

What are the main determinants for large-scale adoption of India's Unified Payments Interface (UPI) system and what are the potential financial innovations that may arise from it?

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This research paper presents an in-depth investigation into the determinants and impacts of the extensive adoption of the Unified Payments Interface (UPI) in India, particularly focusing on its influence on technological innovations within the nation's digital payment ecosystem. There exists a notable gap in context-specific studies that combine an examination of government initiatives, digital infrastructure, regulatory frameworks, and consumer behavior patterns. This study addresses this lacuna by unveiling the intricate influences that have propelled UPI's remarkable adoption, setting it apart from global counterparts like M-Pesa, AliPay, and cryptocurrencies. Furthermore, the paper highlights UPI's transformative role in reshaping India's financial sector and credit ecosystem, areas that have previously been overlooked or treated peripherally. By conducting a comparative analysis with prominent global systems, the research underscores the unique confluence of factors necessary for establishing successful digital payment interfaces, thereby offering valuable insights to policymakers and stakeholders in emerging economies attempting similar digital transitions. In addition to secondary research, the study stands out in its incorporation of primary data, utilizing a survey conducted across a diverse sample of 375 Indian citizens. This approach not only captures a multifaceted view of the real-world impact and acceptance of UPI but also contributes empirical richness to the existing literature, which has leaned heavily on theoretical or qualitative assessments. Ultimately, this paper signifies a critical step forward in understanding the holistic impact of digital payment systems on a country's technological advancement, financial inclusion, and economic growth. It aims to serve as a beacon for future research in this domain, guiding both academic inquiry and practical initiatives toward informed decisions that can harness digital innovations for societal benefit.

Introduction

The Unifying Payment Interface (UPI) is a groundbreaking technological initiative that has transformed the landscape of digital payments in India. Introduced by the National Payments Corporation of India (NPCI), UPI is a real-time payment system that facilitates instant fund transfers between individuals and businesses with the utmost convenience and security. Launched in April 2016, UPI has witnessed unprecedented growth and adoption, making it one of the most revolutionary payment systems in the world¹.

Prior to the advent of UPI, digital payments in India were fragmented, with different banks and payment platforms offering various solutions that lacked interoperability. Initially, banks were the only entry point to formal finance. Unlike the Western world, credit card provision has been unsuccessful in developing economies; most citizens are undocumented, and the cash economy is ripe with fraud as many disincentivize credit card usage by providing cash discounts so they can then evade taxes by underreporting income². This fragmentation hinders the seamless transfer of funds between different

accounts and leads to inefficiencies in the payment ecosystem. Recognizing these problems, NPCI conceptualized UPI to provide Indians with a unified system transcending the barriers of banks and payment service providers.

The inception of the National Payment Corporation of India (NPCI) in 2009 marked a significant stride toward streamlining and unifying online payment systems within the country. This initiative was further galvanized by global precedents that underscored the transformative power of digital payment solutions. Notably, the success story of M-Pesa in East Africa served as a template, showcasing the potential of mobile-based transactions. Inspired by such international models, the Indian government recognized the imperative of fostering a similar digital ecosystem, leading to an effort to harness the concept of 'digital currency' within its market framework³. In 2011, the Reserve Bank of India, on the back of surveys, found that the average Indian makes just six non-cash transactions annually⁴. At the time, around 10 million retailers accepted credit card transactions; however, 145 million families did not have access to formal banking services leading to primarily cash transactions⁵. Over the next year, RBI outlined a four-year vi-

sion statement, highlighting its commitment to establishing a secure, efficient, accessible, inclusive, interoperable, and authorized payment and settlement system in India⁴. Finally, in 2016, the Unified Payments Interface (UPI) was officially introduced to the public in India. UPI revolutionised the digital payment landscape, providing an instant payment system facilitating swift fund transfers between individuals and businesses, which ensured convenience and security.

Unlike the failed demonetization in 2016, whereby the government overnight got rid of large bills, instigating a cash crunch⁶, the government of India realized the transformative power of UPI for change. They made it their mission to ensure that UPI is a household product. Partnered with the Jan Dhan Yojana, a financial inclusion scheme launched by the Indian government in 2014 to provide affordable banking services to all, the platform records digital transactions, reducing tax evasion and corruption⁷. To achieve this, the government implemented the “Zero Commission Rule,” where fintech apps were not allowed to charge any transactional commission, viably making UPI a digital currency. The government’s “Open Payment System” has steadfastly adhered to this approach, citing concerns that unbanked individuals, such as minimum wage workers and rural citizens, might not utilize it, dismissing it as a mere profit-making gimmick⁸. Instead, the government intends to use UPI to help provide modern financial services along with well-kept records, providing real-time data on sellers, businesses, and buyers. Applications track purchasing trends which in turn helps insurance firms to reach customers who do not have much financial history. While these features may seem standard, they are a giant leap forward for an emerging economy like India. UPI made it easier to cut banks out of the picture, shortening the process of acquiring loans; this increased India’s short-term credit provisions from 9 billion to 270 billion dollars³.

UPI struggled to gain widespread adoption initially, with transactions amounting to less than 50,00,000 rupees in the first four months of its release and transactions capping at about 90,000. Almost six months after its release, UPI started to take off, with transactions increasing tenfold in September 2016 alone (NPCI)⁹. In November 2016, the government of India decided to demonetize the economy, a landmark economic event that brought about a radical shift in the country’s financial landscape. Demonetization caused an immediate and substantial cash shortage in the economy. It led to serpentine queues at ATMs and banks as people rushed to exchange their old notes for new ones⁵. With the sudden withdrawal of 500 rupee and 1,000-rupee banknotes, the government sought to curb corruption and tackle the menace of black money¹⁰. Concurrently, the demonetization endeavour indirectly paved the way for India’s rapid growth of the Unified Payments Interface (UPI). As the Reserve Bank of India (RBI) struggled to print new currency, citizens turned to India’s digital finance

system, transforming how Indians transact and accelerating the country’s journey towards a more cashless economy. The demonetization drive unprecedentedly impacted India’s financial ecosystem, particularly on digital payment platforms like UPI.

