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Decoding the Sub-national Digital Payment Revolution in India

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August 10, 2023

Abstract

India emerged as the global leader in digital payment transactions in 2022, accounting for 46% of global real-time payments. Using a novel disaggregated digital payment transaction data on value and volume, this study finds sub-national heterogeneity in India's digital payments evolution owing to the disparities in the infrastructure and policy initiatives towards digital financial inclusion. The study also shows that the least digitally competitive sub-national economies of Odisha and Bihar witnessed phenomenal growth in digital payments post-pandemic. The expansion of the Bank Correspondent model through the "Bank Sakhi" program unlocked the digital payments potential of these sub-national economies.

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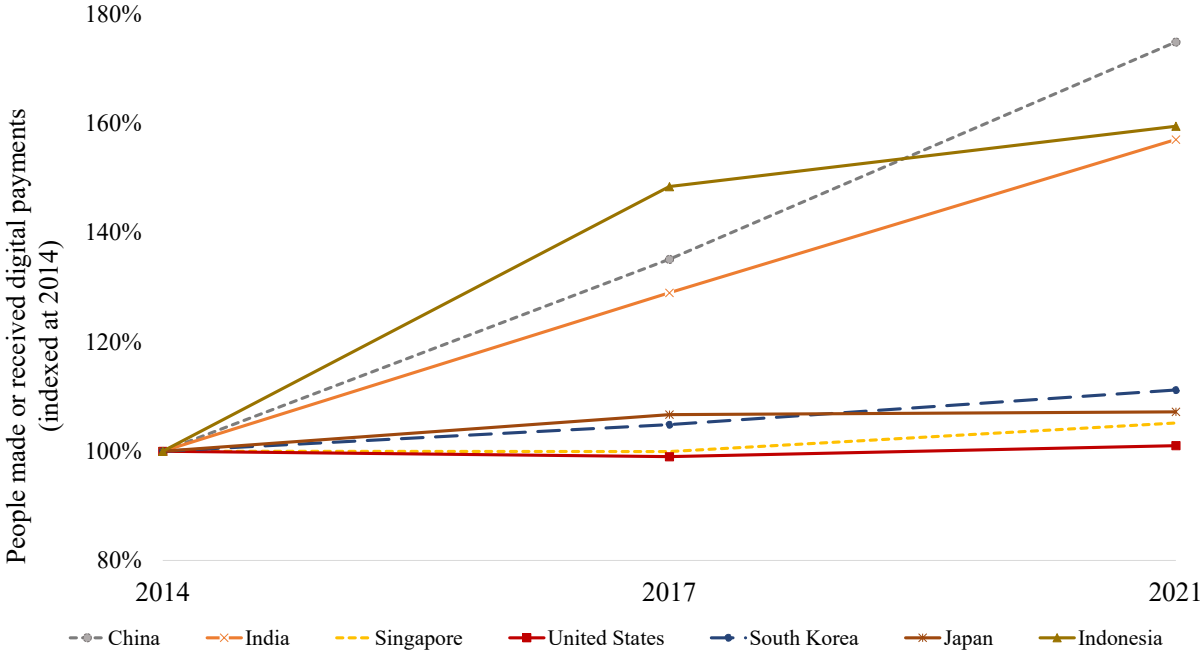
1 Introduction

The ongoing fourth industrial revolution has blurred the lines between the digital and broader economy. Almost every facet of the traditional economy has felt the impact of disruptive digital technologies, encouraging both advanced and emerging markets to embrace the digital economy. With its thriving digital market, India has become one of the fastest-growing digital economies. The digital payment revolution has further unlocked India's digital economy potential. India has become a prominent player in the global payments ecosystem (see Fig. 1).

Figure 1: **Digital payment usage (standardised value)**

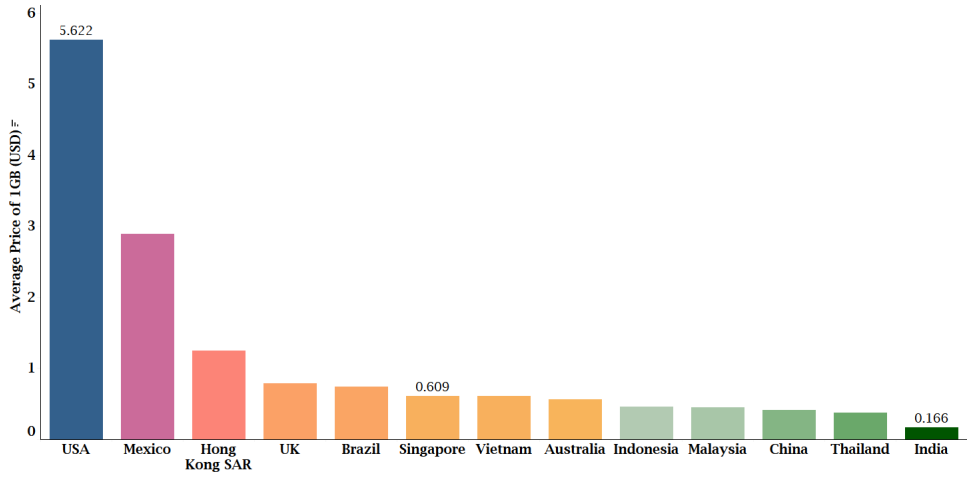


Source: ACI calculations based on the World Bank Global Findex Data, 2022

The digital payments revolution in India can be credited to private sector innovations, improved internet access, and government initiatives such as the *Digital India* programme (McKinsey Global Institute, 2019). Launched in 2015, the Digital India initiative aims to empower India's economy through a "Faceless, Paperless, Cashless" digital transformation. It focuses on three main objectives – providing digital infrastructure as a utility, delivering governance and digital services, and empowering citizens digitally. The program introduced initiatives, including e-governance, mobile e-health services, and digital finance, to achieve these goals. Additionally, efforts to boost Aadhaar registration and establish the Goods and Services Tax Network have accelerated the pace of digitization. Projects such as public Wi-Fi hotspots and BharatNet have also played a crucial role in developing internet infrastructure in rural areas.

Furthermore, increased mobile ownership and affordable mobile data have made internet and mobile phones more accessible to a larger population. The average cost of 1 GB of mobile data is approximately USD 0.17 (₹ 14), the cheapest in the world (see Fig. 2). This is primarily the result of the growing demand for internet services and the disruptive impact of Reliance's Jio network, which reduced data prices (Livemint, 2022). This accessibility has contributed to the rapid adoption of digital payments nationwide.

Figure 2: **Average price of mobile data (US$)**



Source: The World Mobile Data Pricing 2022, Cable.co.uk

India's digital payment volume has grown significantly over the last five years, with an average annual growth of around 50%. In 2022, digital payment transactions amounted to USD 1 trillion in 2022, equivalent to a third of India's GDP. Several factors have contributed to this success, including the government's active involvement in promoting digital payments and considering it a public good. This approach has facilitated financial inclusion and ensured that digital payment services remain free for the foreseeable future. However, despite this progress, discrepancies in access and adoption rates exist among different sub-nationals, mainly influenced by the pre-existing digital divides and economic disparities.

To gain a deeper understanding of the digital payments landscape in India and the factors driving its advancement, it is essential to examine the associated regional heterogeneity. Our analysis shows the bottom digitally competitive economies like Bihar and Odisha witness a massive surge in digital transactions. Besides digital competitiveness, several other factors drive digital payments, including targeted policy initiatives. For example, in many sub-national economies, government-promoted Bank Sakhis have been crucial in providing essential banking services and promoting digital payments across India, especially during the pandemic. These insights highlight the complex dynamics

at play and the need for further exploration to better comprehend the nuances of digital payments across India.

The remainder of our study is organized as follows. Section 2 discusses the data used for analysing the digital payments landscape in India. Section 3 provides an in-depth exploration of India's comprehensive three-pronged policy strategy that played a key role in the rapid adoption of India's digital payments. Section 4 and Section 5 present the national-level digital payments trends, highlighting the regional disparities. Section 6 deep dives into the digital payments landscape in India, specifically examining the sub-national trends. This section also provides a discussion on the digital payment trajectory of select sub-national economies, providing valuable insights into their unique experiences. Section 7 explores the linkages between the digital competitiveness rankings of sub-national economies and digital payment transactions. Lastly, Section 8 concludes.

