

## FINTECH SECTOR IN INDIA-AIMING FOR THE SKY

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**Abstract:** Fintech sector in India has received a lot of attention in the recent years. The funds flow also have seen an increase commensurate with the number of firms starting up in this domain. Changing regulatory landscape and exponential growth in Indian telecommunication sector have acted as the main driver of fintech sector in India. However, Indian fintech industry has a long way to go to become a global hub. There are a lot of hurdles ranging from a lack of a robust ecosystem, to regulatory gaps to lack of proper IT and Telecom Infrastructure, to name a few, which need to be overcome before India aims to be a global superpower in Fintech. This paper traces the evolution of Indian fintech industry and gives an up-to-date overview of the industry as is seen in the country today. The paper also compares the Indian scenario with the global one and identifies the key challenges before the industry. The paper also covers the new initiatives in Indian fintech industry.

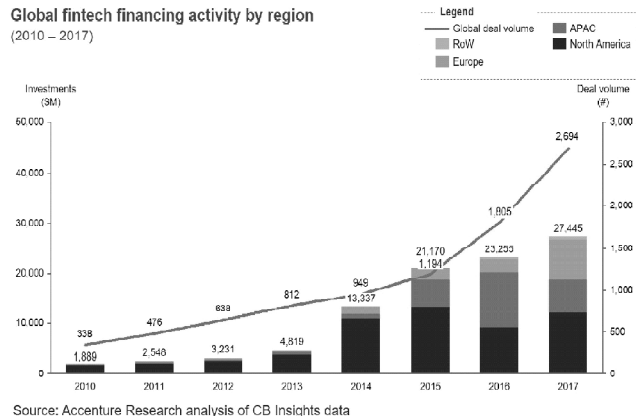
**Keyword:** Fintech, India, Mobile banking.

### INTRODUCTION

Fintech rose during the 2008 financial crisis. Between 2008 and 2013, fintech investment quadrupled compared to venture capital. The interest in Fintech did not start to grow until early in 2013. Even though “fintechs” in marketplace lending and payments have been around for 15-20 years, only in the past five-to-seven years have many traditional financial services companies dramatically ramped up their own investments and transformation initiatives to keep pace with the new breed of technology disruptors dominating most conversations about the industry’s future. In 2015, more than 12,000 start-ups sprouted in the Fintech space across the world with a massive investment of \$19 billion. [3] Global investment in fintech ventures reached another all-time high in 2017, buoyed by a surge in funding for startups in the United States, United Kingdom and India. Nearly \$100 billion has flowed into fintech ventures since 2010.

India has created an ecosystem that provides start-ups an opportunity to grow exponentially into big businesses. The Indian Fintech software market is poised to touch \$2.4 billion by 2020 from \$1.2 billion in the

**Global fintech financing activity by region (2010 – 2017)**



financial year 2016.[3] The Indian fintech software and services market was around \$8 billion in 2016 and likely to grow 1.7 times by 2020. The transaction value for the Indian fintech sector was approximately \$33 billion in 2016 and slated to reach \$73 billion in 2020 growing at a five year CAGR of 22%. Fintech in India is advantageous because the country boasts of an unrivalled youth demographic which is rapidly growing. Over 95% of financial services incumbents seek to explore Fintech partnerships. [2]

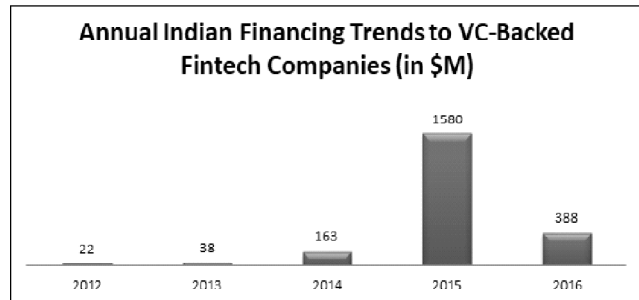
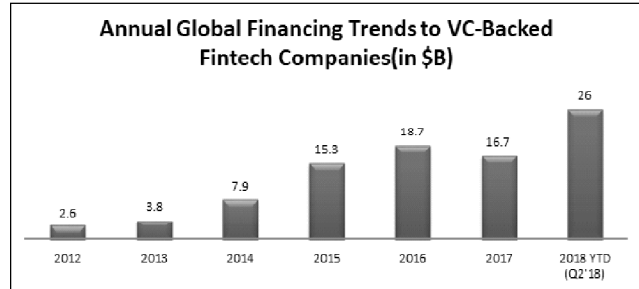
## EVOLUTION OF FINTECH INDUSTRY

Fintech, short for Financial Technology, is not just about innovative or disruptive startups but is a broader category that is shaping the future of financial services. It includes small start-up companies which develop innovative technological solutions in areas such as mobile and internet banking, insurance, real estate, big data and investment funds.

With a population of around 1.3 billion, India is a growing market for Fintech Industry. The fact that India is having a large percentage of unbanked or underbanked population and is a young nation witnessing a high growth in digital penetration, makes India an exciting global space for Fintech.

For two decades since 1991, the technological innovation in financial services and banking were government-driven and witnessed slow growth. The Indian government began liberalizing its banking industry from 1990 along with the introduction of hi-tech banks. The government also took legislative action to boost the banking system and pushed new technology such as MICR, electronic funds transfer and other electronic payments that revolutionized the banking system and in turn boosted the Indian economy.

The Indian banking and financial industry has witnessed the penetration of startups or Fintech in the consumer-facing offerings from the mid-2000s. One of the initial offerings, which came up at around 2005, was the BC model, which was used to increase penetration of financial services to the rural household. FinoPayTech and Eko India were the major startups that took advantage of this opportunity and built their services around the BC model. 2010 saw an emergence of payment startups in mobile wallets including Oxigen, MobiKwik, Paytm and Freecharge. From 2010, there have been multiple Fintech startups have developed in different segments such as lending, personal finance management and investment management. These startups brought the finance industry into an age of technological innovation by infusing automation, real-time payments, and better loan offerings through P2P lending platforms into the financial ecosystem. Fintech has gained even more prominence with VC firms displaying keen interest with a 40% growth in investments or funding activity between 2014 and 2016.



The last three years (2014-16) witnessed various developments in the Fintech segment in India where apart from startups and investments, the established corporate sector including banks, financial institutions and even the government and regulatory bodies have taken steps to develop, implement and propel innovative solutions. The key stakeholders who define the success of the industry include start-ups, universities and research institutions, government and regulators, financial institutions, incubators and accelerators and the users.

Over the years, the regulatory bodies and banks have brought new solutions that have created interesting opportunities for Fintech and the financial services sector as a whole. The most prominent of these was the launch of UPI. In order to leverage the increasing usage of smartphones and mobile apps, NPCI launched UPI, a set of standard APIs with an open architecture provided to the banks in order to facilitate account-to-account transfers by customers by entering just one virtual ID. India's leading startups like Flipkart and Snapdeal have partnered with Yes Bank and Axis Bank respectively to incorporate UPI in their mobile payment offerings. Yes Bank has also partnered with 50 merchants in various segments such as lending, e-commerce, and mobile payments to provide full usage of UPI via their Yes Pay Wallet. This enables business for efficient P2P transactions, and also eliminates the waiting time or

failed transactions associated with online payment and gateways.

Fintech Industry evolved globally mainly in three eras

### **Fintech 1.0 (1866-1967) : From analogue to digital**

From around 1866 to 1967, the financial services industry remained largely analogue despite being heavily interlinked with technology. In the late 19th century, technologies such as telegraph, railroads and steamships underpinned financial interconnections across borders. The financial services market in India is primarily untapped, with 40% of the population having no association with any bank and more than 80% of the transactions carried out through cash. This represents an opportunity for Fintech start-ups to massively spread their wings in different segments.

#### • **1866-1933 : First Age of Financial Globalization**

The connection of first transatlantic telegraph cable was completed in 1866. In 1915, for the first time, Federal Reserve Banks started movement of funds electronically. By 1918, the banks established a proprietary telecommunications system to process funds transfers, connecting all 12 Reserve Banks, the Federal Reserve Board and the US Treasury by telegraph using Morse Code.

#### • **1945-1967: Early Post-War Period**

In 1950 Diners Club International (DCI) was formed which was the first independent credit card company in the world and established the concept of self-sufficient company producing credit cards for travel and entertainment.