Fintech companies, banks, and the government actively promoted UPI-based payment applications during the Indian Demonetization, as cash scarcity led to a decrease in aggregate demand. To escape this mess, financial institutions used online payment platforms and UPI was able to perfectly fill this gap as people started to use it for day-to-day transactions. Its transactions surged as individuals and merchants embraced the simplicity and safety of digital payments. The government’s demonetization moves inadvertently acted as a catalyst for the rapid adoption of UPI, driving its exponential growth. During the month of demonetization, UPI usage doubled; 300,000 transactions, moving over Rs 100 crores¹¹. UPI adoption rapidly expanded, rising to 1600 crore rupees per month by the time the cash shortage was over. By then, UPI had already imprinted itself in every Indian’s daily life. Post-demonetization, the government focused on enhancing the UPI ecosystem. UPI has proven to be a stimulus in reducing the friction of money, encouraging higher spending propensity among users, boosting aggregate demand, and playing a pivotal role in stimulating economic growth. UPI has remained a transaction platform, growing from around 17% of 31bn digital transactions in 2019 to 52% of 88.4bn transactions by 2022. India has 40% of the world’s real-time digital transactions³.

Despite the rapid adoption and apparent success of the Unified Payments Interface (UPI) in revolutionizing digital transactions in India, there is a critical knowledge gap regarding its comprehensive impact on the country’s financial inclusion, credit accessibility, and long-term economic growth. This research aims to delineate the multifaceted effects of UPI within India’s broader financial ecosystem, comparing its trajectory and outcomes with global digital payment models and addressing the consequential societal and economic transformations that have been understudied. The insights derived are vital for stakeholders and policymakers seeking to understand and emulate the factors contributing to the successful integration and expansive influence of digital payment systems in emerging economies.

The rise of the Unified Payments Interface (UPI) in India has given rise to intriguing questions about its influence on credit provision and its potential to revolutionize the financial sector in the long term, which this paper intends to discuss. This paper delves into critical dimensions of modern financial systems. The Literature Review uncovers the origins of UPI and M-Pesa. The Comparative Analysis section evaluates the influence of governmental policies on UPI and Alipay. Analysing Crypto Currencies investigates the pitfalls in their trajectory. Shifting focus, the study explores UPI’s effect

on short-term credit in India, followed by an examination of financial products leveraging the UPI framework. Moreover, we explore other financial innovations that have emerged using the UPI interface. From digital wallets to bill payment solutions and investment apps, a vibrant ecosystem of financial services has sprouted, further enriching the digital payment experience and contributing to India's journey towards becoming a global leader in the realm of financial technology. Additionally, financial apps leveraging the UPI network have harnessed transaction data to extend credit to previously unbanked clients, empowering them with newfound financial inclusion and opportunities. I plan to review what the current literature has to say about these questions, and also offer a comparative analysis of M-Pesa and Ali-Pay digital platforms within Kenya and China, respectively. Finally, I will investigate how UPI has enhanced the customer experience using primary-source survey data to understand why consumers use UPI on a day-to-day basis.

Comparative Analysis

I- Decoding UPI and M-Pesa: How it all started

The digital transactional platform revolution began with M-Pesa, but its business model has evolved significantly since then. Launched in 2004, it utilized a basic messenger system to facilitate transactions, "it was about transferring data and information", said Sir Arun Sarin, former CEO of Vodafone Group¹², the owner of the umbrella firm Safaricom, a company that was pivotal in getting M-Pesa launched in Kenya¹³. One agent would collect funds from the sender and send a message to another agent in a different city, instructing them to provide the equivalent amount to the recipient. This person-to-person (P2P) approach ensured a seamless flow of money across the country, capturing the attention and support of both consumers and the government. Vodafone's substantial market share in the telecom industry provided a significant advantage, allowing them to create a system that leveraged existing telecom infrastructure. This early traction laid the foundation for Kenya's digital financial market.

Sir Arun Sarin claims that a significant catalyst for M-Pesa's expansion was the government's 30% ownership stake. This enabled the government to set regulatory standards, similar to the intervention seen in India. The collaboration between the private sector and the government created an environment conducive to M-Pesa's growth, allowing it to navigate the intricate landscape of licenses and regulations. Such support was instrumental in overcoming challenges associated with a highly regulated banking structure in Kenya. Further, M-Pesa's 65% market share allowed it to be the standard setter, unlike its competitors¹⁴.

The Indian government's strategic interventions, although

not through ownership but through robust regulatory frameworks and initiatives, have similarly shaped a fertile ground for UPI's proliferation. Furthermore, UPI's evolution in India underscores the transformative power of digital financial services, especially when backed by governmental support, to achieve financial inclusion and stimulate economic activities. Drawing lessons from M-Pesa's trajectory, UPI's future development requires continued collaborative efforts. The government should maintain a nurturing, yet non-monopolistic stance, ensuring that regulations facilitate innovation rather than stifle it. As UPI moves forward, it could benefit from strategies that solidify user trust and broaden its applicability."

Prior to M-Pesa, the physical transfer of money was the norm. The simplicity and convenience of M-Pesa's P2P system revolutionized the payment space. With the absence of a formal banking system, M-Pesa filled a critical gap, addressing real problems and needs. The interfaces developed were directly aligned with solving specific challenges, ultimately leading to integration with formal banking systems.

