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Fintech or TechFin: Discovery of an Extant State by Panel Data Estimation

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ABSTRACT

FinTech has been the most marked jargon recently in the finance industry, envisioned to be primarily dependent on the infrastructure of telecom sector. Thus, this study attempts to ascertain an association between financial inclusion and technological growth of telecom sector over last decade viz. year 2008 to 2017 and vice versa. In order to represent the growth of telecom technology, the number of mobile subscribers has been deployed and for measuring the growth in financial inclusion, the number of bank account holders has been taken from the official website of Ministry of Communications and CMIE, respectively. To analyse long run association, Johansen Fisher Co-integration has been applied and to test driver or catalyst in this system of FinTech and TechFin, we have applied VECM Model on each variable by using each variable as dependent variable once and as an independent the next time. The results expound that both the variables have long run association for the specified period and growth in technology causes the financial inclusion in long run and short run also, but financial inclusion causes technology in long run only.

Keywords: Co-integration, FinTech, financial inclusion, mobile banking, telecom sector, telecommunication infrastructure.

INTRODUCTION:

Today, mobile phone innovations has extensively been used as a medium for providing various financial amenities leading to the emergence of mobile money services or mobile-banking that is (m-banking), mobile-transfers (m-transfers), mobile-payments (m-payments) and mobile finance (m-finance). In this era where developing countries are widely using mobile phone technology to provide financial services, the telecom operators are employed in building the favourable ecosystem which acts as a catalyst for financial industry. Telecom sector is proving itself as the most powerful machinery in system satisfying the agenda of digitization in the country. This sector is acting as a major partner with a very important role of fetching the financial services to the remotest of areas in India. It is also serving people to improve their standard of living. Also, it has led to the greater financial inclusion. In this information intensive global economy, telecommunication is evolving as a key driver for the development.

Up to year 2009, more than one hundred and twenty projects related to mobile money were installed in seventy developing countries (Beshouri et al., 2010). In the similar lines, India has also extensively been promoting digitization through its Digital India Platform. Several programmes are introduced by the government for rapid financial inclusion in the country that too via digital platforms. The telecommunication infrastructure is best

leveraged for the purpose where numerous efforts are also made to induce financial inclusion and financial literacy in the country. One of the biggest motives of this sector also pertains to reach unbanked population across India.
Across the divides amongst urban and rural and haves and have nots, mobile connects individuals to individuals with much efficient and effective approach. In this research paper, we have tried to ascertain effect of telecommunication infrastructure on the financial inclusion as today, we can see there are various applications which are used to perform financial transactions like Oxigen Wallet, Bhim, Paynear, Mobikwik, Payzapp, CitrusPay etc. It would have been impossible without the growing pace of sound and sophisticated telecommunication infrastructure. Thus in order to find the genuine contribution of this sector in the growth of India's financial sector, we have attempted to derive the relationship between the mobile subscribers and bank account holders in various states of India. Furthermore, the effort has also been made to extract the interdependency of each other on each other so as to check which affects what and up to what extent.

REVIEW OF LITERATURE:

Roller and Waverman (2001) examined effect of infrastructure supporting the telecommunications' sector on economic growth by deploying the sample from 21 OECD member countries containing data of twenty years. Along with this it was also examined that whether in these countries, telecommunications' development have taken place by focusing on the connection of telecommunication investments with a micro production function. The study revealed that there is a significant level of causal link between telecommunication infrastructure and growth of an economy.
In addition, Aker and Mbiti (2010) observed the growth, exploring all the main channels of mobile phone coverage and adoption in sub-Saharan Africa for the tenure of ten years in order to study the economic output as well as its evidence in economic growth. The study concluded with the recommendations to telecommunication sector suggesting various measures to promote broader economic development in Africa by pointing out the scope left in the domain which could have been accessed to develop the better opportunities
Hanning and Jansen (2010) argued that "the potential costs of financial inclusion are compensated for important dynamic benefits that enhance financial stability over the time through a deeper and more diversified financial system" which can definitely be developed by the mobile banking with the help of better telecommunications infrastructure. Also, Andrianaivo and Kpodar (2012) evaluated the effect of mobile phones and related infrastructure on growth of an economy in the countries from Africa, from 1988 to 2007, by investigating the growth of financial inclusion with the penetration of mobile phones by estimator of GMM. The result revealed that mobile growth has led to the development of economic growth as well as growth in financial inclusion.
In addition, Vong. Fang and Insu (2012) showed the niche area and pointed out that the mobile technologies are fuelling the social and economic development. The study was conducted in rural areas of Cambodia where it was identified that the services with respect to mobile money have gained much of the market recognition and acceptance in daily commercial requirements with enhancement of easier access to services in the financial domain.
With the advent of mobile banking, the government of India had also started introducing the laws in order to strengthen the ecosystem and prevent the stakeholders against various concerns. Several frameworks for enhancement of mobile banking transactions and USSD based mobile banking and payment services were also introduced. In its efforts to boost the digital transactions for our economy to move towards 'less cash' society and then to "cash less" society, the Government of India has taken a number of steps. RBI's Vision-2018 moreover seeks to inspire larger use of e-payments. The regulators are further seeking to put in place, policies, which support the mobile finance and mobile banking. It is also engaged in smoothing payment services by means of improving options for registration of customers for mobile payment services, which enables the wider reach, in multiple languages, even for those who are non-smartphone users. They are simultaneously seeking innovations in the industry, for mobile based ease and simple payment solutions. The Watal Committee Report on Digital Payments confirms that digital ecosystem for payments and finance has significant dependencies upon power and telecommunications' infrastructure. Also, it reveals that the savings in the cost due to digital payments, and the introduction of robust payments tools, may ultimately lead to the benefits to our economy as a whole.
RBI's report on FinTech & Digital Banking also confirms that the foundation for the mainstream improvements in the field of finance and payments is mobile technology. They also suggested that this technology acts on top of the prevailing infrastructure of card payments turning the mobile devices of users into their debit (pre-paid)/ credit cards. The study by the committee further suggested that there are numerous applications based on the web and mobile technologies that largely focus on the experience and involvement of customer and intend to

assimilate payment transactions in a better way within the business value chain. Also, the e-wallets in the country resulted in the change of entire scenario. Many start-ups and FinTech firms are mushrooming each day with newer, better and faster mechanisms providing peer to peer transfer of money without using any one's bank account details. Leading banking systems are also moving backwards in order to launch their own e-wallets, leveraging the platforms provided by IMPS and NPCI with various social media features.

The report of internet and mobile associations of India informed that India had 32.057 crore internet users who used net via their mobile phones in the year 2016 whereas in the year 2017 it was increased to 33.177 crore and is projected to further grow to 51.189 crore up to the year 2022. Even the same has not extended up to its optimum level of outreach to the people in India, then also it is one of the largest market numbered as second in rank with online penetration worldwide. Majority of internet users in India are the people who access the internet through their mobile phone devices. Thus, leveraging the opportunity of high concentration of mobile phone users in the country could be the smart move to tap the largest population amounting to over and above one billion for financial inclusion and other services related to the domain. Many mobile applications use mobile numbers for faster payments via IMPS due to the ease and simplicity brought by Unified Payment Interface (UPI) providing complete inter-operability for merchant and P2P outflows, through which the country has experienced drastic change in the perception of only and entirely believing in the cash system. The facility is given just by linking the bank account details with their phone numbers.

There are other numerous studies, we have reviewed which support the fact that due to enhancement of telecom sector, there is seen a leap in financial inclusion, financial literacy and faster and easier financial services. Maximum studies highlighted the relationship of growth in infrastructure of telecommunication industry and development of economy directly but did not specifically study about the relationship of telecom sector growth and financial inclusion, financial literacy and other financial services, especially in Indian context. India is also on its way to digitization. It made numerous efforts towards financial inclusion by deploying number of digital techniques, which are completely based on telecommunication infrastructure. Thus we have attempted to access the relationship and association among the number of mobile phone subscribers (CDMA and GSM) and number of bank account holders in various states of India.

RESEARCH METHODOLOGY:

Objective:

To access the link between financial inclusion and technology acceptance in significant states of India.

Hypothesis:

H01: There is no Co-integration or long run association among number of mobile phone subscribers and number of bank account holders.

H02: Technological growth does not affect financial inclusion.

