT theft loss – This is basically a cyber intrusion into the computer which later on leads to unauthorized payments that are being made to any third party. This covers legal expenses that occur when a claim is lodged by a third-party

Phishing –Unauthorized access to details like credit card information password username etc. Any financial loss at a cost because of the loss of sensitive information. For phishing attack any prosecution

cost that occurs against a third party.

Email spoofing –This is basically manipulation or forgery of emails subjects so that the person receiving it thinks that the email is from a genuine and actual source. Any financial expense that arises out of this email spoofing is covered. Any prosecution costs that are there against a third party is also covered.

Media liability claims – Any digital content that gets published or broadcasted due to any cyber attack. Compensation to the third-party, prosecution cost and transportation cost to the court are covered.

Cyber extortion –This is majorly a threat to cause any cyber – attack data breach and / or privacy breach. Any losses that occur because of such threats are covered.

Potential and Target Customers:

Following are the target prospects for Cyber security insurance-

- Individuals
- Information Technology companies
- Educational institutes for example schools and colleges
- E-commerce /m-commerce
- Manufacturing units
- Travel agencies
- Hospitality industry
- Retail units
- FMCG
- Any firm/ company doing online business

- Any firm/ company dealing with customer information.

Challenges that are faced by the insurance companies:

1. The risks are ever evolving: There is a continuous shift in the exposures. Adapting to only one type of attack only leads to facing a new threat technique. Therefore, risk management does become an ongoing process. Coming in of IoT that is internet of things and innovations in business making everything go towards the tech side pose cyber – attack threats and possibilities that need to be brought into assessment and also need to be insured.
2. No standardization: Different terms are used depending on insurer to insurer and the policies are normally customized. This means that there is no standard policy. Potential gaps in the coverage seem to be a major concern as to why businesses are not fully inclined towards having a cyber insurance policy. Standardized policy language needs to be created to overcome this challenge.
3. Lack of knowledge and understanding of cyber risks: Most of the people are not aware of the cyber risks they are facing. Insurance companies can encourage businesses to start implementing risk management programs and take coverage for the multiple cyber risks.
4. Lack of awareness: For cyber insurance one of the major barriers is lack of awareness. Companies have this perception / misconception that it is better to improve security controls than to purchase insurance cover which is very highly costly and doesn't provide visible return. We can take an example of the US, over here the security practices are very well developed and

much more mature but still they are facing a lot of cybercrimes at a very alarming rate. According to director of Qadit systems and solutions, Mr. Vijay, the awareness about cyber insurance in our country is very less. The barriers are not only there from the insurer but also from the insured. There is no standard product for this type of insurance and coming to the insured they hardly are associated with any damages or cost with any cyber incidents and therefore the awareness that cyber incidents can cause financial loss will not make them think of insurance.

5. Smarter cyber criminals: they are getting smarter day by day and are figuring out and inventing new methods for hacking which is very hard to figure out for us. Companies need to understand this before it becomes too late as now with the rise in the use of technology all over the world it is very important to be protected against any losses it can cause. There are a lot of examples showing us how one major single attack has led to MNCs being shut down. It is not just about the attack it is about the lack of training and lack of awareness lack of information about access rights and data privacy rules among the employees. This can lead to a major significant financial loss for the organization a company and also a loss of reputation for other companies as well.
6. Lack of privacy laws in India is a major disadvantage. Personal information is quite easily accessible and available and not kept in sync with the required standards which might lead to us becoming a very easy target in the future.
7. Rigorous Premium calculation and detection of fraudulent claims: Calculating the premium and detecting the claims that a fraudulent is the biggest challenge for the cyber insurance

industry. Despite concerted efforts, solution is not that simple for these problems.

Opportunities:

One of the major opportunities for the insurance companies related to cyber insurance is the increase in dependance on technology. It is rightly said that the world today is driven by technology. We cannot imagine even one day without the usage of technology be it our mobile phones, laptops etc. Technology has become a way of life. With everything becoming digital around us it is very important that we have proper protection for any financial loss. Everything today is just a click of a button away. If we take the pandemic that has lasted over a year now and it's still not over we cannot imagine coming through it without the use of technology.

Businesses have been able to continue operating because of the online platform that technology provides us, Education has been possible in all parts of the country due to the technology, Teachers have been able to teach because of this technology, Stores and shops have been able to operate by selling the products online due to technology, payments have been able to be made and received with the help of e - banking which was also not possible without technology. These are just a few examples of how important technology is and how it has been such a major factor in helping us reach thus far.

All these activities that we all are performing online need some kind of protection which this type of insurance provides. All our data that we store on our laptops or computers or systems is all prone to cyber - attacks. Different kind of cyber - attacks and cyber threats like phishing, malware attacks,

ransom ware etc. have been on the rise. Cyber insurance helps us to compensate the losses that occur due to these cyber - attacks.

So, in other words, digitalization and the need for technology in our lives is a major opportunity for cyber-Insurance.

COVID-19 has made people realize the importance of this technology and along with it the need to protect ourselves from cyber - attacks which is also a major opportunity for the cyber insurance industry.

The future of cyber insurance:

With an exponential increase in the cyber – crime rate, the Indian market will only improve as we can see there is a steady increase in the policies sold.

Strict laws may be mandated by the government to handle personal identifiable information and counter measures that would be needed for data theft. The main question that arises here is that will cyber insurance become mandatory for the companies in India handling data that is very sensitive.

Another issue here is that the organizations in India don't really associate a monetary or financial value to the cyber incidents. Yet in the near future we can see that cyber insurance will be a choice and can be made mandatory. It can be done if the insurance companies offer a product that is well aligned to the needs of the businesses.

Studies indicate that the Indian market for cyber insurance products will definitely grow at a much higher rate and the organizations will realize the need of it and will invest more in the products

associated with different types of advanced technology.

If we take a sectoral analysis it basically says that the cyber security market for insurance in India is defined by three major sectors- information technology and information technology enabled services that is ITES, Banking and financial service industry and the government. 68% of the cyber insurance market will be constituted by these three main sectors.

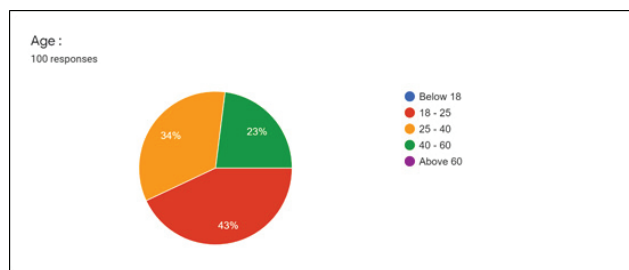
In the BFSI sector the cyber security attacks have evolved a lot. Having a 26% share, it has the largest cyber security expenditure. The BFSI sector is being expected to increase its expenditure at a CAGR of 16.1%

Valuable client information that is held by the service organizations have also become a major target for the cyber security attacks. The IT e S / IT sector is predicted to be witnessing a growth in this expenditure for security at a CAGR of 18%.

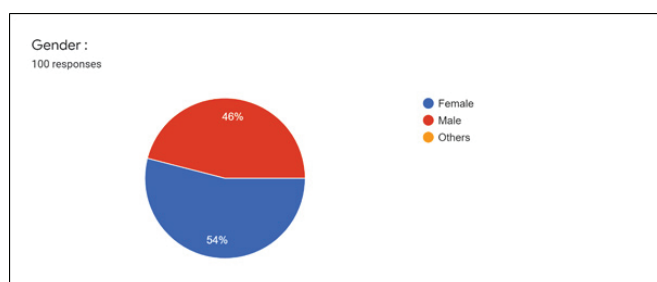
Significant security spending will be there in the government sector to prevent cyber security attacks from happening. It will revolve around defensive measures and investment. The market is supposed to be growing at a rate of 13.8% CAGR for cyber security.

Data analysis:

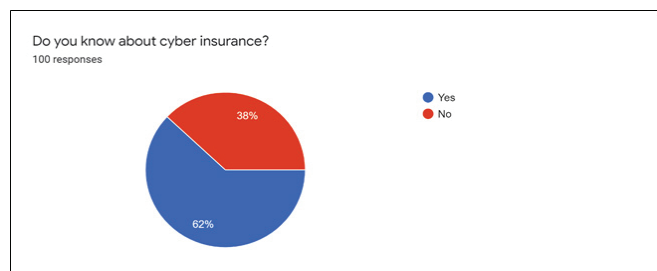
The sample for this research were people in the age bracket of above 18 years, basically the working segment.



Survey was conducted among people working in the insurance sector, banking industry, I T sector, students studying insurance, banking and I T, faculty teaching the insurance and banking subjects, people working in the different companies who require the need for cyber protection. 46% men and 54% women were respondents to the survey.



1) Do you know about Cyber Insurance?

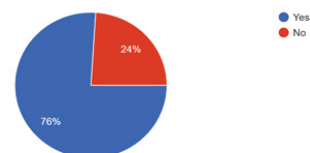


62 people out of 100 knew about cyber insurance. They either have cyber insurance in the company they work or are aware about it majorly because of the rapid increase in digitalization. This is basically 62% of the entire sample.