Both UPI (Unified Payments Interface) and M-Pesa originated in markets where a significant portion of the population was underbanked. They each sought to bridge the financial inclusion gap by offering easy, quick, and accessible digital financial transactions. Both systems leverage mobile technology, acknowledging the high penetration of mobile phones even in areas with limited banking infrastructure. In contrast, UPI was designed as an advanced payment system facilitating bank-to-bank transfers in real time. It's a more comprehensive platform, integrating multiple bank accounts, merchant payments, and various transaction models (like QR code) under one umbrella. While M-Pesa was critical in basic financial services, UPI provides a unified ecosystem for more sophisticated financial activities.

Overall, Sir Sarin concluded by saying that there is no formula for making such a platform work: what might work in India might not work in Kenya. However, he said that a few factors were essential for an online financial platform to work: catering to a population largely unbanked especially in regions with limited access to traditional banking services, and having the stakeholders and the government support the project, otherwise it is challenging to get digital payment platforms off the ground and achieve economies of scale.

Comparative Analysis between UPI and Alipay: The Role of Government Policy

UPI was not the first digital payment interface, but why did it expand to become the most prominent digital transaction market in the world? Although the inception of UPI coincided perfectly with the disruption of Indian Demonetization,

the public fails to appreciate the role well-coordinated government policy had on accelerating UPI adoption. Take China's Alipay, an escrow service for Alibaba's e-commerce platform, a widely used mobile and online payment platform. Alipay rose to prominence by using smartphones and QR code. With its counterpart, WeChat Pay, it now processes some 90% of Chinese digital payments¹⁵. Such a high concentration of power raised concerns among Chinese regulators about potential monopolistic practices, which could stifle competition, innovation and harm consumers' interests. Earlier in 2020, Jack Ma, the founder of Alipay, criticized the Chinese authorities regarding the policy changes. Shortly thereafter, he withdrew from the public's attention, only to reemerge on October 1st when he resigned from the board, setting off a sequence of consequential events. In November 2020, Ant Group's highly anticipated IPO was suspended by Chinese regulators just days before it was scheduled to take place. Investors were left feeling uncertain and uneasy, directly impacting Alibaba's (BABA) stock³.

This was a significant setback for the company, indicating a shift in the government's stance towards fintech companies and their operations. The company's shares took a hit, falling as much as 7% during trading in Hong Kong. However, this is just part of the story; since November 2020, Alibaba (BABA) has faced a rollercoaster ride from Chinese regulators. The company saw a staggering 62% reduction in its market value, erasing a mind-boggling \$380 billion from its overall market capitalization. The government has made Alipay restructure its financial holding company and create a different brand for its loans; why is the government doing this? Alipay is a monopoly in the digital space in China, with almost 700 million daily users. The government wants to share in the credit-scoring joint venture business to ensure that history does not repeat itself. Alipay is the only digital platform that is a monopoly and still is not part owned by the government. As the banking industry is highly regulated, government approval as well as support is required. A reason for the lack of support was to reduce potential systemic financial risk in their banking system since Alipay was giving out unfettered loans. Furthermore, Alipay was continuously expanding its loan portfolio and due to its considerable market power, could set the market-going interest rate on loans³. Overall, the lack of support from the Chinese government, combined with increasing regulatory scrutiny and concerns, posed significant challenges to Alipay's expansion.

Unlike Alipay, UPI was created by the government. The National Payments Corporation of India created UPI's interface. The Indian government also kept a close watch on fintech companies, ensuring no one firm had a high enough market share to manipulate interest rates on loans. They implemented the "Zero Commission Rule" so fintech companies were not allowed to charge a transaction fee, whether it was a

consumer-to-consumer (C2C) or consumer-to-business (C2B) transaction, hindering their ability to make a profit as they could not make money off transaction fees. Having to cut their expenses, the FinTech's started cutting costs from their customer relations and security teams. For instance, instantaneous transactions over the phone are non-reversible, so if you were to transfer the wrong amount to the wrong person, there is no in-network mechanism or customer support system to recover your funds. This is fundamentally different from credit cards where if someone were to steal your card and charge your account, your funds are generally recoverable.

Recognizing that flaws in the security apparatus were fundamentally tied to FinTech's inability to make enough money on the platform, after nearly seven years, the NPCI has allowed FinTech's to charge a transaction fee of up to 1.1%¹⁶. However, regulations were placed such that transaction fees could not be charged for any C2C transactions; further, B2C transactions must have a minimum transaction of Rs.2000 to be eligible for transactions. This was an important step, as in the Western world, the real victims of transaction fees (by credit card use) are small to medium-sized businesses, which in India make up the largest market share of UPI¹⁷.

UPI and Alipay are integral components of their respective countries' digital economies, representing monumental shifts in financial transactions. Both platforms facilitate a variety of transaction types, including person-to-person transfers and payments to businesses. They have contributed significantly to financial inclusion, catering to populations underserved by traditional banking systems.

UPI, on the other hand, was initiated by the National Payments Corporation of India (NPCI), a not-for-profit entity, to facilitate inter-bank transactions. It's a governmental initiative designed from the ground up to be a public utility rather than a profit-driven service. UPI stands out for its open architecture, allowing various banking and financial institutions to participate and promoting competitive innovation. While Alipay faced regulatory challenges due to its market dominance and commercial practices, UPI operates under stringent regulatory oversight designed to prevent monopoly and encourage fair competition.

Analysing Crypto Currencies: What Went Wrong?

In 2009, Bitcoin developer Satoshi Nakamoto told investors, "What is needed is an electronic payment system... allowing any two willing parties to transact directly with each other without the need for a trusted third party"¹⁸. Initially, Bitcoin developers simply wanted a safe decentralised currency used to make transactions, devoid of government interference. However, that was not the case as computers kept a copy of the

transaction, using blockchain, breaching their selling point: privacy¹⁹.