2 Data

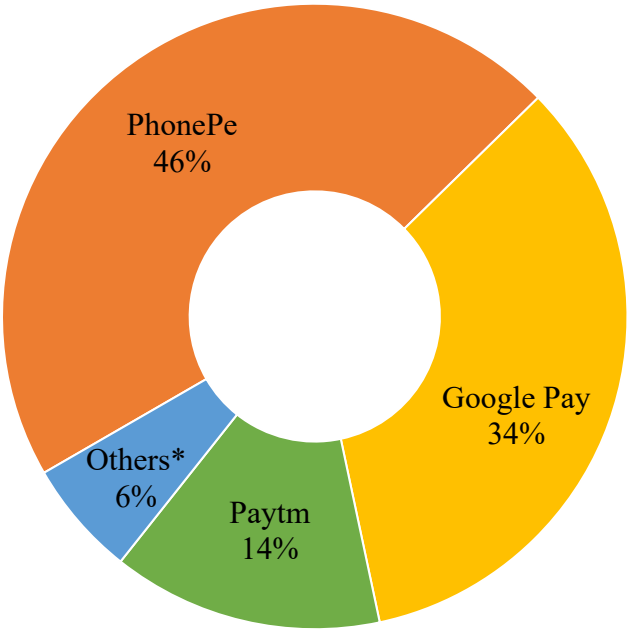
Our analysis uses payments data published by PhonePe, a leading digital payments company in India. PhonePe holds a significant market share of 46% among Third Party Application Providers (TPAPs) in India, which ensures data representativeness of our sample (seeFig. 3)[1]. The licensed Pulse data, available on GitHub, comprises anonymized aggregated payments data on users and transactions (PhonePe, 2022). Both the user and transaction data are accessible at national and sub-national levels. The data is available on a quarterly basis, from 2018 quarter one to 2022 quarter 3. We exclude 2022 data from our analysis due to its incompleteness. Our sample time period is from 2018 to 2021.

The data sample constitutes sub-national user data such as the total number of registered users, app opens, and user distribution across individual devices at a quarterly frequency. The sample also includes transaction data on the volume and value of each type of transaction - financial services, merchant payments, peer-to-peer payments, recharge and bill payments, and others.

We also use sub-national population and bank deposit data from the Ministry of Statistics and Programme Implementation (MOSPI) and the Reserve Bank of India (RBI), respectively. Lastly, our sample also includes the open-source data on sub-national COVID-19 containment zones to gain insights into the dynamics of digital payments during periods of pandemic-related restrictions (Github, 2020).

[1]TPAPs are service providers who participate in the Unified Payment Interface (UPI) through banks.

Figure 3: **Share of payment transactions by major third Party Application Providers in India**



Source: ACI calculations based on PhonePe data

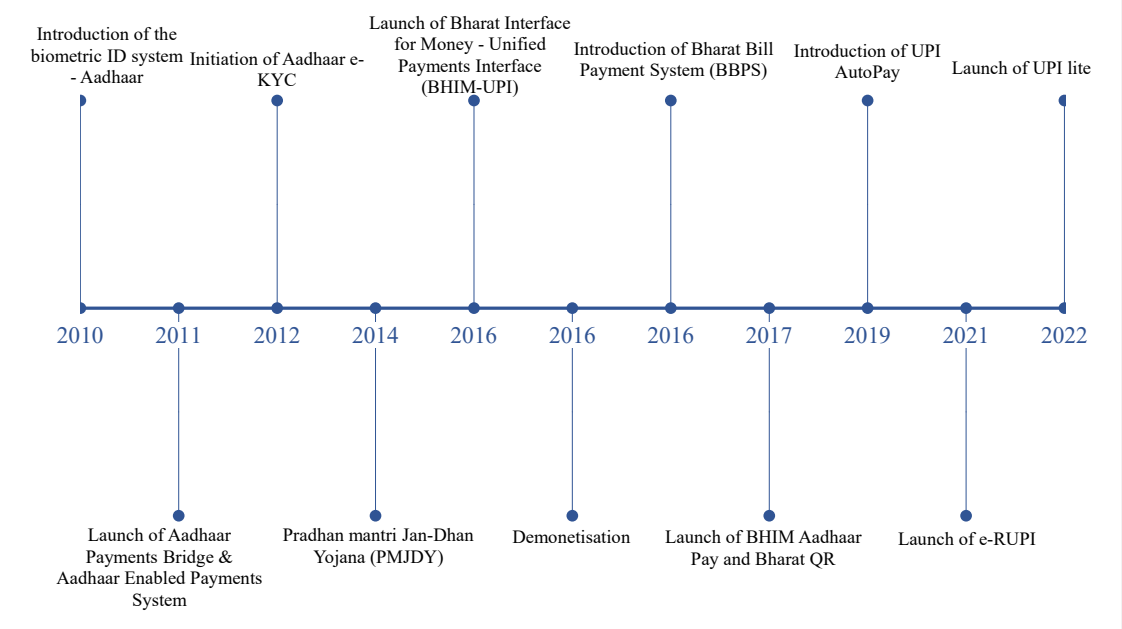
Key National Policy Initiatives

India's journey towards simple, seamless, and secure digital payments has been a result of meticulous long-term planning. The payments system can be compared to a well-oiled machine, comprising several "cogs" working in complete synchronization (see Fig. 4)[a]. The groundwork for India's digital payments ecosystem began as early as 2010 with the implementation of "Aadhaar," a national biometric ID system by the Unique Identification Authority of India (UIDAI). Aadhaar simplified identification procedures and eliminated the role of multiple identity documents for verification. Building on this foundation, the Aadhaar Enabled Payment System (AePS) was introduced in 2011 by the National Payments Corporation of India (NPCI)[b]. AePS allowed people to access financial and banking services using Aadhaar authentication, promoting financial inclusion.

The government launched the Pradhan Mantri Jan Dhan Yojana (PMJDY) in 2014 to improve financial access. This initiative aimed to provide banking services, credit, insurance, remittance facilities, subsidies, and pensions to every unbanked adult in the country. The Bharat Interface for Money (BHIM) was then launched

in 2016, revolutionizing real-time fund transfers through the Unified Payment Interface (UPI). BHIM-UPI was further supported by the introduction of the Bharat Bill Payment Service in 2017, facilitating recurring bill payments.

Figure 4: **Timeline of key policy initiatives**



Source: India Stack

Demonetization in 2016 also played a pivotal role in digital payment adoption by phasing out high-denomination currency notes. Subsequently, BHIM Aadhaar Pay was launched, allowing merchants to receive payments through Aadhaar authentication. In 2019, UPI AutoPay was introduced, enabling consumers to automate fixed-amount recurring payments. The COVID-19 pandemic highlighted the need for efficient disbursement of government benefits, leading to the launch of e-RUPI in 2021. e-RUPI ensured the contactless and secure delivery of various government welfare programs.

Continuing the push for widespread digital payments, UPI-Lite was introduced in September 2022, enabling users to make small-value offline payments without requiring a UPI PIN. With each innovation, the digital payments infrastructure expanded its reach, allowing greater access and convenience for consumers. The government remains committed to improving efficiency and interoperability in the digital payments ecosystem, driving further innovation and cross-border expansion. While laying the foundation was crucial, encouraging adoption remains an equally significant step in the journey towards a thriving digital payments landscape.

[a]For the timeline of key policy initiatives, we refer to India Stack's and NPCI's websites
[b]NPCI is an umbrella organisation that oversees the payments and settlements infrastructure in India. It is a consortium of the Reserve Bank of India and the Indian Banks' Association

3 JAM Trinity

In building a digital India, the government concurrently focused on financial inclusion. The comprehensive policy approach toward digital financial inclusion, popularly known as the '**JAM** trinity' – (Pradhan Mantri) **J**an Dhan Account–**A**adhaar–**M**obile, aimed to drive financial inclusion and streamline government welfare programs through Direct Benefit Transfers (DBTs). The JAM trinity represents a powerful force that integrates the unbanked population into the formal financial system while ensuring efficient DBT implementation (Narayan, 2022). The JAM trinity was instrumental in India's digital payment revolution.