H03: Growth in financial inclusion does not lead to the growth in technology, specifically the mobile or telecommunication infrastructure.

Data:

We have deployed number of mobile subscribers as the proxy of acceptance of technology or growth in technology among people. This number is extracted from the annual report of Department of Telecommunications, Ministry of Communications, Government of India. As well as, we have taken number of bank account holders as the representative of financial inclusion in India from CMIE for the period of year 2008 to year 2017. This study includes 24 significant states of India namely Bihar, Assam, Haryana, Gujarat, Himachal Pradesh, Kerala, Jammu & Kashmir, Chhattisgarh, Karnataka, Maharashtra, Madhya Pradesh, North-East, Punjab, Rajasthan, Orissa, Uttrakhand, West Bengal, Tamilnadu, Uttar Pradesh and Delhi. Here North-East includes Sikkim, Manipur, Tripura, Nagaland, Mizoram and Meghalaya.

EMPIRICAL ANALYSIS:

The study is based on panel data. The objective of the study is to access the connection and causality between financial inclusion and technological development in telecommunication sector and its acceptance amongst the public. Hence, we have taken the growth in number of bank account holders by calculating differential log, which is denoted by DBANK and similarly the growth in number of mobile subscribers, which is denoted by DMOB for the specified period.

Unit root tests:
We have to test stationarity of series to apply Co-integration test and further modelling. There are various tests used in order to check the stationarity of growth rate in mobile subscribers and number of bank account holders viz. ADF-Fisher, PP-Fisher, Pesaran & Shin and Levin Lin test.

Table 1: Unit Root Tests for DBANK – Summary

Method	Statistic	Prob.	Cross-sections	Obs.
Null Hypothesis: Unit root (common unit root process)				
Levin, Lin & Chu t* test	-6.50986	0	18	137
Null Hypothesis: Unit root (individual unit root process)				
Im, Pesaran and Shin W-stat test	-2.4917	0.0064	18	137
ADF - Fisher Chi-square test	61.464	0.0051	18	137
PP - Fisher Chi-square test	57.5903	0.0126	18	144

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Table 2: Summary of Unit Root Tests for DMOB

Method	Statistic	Prob.	Cross -sections	Obs.
Null Hypothesis: Unit root (common unit root process)				
Levin, Lin & Chu t*	-8.84512	0	18	137
Null Hypothesis: Unit root (individual unit root process)				
Im, Pesaran and Shin W-stat	-2.2174	0.0133	18	137
ADF - Fisher Chi-square	57.2036	0.0138	18	137
PP - Fisher Chi-square	43.8213	0.1737	18	144

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The null hypothesis is taken as that there is unit root in variables or variables are nonstationary. As per the Table 1, it is seen that values of Probability is less than 0.05 critical level in each test, which rejects the null hypothesis. Thus, null hypothesis is accepted and is showing that DBANK is stationary at level.
The same tests are applied to check the existence of unit root in the growth in number of mobile subscribers. The summary of unit root test of DMOB is shown in Table 2. As per this Table, It is seen that other than PP-Fisher Chi Square test, all three tests have shown the variable stationary at level. As both the variables are I(0) which denotes that both of them are stationary at level, thus we can further test Co-integration to find out the link.

Co-integration:
In order to assess the long term association between DBANK and DMOB, we have used Johansen-Fisher Co-integration test on state wise panel data. In this test, Trace and Maximum Eigen statistics are used to determine the number of equations, which can prove the presence or absence of co-integration between said variable DBANK and DMOB. Table 3 is representing the results of the same test. By considering first i.e. null hypothesis that there is no equation(r=0), which is showing co-integration among the variables. In the table, value of probability is less than 5% thus the hypothesis is rejected and indicates co-integrated equation. Same as second null hypothesis is assumed as that there is not at most 1 co-integration equation exists. As per the value of probability at r≤1, hypothesis is rejected and signposts the existence of co-integration in DBANK and DMOB overall in last the decade.