Cryptocurrencies like Bitcoin have been around for over a decade at this point and have traded more like an asset than a means of exchange as the price has been incredibly volatile. Institutional investors had been waiting for the price of crypto to settle down and become more stable in order to invest in bitcoin like a typical asset class, or as some investors like to call it, “digital gold”²⁰. Although crypto boomed after government intervention induced by the COVID-19 pandemic, the price dropped precipitously after the Federal Reserve began tightening monetary policy, raising the question, will crypto ever be able to recover as a digital currency? Advocates of cryptocurrencies claim that strict policy control is the only way to stabilise crypto again. While others say that it is too late now. Since its launch, cryptocurrencies have been popular in some developing countries due to the lack of better options. For instance, in Argentina, cryptocurrencies have been widely used since the Argentine peso has been devalued due to excess fiscal spending and overly loose monetary policy²¹. But as time has passed, multiple financial institutions have created systems to do the same: India’s UPI, Brazil’s Pix, M-Pesa or Alipay. These platforms have built a cross-border network, while countries are continuously backing out of crypto. Singapore, which used to be a major hub for crypto, has requested that Binance halt its operations by December 2021²². Despite receiving approximately 600 applications for crypto businesses, only ten licenses have been granted so far. A report by the Atlantic Council, a think-tank, shows that 25 out of 45 countries have either partially or fully banned crypto. Furthermore, the governor of the Reserve Bank of India, Shaktikanta Das, stated that cryptocurrency has no inherent value and that they may ban most of it²³. Additionally, on January 5th, American regulators such as the Federal Reserve and the Federal Deposit Insurance Corporation expressed their belief that crypto-assets on decentralized networks are not consistent with safe and sound banking practices²⁴. As well, Signature Bank, a prominent bank for the crypto industry, was seized by the government after it collapsed. So far, the crypto currency industry has failed to take off and suggestions on how to safeguard the industry oftentimes incorporate stringent government regulation, which defeats the original intent of the asset class outlined by early founders like Satoshi Nakamoto.

Cryptocurrencies in India have encountered a complex maze of challenges, primarily due to regulatory skepticism and the subsequent apprehension surrounding their stability and utility as a financial instrument. This environment of uncertainty has been accentuated by the Indian government’s concerns about cryptocurrencies’ speculative nature, potential impact on economic stability, and issues related to consumer protection and national security. Concurrently, UPI’s success story stands in stark contrast.

As a government-backed initiative, UPI thrived, gaining widespread acceptance due to its secure framework, ease of use, and solid regulatory backing, further solidifying the public’s trust in state-sanctioned digital transactions over decentralized cryptocurrencies. The tightening of regulatory frameworks globally signals a tough road ahead for cryptocurrencies. These actions, although aimed at consumer protection, financial transparency, and national security, often clash with the foundational principles of cryptocurrencies—decentralization and privacy. As regulations stiffen, there’s a palpable shift towards more controlled digital transaction systems that governments can oversee, such as UPI in India. For the cryptocurrency market, this could mean a push towards finding a middle ground—adapting to regulatory requirements while trying to maintain the core principles set forth by pioneers like Nakamoto. The challenge lies in balancing these aspects, wherein cryptocurrencies can function within a regulated environment without losing their essence, thereby gaining the trust and acceptance necessary for mainstream adoption. This delicate equilibrium, if achieved, may determine the future resilience and relevance of cryptocurrencies in the global financial ecosystem.

Impact UPI has on Short-Term Credit Provision in India

In India, there has been a significant increase in short-term loans since the release of UPI 2.0. Certain financial institutions have created credit options based on UPI, allowing qualifying users to obtain small loans or credit lines directly through the UPI platform. Around a decade ago, the Indian short term loan market was 9 billion dollars, whereas today, that number has risen to nearly 270 billion dollars³. The credit for this expansive growth has to be given to UPI. Initially, to take a short-term loan, for Indians that did not use credit cards, people had to go to the bank and apply for the loan. This process involves providing the bank with papers, credit history, and a stable source of income²⁵. On the other hand, UPI allows users to apply for a short-term loan straight from their phone. Using basic information, financial apps assess the user’s creditworthiness based on various factors, such as transaction history, bank account details, and credit score, if available. If the loan application is approved, the credit amount is instantly disbursed to the user’s linked bank account, and they can start using the money immediately.

In the case of pre-approved credit, participating lenders can see the available credit amount in their UPI apps. These participating lenders are regular users of UPI that have joined a program based on financial criteria, as the lenders on this platform are not financial institutions, they do not have the financial backing to provide large loans to businesses. Let’s take a gen-

eralization, business owners usually take out financial credit to invest in further capital or inventory stock. It would typically have that asset on the collateral if it cannot repay the loan. UPI focuses on ensuring that all its features are seamless, which is why long-term loans are not a viable option. Behind the long-term loans, a lot of paperwork must be processed while also requiring regular checks on the collateral. UPI will be needed to build new infrastructure on a digital platform to have the processing power to run these longer background checks.

The explosive growth in short-term loans via UPI is significantly propelled by fintech companies, which leverage the platform's infrastructure to assess creditworthiness swiftly and provide instant credit solutions, bypassing traditional banking hurdles. These fintech entities capitalize on UPI's seamless transaction capabilities to offer hassle-free loans, attracting a broader user base comfortable with digital platforms. Their innovative credit models, less reliant on conventional credit histories, are pivotal in democratizing access to finance, especially for those underserved by traditional banks.

Financial Products Built Upon the UPI Network

Since its establishment in 2016, the Unified Payments Interface (UPI) has embarked on a transformative journey by integrating cutting-edge technologies, creating an inclusive and user-centric financial ecosystem accessible to all Indians. This evolution of UPI has been characterized by constant innovation, reshaping the country's economic transactions landscape.