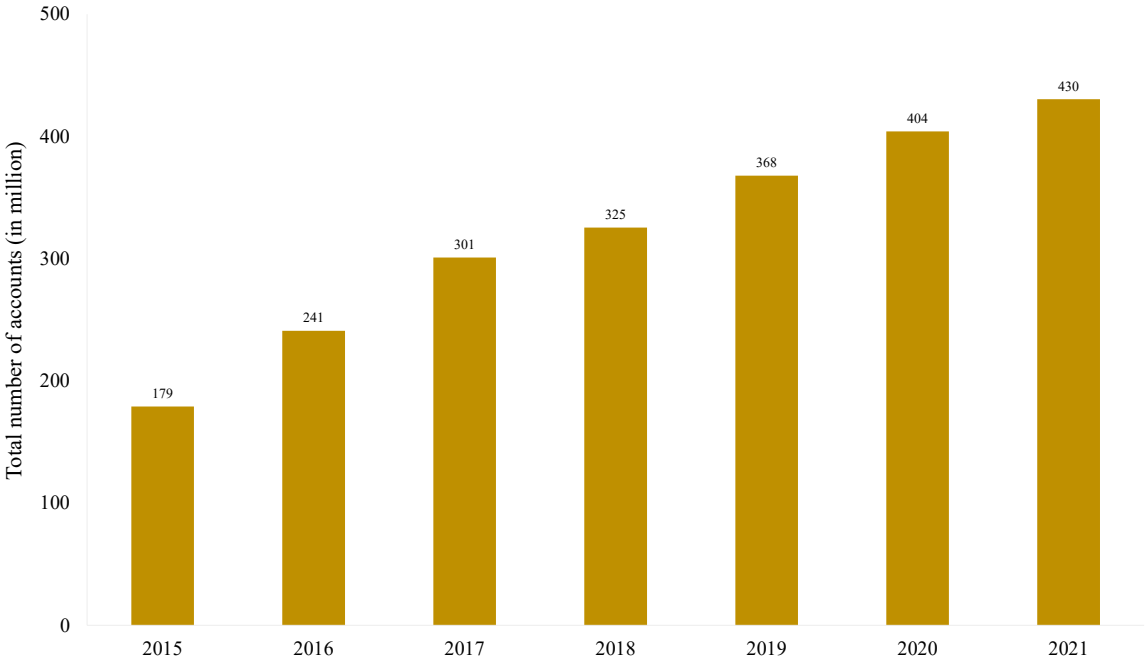
One of the key initiatives within the JAM trinity is the Pradhan Mantri Jan Dhan Yojana (PMJDY), which targeted the underserved sections of society and facilitated the opening of no-frills, zero-balance bank accounts. On the program's first day alone, over 15 million bank accounts were opened (Jain and Shinde, 2020). As depicted in Figure 5, Jan Dhan accounts grew steadily over time. These Jan Dhan accounts are unique identifiers linked to the account holders' Aadhaar numbers. The linkage with Aadhaar is crucial in the DBT process, as it verifies an individual's eligibility for various government welfare schemes (Narayan, 2022). This targeted approach has enabled the precise disbursal of benefits across approximately 450 welfare schemes. Over the years, Aadhaar coverage has significantly improved, with an overall coverage rate of 92% and nearly 100% coverage among adults in the country (see Fig. 6).

The last link that completes the JAM trinity is Mobile. The availability of affordable smartphones and inexpensive mobile internet services has integrated most of India's population into the digital economy (see Fig. 7). The government has enhanced outreach and communication related to benefit transfers by leveraging the widespread usage of internet-enabled smartphones. The JAM trinity and the expanding digital infrastructure propelled digital payment, which was further catapulted by the coronavirus pandemic.

4 National trends in digital payments

This section provides an overview of the evolving trends in India's digital payments over the last few years. Figure 8 showcases the quarterly trends in the volume and value of digital payments from 2018 to 2021. Notably, both volume and value have

Figure 5: **Total Number of accounts opened under PMJDY (2015-2021)**

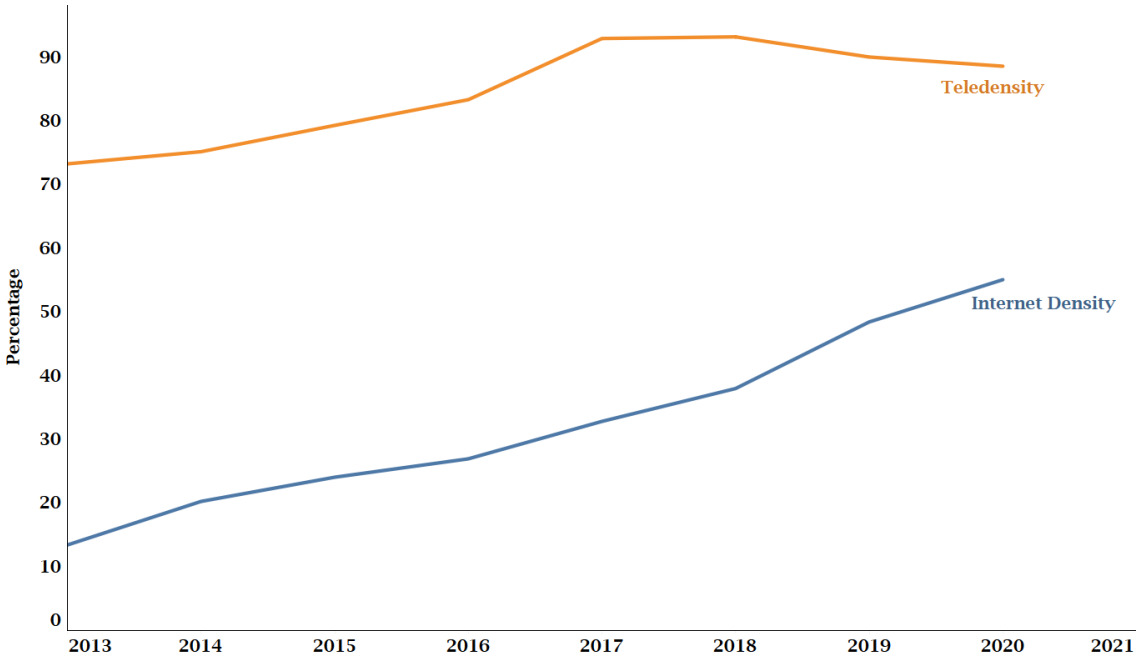


Source: ACI based on Ministry of Finance data

Figure 6: **Aadhaar generation (FY2010-2021)**

Source: ACI based on Unique Identification Authority of India data

Figure 7: **Teledensity and internet density (2013-2021)**



Source: ACI based on Telecom Regulatory Authority of India (TRAI) data

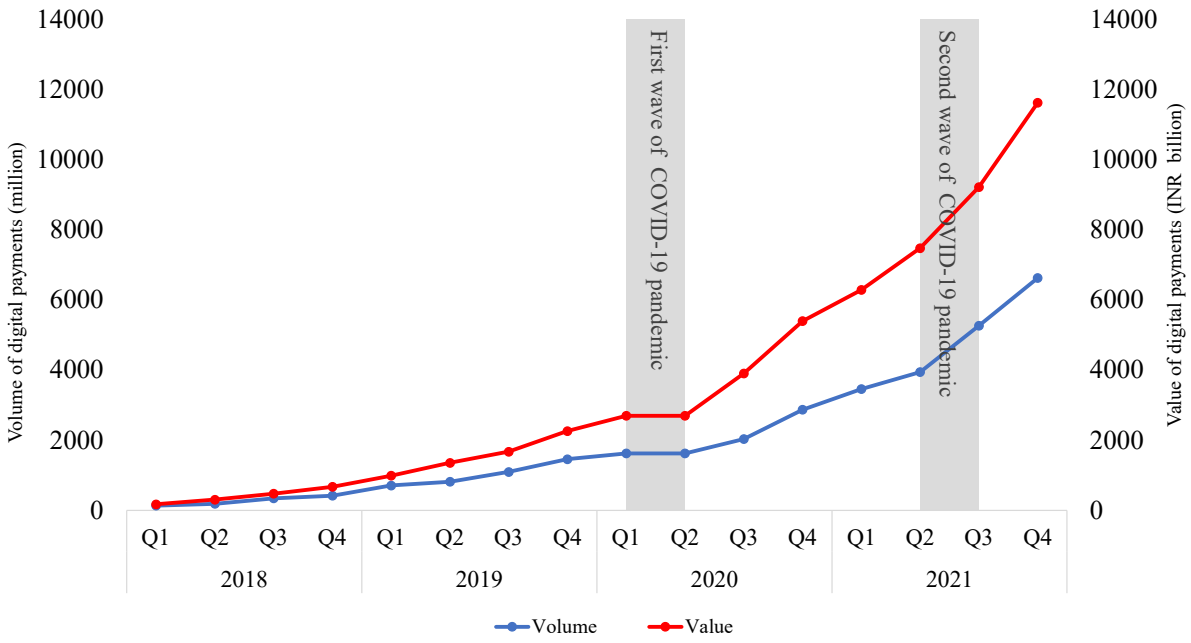
Note: Teledensity and internet density refer to the number of telephone connections and internet subscribers per 100 inhabitants, respectively

been on a consistent upward trajectory since 2018. However, during the initial wave of the COVID-19 pandemic, the growth in digital payments stagnated temporarily due to the economic slowdown caused by the national lockdown. The travel restrictions, limited access to retail and hospitality, and consumer uncertainties dampened spending habits. As restrictions were gradually lifted, businesses resumed operations, and consumer spending rebounded. During this time, there was a notable shift towards safer and contactless payment methods, leading to a surge in digital payments in June 2020 (KPMG and The Economic Times, 2020).