38 people out of 100 did not know or were not aware about cyber insurance. Through the survey they did gain a small amount of knowledge about it but they don't know much. This is basically 38% of the entire sample.

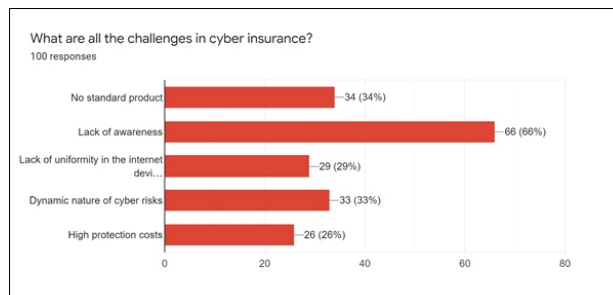
2. According to the Data Security Council of India, cyber insurance market is gaining traction in India. Do you agree?

According to the Data Security Council of India, cyber insurance market is gaining traction in India. Do you agree?
100 responses



76% of people agree that cyber insurance market is gaining traction in India. This is mainly because there has been a 40% rise in the number of policies issued in the past years. 24% people don't think that cyber insurance will gain traction in India.

3) What are the challenges in Cyber Insurance?



When questioned about the challenges of cyber insurance, maximum people selected lack of awareness. Lack of awareness is a challenge to the insurance industry specifically cyber as it is very new to the market and with the increase in digitalization, it is becoming more of a necessity.

Not having a standard product is a major challenge for the cyber insurance industry since there isn't any standardization in the policy wording, people do not completely understand and rely on the product. It is one of the major challenges faced by the insurance industry as the types of cyber – attacks are very dynamic in nature and one

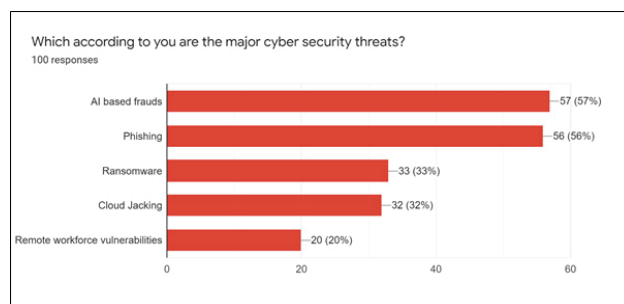
cannot number down the different threats. New ones emerge everyday so it is very tough to actually write them down and standardize the product.

Dynamic nature of these cyber risks makes it very tough to know which risk is covered and which is not as new cyber threats emerge every day.

Lack of uniformity in the internet devices is also a challenge for the cyber insurance industry.

High protection cost is another challenge as the cost for cover is extreme high including the expensive administration cost. Expenses that need to be taken care of are very high for this cyber security and protection policy.

4) Which according to you are the major cyber security threats?



AI based frauds is a thing that is a major cyber security threat. These are frauds that are caused by usage of artificial intelligence. For instance we can take online transactions which are fraud based which can be based on the amount, time, etc.

Phishing is basically a fraudulent attempt which is used to obtain any sensitive data or information like password, your credit card details, username and sensitive details by impersonating oneself as anybody who is like a trustworthy entity through online communication. These attacks are normally communications that are fraudulent which

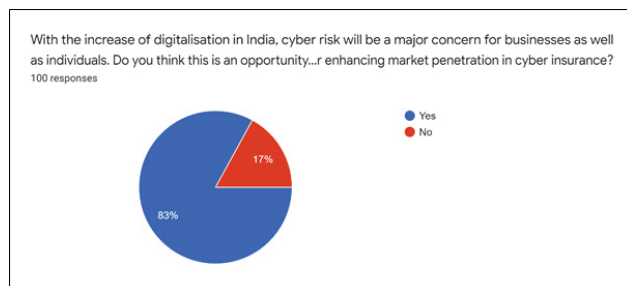
appear to be from some reliable source. Normally it is done through email and it uses the sensitive data or installs malware on the device. 56% of people think that it is a major cyber security threat.

A type of malware which basically encrypts the victims file is known as ransomware. The attacker then demands ransom to basically restore the excess of the data upon payment of the ransom to the victim . It has unique components that differentiate it from other malware and utilizes unbreakable encryption which makes it very difficult and impossible to decrypt the affected files . About 33% people think that it is a major cyber security threat.

Cloud jacking is also known to as cloud account hijacking and is normally a cybercriminal who takes over an account which is a business or individual one and once they get control of the account the hackers steal data or perform identity theft. In 2020, it was likely to emerge as the most dominant cyber security threat. About 32% people think it is a major cyber security threat.

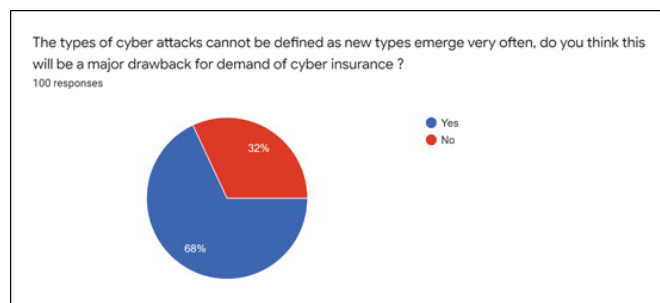
Remote workforce vulnerability is also considered a major cyber security threat, about 20% people believe that . In this normally the complete data access is given to the employees who are at different places, and this raises a lot of concern about interruption of data and the security of the utilized connections or any of potential theft or loss of the data that is there. Better remote access terms / policies need to be made and personal work data needs to be separated and the public networks should definitely not be used, and the private network should be used to increase the security. Whenever a person is working for the company, they should not put themselves or the company data at any risk

- 5) **With the increase of digitalization in India, cyber risk will be a major concern for businesses as well as individuals. Do you think this is an opportunity for the Insurers for enhancing market penetration in cyber insurance?**



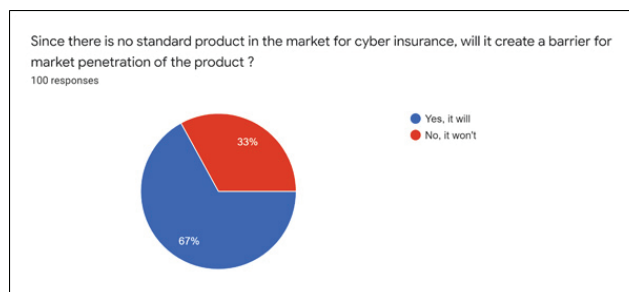
Majority of people think that with an increase of digitalization in India leading to cyber risk being the most known concern for business as well as individuals, this is a big opportunity for cyber insurance. With the trend of work from home and everything becoming online be it transactions, shopping, education, etc. it is very important that all this data is protected. This creates a very large market for cyber insurance and is therefore a huge opportunity to increase market penetration for the cyber insurance industry. Still there are a few people that think that it won't be an opportunity for cyber insurance as it for sure does have quite a few challenges.

- 6) **The types of cyber - attacks cannot be defined as new types emerge very often, do you think this will be a major drawback for demand of cyber insurance?**



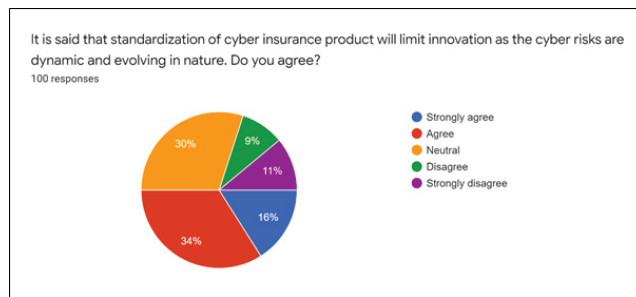
68 % people think that a major drawback for the cyber insurance industry will be that cyber -attacks cannot be defined as new ones emerge almost every day . Cyber risks are very dynamic in nature and there can be no fixed or standard definition for them. Some people i .e. 32 % still do think that this will not be a major drawback for the cyber insurance industry.

- 7) **Since there is no standard product in the market for cyber insurance, will it create a barrier for market penetration of the product?**



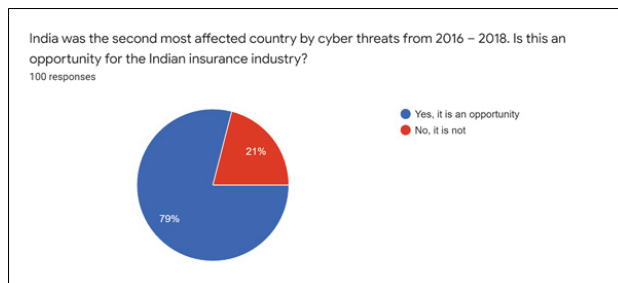
Since we all know that standardization is a major challenge for the cyber insurance industry it will to some level create a barrier for market penetration for the product. 67 % people think it will create a barrier but some around 33 % feel it should not come in between and create a barrier. As the nature of cyber risks is very dynamic it is very tough to get a standard product in the market.