### **Fintech 2.0 (1967-2008): Digitalisation of traditional financial services**

In the late 1960s and 1970s, electronic payment systems advanced rapidly. The Inter-Bank Computer Bureau was established in the UK in 1968, forming the basis of today's Bankers' Automated Clearing Services. The US Clearing House Interbank Payments System was established in 1970. The Society of Worldwide Interbank Financial Telecommunications was established in 1973 in order to interconnect domestic payment system.

The *Single European Act* 1986, the 1986 Big Bang financial liberalisation process in the UK, and the 1992 Maastricht Treaty set the baseline for the full interconnection of European Union financial markets by the early 21st century. The next level of development began in 1995 with the introduction of online banking. In the late 1990s, the internet provided the foundational change that made Fintech 3.0 possible a decade later.

Few of the important financial innovation and events during this era are :

- 1967: First ATM was put into use by Barclays Bank and the first Portable Handheld Calculator was invented by a team of Engineers from Texas Instruments.
- 1968, 1970: BACS, CHIPS
- 1971: NASDAQ
- 1973: SWIFT
- 1981: Bloomberg
- 1983: Mobile phone
- 1987: Program trading
- 1983/1985: Online banking (NBS, WF). By 2001, 8 banks in the US have 1m+ online Banking customers
- 1986: Big Bang, Single European Act
- 1990s: Quantitative risk management / VaR
- 1999: Internet / Dot.Com Bubble
- 2008: Global Financial Crisis

### **Fintech 3.0 (2008-present)**

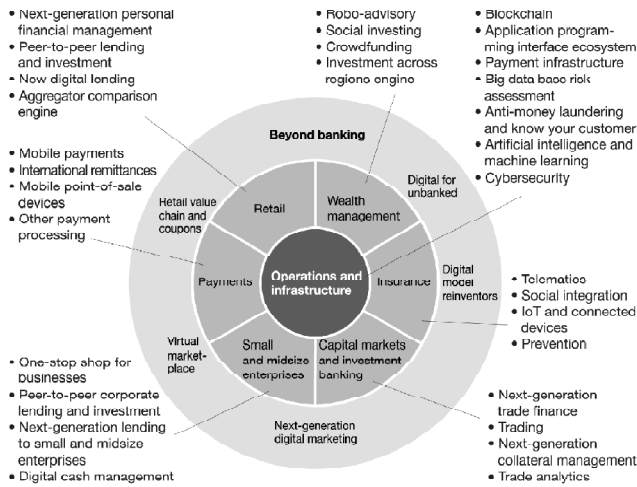
A new ecosystem has emerged in which financial services institutions are more likely to be investors, partners, and acquirers of fintech startups, rather than competitors. Technologies such as artificial intelligence, machine learning, blockchain and IoT have a wide range of potential in Fintech industry. Where once companies focused on payment applications, lending, and money transfers, the industry's reach has extended into more than 30 areas. The shift brings fintechs away from a focus on frontline activities to a broad engagement throughout the value chain. The new offerings cut across a wide swath of financial services: retail, wealth management, SMEs, corporate and investment banking, and insurance.

The major innovations during this era were:

- 2007: In 2007, iPhone was launched
- 2008: Wealthfront was founded and provided automated investment services
- 2009: BitCoin launch was the most important event in the era. Also, Square was created which helped in providing mobile payments solutions
- 2009: Kickstarter introduced a reward-based crowdfunding platform
- 2011: P2P money transfer service Transferwise was created

We see more than 30 areas emerging as new norms in banking.

**Key fintech trends**



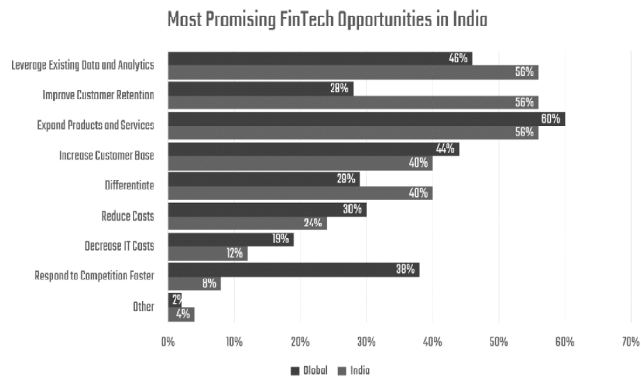
McKinsey&Company | Source: Panorama by McKinsey

**OPPORTUNITIES**

Fintech is a digital revolution. It's mainly about the technological changes to asset management, business and personal loans, fund raising, money transfer and fraud and risk management. Fintech startups have been able to create business models which avoid the structural formalities of being a bank, while providing a more efficient means of serving customer needs.

Fintech includes alternative financing mechanisms like P2P lending along with financing of technology itself (e.g via crowdfunding) and the use of technology in transactions such as algorithmic trading. Fintechs offer companies agility, speed, transparency, and integrations that banks have only ever offered businesses on a

superficial level. Financial companies are offering more values and services to customers, at a fraction of time and cost. Innovations such as chatbots, artificial intelligence, machine learning and automated invoicing have played a major role in this. The convergence of finance, big data and technology has enabled financial institutions to gain greater insight into their customer's needs. AI solutions have helped in cutting operational costs and minimising labour. Blockchain systems that track and store an expanding series of transactions help to reduce infrastructure costs and improve efficiency.



The traditional financial services have globally undergone a radical transformation that has been brought about by technology and innovation. In 2015, more than 12,000 start-ups sprouted in the Fintech space across the world with a massive investment of \$19 billion. The industry is likely to continue its current growth trajectory, with the global Fintech software and services sector predicted to touch \$45 billion by 2020 at a CAGR of 7.1%.

**PERKS OF FINTECH**

**Unified Payment Interface (UPI):** The objective of UPI is to simply reduce transaction costs to ensure consumer security and speed up digital money transfers. The NPCI has also introduced several innovative products, such as RuPay cards, which will allow for immediate money transfers and a more convenient experience for the customer. These initiatives provide a solid foundation for a digitally enabled financial sector in India, giving FinTech startups the opportunity to leverage these technologies and initiatives to be adopted into the mainstream banking experience in India. [2]

Most people in India lack credit history. Digital payments give them a credit history which can be leveraged in other areas. [14]

**Jan Dhan Yojana:** Jan Dhan Yojana was launched by the Ministry of Finance as a key step towards financial inclusion through opening of bank accounts for the unbanked offering deposit and interest/withdrawal facilities with no minimum balance requirement, access to credit, insurance, overdraft facilities, easy money transfer across India, pension facilities and direct transfer of government benefits. [1]

**Aadhaar Adoption:** The RBI recently approved Aadhaar based biometric authentication, allows bank accounts to be opened through e-KYC at any BC location. This allows financial services companies to do e-KYC checks more economically, thereby reducing transaction costs for customers. [2]

Fintech is also increasingly involved in areas such as robo-advisory services. Robo-advisory systems which provide automated recommendations with little human input use tested technologies to meet customer needs.

There have been core drivers of IT spending by financial institutions, as they have to build better compliance systems. In order to keep up with the demands for faster service, organisations are tapping fintech to eliminate wait time, cut costs and connect more immediately.

**Startup India Action Plan:** Startup India Action Plan is an initiative launched by Ministry of Commerce and Industry which aims at providing a conducive business environment for startups to enter the market and grow. It includes initiatives on simplifying regulatory liabilities, tax exemptions, patent reforms, providing funding, mentorship opportunities and incentives, creating industry-academia partnership and incubation (e.g. launch of Atal Innovation Mission (AIM) with Self-Employment and Talent Utilization (SETU) Program, setting up of 7 new research parks). [1]

Payments have been an area of great regulatory attention resulting in the development of both domestic and cross-border electronic payment systems. As biometric security improves the experience, customers have adopted this technology. Similarly, infrastructure for

securities trading and settlement and OTC derivatives trading is central, and IT and telecommunications companies are seeking opportunities to disintermediate traditional institutions here.