Although another nationwide lockdown was imposed during the second pandemic wave in April-May 2021, it was less stringent than the first. In contrast to the first pandemic wave period, the volume and value of digital payments rose during the second pandemic wave despite localized movement restrictions and a decline in commerce. This indicates India's paradigm shift from cash usage to digital payments amid the pandemic.

The pandemic transformed consumer payment behaviour, with restricted mobility and concerns about physical money driving millions of Indians to embrace digital payments for retail transactions. The proliferation of Quick Response (QR) codes also encouraged merchants to accept and promote digital payments. In fact, by the second quarter of 2020, mobile payments surpassed ATM withdrawals and accounted for 30% of private consumption in India (S&P Global Market Intelligence, 2020).

Figure 8: **Volume and value of digital payments in India (2018-2021)**



Source: ACI calculations based on PhonePe Pulse data.

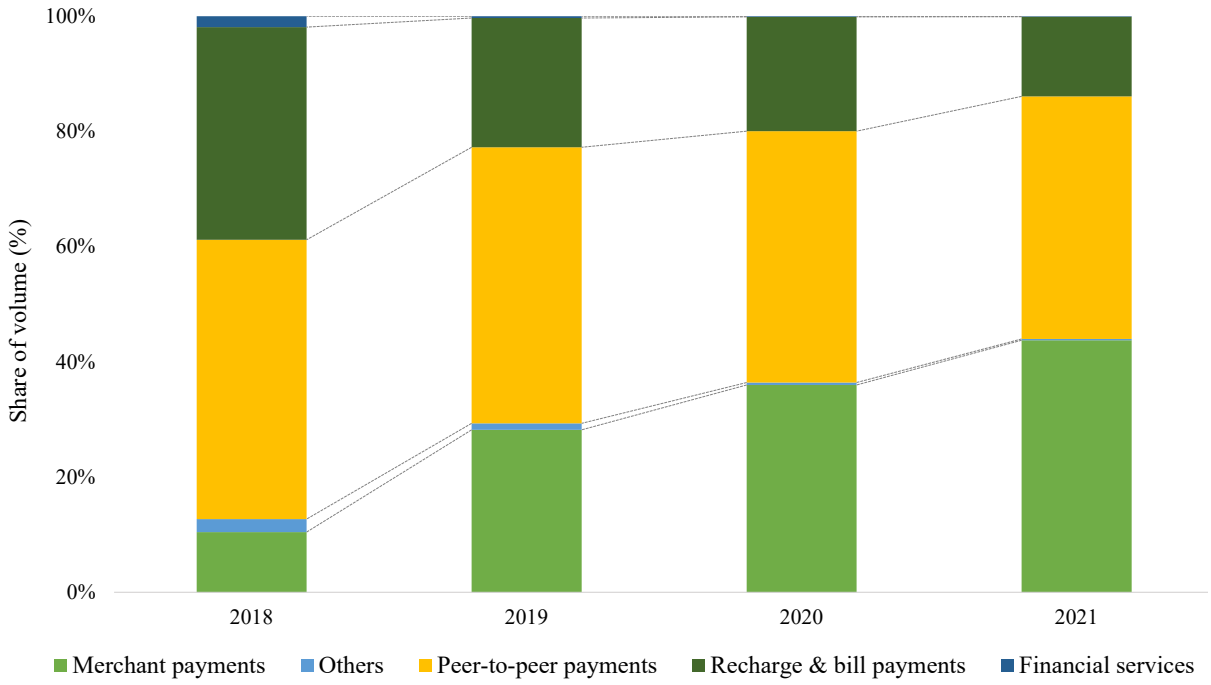
Dominance of merchant payments

As digital payments gained momentum, these transactions' use cases evolved. The five main types of digital payment transactions are merchant payments, peer-to-peer payments, recharge and bill payments, financial services, and others. Fig. 9 shows that merchant payments have witnessed significant growth due to increased digitization among merchants, underpinned by factors such as the pandemic and the government's decision to waive charges for Unified Payments Interface (UPI) transactions. This waiver proved beneficial, particularly for small merchants who lack or could not afford card payment terminals (PhonePe Pulse, 2022).

Peer-to-peer (P2P) payments remain the most prevalent use case for retail digital payments, encompassing activities like splitting bills, remittances, and ride payments. The convenience of making transfers anytime and anywhere has fueled the widespread adoption of P2P digital payments (The Indian Express, 2020). Whereas recharge and bill payments have experienced a decline in popularity, potentially due to network service provider apps offering direct digital payment options. As these providers launch their dedicated apps, they enhance customer outreach through app-exclusive benefits, thereby reducing reliance on TPAPs. Additionally, a growing number of banks on the UPI platform has led to a contraction in financial services transactions conducted through TPAPs. The increasing availability of banking services on UPI and a preference for traditional

payment methods to purchase financial services have decreased digital payments for such transactions.

Figure 9: **Share of transaction types in digital payment volume (2018-2020)**



Source: ACI calculations based on PhonePe Pulse data.

5 Regional differences in digital payments

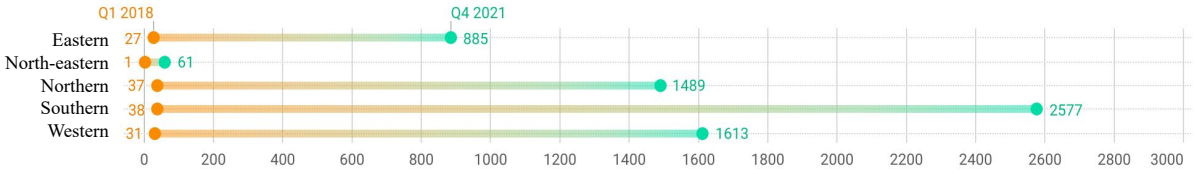
While the national-level statistics indicate a remarkable surge in digital payments over the past three years, there are noticeable differences in their adoption rates across regions. Figure 10 offers some meaningful insights into the expansion of digital payments in the five regions of India[2]. The Southern and Western regions have experienced significant growth in digital payments, surpassing other regions. This surge can be attributed to factors such as language familiarity, as major UPI-based mobile payment applications primarily use English and a few regional languages including Telugu, Tamil, Kannada, Malayalam, and Marathi in their user interfaces. Additionally, private and multinational companies, such as L&T Financial Services, have successfully conducted several digital banking campaigns in rural areas of these regions. The rural population in the Southern and Western states has embraced digital payment methods at a faster pace as compared to other regions (Jain, 2020).

[2]The regional classification provided by the Confederation of Indian Industry (CII) is used to identify the different regions based on their geographical locations.

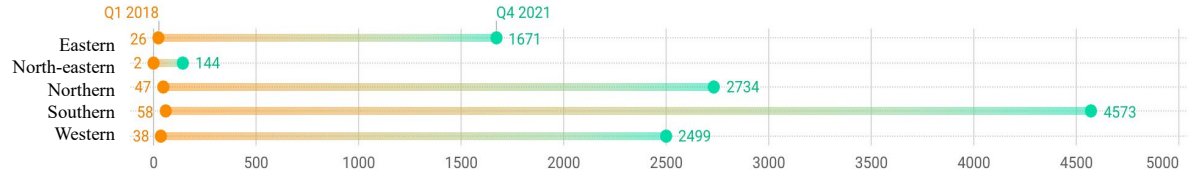
On the other hand, progress in the Eastern and North-eastern regions, where most low-income sub-national economies are located, has been slower. In these regions, the campaigns initially focus on creating livelihood opportunities and ensuring sustainable income generation, followed by efforts to improve financial and digital literacy.

Figure 10: **Digital Payments by region (2018-2021)**

(a) Volume of digital payments (Million)



(b) Value of digital payments (₹ Lacs)



Source: ACI calculations based on PhonePe Pulse data.