- 8) **It is said that standardization of cyber insurance product will limit innovation as the cyber risks are dynamic and evolving in nature. Do you agree?**



A majority of people agree that standardisation of cyber insurance product will limit innovation as the cyber risks are dynamic and evolving in nature. A section of the people are neutral and a part of them also disagree and strongly disagree to this. 34% people agree to this 30% of them a neutral 16% strongly agree to this 11% strongly disagree whereas 9% disagree. We all know that cyber risks are dynamic and evolving in nature. This does limit product innovation and standardisation of cyber insurance as you cannot know what risk will come up the next day.

9) India was the second most affected country by cyber threats from 2016 – 2018. Is this an opportunity for the Indian insurance industry?

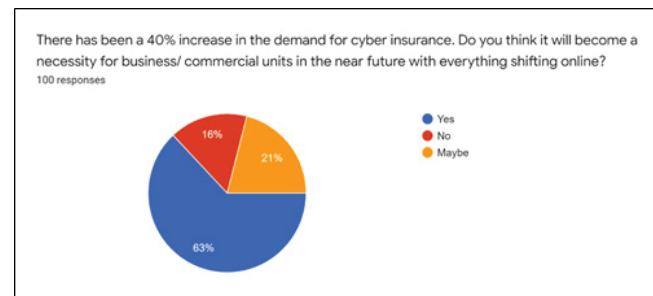


Majority of people think that this is definitely an opportunity for the Indian cyber insurance industry as we know India is the second most affected country by cyber threats from 2016 to 2018. 21% of people think that this is not an opportunity for the Indian insurance cyber market.

Due to digitalization and shift towards

technology there is a rise in people using IT. This also increases the cyber threats and risk as everything has their pros and cons so yes we can say this is an opportunity as protection is needed against all the cyber threats and risks. So as we can see, 79 % people do consider it an opportunity.

10) There has been a 40% increase in the demand -for cyber insurance. Do you think it will become a necessity for business/ commercial units in the near future with everything shifting online?



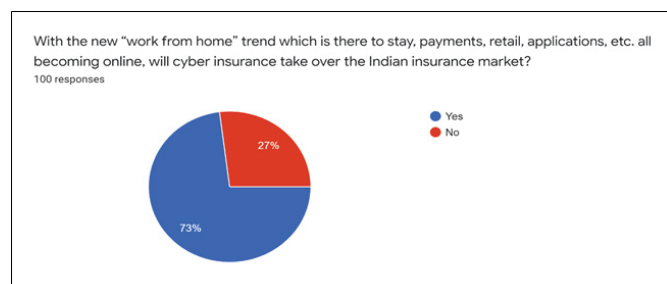
According to the survey conducted 63% of people think that this 40% increase in demand for cyber insurance means that there is necessity for it in business or commercial units in the near future as everything is shifting online. 21% are neutral towards this and 16% people think that it will not be necessary to have cyber insurance for businesses in the near future.

A 40% rise does show us that people are realizing the importance and need of having cyber insurance as almost everything is shifting online and digitalization is rising at a very fast speed

Since maximum of the data is stored online these days it will be necessary to protect this data therefore need in cyber insurance.

11) With the trend “work from home” which is there to stay, payments, retail, applications, etc. all becoming online, will cyber insurance

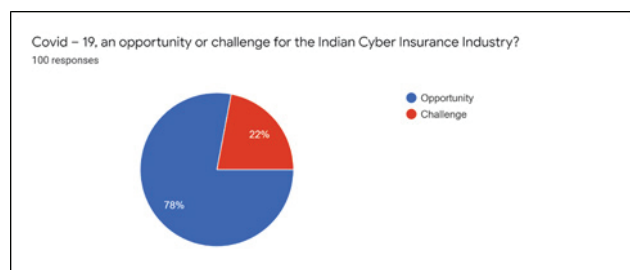
be adopted by the Indian insurance market?



73% of people think that cyber insurance will take over the Indian insurance market as the new concept of work from home is coming in and is here to remain. Payments retail application etc. everything is becoming online. 27% people still do think that cyber insurance will not take over the Indian insurance market.

But as we can see especially in the past one year while the pandemic everything has been running smoothly just because of technology so you can at some point say that cyber insurance will take over the Indian market for insurance and will become a necessity

12) Whether 'COVID – 19' pandemic is an opportunity or challenge for the Indian Cyber Insurance Industry?



78% people think that COVID-19 is definitely an opportunity for the Indian cyber insurance industry. This is basically belived as since the date of imposing lock down, people have not been able to move out of the housed or travel around due to this the work from home trend. This

pandemic so far therefore COVID-19 does seem like an opportunity as people are realizing the need for technology and the importance of protection that is cyber insurance but still 22% people think that COVID-19 is a challenge for the Indian cyber insurance market as we all know that it's been a very rough year and it obviously does have its challenges.

Conclusion:

Cyber-insurance plays a vital role to compensate the financial losses that are caused by the cyber threats and risks. The cyber insurance penetration level in the India market has increased by 40% from the year 2016 to 2018 .

One major drawback of the cyber insurance policy is that it's not a standard product meaning there is no standard definition of cyber threats or cyber risks that are covered since these cyber risks & threats are dynamic in nature & they keep on changing day by day and new ones keep coming in every day . One cannot have a standard set of threats that are insured against. This is a major drawback for the cyber insurance industry.

Well if it's right to say Covid - 19 seems like an opportunity for the cyber insurance industry as digitalization has really risen up while the pandemic making technology something that we cannot imagine living without and making it also a major resource that needs to be protected.

Impact of Low Interest Rates on Economy

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Abstract

For a long time now, the central banks have been persistently using lower/negative interest rates as a monetary stimulus measure to direct economy out of demand and supply shocks. The recent COVID-19 pandemic has not only resulted in the loss of millions of lives globally but also the loss of livelihood for many, causing huge disruption to the economies worldwide. Various changes have been implemented to the monetary policies to revive economic growth, the vital tool being cutting down of interest rates in order to avoid credit crunch and mass bankruptcy.

This study will focus on collecting historical data and analysing how the low interest rate environment have impacted the economy with special emphasis on its role in stabilising economy during and after the pandemic and the induced side effects. The study will also include performance comparison of the largest economies over time with changing interest rates. It will cover the correlational research between interest rates and various economic growth indicators such as consumer spending, investment, inflation level, GDP, unemployment, exports, and imports etc. Impact of interest rate changes on various sectors such as insurance industry, financial institutions such as banks, bonds market, labours, consumers will be discussed. Regression analysis will be done to study causality and to forecast rates. Challenges and limitations will be discussed. Data for this project is to be collected from secondary sources.

- *Governmental statistical data for analysing trends and patterns (For e.g., Data released by RBI, World Bank Open Data etc.)*
- *Published literature articles*
- *Textbooks*

Key words: *Monetary policies, COVID-19 pandemic, interest rates, economic growth, regression*

Introduction

During the period between 2003 to 2008, India was acclaimed as one of the fastest growing developing economies with unprecedented annual growth rate of 8-9% accompanied with stable price levels showing no significant fluctuations and flourishing capital inflows while the investment

rate reached all time high, about 38% of annual GDP level. With 2008 Global Financial Crisis, India's booming economy saw a modest dip due to stringent financial regulations and a huge domestic driven market. During the Crisis period, interest rates were slashed, inflation level began to rise, and soon India made a V-shaped economic

recovery until 2012. Soon the inflation level was left uncontrolled leading to a phase of stagflation i.e., high inflation with low levels of employment and economic output along with high level of corruption and bad loans debt.

In 2015, political changes occurred with a new government undertaking several new initiatives such as "Make in India", "Digitalization" and a period of demonetization to fight against corruption and to bring back economic growth. Demonetization brought large macroeconomic shocks, disrupting the money supply chain in the nation, leading to a contraction in economic activity and employment levels. Again in 2017, the introduction of GST regulations brought another economic shock, largely affecting the business sector specially the informal enterprises.

Since then, several changes have been adopted in the monetary policies to strike a balance between interest rates and inflation, showing a declining trend from 9.5% in 2013-2014 to 3.4% in 2018-2019.

In 2020, another global crisis took place with the COVID pandemic which has not only resulted in the loss of millions of lives globally but also huge disruption to the economies worldwide. Various changes have been implemented to the monetary policies to revive economy, the vital tool being cutting down of interest rates in order to avoid credit crunch and mass bankruptcy. Low interest rates are introduced to support economic recovery by encouraging more consumer spending and investment, raising the aggregate demand in the economy but at the same time persistent low rates often results in stirring inflationary pressure, which again causes deterioration in purchasing power of the consumer, thus slowing down economic revival.

For a long time now, the central banks all over the globe have been persistently using lower/negative interest rates as a monetary stimulus measure to direct economy out of demand and supply shocks. Even slightest of changes in interest rates significantly impact the market situation thereby affecting consumers, industries, financial sectors such as banks and NBFCs, policymakers, investors etc.

This study is conducted to focus on the effectiveness of expansionary monetary policies using low rates of interest persistently being adopted by countries to tackle slowdown of economic growth.