**Digital India Campaign:** The need of a digitally empowered society led the basis for Digital India Campaign. It aims to transform India a digitally empowered society and knowledge economy, based on its three vision areas which include digital infrastructure as a core utility to every citizen, governance and services on demand and digital empowerment of citizens. [1]

The digitisation of the financial industry means it is particularly vulnerable to cybercrime and espionage. However, Fintech is working to minimise this risk through biometric verifications like fingerprint access and facial recognition. Fintech innovation is present in the use of 'big data' to enhance the efficiency and availability of financial services. The 'big picture' transformation is simplifying the buying process and creating a deeper cultural shift. It has begun liberating the individual from the fetters of the old world's slow, bureaucratic banking system and is paving the way for a more open, user-controlled market.

Innovative data-driven and behavioral risk management models can overcome barriers that arise from lack of widespread and robust credit scoring of individuals. [14]

Internet-of-Things (IOT) enabled solutions are gaining popularity globally within the InsurTech sector, powered by rich customer data gathered through various sensors used for other purposes. Linking of health and wellness data for instance can help insurers predict consumer behavior better, and lead to increased revenues through smarter pricing strategies. Marketplaces are also bringing increased transparency to the product offerings, motivating insurers to make products simpler and easier to understand.

The consumer interface offers the greatest scope for competition with the traditional financial sector, as tech companies can leverage off their pre-existing customer bases to roll out new financial products.

**Bharat Bill Payment System (BBPS):** This initiative was launched by the Indian government to

enhance consumer convenience to pay bills. The current scope of BBPS covers repetitive utility payments (e.g. gas) and is planned to be extended to other payments such as schools.[1]

### SHORTFALLS OF THE TRADITIONAL BANKING INDUSTRY VIS-A-VIS FINTECH

The major challenge of the traditional banking system is to integrate distribution channels to optimize efficiencies, reduce costs and serve customers and prospects in a consistent way.

For the banks, the challenge is to reach MSME segment and for small business owners to access finance. The key products through which banks lend to MSME is working capital finance (in form receivable discounting and / or basis trade assets), loan vehicle / equipment purchase, project finance, and long-term finance.

The rural poor tend to have irregular income streams and expenditure patterns and are highly exposed to systematic risks. Most of the SMEs are being driven as family business or first-generation entrepreneurs. They do not have strong capital base or adequate collaterals which pose major problems for bankability of their firms. Nearly all banks prefer to lend to MSMEs only against collateral. This is because of the risk framework adopted by the banks to build secured loan book. Lengthy and complex paper & processing system of loan approval observed impediment for SME sector. Despite the decent growth, there is huge lending gap for this sector. The intrinsic characteristics of SMEs involving lack of collateral, small amount of lending and information opacity make them less attractive to lenders than bigger firms. The small amount of lending often does not compensate for the cost of monitoring and screening.

The transaction costs of rural lending in India are high, mainly due to small loan sizes, high frequency of transactions, large geographical spread, the heterogeneity of borrowers, and widespread illiteracy. For private-sector banks, the lack of a rural branch network is an additional problem. The government was even not able to develop and enforce a legal and regulatory framework for rural finance so that contract design, contract renegotiation, and contract enforcement remain weak, making it even

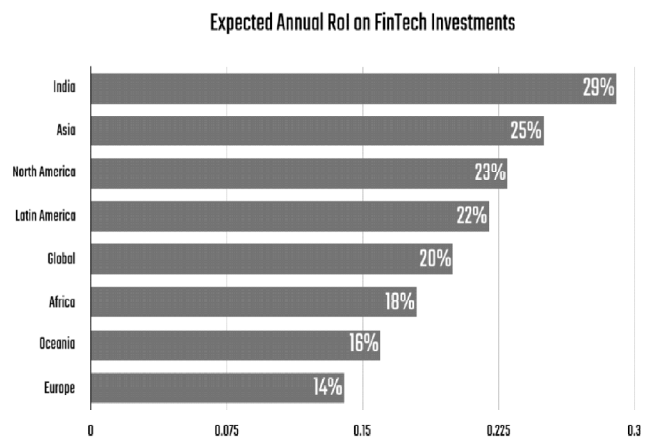
more difficult for financiers to provide borrowers with right incentives for repayment. [5]

The government policies created a financial climate which was not in favour of lending, especially to the rural banking. High fiscal deficits, the government's domination of rural finance institutions, persisting weaknesses in the regulatory and legal framework, and a set of policies toward the sector that have been designed to gain political patronage have resulted in the distortion of risk/return signals and inefficiencies in the delivery of rural finance services. An outcome of these realities has been a dilution of the credit-creating role of rural banks. [5]

Lack of information and awareness on part of entrepreneurs as to governmental benefits and schemes designed to facilitate their induction into and continuance in the MSME sector also posed a challenge to the banking industry in providing efficient banking services.

### PROGRESS AND FUTURE PROJECTIONS OF THE INDUSTRY IN INDIA AND ABROAD

Governmental efforts towards promoting digitisation of financial systems and reducing cash transactions in the economy have been quite effective in shifting consumer focus towards digital alternatives for financial transactions, with the payments sector having benefited the most. Prime Minister Narendra Modi's demonetisation drive gave a significant boost to the fintech sector in India. Overall India offers the highest expected ROI on Fintech projects at 29% versus the global average of 20%. [2]

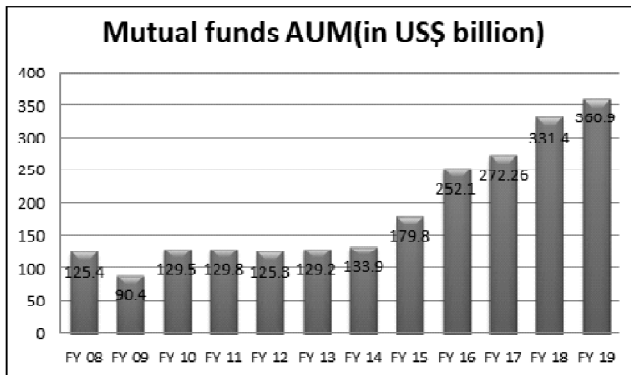


Source: FinTech Trends Report India 2017

Almost two-thirds of bank customers across the globe are already using FinTech products or services. 81 percent of Fintech industries offer faster services in the perception of customers whereas only 36 percent bankers feel the same. 80 percent of bank customers feel that Fintechs are providing a good experience.

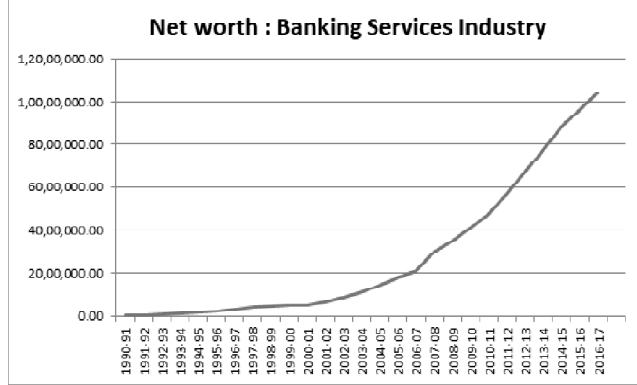
India's gross domestic savings (GDS) as a percentage of GDP has remained above 30 per cent since 2004. It is projected that national savings in India will reach US\$ 1,272 billion by 2019.

The asset management industry in India is among the fastest growing in the world. Corporate investors accounted for around 43.44 per cent of total AUM in India, while High Net Worth Individuals (HNWI) and retail investors account for 30.09 per cent and 24.79 per cent, respectively. In the Asia-Pacific, India is among the top five countries in terms of HNWIs. [30] For the year 2017-18, the assets under management of the mutual fund industry stood at \$360.90 billion. [29]

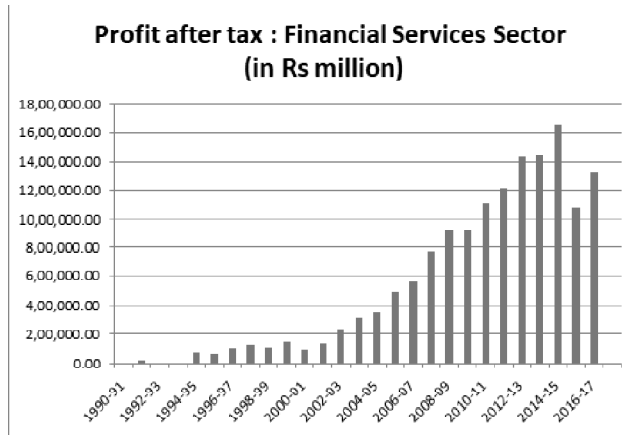


UPI has emerged as one of the fastest growing payments instruments since the demonetization of high value banknotes in November 2016. UPI reported 145 million transactions in December 2017. India's mobile wallet industry is estimated to grow at a CAGR of 148 per cent to reach US\$ 4.4 billion by 2022. The growth potential of P2P lending market in India is huge as there are about 57.7 million small businesses in the country.