Among the five regions, the North-eastern region has registered the lowest level of digital transactions in the past four years. Several challenges have hindered the development of a seamless digital payments ecosystem in this region. Firstly, around 80% of the 1.5 million merchants in the region lack the necessary infrastructure to accept digital payments, especially in semi-urban and rural areas. Secondly, these merchants often face technical difficulties during digital transactions, leading to higher transaction failure rates due to slow internet speeds and frequent network downtime. Additionally, the complicated user interface of digital payment systems and a lack of familiarity with the language used further discourage merchants from transitioning to digital modes of transaction. Lastly, the penetration of Aadhaar and the linking of Aadhaar bank accounts in the North-eastern sub-national economies is significantly lower compared to other regions. As a result, financial service providers and the TPAPs struggle to reach the last-mile users, particularly in states like Assam, Meghalaya, and Nagaland (MeitY, Government of India, 2021).

6 Sub-national heterogeneity in digital payments

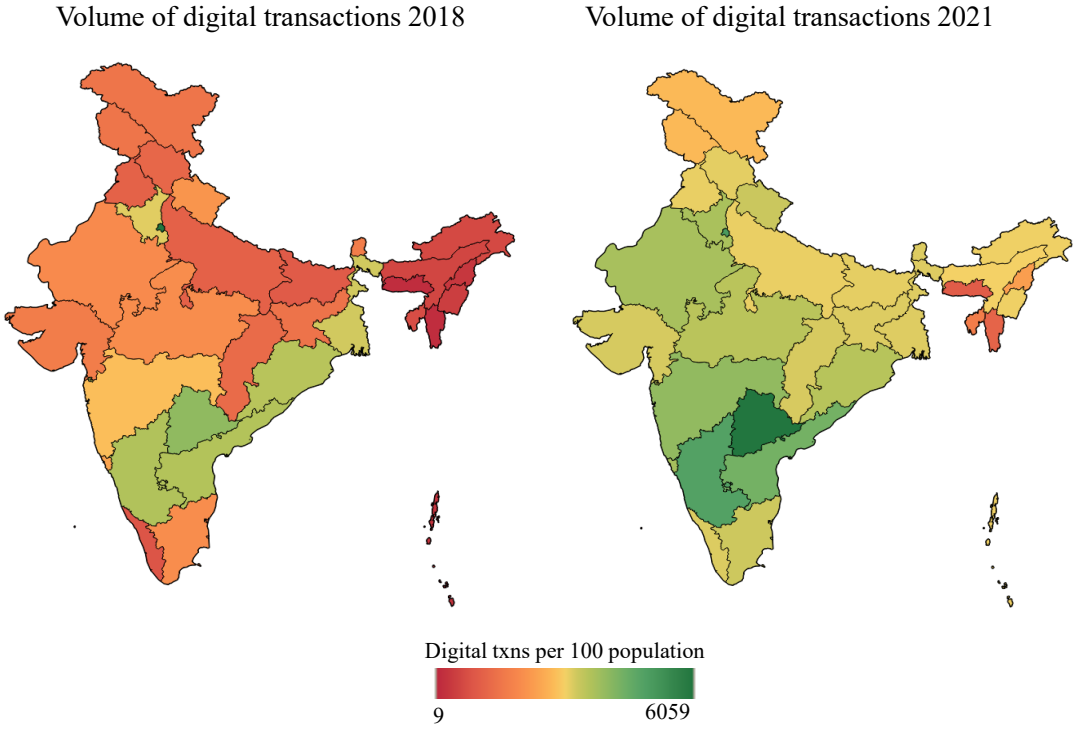
Next, we further delve into the sub-national level digital payment trends to better understand the disparities at a granular level. Figure 11 illustrates the digital transaction trends in sub-national economies over the past four years. In 2018, all sub-national economies, particularly in the Northern and North-eastern parts of India, had low digital payment penetration (refer to maps on the left in panels a and b). However, data from 2021 indicates a significant increase in both the volume and value of digital payments, driven by the pandemic's influence on people's bank account openings and the concurrent adoption of digital payment methods (Business Today, 2021). Despite this rise, digital payment penetration remains uneven across the country. Sub-national economies such as Telangana, Karnataka, Andhra Pradesh, Delhi, and Maharashtra recorded the highest number of transactions per 100 population, while Jammu & Kashmir, Mizoram, Meghalaya, Tripura, and Nagaland lag behind. A similar trend can be observed when considering the value of digital transactions as a share of sub-national economies' GDP.

Grassroots campaigns in the states such as Andhra Pradesh and Telangana, as well as the sizable rural populations of Bihar and Uttar Pradesh, have contributed to the adoption of digital payments in these regions. Additionally, various factors, including higher income levels, access to high-speed internet, better banking infrastructure, and reliable power supply, play a critical role in driving digital payments in these sub-national economies (Manikandan, 2020). More importantly, the proliferation of UPI-participating TPAPs has also bolstered the growth momentum in these states. Furthermore, digital literacy and familiarity with the English language have further propelled the growth of digital payments in the Southern and Northern regions. In contrast, the major obstacles preventing laggard sub-national economies from transitioning to cashless societies are their large rural populations, limited internet access, inadequate banking systems, and lack of language familiarity. Within rural areas, low smartphone and internet penetration, particularly among females, coupled with complex user interfaces of mobile applications, have hindered the uptake of digital payments (Bhalla, 2020). Lastly, the severity of COVID-19 outbreaks has played a role in the uneven adoption of digital payments. Notably, sub-national economies heavily affected by the virus and subject to continuous mobility restrictions, namely Uttar Pradesh, Karnataka, Delhi, Kerala, and Maharashtra, have experienced significant growth in digital transactions, as depicted in the Fig. 11 (The Economics Times, 2020).

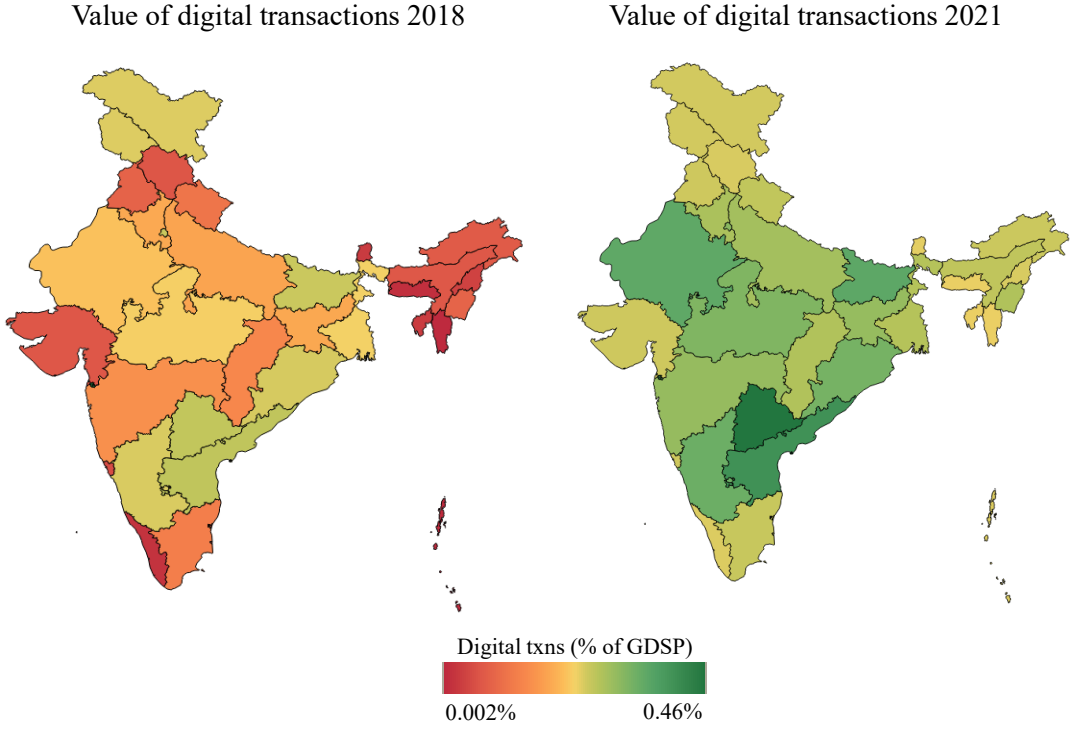
To understand the dynamics driving the digital payments boom in India, we also examine the digital consumption spending trends in a few selected economies. The digital consumption spending represents the total digital payments per registered user for