Review of Literature

Extensive studies have already been done to seek understanding of the role played by traditional and unconventional monetary policy measures in shaping up the economy of a country and many are ongoing by plethora of prominent organizations. While many researches have presented the more conventional model of lower interest rates augmenting the net present value of future cashflows corresponding to higher economic productive capacity, the study conducted by Ernest Liu, Atif Mian, Amir Sufi (2020) from Princeton University brings more attention towards the unconventional interest rate model where lower interest rates have a sore dominating effect of falling aggregate investment, therefore bringing down economic growth.

The World Economic Outlook –Report by International Monetary Fund Members in 2021 have keenly scrutinized COVID pandemic resulting in large scale supply-chain disruption leading to a situation of supply side inadequacy to meet up

with discharging of suppressed aggregate demand and higher commodity price level. It suggested to tighten the interest rates in order to address the rising inflationary pressures even if that delays the **employment recovery.**

New-York University professor Thomas Philippon investigated that the economy is less competitive than it once was. Businesses with increasing market power not only raise their prices but also invest less. Again, reduced demand for capital puts downward pressure on interest rates. An article by Blundell-Wignall 2020 highlights that persistently low interest rates have a little-known effect in achieving the goal of balancing inflation and economic productivity instead often contributes in creating future risks of financial crisis, overlooking the need to deal with root causes of lower investment rates, economic output, and inflation pressure.

Research conducted by Starsky and Hwang (2019) highlighted that persistently low interest rates lead to lower profitability for banks but the effect keeps on reducing year by year and this effect is preceded over largely by the the positive effects of low/negative interest rates on an economy. Study by Afanasyeva and Güntner (2020) examines banks profitability during interest rate cuts, showing that during low interest rate periods, financial institutions such as banks, NBFCs etc. tends to lend more against a given collateral giving more power to the borrowers but at the same time resulting in lower creditworthiness.

Article by N. Gregory (2020) has mentioned that periods such as the financial crisis of 2008 or the latest pandemic that we are witnessing leaves a long-term impact on people's mind and results in

reducing their risk-taking capacity. They tend to save more as a precautionary measure and aims to invests in more secured assets rather than having the goal of earning higher returns by taking higher risks which leads to downward driven interest rates.

Research published by in International Journal of Economics and Financial Issues discusses the key industries impacted by COVID-19 pandemic in India. She emphasized on the financial markets such as stocks and bonds reaching an all-time low all around the globe due to lower interest rates and reduced consumer confidence and future expectations. Elmendorf in his study suggested that the elasticity of savings and consumption can significantly vary depending on the life condition of the individual at the moment as well as on the model chosen. Hamid Rashid and Ingo Pitterle in their article titled "The monetary policy response to COVID-19: "published in World Economic Situation and Prospects 2022 focused on the impact of asset purchase programs where the weightage is given to unconventional ways of monetary policy changes since developed countries before pandemic were dealing with negative interest rates and had no room left to reduce it down further. Owing to interest rate changes' potential impact on destabilizing the global economy, there is a need to analyse past data and use that information to evaluate both the positive and negative implications, identify the trends and prepare better for sustaining the economic growth in future.

Need and Significance of the Study

Interest Rate is a key monetary policy instrument to control money supply in an economy. It has a direct influence on spending and investment decisions therefore impacting demand and supply market forces.

In order to bring economy back on its track, the government can set interest rates in the short run but in the longer run, interest rates are self dictated and adjusted by the market forces i.e., aggregate demand and supply. In the long run, changes in interest rates results in capital aggregation and thus leading to rising opportunities for growth of an economy.

According to the 2021 World Economic Outlook prepared by the International Monetary Fund (IMF)

- Global economic growth fell to an annualized rate of around -3.2% in 2020.
- India's GDP contracted by 7.3% in 2020-21.
- A sharp rise in the unemployment rate from 5.27% in 2019 to 7.11% in 2020
- Average inflation rose from 4.8% in 2019-20 to 6.2% in 2020-21.

To deal with COVID-Crisis, many of the advanced economies opted for aggressive unconventional monetary policy measures such as cutting down interest rates to a historically low level accompanied with large fiscal stimulus packages. The developing economies too, followed the suit with the introduction of expansive monetary policies and fiscal spending in their own capacity.

This study is essential to understand the role of setting appropriate interest rates in combating economic slowdown along with all the positive and negative implications on the dynamics of an economy and to be able to foresee the future implications and take suitable measures in the present.

Objective of the Study

To assess the effectiveness of low interest rate environment in stimulating economic growth by since the central banks all around the world are persistently using lower or even negative interest rates as a monetary stimulus measure to direct economy out of demand and supply shocks.

- Analyzing trends and patterns from historical data
- Performing regression analysis to study causality between interest rates and various economic growth indicators such as consumer spending, investment, inflation level, GDP, unemployment, exports, and imports etc.
- Comparing and evaluating the performance of major economies with changing interest rates over time.
- Studying the impact of interest rate cuts in mitigating the economic implications caused by COVID-19 pandemic.

Research Methodology

To understand the role of interest rates in an economy, we need to understand its scope and reach by studying past patterns and trends for quantitative analysis of economic performance both at domestic and at global level. For statistical analysis and graphical visualization, IT tools such as MS Excel have been used.

Balancing Inflation And Interest Rate Level

The Taylor rule in macroeconomics suggests that the interest rates should be raised when the inflation exceeds the required level and should reduce it when inflation is below the required level and this equilibrium level should be maintained at all times for growth of an economy.

Analysing the historical data, we can observe that the Taylor rule is applicable at all times. Trends suggest no consistent increase or decrease in interest rates over the period. India registered sharp fall in interest rates post 2008 global recession crisis just after a record high of 9% pa in the previous year followed by rise in interest rates continuously during the period 2010-2014 as the GDP returned back to pre-recession. Since 2014, trends suggest a constant decline in the interest rates with a constant record low of 4% pa due to pandemic since 2020 to present date.

A weak, negative association was witnessed between interest rates and the inflation levels. With India witnessing a sharp rebound in economic activity post pandemic, inflation level is again seeing an upward trend having potentials of disrupting the economy again.

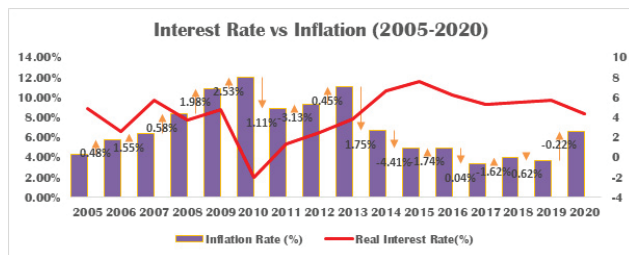


Fig1. Real Interest rates shown along with percent changes in consecutive years and inflation rates Data source: World bank data

Consumer Savings And Spending

Savings plays a crucial role in encouraging the national capacity of investment which in turns lead to higher economic output. When interest rates fall, it increases consumer’s spending level since lower interest rates means less encouragement for consumers to save their money through deposits in banks.

A constant upward trend can be witnessed in

the consumer spending throughout the period with the exceptions during the period 2012-13 where the spending remained almost constant and a 10.78% dip from 2019 to 2020 owing to pandemic when GDP contracted almost 7%.

With significantly lowering down the interest rates during the period 2019-20, consumer spending was adversely affected during the peak time of pandemic in 2020 while the domestic savings were not affected much.

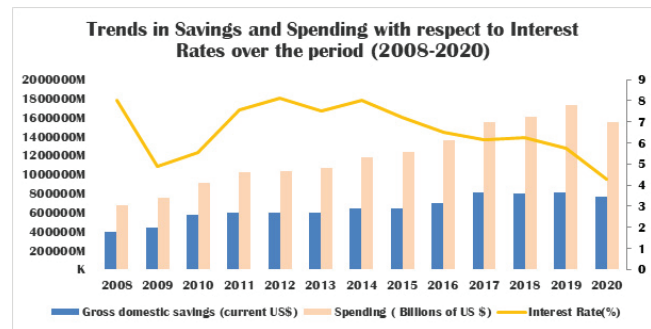


Fig2. Consumer Savings and Spending with respect to Interest Rates over the period (2008-2020) Data source: World bank data

Through the scatterplot we can say that a negative correlation exists between Investment (% of GDP) and Real Interest Rate. As the interest rates reduces, people are less focused on inviting their money in financial markets due to lower returns.

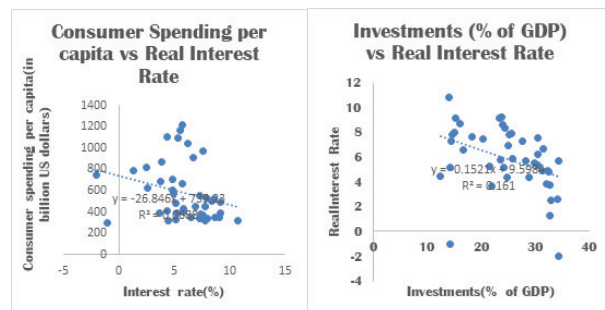


Fig3 and 4. Scatter plot between consumer spending vs real interest rate and Investment vs real interest rate

Role Of Consumer Confidence (Current Perception And Expectations)

Besides interest rates, another major factor that affects consumer spending is the consumer confidence. It represents the current and future perceptions of consumers of how the economy is performing. When people are positive of the economic growth (high consumer confidence) and when people have negative outlook of the economic growth (low consumer confidence). When people are more confident about the future, they tend to spend more today while if people are uncertain of future conditions, they may be propelled to save more today instead of spending.