One of the pivotal technologies shaping UPI's path is the Mobile Wallet²⁶. Serving as the foundation of UPI, mobile wallets have revolutionized peer-to-peer payments. They allow consumers to seamlessly transfer money to other UPI users using their mobile numbers, simplifying transactions, and reducing reliance on complex banking details. Mobile wallets operate independently of traditional bank accounts, increasing consumer confidence in digital commerce.

Another significant addition to the UPI ecosystem is the Bharat QR, developed in collaboration with the National Payments Corporation of India (NCPI)²⁷. Bharat QR streamlines payments for businesses and customers, introducing a uniform QR code that companies can use for payments through QR codes, like credit card machines. This innovation not only enhances convenience but also has the potential to reshape retail transactions by replacing traditional payment methods.

Fast-Tag, an extension of Bharat QR, further streamlines payments, especially in transportation contexts²⁸. Fast-Tag simplifies parking ticket payments and toll collection by fixing a QR code to vehicle windshields. This technology ensures seamless toll collection while directing revenue to the government, curbing illicit financial flows.

The integration of UPI with India's unique identification system, Aadhaar, has led to the creation of the Aadhaar En-

abled Payment system²⁹. This approach uses biometric data to facilitate peer-to-peer transfers, increasing financial access for those in remote areas without traditional banking services. This technology bridges gaps in financial inclusivity by eliminating the need for credit and debit cards.

The UPI ecosystem has also introduced the Request to Pay feature, allowing consumers to quickly request money from peers for bill splitting and payment reminders³⁰. Simultaneously, UPI AutoPay automates recurring payments, reducing manual transaction burdens, particularly for subscriptions²².

The Overdraft Facility grants users greater flexibility by linking their overdraft accounts to UPI¹⁴. This allows transactions to proceed even with insufficient savings account balances, tapping into the overdraft account as a short-term fund source, minimizing the risk of transaction failures due to low ratios and empowering users with improved financial control.

UPI 2.0 was launched in 2018 to enhance security; this upgraded version prioritized user safeguards. The Invoice in the Inbox feature provides post-payment notifications as expenditure records, facilitating financial tracking and transparency. Signed Intent/QR, another UPI 2.0 feature, enhances transaction security by appending business profiles to QR codes, reducing the likelihood of fraudulent transactions¹³.

Further enhancing security, the Additional Security and Authentication feature introduces an additional layer of protection for transactions surpassing a predetermined limit. This secondary authentication level significantly reduces unauthorized transactions, bolstering trust in the UPI system.

In conclusion, the journey of UPI since 2016 has been marked by remarkable innovation and integration. Through technologies like Mobile Wallets, Bharat QR, Fast-Tag, Aadhaar Enabled Payment, Request to Pay, UPI AutoPay, and the Overdraft Facility, UPI has modernized financial transactions while championing inclusivity and security. This ongoing progress underscores UPI's pivotal role in reshaping India's digital economic landscape.

Long-Term Implication of UPI on the Financial Sector in India

The launch of UPI has led to an unprecedented Digital Payments Revolution, the adoption of digital payments in India has increased significantly due to the emergence of UPI. This transition has the potential to introduce greater transparency, efficiency, and convenience to the financial ecosystem. Furthermore, this adoption will lead to India becoming a cashless economy; India's economy has traditionally relied heavily on cash transactions, which has led to issues such as tax evasion, black money, and security risks²¹. However, the success of UPI can help reduce the country's dependence on cash and promote a more formal and transparent economy. Seemingly,

the hardest hit industry due to UPI is the traditional banking system; the larger and more convenient UPI grows, the more the banks lose out. The use of UPI enables direct transfers between banks and peer-to-peer transactions without any intermediaries. This may lead to increased competition for traditional banks. Fintech companies and digital payment platforms may offer more efficient and user-friendly services, potentially challenging the dominance of conventional banks.

With the increase in UPI transactions, financial institutions have the opportunity to gather useful information about consumer behavior and spending habits. By analyzing this data effectively, they can offer more personalized financial services and implement targeted marketing strategies. These data sets allow UPI's lender schemes to become feasible. The interface is able to discern spending patterns to ultimately determine the user's credit score¹². It is, however, important to note that this credit score is not related to the credit score provided by formal banks. UPI uses non-traditional data to allow anyone to take short term loans; UPI has been instrumental in providing financial services to those who are unbanked. By expanding its reach to rural and remote areas, UPI can promote financial inclusion by offering access to banking services, and insurance to those who previously did not have access to such infrastructure. As this infrastructure continues to improve, it will bring millions of people into the economy²³, triggering aggregate demand to rise and prompting economic growth. Having continuous improvements, the ease and security of UPI transactions may increase consumer trust in online shopping, leading to more significant online retail activity. As discussed before, another triggering factor for aggregate demand to rise is that the friction of money is falling: easily available overdrafts joined with the not being constrained by the amount of physical cash that you carry lead to this phenomenon. The growth over the years has prompted millions of new applications coming up trying to replace physical documentation.

Data Analysis

In our study aiming to understand the penetration and application of digital financial platforms among Indians, we focused on individuals within the business community, particularly in the financial services sector. Our methodology involved a structured survey, deployed via Google Forms, targeting professionals in Dehradun. Out of an initial pool of 400 individuals contacted, we received 375 complete responses.

To uphold the respondents' confidentiality, our survey was designed to secure anonymity. However, this approach also limited our access to comprehensive demographic data, restricting our ability to fully analyze the sample's representativeness based on factors such as age, gender, and educational background. In light of these limitations, the survey results, detailed in the subsequent section of this paper, must be in-

terpreted with an understanding of the potential for selection and response biases. The demographic diversity was present in sending the form to people from all financial backgrounds. Respondents were all aged 18+ as to be abiding by the UPI regulations. The respondents ranged from working in the financial sector to being roadside vendors.