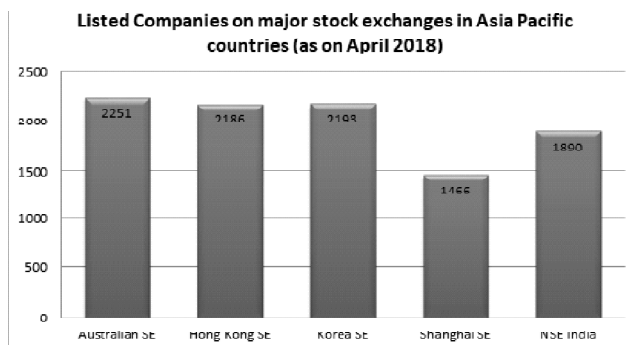
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an opportunity for Fintech start-ups to massively spread their wings in different segments. [3]



India's equity market turnover has increased significantly in recent years. The number of listed companies on NSE and BSE were 7,501 in March 2018. The annual turnover value in the National Stock Exchange (NSE) witnessed a CAGR of 19.13 per cent between FY 96 and FY 17 to reach US\$ 790 billion. During the month of January 2018, equity mutual funds have registered a record net inflow of \$ 2.27 billion. [30] Indian stocks markets, S&P Sensex and Nifty 50, rose 27.9 per cent



and 28.6 per cent respectively in CY 2017, thereby yielding the best returns since 2014.[29]

The Government of India has taken various steps to deepen the reforms in the capital markets, including simplification of the IPO process which allows QFIs to access the Indian bond markets. A total of 153 IPOs were issued in the Indian stock markets in 2017, which raised a total of US\$ 11.6 billion. In FY18 the total amount of Initial Public Offerings increased to \$ 13,089 million. [29]

The global Fintech software and services sector is predicted to touch \$45 billion by 2020 at a CAGR of 7.1%. [3]

FinTech has the potential to “globalize” basic financial services through enhancing “financial inclusion.” Not only in advanced economies but also in developing and emerging economies where financial services are not yet widespread, cellphones and smartphones are now spreading rapidly, and FinTech has opened up the possibility of providing basic financial services through these new instruments.

### REGULATORY LANDSCAPE IN INDIA ON FINTECH AND ABROAD

The government is naturally the prima facie catalyst for the success or failure of fintech in a heavily regulated financial industry. The government along with several regulators such as the RBI, the SEBI for intermediaries in the securities market, the IRDA for insurance-related business and the TRAI for telecom-related activities are aggressively supporting the ambition of the Indian economy to become a cashless digital economy and emerge as a strong fintech ecosystem via both funding and promotional initiatives. The SEBI regulations such as the SEBI (Investment Advisers) Regulations, 2013 regulate investment advisers, the SEBI (Stock-Brokers and Sub-Brokers) Regulations, 1992 regulate stock brokers and the SEBI (Merchant Bankers) Regulations, 1992 regulate merchant bankers. The IRDA regulates web aggregators and insurance agents.

Fintech enablement in India has been seen primarily across payments, lending, security and wealth management.

- **Payments Regulation:** The payment space is one of the most regulated sectors in India. This sector is regulated by the Payments and Settlement Systems Act, 2007 and the Payment and Settlement System Regulations, 2008. Payment systems include ATM networks, card payments network and pre-paid instruments. The introduction of UPI with NPCI which holds the potential to revolutionize digital payments and take India closer to objective of “Less Cash” society, approval to 11 entities for setting up Payment Banks and approval to 10 entities for setting up Small Finance Banks that can significantly run in favour of cause for financial inclusion. The RBI has given in-principle approval to 33 entities for operating as BBPOU under BBPS. UPI based BHIM app which supports remittance transactions both push and collect was launched in order to promote “Less Cash” society.
- **P2P Regulation:** The RBI issued directions on NBFC P2P lending on 4th October 2017 which require the registration of a P2P lending platform. The role of NBFC P2P is to act as intermediary providing an online market or platform to the participants involved in P2P lending. The NBFC P2P can also assist in disbursement and repayment of loans availed on the NBFC P2P. However, the NBFC is not permitted to lend on its own, permit the international flow of funds or facilitate or permit secured lending on the platform.
- **Regulations for Financial Inclusion:** Section 35A of the Banking Regulation Act empowers the Reserve Bank to issue directions to banking companies in public interest and in the interest of banking policies, etc. Reserve Bank is also empowered under section 36 of the BR Act to caution or prohibit banking companies generally and generally to give advices to banking companies [27]. RBI advised all the nationalised banks to open accounts with Basic Savings Bank Deposits. This resulted in increased number of general accounts across the country. The RBI



also directed to simplify the KYC norms to register as a customer of the bank. RBI also directed the banks to compulsorily open 25% of the total number of its branches opened in a year in tier-5 and tier-6 centres which generally consists of villages and has started licensing new banks for proper implementing financial inclusion scheme throughout the country. The PMJDY was also launched with a goal to provide banking facilities to all, at all times. The Direct Benefit Transfer (DBT) scheme will enable deeper penetration of financial services and help in achieving financial inclusion goals as per RBI.

- **Blockchain Regulation:** While India does not yet have clear regulations on cryptocurrencies and exchanges, the government has maintained that virtual currencies are not held as legal payment instruments in the country. Currently, the role of each regulator has been decided but the committee is yet to decide the regulations. [26]
- **Security and Biometrics:** Banks are leveraging new technologies to improve the banking customer experience. As the consumer acceptance of eKYC and biometric authentication increases, fingerprint recognition has the potential of becoming the most commonly used technology for customer interactions. The usage of biometrics in banking helps ensure proof of identity and strengthens the fraud detection mechanism. Kotak Mahindra Bank organises “Mobility Hackathon” to promote start-ups to develop innovative applications in the field of fintech, security and e-commerce. The facility of “Smart Vault” offers automated locker facility in a secure lounge with biometric authentication.

## GLOBAL FINTECH REGULATION

In the UK, FCA launched an initiative in the name of “Project Innovate” for helping start-ups work with the British financial regulators to launch innovative products in the market.

In the US, adoption of “Bit License” regulation by the New York State Department of Financial Services in 2015 is proving to be instrumental in enabling innovation.

- **P2P Regulatory Overview:** In the U.K., IFISA allows members to invest through P2P lending platforms tax free. Additionally, the country has a P2P Finance Association (P2PFA) with representations from major P2P players. In Australia, the P2P lending model falls under the existing managed investment regulatory structure. P2P lenders need to hold AFS and Australian credit licenses. In China, the market is currently in its early stages of regulatory maturity. The CBRC has issued draft rules for online lending in December 2015. In the U.S., there are two levels of securities regulations for P2P lending, the SEC and the state. While some states like Texas have banned the practice of P2P lending, other states like California have placed limits on the type of investors granted access to the lending platform.
- **Regulations for Financial Inclusion:** United Nations along with World Bank has come up with a commitment for creating “Universal Financial Access” by 2020 to address the constraints of poor connectivity, non-existence of credit history, diverse profile of consumers and to scale up their operations in unbanked sectors. This will be covering 25 countries and targeting 75 percent of the financially excluded population.
- **Robo-Advisory Sector Regulation:** FCA is venturing into discussion for understanding how robo-advisory can be used more effectively for consumers and is establishing advisory units for helping firms develop automated advice models. Similarly, regulatory authorities in Australia have set up Digital Financial Advisory Committee to collaborate with start-ups on developing regulations, as various banks are planning to launch robo-advisory platforms.
- **Blockchain Regulation:** In US, the SEC is approaching companies that are seeking to use blockchain for transfer of securities. Recently,

the SEC has approved Overstock to issue stocks with the use of blockchain. Australian Securities Exchange announced that it is building a private blockchain for clearing and settling of trades. In the U.K., the FCA is continuously monitoring the development of the technology.