During low interest rates environment, consumers are discouraged from savings due to lower investments returns and have more dispensable income to spend. But if this low interest rate environment is accompanied with low consumer confidence, then consumers are more likely to spend less, demand falls, unemployment rises and hence economic output reduces. With the arrival of pandemic, the consumer confidence on the economic situation of country saw a drastic dip. Although interest rates are lowered down, the road to recovery is sluggish due to lower confidence. The survey data has been taken from RBI in which 5389 people across 13 cities in India participated in which questions were asked to find a quantitative measure of current perceptiveness and confidence in future performance of economy just before and after the surge of COVID.

Summary based on Net Response						
Main Variables	Current Perception compared with one-year ago			One year ahead Expectations compared with current situation		
	Dec-18	Mar-19	Change	Dec-18	Mar-19	Change
Economic Situation	-6.4	13.7	↑	35.6	48.6	↑
Employment	-8.7	3.9	↑	37.6	46.4	↑
Price Level	-79.5	-72.0	↑	-59.1	-57.8	↑
Income	7.8	10.2	↑	57.3	55.1	↓
Spending	70.3	67.0	↓	73.3	74.9	↑
Consumer Confidence Index	96.7	104.6	↑	128.9	133.4	↑

Summary based on Net Responses						
Main Variables	Current Perception compared with one-year ago			One year ahead Expectations compared with current situation		
	Jan-20	Mar-20	Change	Jan-20	Mar-20	Change
Economic Situation	-27.8	-23.9	↑	11.9	15.1	↑
Employment	-33.1	-30.5	↑	13.0	14.7	↑
Price Level	-88.7	-84.6	↑	-66.7	-70.4	↓
Income	-5.0	-2.2	↑	42.7	44.2	↑
Spending	73.1	69.2	↓	74.7	72.3	↓
Consumer Confidence Index	83.7	85.6	↑	115.1	115.2	↑

Fig 5 and 6: Summary responses on Current and future consumer perception. Data Source: RBI

Following observations were witnessed:

- Consumer confidence saw a major dip in 2020 as compared to 1 year ago i.e., when COVID was in its initial stage and had not created much of an impact.
- The only parameter that saw low consumer confidence before and after pandemic was the price level.
- The current perception continuously worsened since May 2019 till Jan 2021 while the 1 year ahead future expectations saw a decline throughout till mid of 2020 but gradually saw a rise in consumer confidence. This can be an effect of the immediate decision taken by central banks to cut down interest rates or due to the major economic relief packages introduced in the economy by government etc.

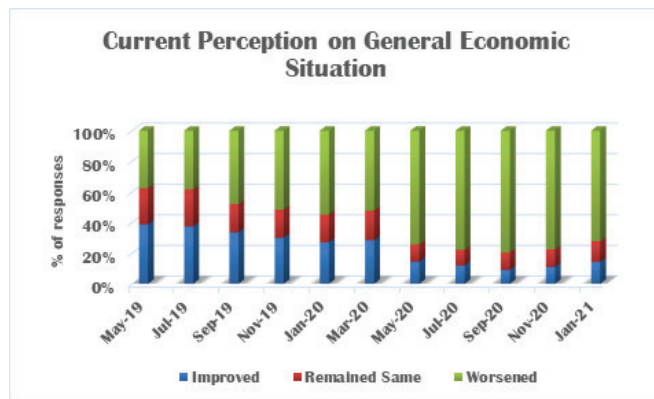


Fig7. Current Perception on General Economic Situation

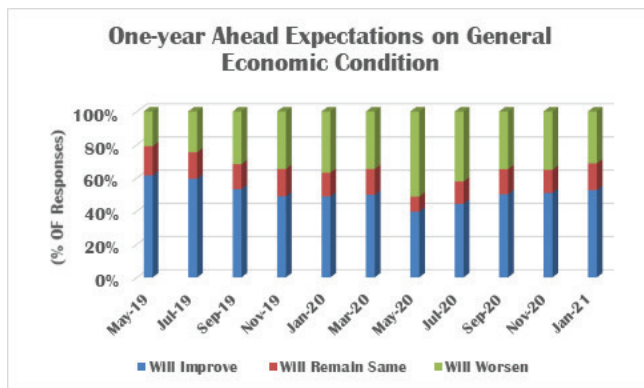


Fig8. One-year Ahead Expectations on General Economic Situation

Impact Of Interest Rates On Trade Balance Deficit (Exports And Imports) And Foreign Direct Investment

The imports and exports are largely affected indirectly by interest rate cuts through changes in exchange rates. The trade balance can be measured by finding the difference between imports and the exports. If the imports exceed exports, it is said to be trade deficit while if the exports exceed the imports, it is defined as trade surplus. In the scatter plot, it can be clearly observed that trade balance (% of GDP) and Real Interest Rates are weak, negatively correlated. However due to the presence of outliers, distortion in measuring the strength of relationship is apparent.

Countries which remain trade deficits persistently generally tend to have higher rates of interest in the long run than countries with balanced trade or surplus. This is done so as to attract investors internationally to finance their shortfalls in trade. The below scatter plot shows weak negative correlation between trade balance (Exports -Imports) and the real interest rates. Since adjusted R square value is 0.1899, the fit of the data can be improved by increasing the period of the data taken to increase the data points observed for accuracy.

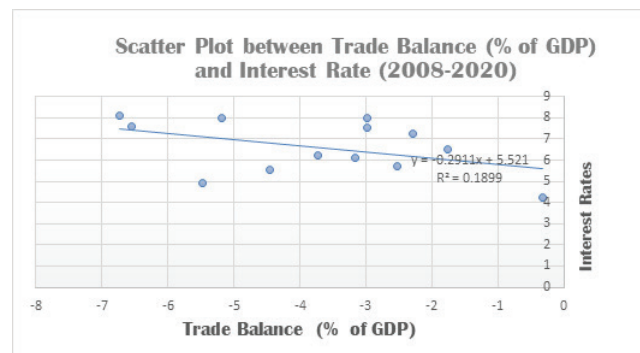


Fig9: Scatter Plot between Trade Balance (% of GDP) and Interest Rate (2008-2020). Data Source: Macrotrends

While it is generally found that both the imports as well as exports should increase for an economy to perform well but if the imports significantly exceed the exports results in trade deficit leading to devaluation of local currency. The aggregate demand for local goods and services will reduce and a significantly higher flow of money into the other economy will result in slowing down of economic growth.

No consistent increase or decrease is observed in the level of imports of goods and services. Imports rose during the period from 2008 till 2012 and then saw a decline from the period 2013 to 2012015-16. 2008-2013 was a period of

low interest rate environment since India was in a recovery stage from the lower aggregate demand due to financial crisis of 2008. As it soon started witnessing an upward trend, the pandemic resulted in lowering down the imports value.

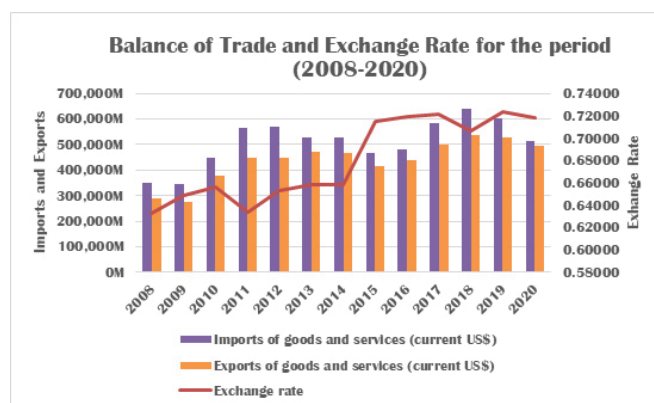


Fig10: Balance of Trade and Exchange Rate for the period (2008-2020). Data source: Macrotrends

IMPACT ON UNEMPLOYMENT LEVELS

Lower unemployment levels in a country are an important indicator of a healthy economy. In macroeconomics, Phillips curve theory was established by A.W. Phillips showing an inverse relation between unemployment and inflation.

We analyse the historical data (unemployment and inflation rates) for the period 2008-2020 using R.

Linear regression model function is used using `lm` function in R

It can be witness that:

- Unemployment levels are negatively correlated with inflation with a correlation coefficient of (-0.002973) while it is positively correlated with the inflation levels while it is positively related with interest rates with a correlation

coefficient (0.022370).

- The positive value for adjusted R square depicts good fit of the data.
- P value is lower than level of significance i.e., there is a significant impact of independent variables on the dependent variables.