Table 3: Johansen Fisher Co-integration

Hypothesized	Fisher Stat.		Fisher Stat.	
No. of Co-integrated Equation(s)	**(Trace test)**	**Prob.**	**(Max-eigen test)**	**Prob**
None	278.7	0	213.2	0
At most 1	187	0	187	0
Individual cross section results				
	Trace Test		**Max-Eign Test**	
Cross Section	**Statistics**	**Prob.**	**Statistics**	**Prob.**

Hypothesis: No Co-integration(r=0)				
Assam	36.484	0	27.5516	0.0002
Bihar	17.8706	0.0215	10.9231	0.1581
Gujarat	22.5999	0.0036	17.356	0.0157
Haryana	13.5344	0.0966	10.8414	0.1623
Himachal Prdash	18.1124	0.0197	9.8964	0.2188
Jammu Kashmir	54.1203	0	44.5134	0
Karnataka	19.1525	0.0134	13.3325	0.0698
Kerala	12.6126	0.1298	8.9505	0.2903
Madhya Pradesh	28.956	0.0003	21.0099	0.0037
Maharashtra	61.0457	0	50.1675	0
North east	33.5983	0	27.4097	0.0003
Orissa	33.8241	0	21.9215	0.0026
Punjab	13.6551	0.0929	8.5197	0.3283
Rajasthan	15.7344	0.046	11.3423	0.1379
Tamilnadu	11.082	0.2065	9.1104	0.2771
UttarPradesh	13.0535	0.1129	8.259	0.353
West Bengal	61.0927	0	41.6059	0
Delhi	56.6192	0	40.3102	0
Hypothesis: At most 1 Co-integration relationship(r<=1)				
Assam	8.9324	0.0028	8.9324	0.0028
Bihar	6.9474	0.0084	6.9474	0.0084
Gujarat	5.2439	0.022	5.2439	0.022
Haryana	2.693	0.1008	2.693	0.1008
Himachal Prdash	8.216	0.0042	8.216	0.0042
Jammu Kashmir	9.6069	0.0019	9.6069	0.0019
Karnataka	5.82	0.0158	5.82	0.0158
Kerala	3.662	0.0557	3.662	0.0557
Madhya Pradesh	7.946	0.0048	7.946	0.0048
Maharashtra	10.8782	0.001	10.8782	0.001
North east	6.1886	0.0129	6.1886	0.0129
Orissa	11.9026	0.0006	11.9026	0.0006
Punjab	5.1353	0.0234	5.1353	0.0234
Rajasthan	4.392	0.0361	4.392	0.0361
Tamilnadu	1.9716	0.1603	1.9716	0.1603
Uttar Pradesh	4.7945	0.0285	4.7945	0.0285
West Bengal	19.4868	0	19.4868	0
Delhi	16.309	0.0001	16.309	0.0001

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Further, we have seen the cross sectional results, state wise, which reveals that Bihar, Assam, Himachal Pradesh, Gujarat, Kerala, Jammu & Kashmir, Karnataka, West Bengal, Madhya Pradesh, North-East, Maharashtra, Punjab, Orissa, Uttar Pradesh, Rajasthan and Delhi are rejecting the null hypothesis at r<=1, which indicates the Co-integration or long run association between the two variables in these states.

VECM:

As the variables are Co-integrated, so that, we can run VECM (Vector Error Correction Model). The results of VECM for growth in bank account holders are shown in Table 4. Here, Coefficient C(1) of model, is negative and significant, thus there is a long run causality running from DMOB to DBANK or also there would be speed of adjustment towards long run equilibrium. Further we have checked the short term causality by Wald test in VECM by using null hypothesis as 1 lag and 2 lag of independent variable namely DMOB jointly do not cause dependent variable namely (DBANK) in short run, meaning that short run causality running from DMOB to DBANK.

Table 4: VECM Model on DBANK

	Coeff.	Std. Error	t-Stats	Prob.
C(1)	-0.02249	0.011985	-1.87643	0.050
C(2)	-0.34031	0.064494	-5.27668	0
C(3)	-0.22389	0.060138	-3.72298	0.0003
C(4)	-0.05833	0.033638	-1.73407	0.0844
C(5)	-0.16159	0.034945	-4.62418	0
C(6)	-0.0073	0.004959	-1.47196	0.1426
C(7)	0.289218	0.017453	16.57146	0
C(8)	-0.22205	0.093913	-2.36442	0.019
C(9)	-0.13421	0.087571	-1.53261	0.1269
C(10)	0.198496	0.048983	4.052343	0.0001
C(11)	0.049698	0.050886	0.976656	0.3299
C(12)	-0.01548	0.007221	-2.14351	0.0333
System Model				
Equation: D(DBANK) = C(1)*(DBANK(-1) - 3.07264969669*DMOB(-1) + 0.165102246935) + C(2)*D(DBANK(-1)) + C(3)*D(DBANK(-2)) + C(4) *D(DMOB(-1)) + C(5)*D(DMOB(-2)) + C(6)				
Wald Test result				
Test Stats	**Value**	**Df.**	**Probability**	
Chi-square	25.89479	2	0	