Additionally, we exerted meticulous efforts to ensure the integrity and relevance of our survey instrument. The questions, crafted to capture clear, unbiased responses, underwent a rigorous validation process, including pre-testing for clarity and consistency. While the anonymity of responses serves to protect respondent privacy, it also necessitates trust in the self-reported affiliation to the financial sector and raises the need for mechanisms to avoid duplication in responses, aspects that future iterations of this research will need to address in depth.

The data collection reveals a pronounced trajectory towards the embracement of UPI within India's digital payment framework. A staggering 58.3% of respondents utilize UPI as an everyday transactional tool, which, when contextualized within the short span since UPI's introduction in 2016, speaks to its transformative impact on India's digital economic landscape. Such high adoption rates not only underscore the relevance and utility of UPI but also hint at a broader shift in consumer preferences and trust in digital financial platforms. Comparative studies or industry benchmarks could offer further insights, enabling a more nuanced understanding of UPI's position vis-à-vis other payment mechanisms, both traditional and digital.

The second question 'Do you find it easy using UPI?' focused on checking whether the user interface was simple for all age groups. An overwhelming 92.8% of all people did find UPI to have relatively simple software. Out of the 7.2% of people that answered no, many people did not use UPI, stating the reason for not adopting the interface was due to technical problems. Although we cannot state conclusively, it is likely the case that these select survey respondents did not have much experience using mobile phones.

The third question in my survey 'Do you prefer using UPI or Cash?' asked consumer's personal preference for making transactions. Surprisingly, 54.3% of people preferred to use UPI over cash, with 36.1% using both equally. This is likely due to the fact that UPI has made it easier and safer to make transactions, as consumers no longer have to carry around physical cash. Moreover, consumers also likely increase their purchasing power by conducting transactions using UPI as they no longer have to carry around coins, which are easy to lose. Only 9.1% of the respondents chose cash, with a further 0.5% choosing credit and debit cards.

The fourth question of my survey 'Have you purchased online services using UPI?' inquired about whether the recipients use UPI to make online purchases. If trying to replace credit and debit cards, UPI must be used while making online pur-

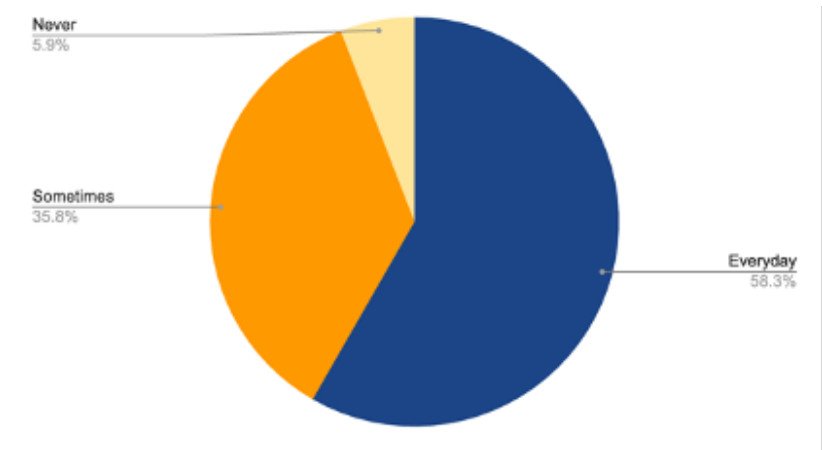


Fig. 1 How Often Do You Use UPI?

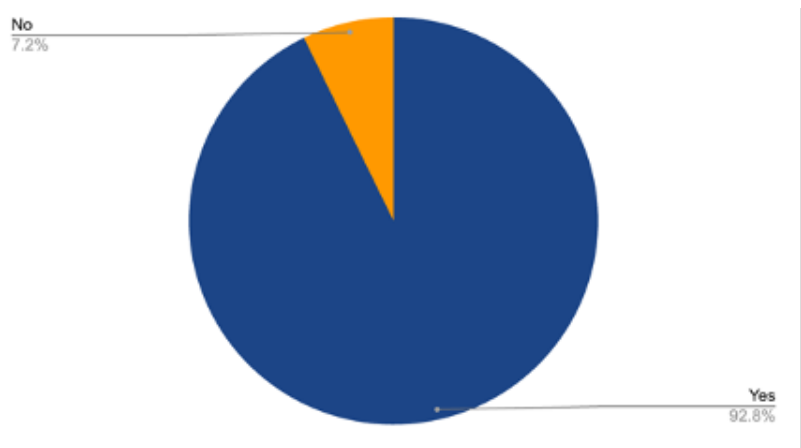


Fig. 2 Do you find it easy using UPI?

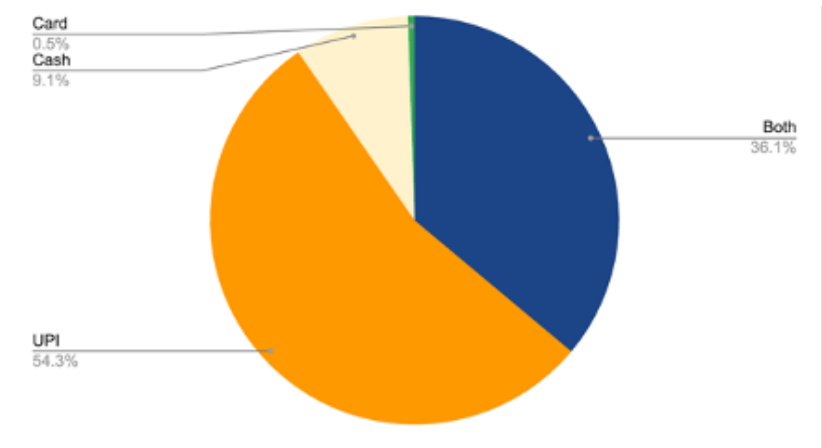


Fig. 3 Do you prefer using UPI or Cash?