R syntax

```
setwd("C:/Users/bhavy/OneDrive/Desktop/SEM 6 EVERYTHING/NTCC SEM 6/EXCEL DATA FOR DISSERTATION")
library(readxl)
data <- read_excel("Unemployment interest inflation.xlsx")
View(data)

#model<-lm(data$Unemployment.rate~data$Real.Interest.Rate.+data$Inflation.Rate,data = data)
coef(model)
summary(model)

Call:
lm(formula = data$Unemployment.rate ~ data$Inflation.Rate + data$Real.Interest.Rate.,
    data = data)

Residuals:
    Min       1Q   Median       3Q      Max
-0.31091 -0.14396 -0.07751 -0.03632  1.47938

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)    5.495353   0.795846   6.905 4.17e-05 ***
data$Real.Interest.Rate 0.022370   0.068353   0.327  0.750
data$Inflation.Rate -0.002973   0.081154  -0.037  0.971
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.4988 on 10 degrees of freedom
Multiple R-squared:  0.02495,    Adjusted R-squared:  0.1701
F-statistic: 0.1279 on 2 and 10 DF, p-value: 0.00034
```

REGRESSION ANALYSIS

Regression analysis is a statistical tool performed to identify which independent variables have a strong or weak impact on a single dependent variable. Thus, it is used for measuring relationship between variables. The study included performing regression analysis to study the extent of association between GDP per capita and macro-variables namely:

- Consumer Spending
- Balance of trade
- Government expenditure
- Gross Domestic Savings

It includes regression statistics and an ova table.

Anova table is used to show whether there exists statistically significant difference between means of variables that are independent in nature.

Since the R-value is particularly high i.e., 99% the model seems to be a good fit i.e.; the independent variables are able to explain the behaviour of dependent variable i.e., GDP per capita.

Strong positive correlation (0.591) is observed between Consumer spending and interest rates while weak negative correlation (-0.3126) exists between balance of trade and GDP. Weak correlation exists between GDP per capita and government expenditure, while very weak positive correlation (0.023) is found to be between GDP per capita and Gross domestic savings. F value comes out to be 2913.209625 which is very large hence denoting significant impact of the independent variables on the dependent variables, GDP per capita.

REGRESSION STATISTICS

	Correlation Coefficient						
	GDPG	FCE	GSAV	RIR	FDINI	FDINO	INFLATION
GDPG	1						
FCE	0.79	1					
GSAV	0.39	0.41	1				
RIR	0.21	0.06	-0.4	1			
FDINI	0.25	0.41	0.85	-0.35	1		
FDINO	0.2	0.25	0.7	-0.43	0.85	1	
INFLATION	-0.05	-0.09	-0.2	-0.33	-0.16	-0.07	1

	FDINO	FDINI	INF	RIR	GDPG
Mean	0.67	1.67	5.44	5.42	7.19
Standard Error	0.14	0.21	0.61	0.73	0.51
Median	0.47	1.65	5.73	5.77	7.56
Standard Deviation	0.53	0.82	2.38	2.83	1.96
Sample Variance	0.28	0.66	5.65	7.99	3.85
Kurtosis	-1.03	1.1	-0.91	-0.17	-0.65
Skewness	0.75	0.91	0.02	-0.16	-0.44
Range	1.53	3.06	7.92	9.62	6.46
Minimum	0.09	0.6	1.07	-0.6	3.8
Maximum	1.62	3.66	8.98	9.02	10.26

GDPG	GDP growth (annual %)
FCE	Final Consumption Expenditure (annual growth%)
GSAV	Gross Savings (% of GDP)
RIR	Real Interest Rate (%)
FDINI	Foreign direct investment (inflows % of GDP)
FDINO	Foreign direct investment (outflows % of GDP)
INFLATION	Inflation (Annual %)

A residual plot shows how the observed data points differ from the best line of fit i.e., regression line. The below residual plots are not following any specific pattern around the horizontal axis i.e., regression line and are dispersed randomly in nature, thus indicating a good fit for the linear model.

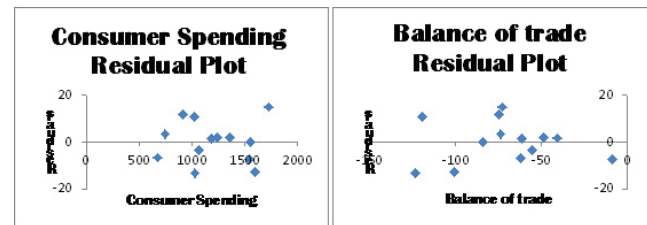


Fig11: Consumer Spending Residual Plot

Fig12: Balance of trade Residual Plot

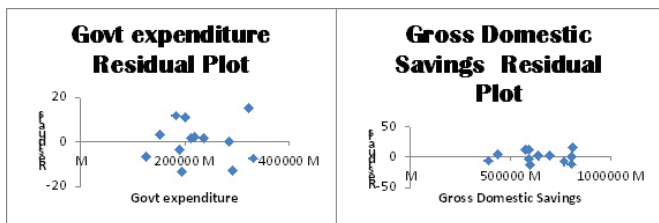


Fig13: Govt expenditure Residual Plot

Fig14: Gross Domestic Savings Residual Plot

6.7. Correlation analysis

	GDP	Consumer Spending	Balance of trade	Govt expenditure	Gross Domestic Savings
GDP	1				
Consumer Spending	0.9945315	1			
Balance of trade	0.1145323	0.180209075	1		
Govt expenditure	0.9624482	0.968435773	0.23026515	1	
Gross Domestic Savings	0.9941091	0.980032036	0.09147978	0.95178708	1

Sector-Wise Impact Of Low Interest Rates

Impact Of Interest Rates On Banks Profitability

Banks are an integral part of financial system of any nation. Thus, a healthy financial system consists of profitable banking environment. The profitability should neither be too low nor too high. Lower rates of interest can lead to minor reduction banks profits in the short to medium run since it is compensated with its positive impact on loan losses and credit demand. However, the negative effects on bank profits increase when interest rates remain very low for a consistently longer period. The profits of banks (smaller in terms of monetary value) having large number of household deposits, limited pricing power or lesser ability to adjust their operations are more sensitive to a consistent period of lower policy rates. The effect of low rates on banks’ profitability also depends on how banks adjust their lending rates. The degree and speed of adjustment in banks’ lending rates depends on their pricing power and the composition of their assets. Banks with more pricing power can ensure the decrease their lending rates is closer to the decrease in their funding costs, leaving their profitability less affected.

Using historical data, we analyse the effect

of central bank’s interest rate policies on commercial banks’ lending and deposits interest rates and total amounts over the 12-year period (2008-2021). It can be observed that even though the real interest rates have been cut down by major points to combat with effects of pandemic, the banks have not passed the benefit to the customers and still charge almost the same lending rate as before.

Year	Lending Interest Rate	Real Interest Rate(%)	Nominal Interest Rate
2008	13.3125	3.77175625	8.021
2009	12.1875	4.808592108	4.896
2010	8.33335	-1.983859222	5.521
2011	10.16666667	1.317979708	7.583
2012	10.60416667	2.473521656	8.125
2013	10.29166667	3.865992863	7.521
2014	10.25	6.69517609	8
2015	10.00833333	7.556488414	7.229
2016	9.6725	6.232711415	6.5
2017	9.508333333	5.327608862	6.146
2018	9.454166667	5.510956675	6.25
2019	9.46625	5.697090258	5.729
2020	9.15	4.338259681	4.258

The graph below represents bank’s weighted average lending rates, real interest rates and the nominal rates. Real interest rates are calculated by finding the difference between nominal rates of interest and the prevailing inflation rates.

Major dip was witnessed in the year 2012 due to financial crisis prevailing in the country while due to pandemic the lending rates have remained almost similar.

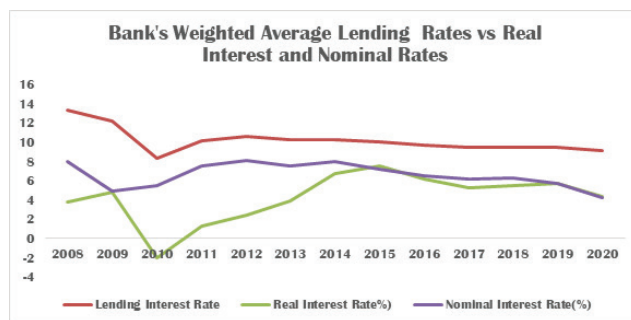


Fig15: Bank’s Weighted Average Lending Rates vs Real Interest and Nominal Rates

The graph below shows the separate lending rates and deposit rates for public and private sector banks.