- **Security and Biometrics:** Some of the prominent U.K. banks such as HSBC, Barclays and RBS have started offering fingerprint recognition technology for authentication. One of U.K.'s leading bank collaborated with a fintech start-up to launch voice and touch identifications for its mobile customers. EbankIT, a fintech company based out in Portugal recently came out with an innovative solution around a visual and voice recognition system, which allows to perform bank transfers and a virtual assistant that works on smart watches. Crypta Labs, UK is set to revolutionize the mobile security market with the implementation of the Quantum Random Number Generator (QRNG). This technology works by using the mobile device's lens and light sensors in order to detect the photons beams and then these beams are counted to generate a random number.

### HURDLES FACED BY THE INDUSTRY

The absence of broad based financial transaction infrastructure is a major challenge as several Indians in rural parts of India do not have bank accounts, credit score and home ownership details. This has played a vital role in the lack of financial services penetration.

Fintech start-ups must know how to sell their technology and make it seamless. [12]

There is a lack of seed stage funding to develop fintech business ideas, and those without significant capital behind them find it difficult to take the leap into a new venture. In particular, there is a lack of seed stage grant funding for inclusive fintech businesses and social enterprises. Where funding policies do exist, they tend to favour bank lending models rather than alternative debt and equity that may be more suited to early stage funding requirements.

Because of the low literacy rate of India, the current set of financial products and services do not cater to the clear majority of Indians and only focus on the top 40 million of population. The lack of authentic consumer information on digital media and low technological and digital infrastructure is a major roadblock for the fintech industry.

There is an opportunity for fintech start-ups in India and incumbents to capitalize and to reimagine the needs of the rest of the population. [12] The challenge is to innovate at different income levels and be able to customize at scale.[14]

Building a cohesive fintech environment which includes 100 percent digital infrastructure penetration, unbiased incubation support to start-ups and lucrative incentives is an ultimate requirement. And since, fintech is growing without any boundaries, the final stride is to build an independent fintech focused trade body that can consolidate the effort and create a formal sector for budding entrepreneurs.

Mobile transfer and mobile payment platforms startups need to expand beyond their home country to facilitate international payments and gain scale.

Fintech companies are strong contenders who are increasing their market share and competing with retail banking services, but the truth is that bank accounts are still where paychecks get deposited. Banks provide security when deposits are too large to practically sit in mobile wallets. Even in case of loans for homes, cars or education, banks become an attractive option. The best way for fintech industries to sustain in the long run is to collaborate with the banks. Through collaborations, fintech startups and banks can have access to broader markets, along with several other benefits. The banks can leverage the technical knowledge and flexible structure of fintechs and reduce their costs sustainability whereas the fintechs can scale and reach out a wider audience at minimal investment. [14]

### Investment Shake-ups

With the disruptive growth of Fintech Industry, there are more investors interested in the opportunity than ever before. Many new investors, even with established venture

capital firms, lack the understanding of how the industry works. Their actions thus create noise and interference in the marketplace.

### **Regulation**

Government at all levels have taken an increasing interest in the financial services industry, post the global financial crisis. Old and new policies may have a significant effect on the success and the failure of new companies. It is important to understand this dynamic when rolling out a new product to make sure there is a plan in place to address. This is a blind spot for many of the new fintech investors.

### **Technology Woes**

New technologies present the opportunity to have superior products and services, but it can be challenging to get industry participants such as banks, merchants and customers to give up old and dated solutions

### **Robo-advisory Obstacles**

With the lack of widespread financial literacy in India, many investors are not aware of the underlying fundamentals of investing and risk management. The lack of personal touch from robo-advisors and their inability to answer questions on par with human advisors hampers credibility and consumer trust in robo-advisors. The lack of reliable data also poses a challenge to develop algorithms and execute a financial plan to achieve the investor's goals, while still complying with the investor's risk profile.

## **RISK IN THE INDUSTRY**

There is a strong link between business interruption and cyber incidents in an increasingly digital and information-intensive business reality. Cyber incidents are considered to be the main future risk and the increasing sophistication of cyberattacks is the main cause of fear in a context of digitalization impact. [16]

- **Phishing Fraud:** Fraudsters dupe customers through phone calls/SMS/emails to share sensitive information such as PINs/Passwords

that may result in embezzlement of virtual money from the wallet.

- **Sniffing/ Intrusion/Cyber Attack:** Fraudsters hack into the digital wallet platform and manipulate the wallets to gain benefit. Fraudsters intercept traffic between the digital wallet platform and consumers to harvest credentials or to manipulate the transactions.
- **Benefits through misconduct:** Regular customers discover product or application flaws that can provide benefit to them in specific scenarios and then repeatedly simulate the same scenarios to exploit these limitations.
- **Fake KYC:** Customers can furnish fake KYC documents to gain access to premium wallets that allow higher transaction value (transfer and cash out). While RBI has prescribed strict KYC norms and monitoring, the effectiveness of complying with these norms may be limited.
- **Application manipulation by authorized user:** Employees having admin/super-user access can perform unauthorized transactions like pseudo virtual money generation on select wallets, virtual money value embezzlement from wallets, and fraudulent reversals.
- **Cyber Risks mitigated by EMV chip-based cards:** The EMV chip-based cards issued by banks support both chip and magnetic-strip functions and are thus exposed to the same risks as magnetic strip cards. Magnetic strips on EMV chip-based cards are vulnerable to cloning or tampering.
- **Risk in IoT:** IoT can scale up the attack surface for any kind of a cyberattack. The risk is can be a distributed attack on a lot of things. There is no record of consumer products connected to the Internet in very wide scale yet, but there's certainly a risk that once everyone has a connected door lock or a connected car, that that will present a bad security situation. [18]
- **Risk in Machine learning:** While machine learning algorithms enable companies to realise new efficiencies, they are as susceptible as any

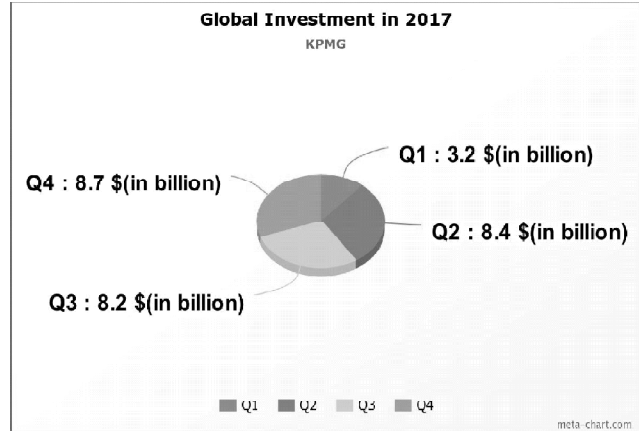
system to the “garbage in, garbage out” syndrome. In the case of self-learning systems, the type of garbage is biased data. If left unchecked, feeding biased data to self-learning systems can lead to unintended, biased and sometimes dangerous outcomes.

- Loophole in Blockchain Technology:** Financial services institutions have been less wary of permission-less Blockchains because the loopholes are still less understood. Blockchain can be abused by utilizing a proof-of-concept (PoC) software that was demonstrated at Black Hat Asia in March 2015 by Interpol. This PoC software essentially morphed into malware, circumventing the blockchain used by bitcoin which introduced ‘data unrelated to transactions into the blockchain.’[20]
- Threats of Artificial Intelligence:** Data and intellectual property security is a tremendous threat to any new technology. On one hand, regulation is required, but how trustworthy is the state when they have the AI source codes for regulatory examination? A handful of Chinese hackers were recently able to hijack the personal information of over 20 million US federal employees from a government database, so AI developers are understandably hesitant to hand over their source codes to the feds. [21]

### GLOBAL INVESTMENT AND EXPERIENCE

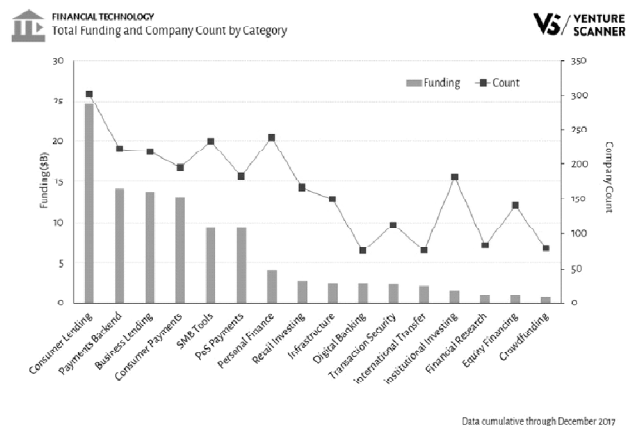
In 2017, the total global investment in fintech industries reached to \$28.5 billion across 1134 deals. In Q1 2017, global investment in fintech companies hit \$3.2 billion [7] across 260 deals whereas in Q2 2017, the global investment increased to more than 250 percent with a value of \$8.4[8] billion across 293 deals. In Q3 and Q4 2017, the global investment reached \$8.2[9] and \$8.7[10] billion across 274 and 307 deals respectively.