Figure 11: **Digital payment penetration in sub-national economies (2018-2021)**

(a) Digital payment transaction volume



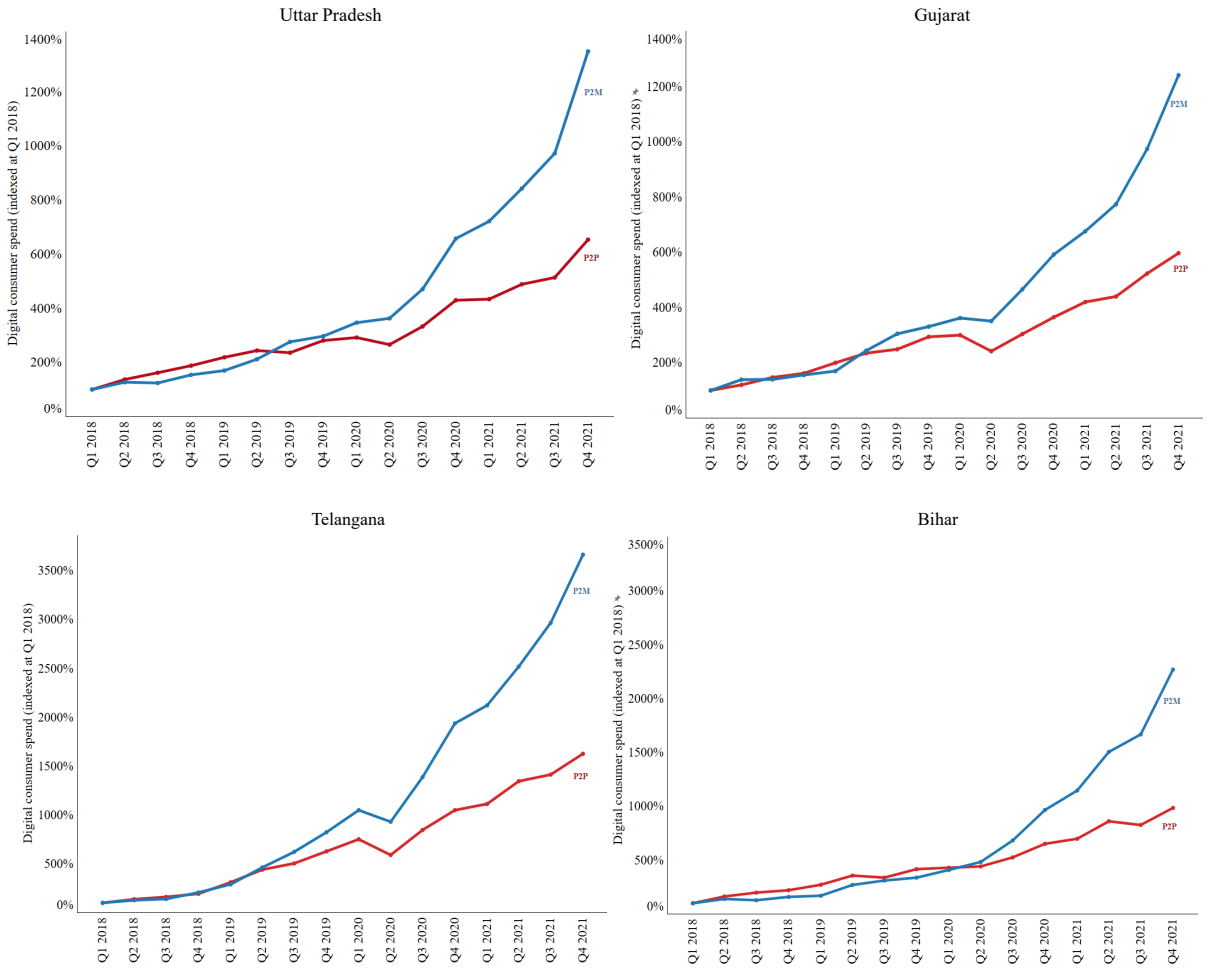
(b) Digital payment transaction value



Source: ACI calculations based on PhonePe Pulse data.

each sub-national economy. Figure 12 presents the quarterly digital consumer spending trend from 2018 to 2021 in four economically significant and politically consequential sub-national economies at different stages of digital payment adoption: Uttar Pradesh, Gujarat, Telangana, and Bihar. The figure shows that the growth of merchant payments (P2M) has outpaced peer-to-peer payments (P2P) in all the selected sub-national economies due to increased digitization among merchants. That said, the growth in P2M transactions varies due to differences in sub-national policy initiatives enabling digital payment adoption. Next, we discuss the policy experiences of Uttar Pradesh, Gujarat, Telangana, and Bihar, which enabled digital payment adoption.

Figure 12: **Digital consumption spending in select sub-national economies (standardised values), 2018-2020**



Source: ACI calculations based on PhonePe Pulse data.

Uttar Pradesh

Even before the pandemic, digital literacy campaigns organized by various private and public sector banks played a crucial role in educating a significant portion of the

population in small towns in Uttar Pradesh (HDFC Bank Ltd., 2017). This not only encouraged households but also micro-merchants, including local shopkeepers and street vendors to adopt digital payment methods (Business Standard, 2022a). During the national lockdown, both P2P and P2M digital transactions experienced a slight decline due to COVID-19 containment measures and economic contraction. However, in the subsequent quarters, digital transactions, particularly payments to merchants, witnessed exponential growth thanks to the sub-national government's efforts in promoting digital payments. The government directed the state administration to utilize common service centers in rural areas to promote digital transactions (Rawat, 2020). Using a first-of-its-kind technology-driven process, the Uttar Pradesh government selected 58,000 women as bank correspondents called 'Bank Sakhis' after the first wave of COVID-19 to provide banking services at the doorstep of rural households. These Bank Sakhis not only handled banking operations and promoted digital payments but also provided government services such as subsidies, pensions, and DBT payouts (Hindustan Times, 2020). PhonePe Pulse data reveals that digital payment methods have gained widespread acceptance and adoption among merchants in Uttar Pradesh, with the state boasting the highest merchant adoption rate of 49% on PhonePe's network (Business Standard, 2022b).

Gujarat

Similar to the Uttar Pradesh government, the Gujarat government initiated a digital payments awareness campaign in 2016 to endorse digital payments and promote the opening of new bank accounts under the Pradhan Mantri Jan Dhan Yojana (PMJDY) through special camps across districts (Times of India, 2016). Following the COVID-19 outbreak, digital transactions saw a significant surge, driven by concerns about using cash and increased awareness and ease of use of UPI technology (Times of India, 2021). Furthermore, the Ahmedabad Municipal Corporation (AMC) also implemented a ban on cash usage for food delivery and groceries, mandating digital payments for these services (Business Standard, 2020). To facilitate a smooth transition to digital payment methods, the AMC trained numerous fruit and vegetable vendors in downloading and using cashless transaction platforms like UPI.

Telangana

Unlike many other sub-national economies, Telangana had already established itself as a leader in digital payments even before the pandemic. Policymakers in the state took notable steps to encourage the public to adopt cashless transactions. In June 2017, Telangana became the first Indian state to introduce its official T wallet, enabling digital transactions for government and private merchant services (Dutta, 2017). Additionally, various grassroots innovations such as the launch of e-services in endowments and agri-

culture departments, expansion of Mee-seva services to mobile platforms, and the rapid roll-out of an optical fibre network contributed to Telangana's swift growth in the digital economy (Information Technolgy, Electronics & Communications Department, Government of Telangana, 2020; The Economics Times, 2021)[3]. During the pandemic, the state administration took proactive measures to implement UPI, enable card payments, and introduce QR codes in state entities including the road transport corporation, tourism corporation, state police eChallan, KBR national park, and Hyderabad metro water supply and sewerage board.

Bihar

One of the least digitally competitive sub-national economies, Bihar also experienced a significant surge in digital payments during the COVID-19 pandemic. Prior to the pandemic, digital payments in Bihar were minimal. However, there was an unexpected increase in digital payments during the pandemic driven by the success of the Bank Sakhi program across all 38 districts of Bihar (Pinto et al., 2020). In 2017, the Small Industries Development Bank of India (SIDBI) and Jeevika, a Bihar Rural Livelihoods Project, collaborated to promote alternative banking services and encourage people to utilize mobile payment applications for transactions. The state's bank correspondent (BC) model has not only accomplished its goal of ensuring access to financial services at the last mile but has also helped in narrowing the gender gap in banking services. Furthermore, Pradhan Mantri Garib Kalyan Yojna (PMGKY) cash transfers and less stringent lockdown restrictions increased spillover transaction activity and, at the same time, propelled people to use digital payment modes (Pinto et al., 2021).