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The same tests have been applied by considering DMOB as dependent variable and DBANK as independent variable. It is seen in this table that (C)1 is negative and significant, which indicates the long run causality running from DBANK to DMOB and it is showing the adjustment towards long run equilibrium. Further, by Wald test it is seen that as 1lag and 2lag of independent variable namely DBANK jointly do not cause dependent variable namely (DBANK) in short run as hypothesis is accepted because value of Probability (0.527) is greater than 0.05.

Table 5: VECM Model on DMOB

	Coeff.	Std. Error	t-Statistic	Prob.
C(1)	-0.88867	0.053626	-16.5715	0
C(2)	0.198496	0.048983	4.052343	0.0001
C(3)	0.049698	0.050886	0.976656	0.3299
C(4)	-0.22205	0.093913	-2.36442	0.019
C(5)	-0.13421	0.087571	-1.53261	0.1269
C(6)	-0.01548	0.007221	-2.14351	0.0333
C(7)	0.069104	0.036827	1.876428	0.062
C(8)	-0.05833	0.033638	-1.73407	0.0844
C(9)	-0.16159	0.034945	-4.62418	0
C(10)	-0.34031	0.064494	-5.27668	0
C(11)	-0.22389	0.060138	-3.72298	0.0003
C(12)	-0.0073	0.004959	-1.47196	0.1426
System Model				
Equation: D(DMOB) = C(1)*(DMOB(-1) - 0.325452003551*DBANK(-1) - 0.0537328570559) + C(2)*D(DMOB(-1)) + C(3)*D(DMOB(-2)) + C(4) *D(DBANK(-1)) + C(5)*D(DBANK(-2)) + C(6)				
Wald Test result				
Test Stat.	**Value**	**Df**	**Probability**	
Chi-square	5.69839	2	0.0579	

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CONCLUSION:

In order to check long run association, Johansen Fisher Co-integration has been applied, furthermore, to test driver or catalyst in this system i.e. FinTech or TechFin or vice-versa, we have applied VECM model on each variable by using variable as dependent and next time as independent. The results revealed that both variables have long run association for the specified period. Growth in technology causes the financial inclusion in short run as well as long run means TechFin works in long run and short run both. Alternatively, financial inclusion or growth in number of bank account holders causes technology in long run, thus it is implied that FinTech works in long run only. There was a time when the entities offering financial services use to seek the help from the technology firms so that things can move faster and smoother. Thus finance moving forward with help of technology was named as FinTech but the way things have progressed, the scenario has turned upside down. The information technology firms now are working in generating various opportunities where the combination of technology with finance can be used to simplify the lives of people at various stages. Development in mobile banking services has grown manifold with advanced technologies including touch and voice capabilities and machine learning algos. The developers in this field are focusing on empowering the public and bank them with least limitations.

The low cost data plans has further facilitated the same and has acted as the catalyst. Various mobile phone applications to access, analyze and invest in the markets are also introduced but still there is a long way to go. India contains large unexploited market where financial services can be provided to the untapped public as 40 percent of the entire population in the country has currently no access to the banks and 87% of the payments are still prevalent through cash as per the report of RBI. With the expectation of increase in usage of mobile phones to 64% in the year 2018 from 53% in last year, and gradual increase in penetration of internet, shows the growth prospects of FinTech and TechFin, both, in India which cannot at all be denied. In conclusion we have found impact of technological growth on financial inclusion. The result of this study is supported by Sassi & Goaied (2013) and Andrianaivo & Kpodar (2012). The study has attempted to provide the understanding and scope of financial inclusion in India based on the development of telecom infrastructure and vice-versa.

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