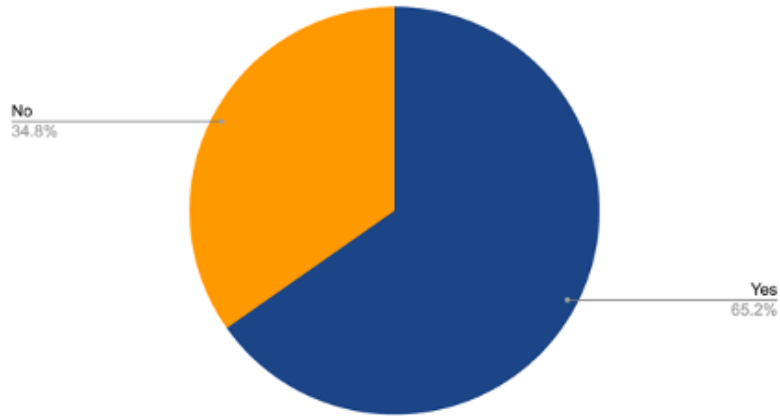


Fig. 4 Have you purchased online services using UPI?

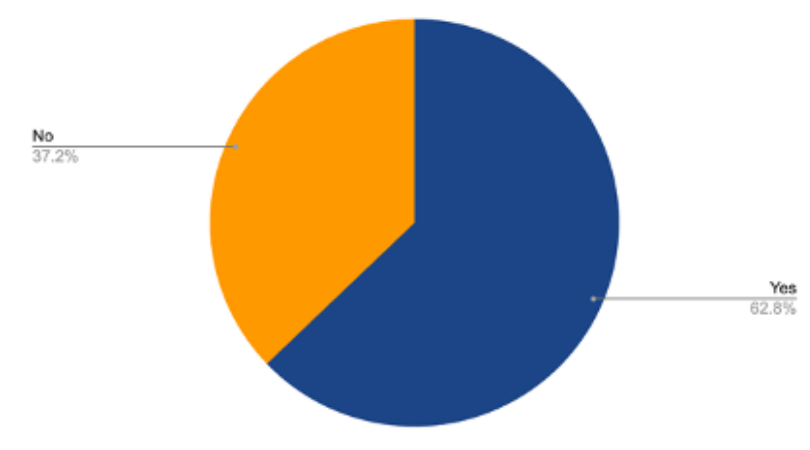


Fig. 5 Do you use Fast Tag?

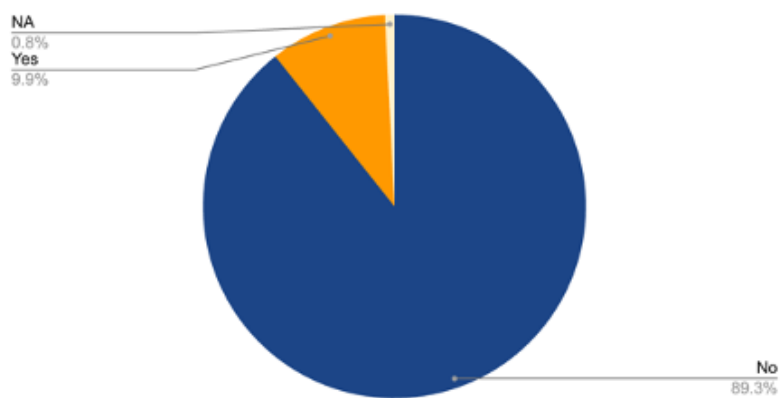


Fig. 6 Have You Ever Got Lost Money While using any UPI related Interface?

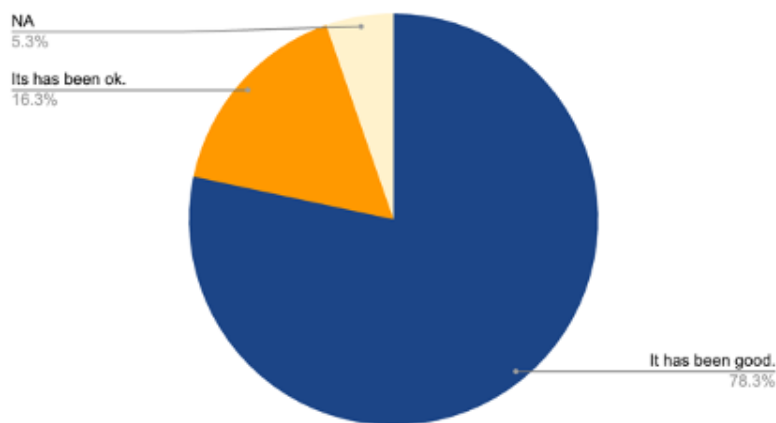


Fig. 7 How has your experience been with UPI?

chases like Netflix, Prime Video etc. As the RBI makes it more difficult for consumers to pay for foreign services, UPI needs to help pick up the pieces. Recent RBI guidelines do not allow consumers to link their bank accounts to Apple Pay, resulting in the need to use UPI to transfer money to their Apple Pay. Unlike the previous questions, only about 65% of Indians use UPI to make such purchases—an aspect yet to be covered entirely. As new policies dissuade the use of traditional banking payments, UPI is the best alternative considering its integration with other payment services around the world.