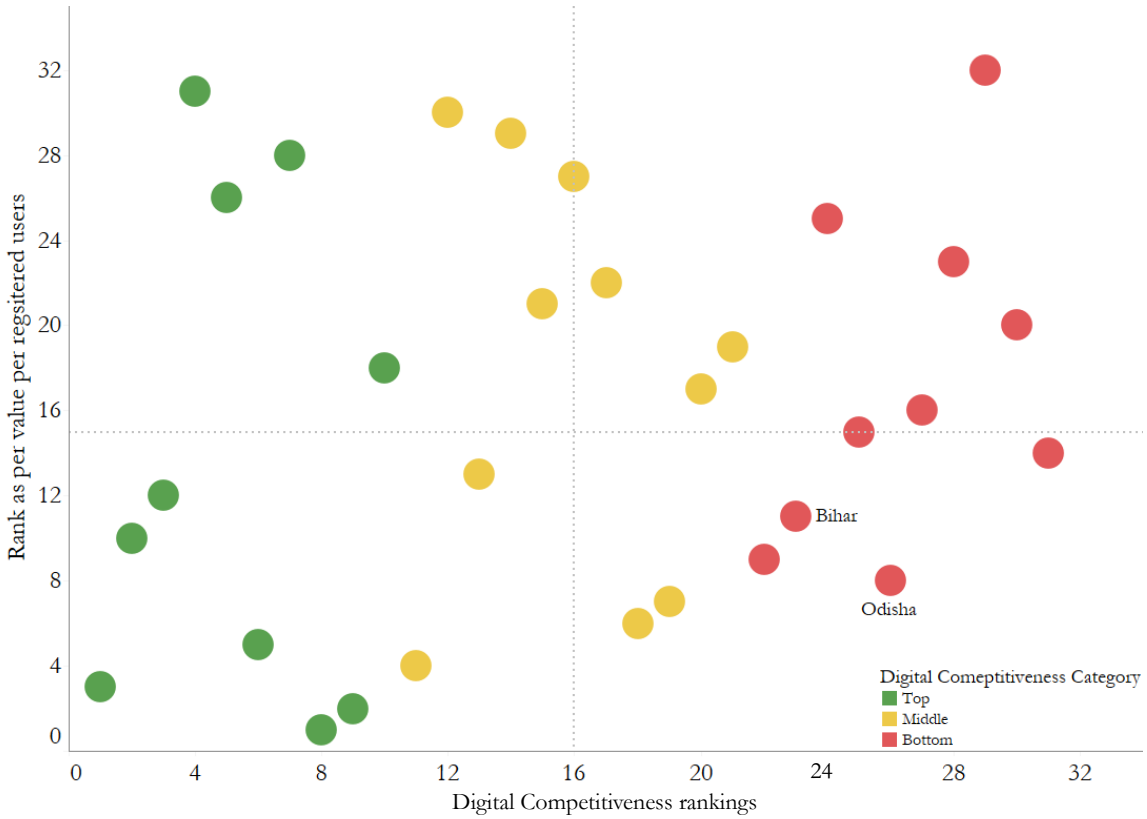
7 Linkages between Digital Competitiveness and Digital Payments

A strong digital payments ecosystem often arises when all participants in digital transactions are well-equipped and adept at using digital technology for making payments. However, as discussed earlier, certain sub-national economies leading the digital payments revolution in India may not necessarily be considered " digitally competitive". Figure 13 showcases the relationship between digital competitiveness Rankings (Zhang and Vaid, 2023) and the value of digital transactions. The X-axis represents the sub-national Digital Competitiveness Rankings 2019, whereas the Y-axis represents the ranking of the states

[3]Mee Seva is a single entry portal for a range of Government-to-business and Government-to-citizen services

as per the value of digital payments per user in 2021[4]. The scatter plot is colour coded based on the digital competitiveness category of sub-national economies in Top, Middle or Bottom. The horizontal and vertical dotted lines represent the median ranks. The first quadrant (bottom-left) comprises sub-national economies with top ranks in digital competitiveness and digital payments.

Figure 13: **Digital competitiveness vis-à-vis digital payments transaction value**



Source: ACI calculations based on PhonePe Pulse data and Zhang and Vaid (2023).

The bottom-right quadrant in Figure 13 shows that close to five bottom digital competitive sub-national economies became top economies engaging in digital payment transactions. Bihar and Odisha serve as interesting examples. Despite being placed in the "Bottom" group for both the Annual Competitiveness Index and Digital Competitiveness Index (Zhang and Vaid, 2023), Bihar and Odisha have recorded a high value of digital transactions per user. To comprehend the shift in their rankings, we next identify the underlying factors driving digital payments in these two sub-national economies.

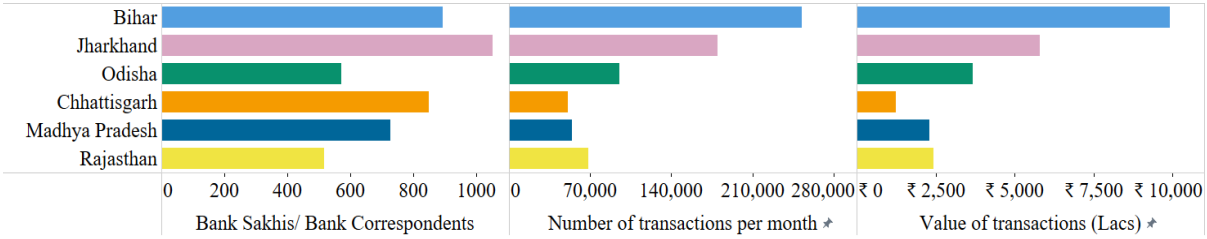
Bank Sakhis drive the digital payments boom in Bihar and Odisha: Reserve Bank of India, with the support of the central government, has actively promoted adopt-

[4]Refer to Appendix I for the 2019 Digital Competitiveness Rankings of Indian sub-national economies

ing the Bank Correspondent (BC) model, particularly in areas lacking traditional bank branches. BCs serve as intermediaries between the bank and customers, providing essential banking services on behalf of the bank. In rural India, where access to formal banking is limited, BCs play a crucial role in bridging the gap by offering basic banking services to local communities. These services include opening bank accounts, depositing and withdrawing money, and accessing loans and insurance. Moreover, BCs play a significant role in educating customers about the benefits of digital payments and providing training on digital payment platforms. They also address customer concerns, emphasizing the safety and security of digital payments. Notably, the deployment of BCs witnessed a significant increase during the COVID-19 pandemic, as many state governments engaged more BCs to ensure continued access to essential banking services, particularly in rural areas. Besides providing digital and contactless banking services, BCs played a vital role in the efficient disbursement of government relief funds to rural areas during that time.

The success of Bihar and Odisha's BC or Bank Sakhi programmes has played a significant role in driving the growth of digital payments in these states. As shown in Fig. 14, both Bihar and Odisha have witnessed a higher number of BCs or Bank Sakhis, resulting in increased volume and value of digital transactions per month (Pinto et al., 2020). The COVID-19 pandemic further emphasized the importance of Bank Sakhis as people sought to utilize cash transfers received under relief packages. Bank Sakhis worked tirelessly to provide essential banking services, particularly in rural areas.

Figure 14: **Scale of bank correspondent agents and digital payments in bottom digitally competitive Sub-nationals**



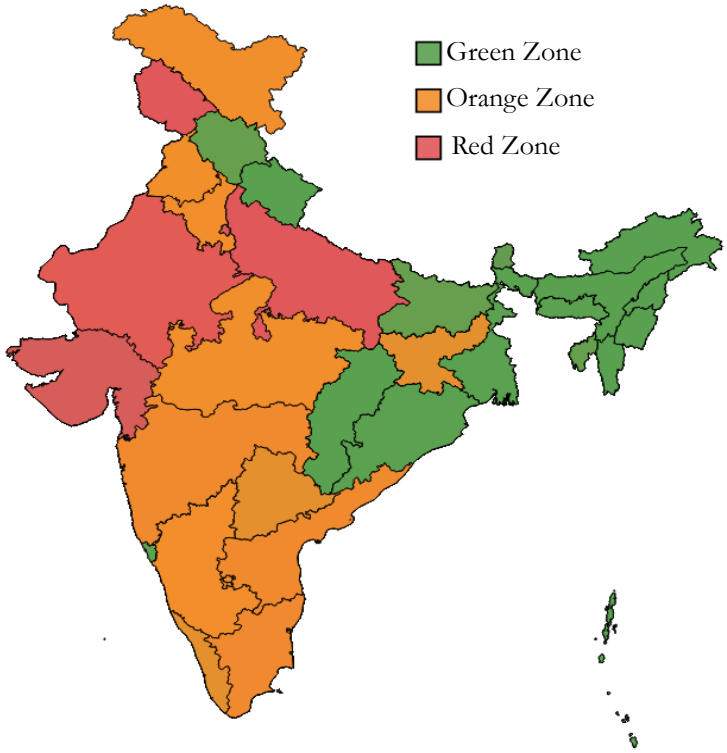
Source: MIS, 2020.