In Q1 2017, investment in Asian fintech companies hit \$492 million[7] across 33 deals whereas in Q2 2017, the investment increased to \$760[8] million across 51 deals. In Q3 and Q4 2017, the investment reached \$1.21[9] billion and \$748[10] million across 41 and 36 deals respectively.



In Q1 2017, investment in American fintech companies hit \$1.8 billion [7] across 133 deals whereas in Q2 2017, the investment increased to more than 300 percent with a value of \$5.65 billion [8] across 147 deals. In Q3 and Q4 2017, the global investment reached \$5.35[9] and \$5.9[10] billion across 158 and 168 deals respectively.

In Q1 2017, investment in European fintech companies hit \$880 million [7] across 89 deals whereas in Q2 2017, the investment increased to more than 225 percent with a value of \$2.0 billion[8] across 90 deals. In Q3 and Q4 2017, the investment reached \$1.66[9] and \$2.05[10] billion across 72 and 94 deals respectively.



The global investment in blockchain has exceeded \$1 billion in over a thousand startups and is expected to increase four-fold by 2019. [25]

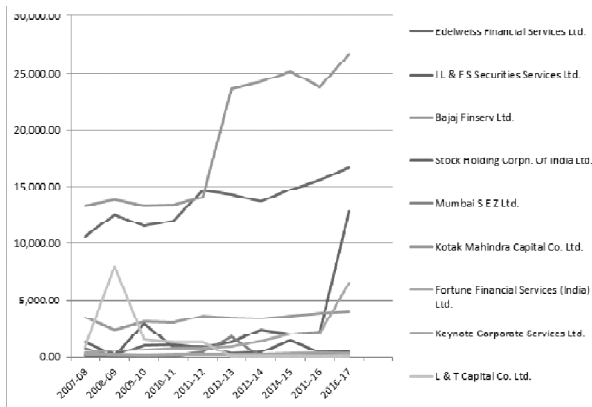
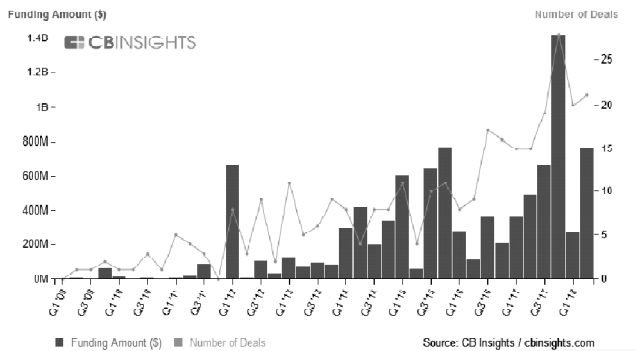
In H1 2017, more than \$2 billion was invested in Indian fintech startups in 76 deals across sub-sectors such

as MPoS, digital payment and wallets. Maximum investment in this space took place at the last stage with 29 deals. The Start-Up India initiative launched by the Government of India in January 2016 includes \$1.5 billion fund for start-ups. [25]

Wipro set-aside \$100 million VC fund in 2014 to invest in start-ups to join the league of tech vendor investors such as Tech Mahindra and Persistent Systems. A leading IT company committed USD 250 million 'Innovate in India Fund' to support & incubate Indian start-ups. Microsoft Ventures enables many early stage fintech start-ups in scaling up fast through their bespoke Scaleup and HiPO programs as part of their umbrella accelerate initiatives

Paytm, India's largest online payment and mobile wallet company has invested \$786 million in mobile payments and has earmarked another \$786 million for the next three years. [14]

The total funding in fintech industry in India has also been increasing over the years. The funding in fintech industry achieved its all-time maximum in the fourth quarter of 2017 with a value of 1.4 billion.



Investment made by different financial services companies  
Source: CMIE Database

In India, digital payments are evolving in tandem with the growth in e-commerce. Digital Payments in India is expected to \$500 billion by 2020, up from \$50 billion in 2016. [14]

### FINANCIAL AND SOCIAL IMPACT ON THE COUNTRY

Finance is a great creation by humans. It has served as a dynamic driving force for humans' building of economic society. Rising demand for socially responsible and purpose-driven finance has resulted in new ways of putting capital to work the world over.

“Financial inclusion” stimulated by FinTech clearly illustrates the positive feedback between finance and the economy. If people in developing countries gain new access to financial services through FinTech, they will gain opportunities to expand business such as e-commerce and e-learning, which are currently hampered by constrained access to payment services. In this manner, FinTech can contribute to economic development. [22]

However, in developed countries where basic financial services are already widespread, it would not be easy to quantitatively assess the impacts of FinTech on the economy through existing economic statistics.

Fintech companies have come up with innovative technology that give solutions. They have enhanced efficiency in the financial system. The companies deal in stock and trading areas, lending between person to person, cryptocurrency payment and transfer payments amongst others. Fintech provides a choice for users, efficiency, timely, secure payments and greater accessibility.

Fintech has facilitated personalized financial services with the help of cellphones and smartphones. Fintech has now made it possible to analyze individual customers by utilizing big data. By combining such new tools, Fintech has now made it easier for the industry to provide more customized services. It is technically possible to imagine a “virtual bank”, which owns no tangible infrastructure and instead uses the internet, smartphones, cloud computing, AI and DLT to provide access to financial services, to make investment decisions and to manage risks.

Fintech companies committed to social change not only provide users with exceptional customer service, but

also dedicate themselves to improving the lives of thousands of people around the globe. The social FinTech sector helps debunk the myth that for-profit financial organizations cannot have social impact as their primary objective. Impact investment has risen by almost ten percentage points since 2012, and over 70% of “impact” businesses generate more profits than traditional businesses. [24]

### Shiksha Finance

Started by two chartered accountants, VL Ramakrishnan and Jacob Abraham, Shiksha Finance hopes to enrich India’s human skills, focusing on the bottom of the pyramid, by creating access to relevant products and services and thereby assuring quality education for all. Shiksha Finance seeks to bridge the ever-widening inequality gap by offering student education loans to middle and lower-income parents to finance their children’s’ fees from nursery to high school. They also provide financing to educational institutions. Shiksha Finance’s work has helped improve education infrastructure and reduce school dropout rates. [23]

FinTech is an industry that makes a lot of sense, particularly for those focused on recruiting for early-stage companies. Using technology, financial institutions can provide billions of people with access to capital and enable them to make better personal and financial decisions.

FinTech can offer solutions that are efficient and effective at lower scale, which will benefit small businesses and provide them with increased access to more diverse funding options. Innovative finance solutions can also significantly assist small businesses by providing them with better cash flow, improved working capital management and more stable or secure funding.

Because financial technology enables the actors in capital markets and financial systems to operate more efficiently and make better decisions there is a clearly delineated link between FinTech and social impact. Companies like CommonBond are lowering interest rates on student loans by leveraging P2P technology to connect student borrowers with alumni lenders, and mobile banking platforms are bringing financial services to millions of people in emerging markets by leapfrogging

the traditional economic entities upon which developed financial systems are built. Companies like Credibly has funded 6000 small businesses with nearly \$300 million in loans and Alibaba monitors and evaluates online transactions to identify commercial opportunities and then offers loans to small businesses through Alipay. [25] In essence, the application of technology to finance imposes an ethos of innovation on the financial industry, i.e., how do we solve the problems that users of the world’s financial systems are facing? As smaller, nimbler companies are able to successfully navigate the regulatory and competitive landscapes of their respective verticals, they will force the bigger companies to reconsider their focus from protecting market positions to re-discovering and catering to customer’s needs.