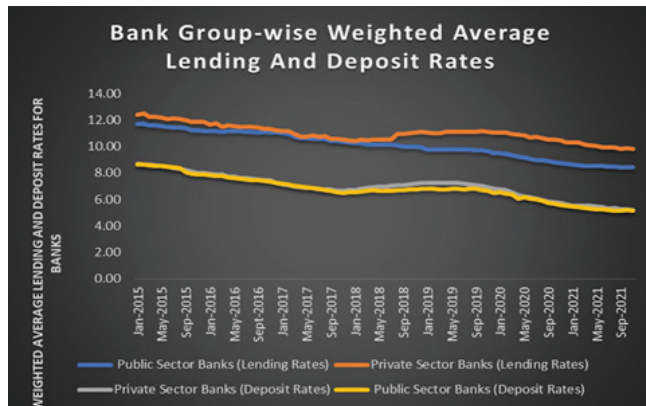


Fig16: Bank’s Weighted Average Lending Rates vs Real Interest and Nominal Rates

Impact Of Interest Rate Cuts On Insurance Industry

Impact of low interest rates on different life insurance products

Premium collection and investment earning are the two main sources of revenue for insurance industry. Interest rate risk is one of the major risks that insurance industry faces since it has a direct impact on its investment earnings. Insurers either invests in stock market, government not or corporate bonds to generate higher returns thus ensure in overall profitability in the business. It also ensures that insurers maintain enough funds so as to pay for their future liabilities related to the in-force policies. Even a small change in interest rates can have substantial impact on the profit earnings which in turn also affects the returns for the insureds.

While the interest rate risk is significantly lower for the term plans and whole life policies since no maturity amount is to be paid thus there is no change in the future liability of insurer and the amount payable is certain from the start.

In the long run, the lower interest rates can result in insurer compensating for the lower returns

from the insured in the form of higher premium ratings.

The interest rate risk is slightly higher for the endowment policies since maturity benefit is often dependent on the returns earned by insurance companies in the future so as to pay for liabilities.

Lower interest rates might also lead in discouraging customers from buying policies which offer lesser returns. This will reduce the premium collection hence affecting the profitability of insurers.

For unconventional life insurance plans such as Unit linked Insurance plans which is a combination of risk cover and investment, interest rates are a major factor for analysis. A portion of premium is invested usually in a combination of debt and equity funds which earns interests over time. Volatility in interest rates can have an impact on the insured’ return at maturity.

Analysis of following balance sheet figures of Indian Insurance sector (bird’s eye view) with movements in interest rates over the period focusing specifically on pre COVID and post COVID recovery period:

The investment income of general insurance companies was more impacted due to COVID-19 pandemic than Investment income figures of life insurers which saw good jump despite pandemic from Rs 233743 crore in 2019-20 to Rs. 466030 crores in 2020-21.

Investment Income of Life Insurers (in Rs. Crore)		
	2019-20	2020-21
LIC	2,36,849.71	2,79,378.88
PRIVATE SECTOR	-3,105.97	1,86,651.47
TOTAL	2,33,743.74	4,66,030.35

Table 1: Investment Income of Life Insurers (in Rs. Crore)

Investment Income of General and Health Insurers		
Insurer	2019-20	2020-21
Public sector insurers	15,300.37	14,529.48
Private sector insurer	11,181.55	12,745.46
Stand alone health insurers	740.71	805.4
Specialized insurers	1,382.89	1,663.21
Total	28,605.52	29,743.55

Table 2: Investment Income of General and Health Insurers

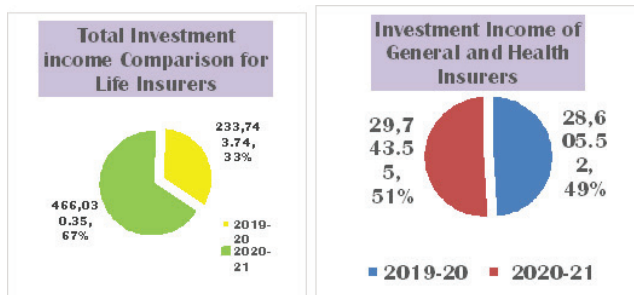


Fig17 & 18 Data source: IRDAI Report

The profit after tax figures saw a huge dip with the emergence of pandemic in 2019 due to higher claim amounts payable, increased operational expenses and lower interest returns from investments. For life insurers profits after tax figures remained stable during 2020 as well while general insurers benefitted during the period 2020-21. One of the main reasons for rise in profits can be due to lower claims payable because of shutting down of businesses, transportation facilities, work from home facilities due to imposition of lockdowns and curfews. Another reason is the increase in significantly higher premium underwritten in 2020-21.

Profit After Tax of Life Insurers		
Insurer	2019-20	2020-21
LIC	2712.71	2900.57
PRIVATE SECTOR	5015.59	5760.06
TOTAL	7728.30	8660.63

Table 3: Profit After Tax of Life Insurers

Profit After Tax of General and Health Insurers		
Insurer	2019-20	2020-21
Public Sector Insurers	-5,700.54	-1,467.29
Private Sector Insurers	4,036.69	5,729.06
Stand alone health insurers	-331.07	1,359.73
Specialized insurers	500.54	950.50
Total	-1,494.38	3,852.53

Table 4: Profit After Tax of General and Health Insurers

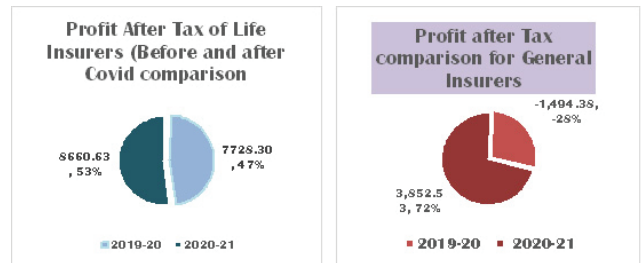
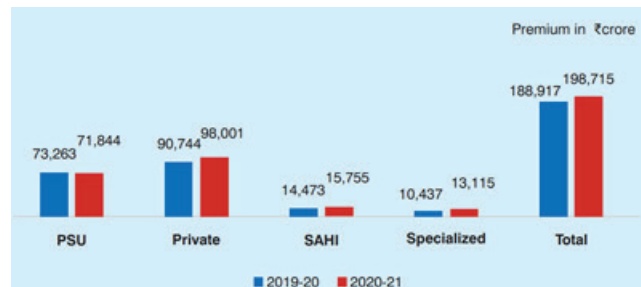


Fig19 & 20: Data source:IRDAI Report

Total Investments of the Insurance Sector (As on March 31) (₹ crore)								
Sector	Life Insurers		General Insurers		Reinsurers		Total	
	2019	2020	2019	2020	2019	2020	2019	2020
Public	27,60,858 (9.25)	30,70,852 (11.24)	1,26,054 (9.91)	1,36,291 (8.12)	52,923 (10.68)	58,757 (11.02)	29,39,635 (9.30)	32,65,901 (11.10)
Private	7,72,485 (16.67)	8,19,422 (6.08)	1,28,346 (24.63)	1,55,895 (21.47)	7,008 (103.37)	11,712 (67.12)	9,07,839 (18.12)	9,87,029 (8.72)
Total	35,33,143 (10.79)	38,90,274 (10.11)	2,54,400 (16.88)	2,92,187 (14.85)	59,932 (16.91)	70,469 (17.58)	38,47,474 (11.28)	42,52,930 (10.54)

Fig21. Data source:IRDAI Report(Total investments of Insurance sector)



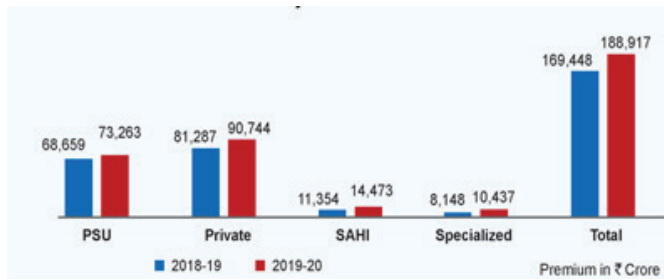


Fig22&23. Data source:IRDAI Report(Premiums underwritten for non life insurance)

Impact Of Varying Risk Discount Rates And Premium On Profit Margin

- As the risk discount rate increase, the profit margin decreases, keeping the premium amount to be constant and vice versa.
- Keeping the risk discount rate constant and raising the annual premium amount ,the profit margin decreases.

		Risk Discount Rate											
		22.455%	5.000%	6.000%	7.000%	8.000%	9.000%	10.000%	11.000%	12.000%	13.000%	14.000%	15.000%
Premium	50000	24.97%	24.43%	23.91%	23.41%	22.92%	22.46%	22.01%	21.58%	21.16%	20.77%	20.38%	20.00%
	100000	12.49%	12.22%	11.95%	11.70%	11.46%	11.23%	11.00%	10.79%	10.58%	10.38%	10.19%	10.00%
	150000	8.32%	8.14%	7.97%	7.80%	7.64%	7.49%	7.34%	7.19%	7.05%	6.92%	6.79%	6.66%
	200000	6.24%	6.11%	5.98%	5.85%	5.73%	5.61%	5.50%	5.39%	5.29%	5.19%	5.10%	5.00%
	250000	4.99%	4.89%	4.78%	4.68%	4.58%	4.49%	4.40%	4.32%	4.23%	4.15%	4.08%	4.00%
	300000	4.16%	4.07%	3.98%	3.90%	3.82%	3.74%	3.67%	3.60%	3.53%	3.46%	3.40%	3.34%
	350000	3.57%	3.49%	3.42%	3.34%	3.27%	3.21%	3.14%	3.08%	3.02%	2.97%	2.91%	2.86%
	400000	3.12%	3.05%	2.99%	2.93%	2.87%	2.81%	2.75%	2.70%	2.65%	2.60%	2.55%	2.50%
	450000	2.77%	2.71%	2.66%	2.60%	2.55%	2.50%	2.45%	2.40%	2.35%	2.31%	2.26%	2.21%
	500000	2.50%	2.44%	2.39%	2.34%	2.29%	2.25%	2.20%	2.16%	2.12%	2.08%	2.04%	2.00%

Table 5: Risk Discount Rate vs Profit Margin

Impact Of Unit Fund Growth On Fund Value At Maturity

Following are three scenarios which can take place with respect to fund value received by the policyholder at maturity if any changes in the unit fund growth rate takes place.