While Bihar and Odisha share similarities in their financial ecosystems, there are notable differences in their financial inclusion parameters which could explain the differences in the digital payments network in each state. Firstly, Odisha has a higher penetration of bank branches than Bihar, whereas Bihar has a larger number of private sector BC agents or "Bank Sakhis" due to its active inward-domestic-remittance corridor and higher population density. Secondly, although both states have successful Bank Sakhi programmes, the efficiency of the Bank Sakhis varies (Pinto et al., 2021). Data from a private sector

bank in Bihar reveals that, on average, 33 out of 40 rural Bank Sakhis performed at least one transaction per day from March 2020 to July 2020. In contrast, data from a public sector bank in Odisha indicates that, on average, 90 out of 126 BC agents performed at least one transaction per day during the same period. In summary, Bihar has a higher average number of transactions per BC agent compared to Odisha. Lastly, during the pandemic, Bihar relied more on the BC agent network, even for basic transactions, due to lower bank branch penetration than Odisha.

In the case of Bihar and Odisha, Bank Sakhis emerged as a crucial link that facilitated last-mile service delivery in the context of digital payments. Particularly during the pandemic, Bank Sakhis played a significant role in easing access to banking services, which in turn led to a surge in cash flows in rural areas. This was particularly evident in the two states as they had relatively less stringent COVID-19 restrictions which made interactions with Bank Sakhis and access to banking services comparatively more convenient than in other sub-national economies (see Fig. 15).

Figure 15: **COVID-19 containment zones**



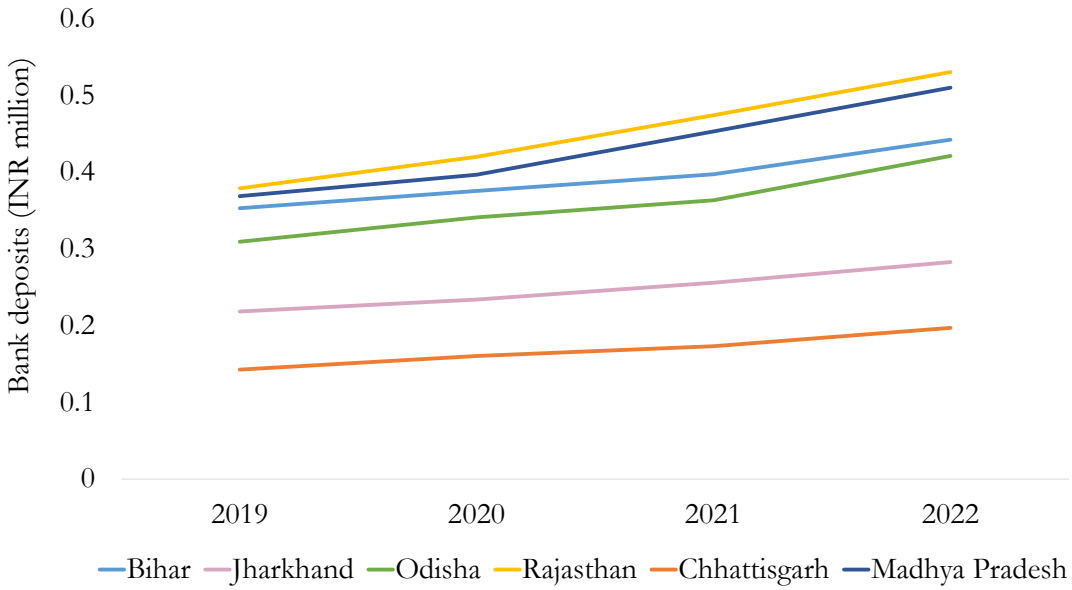
Source: ACI based on , 2020.

Note: The Red, Orange, and Green zones represent areas with the highest, limited, and few or no confirmed cases, respectively.

The steady increase in bank deposits during the pandemic years serves as a testament to the success of Bank Sakhis in ensuring a steady flow of cash, primarily through Di-

rect Benefit Transfer (DBT) transfers, into the rural economy (see Fig. 16). Moreover, the classification of Bihar and Odisha as green zones during the pandemic resulted in fewer restrictions on the operation of small and micro industries, as well as agricultural activities. This favourable condition contributed to the stability of rural incomes and consequently boosted bank deposits in these regions. The relatively relaxed regulations facilitated minimum economic activities, ensuring a steady flow of funds into the rural economy and reinforcing the positive impact of digital payment adoption in Bihar and Odisha.

Figure 16: **Bank deposits in bottom digitally competitive sub-nationals**



Source: ACI based on RBI data.

The presence of Bank Sakhis not only facilitated digital transactions but also promoted financial inclusion in underbanked regions. Bank Sakhis empowered individuals in remote areas to participate in the digital economy by acting as intermediaries and providing assistance in digital payment processes. The success of Bank Sakhis in ensuring increased cash flows and improving access to banking services highlights the transformative impact of this programme on rural communities of these sub-nationals during challenging times.

In contrast to their regional counterparts, Bihar and Odisha have demonstrated remarkable growth in digital transactions by capitalizing on their existing financial ecosystem and establishing a robust network of Bank Sakhis. Through these strategic measures, both sub-nationals have successfully fostered a conducive environment for digital payment adoption, resulting in significant progress in their respective digital transactions.

8 Concluding Remarks

The Covid-19 pandemic has resulted in a paradigm shift in India's payment habits, with a large pivot towards digital payments from a cash-based economy. Our analysis of the sub-national trends in India's digital payments landscape reveals evidence of regional disparities. Our results also report the weak linkages between the pre-pandemic digital competitiveness and post-pandemic digital payment transactions of sub-national economies. Bihar and Odisha exemplify this trend. Despite ranking low in digital competitiveness, both states experienced remarkable growth in digital payment transactions, primarily driven by their regional Bank Sakhi programme.

The success of India's digital payments ecosystem is a testament to the country's immense potential in the global digital technology arena. Recognizing this, the Government of India has strategically decided to expand the reach of its Unified Payments Interface (UPI) and associated solutions beyond its national borders. This expansion aims to facilitate secure and seamless cross-border transactions, including remittances, wherein India is the largest recipient. Furthermore, this move towards global expansion enhances interoperability, enabling seamless integration with payment systems of other countries.

Through collaborations with the National Payments Corporation of India (NPCI), India has forged partnerships with over 20 countries, effectively integrating its robust payment systems and solutions. As a result, these countries now accept India's payment systems, extending the benefits of safe and efficient digital transactions to an international user base. This strategic approach to digital diplomacy showcases India's commitment to spearheading technological advancements globally, leaving a lasting impact on the world stage.

In essence, India's digital payments revolution not only demonstrates its domestic success but also sets the stage for its influence and collaboration in the international realm. By leveraging its technological prowess and expanding its payment systems globally, India is poised to leave a significant imprint on the world, transforming how nations transact and paving the way for a more connected and digitally empowered future.

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A Appendix I

Table 1: **Overall Digital Competitiveness Ranking and Scores for 31 Sub-National Economies of India**

Rank	Economy	Score
1	Delhi#	3.00
2	Tamil Nadu	1.64
3	Maharashtra	1.57
4	Kerala	1.43
5	Gujarat	0.92
6	Chandigarh#	0.89
7	Goa	0.78
8	Telangana	0.74
9	Karnataka	0.47
10	Punjab	0.44
11	Andhra Pradesh	0.28
12	Uttrakhand	0.25
13	Haryana	0.19
14	Himachal Pradesh	0.06
15	West Bengal	-0.04
16	Manipur	-0.25
17	Uttar Pradesh	-0.30
18	Rajasthan	-0.31
19	Sikkim	-0.56
20	Chattisgarh	-0.66
21	Jharkhand	-0.74
22	Madhya Pradesh	-0.77
23	Bihar	-0.78
24	Meghalaya	-0.85
25	Arunachal Pradesh	-0.85
26	Odisha	-0.98
27	Nagaland	-1.05
28	Jammu & Kashmir	-1.05
29	Tripura	-1.14
30	Assam	-1.17
31	Mizoram	-1.24

Note: #Denotes federal territories.

The Top 10, Middle 11, and Bottom 10 groups constitute sub-national economies ranked 1 to 10, 11 to 21, and 22 to 31, respectively.

Source: Zhang and Vaid (2023)