### REFERENCES

- Fintech in India  
<https://www.nathaninc.com/wp-content/uploads/2017/02/Fintech-in-India.pdf>
- FinTech Trends Report India 2017  
<https://www.pwc.in/assets/pdfs/publications/2017/fintech-india-report-2017.pdf>
- Growth of Fintech in India  
<http://www.makeinindia.com/article/-/v/growth-of-fintech-in-india>
- Overview of Fintech Industry Bw-Disrupt Report  
<http://bwdisrupt.businessworld.in/static/images/BW-Disrupt-Report.pdf>
- Improving Access to Finance for India’s Rural Poor  
<https://siteresources.worldbank.org/INTTOPCONF3/Resources/364480PAPER0IN101OFFICIAL0USE0ONLY1.pdf>
- Issues in SME Financing  
<http://www.iibf.org.in/documents/reseach-report/Report-30.pdf>
- The Pulse of Fintech Q1 2017  
<https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2017/04/pulse-of-fintech-q1.pdf>
- The Pulse of Fintech Q2 2017  
<https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2017/07/pulse-of-fintech-q2-2017.pdf>
- The Pulse of Fintech Q3 2017  
<https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2017/11/pulse-of-fintech-q3-17.pdf>
- The Pulse of Fintech Q4 2017  
[https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2018/02/pulse\\_of\\_fintech\\_q4\\_2017.pdf](https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2018/02/pulse_of_fintech_q4_2017.pdf)

## *Fintech Sector in India-Aiming for the Sky*

The Evolution of Fintech

<https://www.forbes.com/sites/jalgunidesai/2015/12/13/the-evolution-of-fintech/2/#2034873d3dd0>

Fintech In India

<https://www.swissnexindia.org/wp-content/uploads/sites/5/2016/10/Fintech-Report-2016.pdf>

In 2017, Challenges and Opportunities in Fintech

<https://www.tsys.com/news-innovation/whats-new/Articles-and-Blogs/nGenuity-Journal/in-2017-challenges-and-opportunities-in-fintech.html>

What's Driving India's Fintech Boom

<http://knowledge.wharton.upenn.edu/article/whats-driving-indias-fintech-boom/>

Why Banks Need to Collaborate (Not Compete) with Fintech Start-ups

<https://quantumfbi.com/why-banks-need-to-collaborate-with-fintech-startups/>

The risk of Digitalization and Disruption for 2016 and beyond

<https://www.i-scoop.eu/the-risks-of-digitalization-and-disruption-for-2016-and-beyond/>

Fintech : Evolution and Regulation

<https://pdfs.semanticscholar.org/presentation/1b0f/213d3c20c15feb519d6816bea48e87310885.pdf>

FinTechnicolor - The New Picture In Finance

<https://www.mckinsey.com/~media/mckinsey/industries/financial%20services/our%20insights/bracing%20for%20seven%20critical%20changes%20as%20fintech%20matures/fintechnicolor-the-new-picture-in-finance.aspx>

Banking on the Future : Vision 2020

<https://www2.deloitte.com/content/dam/Deloitte/in/Documents/financial-services/in-fs-deloitte-banking-colloquium-thoughtpaper-cii.pdf>

What are the risks of Blockchain Technology

<https://stealthcare.com/what-are-the-risks-of-blockchain-technology>

How Artificial Intelligence Impacts the Finance Industry : Opportunity or Threat?

<https://siliconvalley.center/how-artificial-intelligence-impacts-the-finance-industry-opportunity-or-threat/>

FinTech - Its Impact on Finance, Economies and Central Banking

[https://www.boj.or.jp/en/announcements/press/koen\\_2016/data/ko161118a.pdf](https://www.boj.or.jp/en/announcements/press/koen_2016/data/ko161118a.pdf)

Four Fintech Start-Ups that are Championing Financial Inclusion in India

<https://www.asiaforgood.com/article/four-fintech-start-ups-are-championing-financial-inclusion-india>

Financial Technology and Social Impact : The New Social Fintech Sector

<https://socialfintech.org/financial-technology-and-social-impact-the-new-social-fintech-sector/>

Understanding the Fintech Effect

<https://gomedici.com/understanding-the-fintech-effect/>

Fintech in India : A Global Growth Story

<https://assets.kpmg.com/content/dam/kpmg/pdf/2016/06/FinTech-new.pdf>

Roles of Regulators Decided in India, Regulations Coming Soon

<https://news.bitcoin.com/roles-of-regulators-decided-in-india-rules-on-bitcoin-coming-soon/>

Report of the Working group on Fintech and Digital Banking

<https://rbi.org.in/scripts/PublicationReportDetails.aspx?ID=892#6.1>

Legal Framework and regulations governing financial inclusion in India

<https://blog.ipleaders.in/legal-framework-regulations-governing-financial-inclusion-india/>

Financial Services - May 2018

<https://www.ibef.org/download/Financial-Services-May-2018.pdf>

Indian Financial Services Industry Analysis

<https://www.ibef.org/pages/39072>

Douglas Warner, 150 years of Fintech : An Evolutionary Analysis

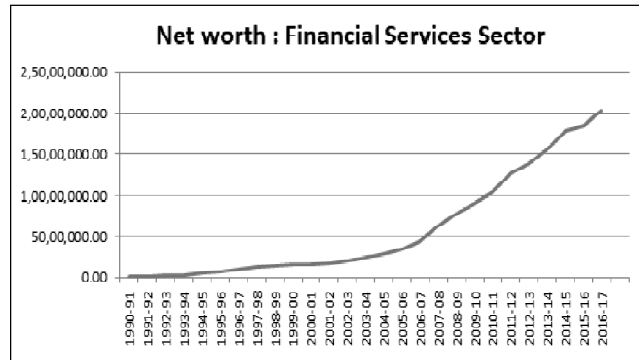
[https://www.finsia.com/docs/default-source/jassa-new/JASSA-2016-jassa-2016-issue-3/jassa-2016-iss-3-150-years-of-fintech-pp-22-29.pdf?sfvrsn=8d839b93\\_4](https://www.finsia.com/docs/default-source/jassa-new/JASSA-2016-jassa-2016-issue-3/jassa-2016-iss-3-150-years-of-fintech-pp-22-29.pdf?sfvrsn=8d839b93_4)

**Appendix 1**

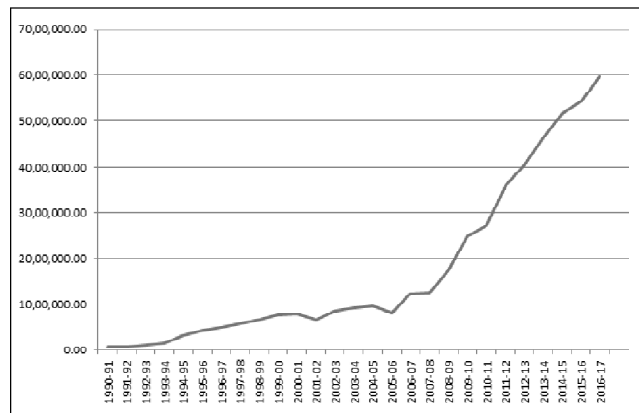
**Top Fintech Investments in India**

1. The biggest investment in 2017 was \$1.4 billion in PayTm by the Japanese conglomerate SoftBank at a valuation of around \$8 billion.
2. In May 2017, Mumbai based services firm ItzCash raised \$123 million from Ebix Inc., a US-based SaaS company that caters to the insurance and financial services industry.
3. In January 2017, Jasper Infotech Pvt Ltd, which runs e-commerce firm Snapdeal, invested close to \$57 million in FreeCharge, filings with the Registrar of Companies (RoC) show. Now FreeCharge got acquired by Axis Bank for \$60 million in July.
4. In August, MobiKwik, a player in the digital payments space, entered into a strategic alliance with Bajaj Finance and raised \$35.2 million in exchange for an 11% stake.
5. In June 2017, Independent POS (point of sale) merchant acquirer and network provider Mswipe Technologies secured Series D funding of \$31 million.
6. In February 2017, Inbeam agreed to invest about \$22.4 million for further acquiring 7.5% equity shares of CCAvenue.
7. In July 2017, Bangalore-based fintech firm Innoviti Payment Solutions Pvt. Ltd raised \$18 million in a Series B round led by the SBI-FMO Fund, Bessemer Venture Partners LP and existing investor Catamaran Ventures.
8. Others who received funding include insurance marketplace Policybazaar (\$77 million), SME lending platform Capital Float (\$45 million) and payment firms Razorpay(\$20 million).[14]
9. In July 2017, Amazon invested an additional \$20 million into digital payments entity, Amazon Pay India.