The fifth question ‘Do you use Fast Tag?’ was focused on finding out the extent of the adoption of other technological advancements relating to UPI. Fast-tag symbolized the digital revolution the UPI has started. This was done keeping in mind, the population who were not well aquited with technical terminology. It is important to note that although this could create uncertainty, predominant number of survey recipients were explained this analogy before answering. Fast tag is an extension of Bharat QR , which ensures seamless toll collection while directing revenue to the government. 62.8% of people were seen to use fast-tags. Fast-Tags don’t represent a particular product, however, the technological revolution instigated by UPI. While this number is lower than the total number of users, it is still evident how India’s economy is slowly evolving into a centralized digital economy.

A large concern of UPI has been its safety issue, with nearly 95,000 people reporting fraud in 2022-2023³¹. However, this pie graph helps put things in perspective. Overall, 95,000 people have experienced fraud, but compared to the 260 million users³², this is actually a very low percentage. As in our survey about 10% of users got scammed using UPI. The reasons are unknown, but this is likely not due to any systemic issue with UPI, but rather consumers transferring money to the wrong account or sharing their One Time Password. This was

particularly important as people assumed a lack of security in UPI. The real problem arising was the lack of adequate customer care as mentioned above.

Finally, the last graph is a summary of the entire paper: the approval rate. Overall, approximately 78% of users have had a good experience with UPI. Even if the product has the best features and is the easiest to use, without consumer satisfaction it will not be able to reach widespread adoption and ultimately disrupt the digital financial ecosystem in India. Summing up the data analysis, I have shown through primary source survey data that UPI is becoming widely adopted and prompting consumers to switch over from using cash in day-to-day consumer transactions.

Evaluation

While the survey provides compelling quantitative insights, the absence of information related to reasoning behind the answers or qualitative intervals is notable. Such metrics are pivotal in ascertaining the reliability and generalizability of the findings. Without these parameters, it remains a challenge to understand to what extent the observed patterns and percentages vary under different circumstances or within larger populations.

Survey data, by its nature, offers a snapshot of respondent perspectives at a specific point in time. While the insights garnered are invaluable, they might be influenced by a confluence factors, such as socio-economic backgrounds, regional differences, or the digital literacy of respondents. For instance, the subset who found UPI’s interface challenging might predominantly consist of individuals less acquainted with digital interfaces. Sole reliance on survey data could inadvertently overlook such nuanced causal relationships. Furthermore, self-reported data is subject to biases like recall bias or social de-

sirability bias, which might slightly distort the true picture.

In the presented data evaluation, the findings seamlessly align with existing trajectories in the digital payment landscape of India. The survey underscores a pronounced adoption rate of the Unified Payments Interface (UPI) system, revealing that 58.3% of respondents utilize this facility daily. This is harmonious with broader national narratives, particularly post the 2016 demonetization initiative. Furthermore, the study accentuates a salient feature of UPI's ascendancy — its user-centric design. An impressive 92.8% of participants affirmed the simplicity and ease of UPI's interface, a statistic that dovetails with industry endorsements. The decreasing preference for cash, characterized challenges faced in global payment platform integrations, and the minimal but significant security apprehensions further corroborate pre-established trends. Thus, this evaluation not only supports but also enriches the current discourse on UPI's increasing imprint on India's digital transaction milieu. Transitioning from this alignment with established data, it becomes paramount to recognize that the landscape of digital payments is in a constant state of flux, shaped by technological innovations and evolving consumer behavior. While the present study lays a robust groundwork, the dynamic nature of this domain necessitates a continual exploration. The potential trajectories of UPI's broader integration, its aspirations for global connectivity, opportunities for refining user experiences, and fortifying security protocols herald vast research horizons awaiting academic pursuit.

Conclusion

The widespread adoption of the Unified Payments Interface (UPI) in India has been driven by a complex interplay of factors that has collectively contributed to its remarkable success. This research paper has highlighted these determinants with further delving into the effect government intervention, in the form of regulatory support, has had on this adoption of UPI. These factors combined helped create a conducive environment for UPI's adoption. The interview with Sir Sarin helped explain the role external stakeholders, such as the government and private businesses, have on the success of UPI. Similarly, using a comparative analysis of UPI with AliPay and cryptocurrencies, we explored the potential downfalls that UPI could have faced. Furthermore, the impact of UPI's adoption reverberates beyond the realm of payments, transcending into increased financial inclusivity. The technological revolution caused by UPI has fostered an innovation-friendly atmosphere. Secondly, standardized protocols of UPI have laid the groundwork for the development of interconnected systems and applications. This has led to increased collaboration between players in the technology ecosystem, giving rise to ecosystems where services seamlessly integrate to provide holistic solutions. The survey conducted seconded our ini-

tial hypothesis, therefore showing the magnitude of the impact of UPI on the Indian economy, receiving similar trends from people belonging to different financial and educational backgrounds. While the advent of UPI has posed challenges to traditional banks, the long-term prognosis need not be adversarial. Rather, a symbiotic relationship can emerge wherein banks adapt and integrate UPI into their systems, thereby innovating and staying relevant in the evolving digital economy. The integration would allow banks to capitalize on their established trust and infrastructure while aligning with modern payment solutions. A cornerstone of UPI's success lies in its ability to foster trust through robust data security and privacy measures. Implementing features such as end-to-end encryption and multi-factor authentication has been pivotal in assuaging consumer concerns. However, ensuring continuous enhancement of these protocols is vital to sustain and build upon this trust. The policy implications derived from the study's findings are manifold. Policymakers should aim to craft guidelines that not only bolster security standards but also promote interoperability and digital literacy. By doing so, an environment conducive to the growth of digital payment systems like UPI can be fostered, ensuring a balance between innovation, consumer protection, and financial stability. To conclude, UPI represents India's testament to leveraging technology for inclusive growth and societal progress. UPI's success can be seen throughout various sectors of the Indian economy. The lessons learned from UPI, government collaboration, user-centric behaviour and adaptability, will play a pivotal role in shaping the trajectory for future innovations.

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