Scenario Summary			
	Current Values	Best Case Scenario	Worst Case Scenario
Changing Cells:			
Unit fund Growth Rate	8%	10%	4%
Result Cells:			
Fund Value at Maturity	? 10,25,148.15	? 12,14,117.12	? 7,37,543.15

Table 6: Impact of unit fund growth on fund value at maturity

Bonds Market

Worldwide, bonds market is the largest securities market providing investors all around the world to invest in variety of options. Bond prices are essentially affected by two factors:

- Interest rates risk
- Credit Risk

This study covers only the interest rates risk that lurks over the bonds market. In economics, bond prices are inversely proportional to the bond yields. As the interest rates falls, the bond prices increases and vice-versa.

- This line graph represents historical monthly data for 10-year long term government bond yields, during the period 2012-2021 .
- The bond yield for the next 5 years i.e. from the year 2022 till 2025 is forecasted using forecast function in Excel.

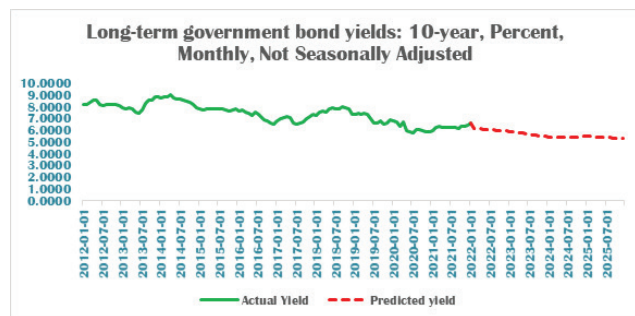


Fig24. Data source:World Bank

Comparison Of Major Advanced And Emerging Economies

The comparison is done to evaluate the effectiveness of interest rate policies adopted by major economies in stimulating the economic

activity during COVID pandemic.

Following countries are taken into view for comparison:

ADVANCED ECONOMIES	DEVELOPING ECONOMIES
United States	China
United Kingdom	India
Germany	Russia
France	Brazil
Japan	
Canada	

Comparison is shown based on the following economic parameters:

GDP growth

Among the advanced economies UK's GDP contracted the most by 21% due to COVID-19 in 2020, followed by France (18.9%), Italy(17.7%), Canada(13%), Germany by (11.3%),Japan (9.9%) while USA's GDP contracted the least by (9.1%).

Among the emerging economies, India's economy contracted the most by (23.9%) followed by Russia (8.5%) while China's GDP growth rate remained positive at 3.2% despite facing the challenges thrown by pandemic.

Interest Rate

Most of the advanced economies entered into negative rates of interest territories due to lower demand for money in the economy. Thus, by introducing negative rates of interest, the central banks encourage people to save less in bank deposits instead use money in purchasing goods and services thus giving a boost to aggregate demand in country. Although developing economies did not witnessed negative interest rates zone, but still cut through interest rates by major points to deal with

stagflation.

Inflation Rate

Inflationary pressure surge has not only been felt by the most of the developed countries but also by the developing countries as a result of cutting down of interest rates to achieve pre-COVID economic output levels. Japan is the only nation where inflation remains negative post pandemic. India faces strong rise in inflation rates from 3.72% in 2019 to 6.62% in 2020 and the trend further continues leading to a situation of stagflation where equilibrium level between interest rate and inflation is becoming difficult to achieve. One common factor among the developing and developed nations is the increase in global demand of goods and services along with rising prices of commodities while the global supply chain still remains affected by pandemic and is facing a shortage. Food price inflation can be witnessed mostly in the developing, low-income countries such as India, China and Russia.

Consumer Spending (Consumption Expenditure)

Consumer spending in developing economics saw a much significant reduction than in advanced economies. Lower demand in the market led to lower economic output due to pandemic. The supply chain also suffered due to several restrictions on travelling, imports and exports.

Unemployment Level

Advanced economies such as America (from 3.7 %in 2019 to 8.9% in 2020), Canada (from 5.7 %in 2019 to 9.7% in 2020), UK (from 3.8%in 2019 to 5.4 % in 2020) suffered the most due to drastic increase in the unemployment levels

while other advanced economies such as Germany, Italy, Japan were able to maintain lower change in unemployment rates.

The lower income countries were hit by lower economic wage growth along with higher unemployment levels which resulted in worsening the economic situation.

Bond Yields

Most of the advanced countries observed negative yields on 10-year long term bonds pointing towards recession. While among the advanced economies Japan, France, Germany, Canada came under negative yield zone, US, UK were able to maintain positive yields on paper. Developing nations such as India and China were able to maintain positive yields despite consumer confidence hitting all time low.

Discussions And Findings

COVID-19 has signalled a turning point for interest rate and money supply measures (monetary policies) adopted by developed and developing nations. Interest rate cuts were introduced during the initial stages of COVID-19 pandemic due to panicking situation that arose among the investors, consumers, labours etc. regarding grim future expectations of economic growth. Currencies value depreciated and money outflows rose resulting in prices of bonds to reduce and bond yield to increase significantly.

With interest rate cuts, central banks enhanced short term liquidity of commercial and government banks, insurers and other financial institutions encouraging banks to lend more to consumers and businesses and raised the accessibility of credit option to the non financial

industry thus giving a boost to consumer spending in the economy, which is a major factor in growth of GDP per capita.

Consumer Spending and Savings plays a huge role in spurring economic growth. Marginal propensity to consume or save is largely impacted by interest rate changes, current inflation, future inflation expectations, and individual income. Negative correlation is found between consumer spending and real interest rates.

India faced huge setback in terms of consumer spending due to pandemic induced recession and hampered economic activity in nation. Slashing down of interest rates lead to gradually increasing the spending levels in nation so as to boost aggregate demand.

The major economic variables that shape individual spending decisions include income and inflation/inflation expectations. In India, inflation and expectations about it have persisted at relatively higher levels in the recent period and may be one of the major factors influencing households' spending decisions.

The study shows a positive relation between real interest rates and the unemployment rates while a negative relation is found out between inflation and unemployment levels in the long run. As the inflation rises, it results in lower investment level, leading to lower employment which aggravates slower economic growth.

Interest rate cuts have also resulted in maintaining foreign exchange market stability.

The advanced economies today give more weightage to unconventional ways of monetary policy changes since developed countries before

pandemic were dealing with negative interest rates and had no room left to reduce it down further .

Challenges And Limitations

The cutting down of interest rates started as a response to deal with the economic challenges posed by the COVID pandemic . But now in the long run, this fall in interest rates is giving rise to inflationary pressures with the retail inflation rising significantly higher than the target level, particularly in developing nations like India which may result in slow economic growth in the coming time. Thus, the central banks face the difficult challenge of raising interest rates without creating leading to destabilization of financial and capital markets.

The study was limited to analysing only few interests sensitive-macro-economic variables and their impact on GDP. Other variables such as effect of income , inequality in wealth distribution, government debt to GDP ratio, wage growth etc. can have significant impact on economic output.

Another limitation of the study was not taking into studying the effect of fiscal policy measures which includes government spending and taxation policies on economic growth and only including analysis of the impact of monetary policies (money supply and interest rates) towards stimulating economic activities. While comparing the pre and post pandemic conditions, relief packages as a fiscal stimulus measure was taken as an important factor in revival of economy. Including such measures in the study can result in explaining the nature and behaviour of macro economic variables towards economic activity differently.

Conclusion

With this study ,we can conclude that interest rates are an important determinant of economic growth in a nation. Interest rates have a significant impact on price levels (inflation) which further affects the aggregate demand and supply in an economy. It was observed how changes in interest rate affect savings behaviour, and how money is allocated to consumption or investments differently. This was an important topic to discuss given that many central banks around the world have indecent years adopted a policy of constantly lowering interest rates in order to stimulate their country's economies, and reach inflation targets. The impact of trade balance indirectly via changes in exchange rates brought by interest rate cuts was thoroughly analysed. Some economies that have adopted negative interest rates have seen their banks maintain profits, while others have seen profits decline. In the short run, we find at most a modest negative effect of lower interest rates on bank profits in aggregate, but larger effects for smaller banks. There is stronger evidence that bank profits decline in prolonged low interest rate environments. Through this study we understand the interest rate changes' scope and reach by studying past patterns and trends for quantitative analysis of economic performance both at domestic and at global level. As it is said, "A global problem needs a global solution." Assessing the historical data to model changes in interest rates in future and its effect on macro-economic variables and thus establishing relevant policy frameworks and regulations is the only solution to continue economic growth in future.

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