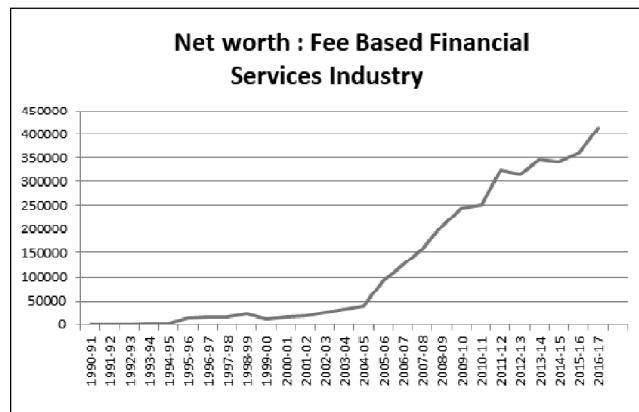
**Appendix 2 : Net Worth of Financial Services Sector**



**Appendix 3 : Net Worth of Asset Financing Services Industry**

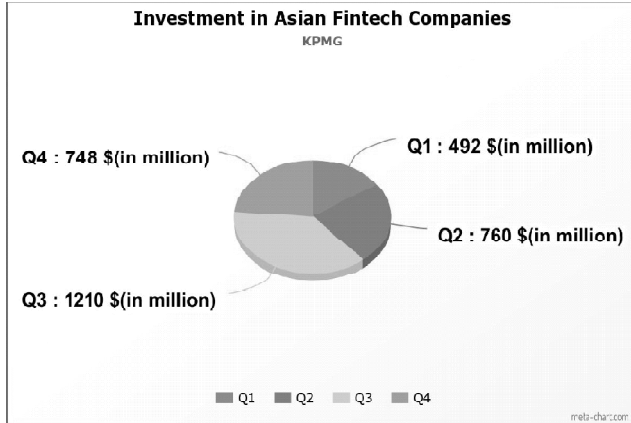


**Appendix 4: Net Worth of Fee Based Financial Services Industry**

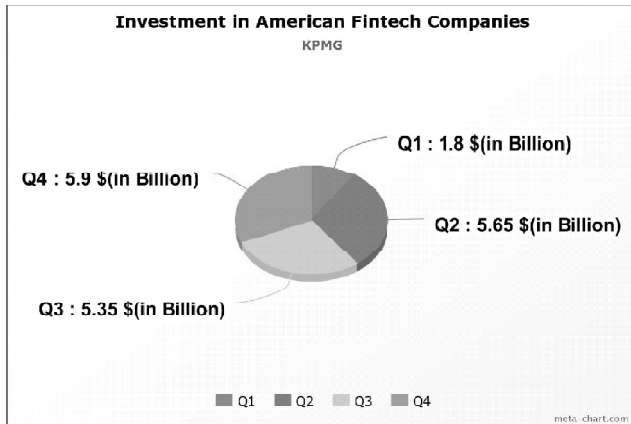




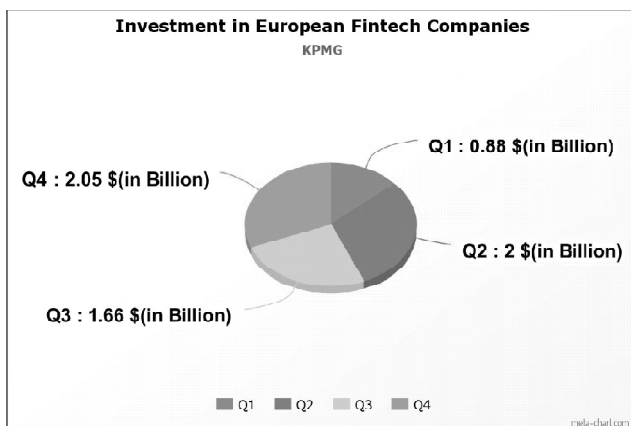
Appendix 5: Investment in Asian Fintech Companies



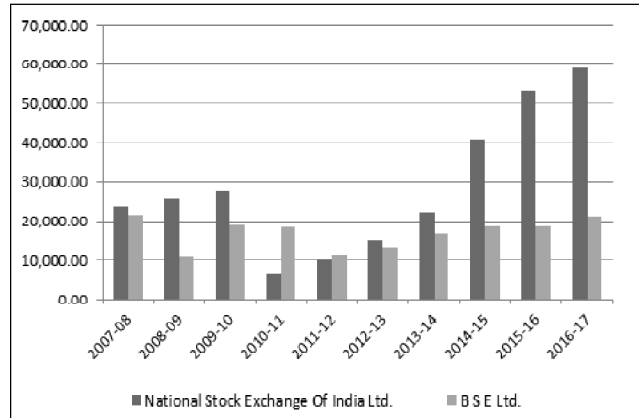
Appendix 6: Investment in American Fintech Companies



Appendix 7: Investment in European Fintech Companies

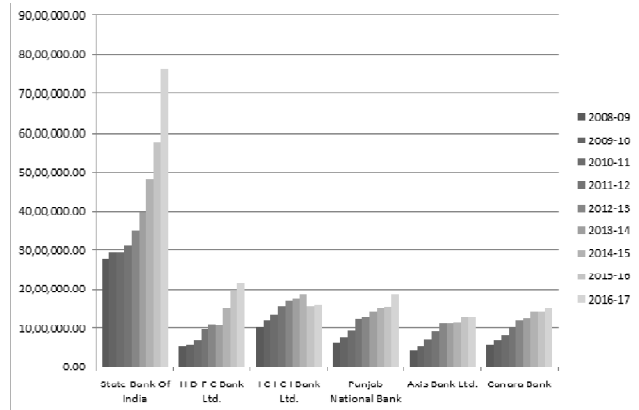


Appendix 8: Investment made by NSE and BSE over the years



Source: CMIE Database

Appendix 9: Investment made by different banks over the years



Investment made by the Banks over the years

Source: CMIE Database

**List of Abbreviations**

BC	- Banking Correspondent	AI	- Artificial Intelligence
UPI	- Universal Payment Interface	DLT	- Distributed Ledger Technology
RBI	- Reserve Bank of India	ROI	- Return on Investment
NPCI	- National Payment Council of India	BFSI	- Banking, Financial services and Insurance
P2P	- Peer to peer	SEBI	- Securities and Exchange Board of India
FY	- Financial Year	IRDA	- Insurance Regulatory and Development Authority
ID	- Identity Document	TRAI	- Telecom Regulatory Authority of India
IT	- Information Technology	NBFC	- Non-Banking Financial Companies
CAGR	- Compound Annual Growth Rate	FCA	- Financial Conduct Authority
MICR	- Magnetic Ink Character Recognition	SEC	- Securities Exchange Commission
IoT	- Internet of Things	NASDAQ	- National Association of Securities Dealers Automated Quotations
API	- Application Programming Interface	SWIFT	- Society of Worldwide Interbank Financial Telecommunications
ATM	- Automated Teller Machine	BBPS	- Bharat Bill Payment System
OTC	- Over-the-Counter	BBPOU	- Bharat Bill Payment Operating Unit
KYC	- Know Your Customer	IFISA	- Innovative Finance Individual Savings Account
MPoS	- Mobile Point of Sale	AFS	- Australian Financial Services
BACS	- Bankers' Automated Clearing Services	CBRC	- China Banking Regulatory Commission
CHIPS	- Clearing House Interbank Payment System	HDFC	- Housing Development Finance Corporation
SMEs	- Small and Medium Enterprises	RBS	- Royal Bank of Scotland
MSMEs	- Micro, Small & Medium Enterprises	QFIs	- Qualified Foreign Investors
VC	- Venture Capital	IPO	- Initial Public Offering
UK	- United Kingdom	GDP	- Gross Domestic Product
US	- United States of America		
EMV	- Europay, MasterCard and Visa		