

INTRODUCTION

Equitable economic growth has been an elusive goal for India's leaders since the nation became independent 75 years ago. Global trade has brought unprecedented foreign capital to the nation, culminating in the growth of industries like IT outsourcing. Despite India's rapid modernization, 10% of the population lives in extreme poverty.

Indian Prime Minister Narendra Modi began his term in 2014 and made economic growth a key priority. Drawing on his experience as the Chief Minister of Gujarat, Modi prioritized the targeting of corrupt actors and the digitalization of the Indian economy.

The most visible symbol of Modi's unorthodox economic agenda was the long lines that formed in front of banks throughout India in November 2016. As the government transitioned to a new series of bills, Indians queued to protect their life savings. Despite the dislocation, Indians looked upon this policy of *demonetization* favorably: They hoped that the conversion limits would penalize wealthy, tax-evading hoarders of illicit black money.

Additionally, the Indian government hoped that demonetization would usher in a broad embrace of digital banking technologies. Despite 80% of Indians having a bank account, transactions conducted through the banking system are far less ubiquitous.

Lastly, Indian leaders introduced Aadhaar, the world's largest biometric authentication database, to improve governance. The project has enjoyed support from leading economists and the Indian population; however, some concerning institutional problems have come to light.

DATA AND FINDINGS

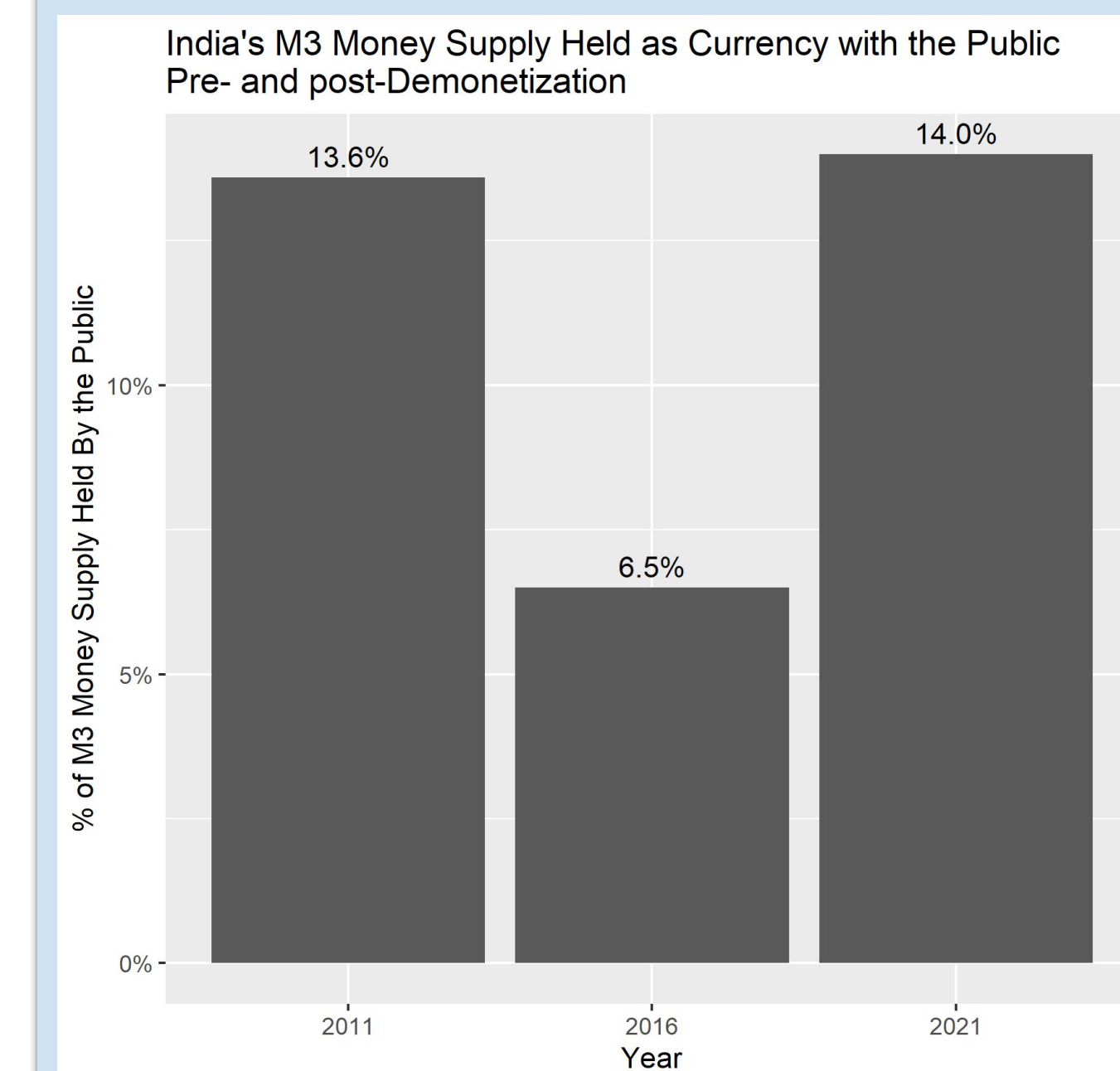


Fig. 1. The M_3 money supply is the sum of unbanked currency, checkable deposits, and time deposits. The Indian government hoped that demonetization, which occurred in November 2016, would hasten a long-term transition away from cash.

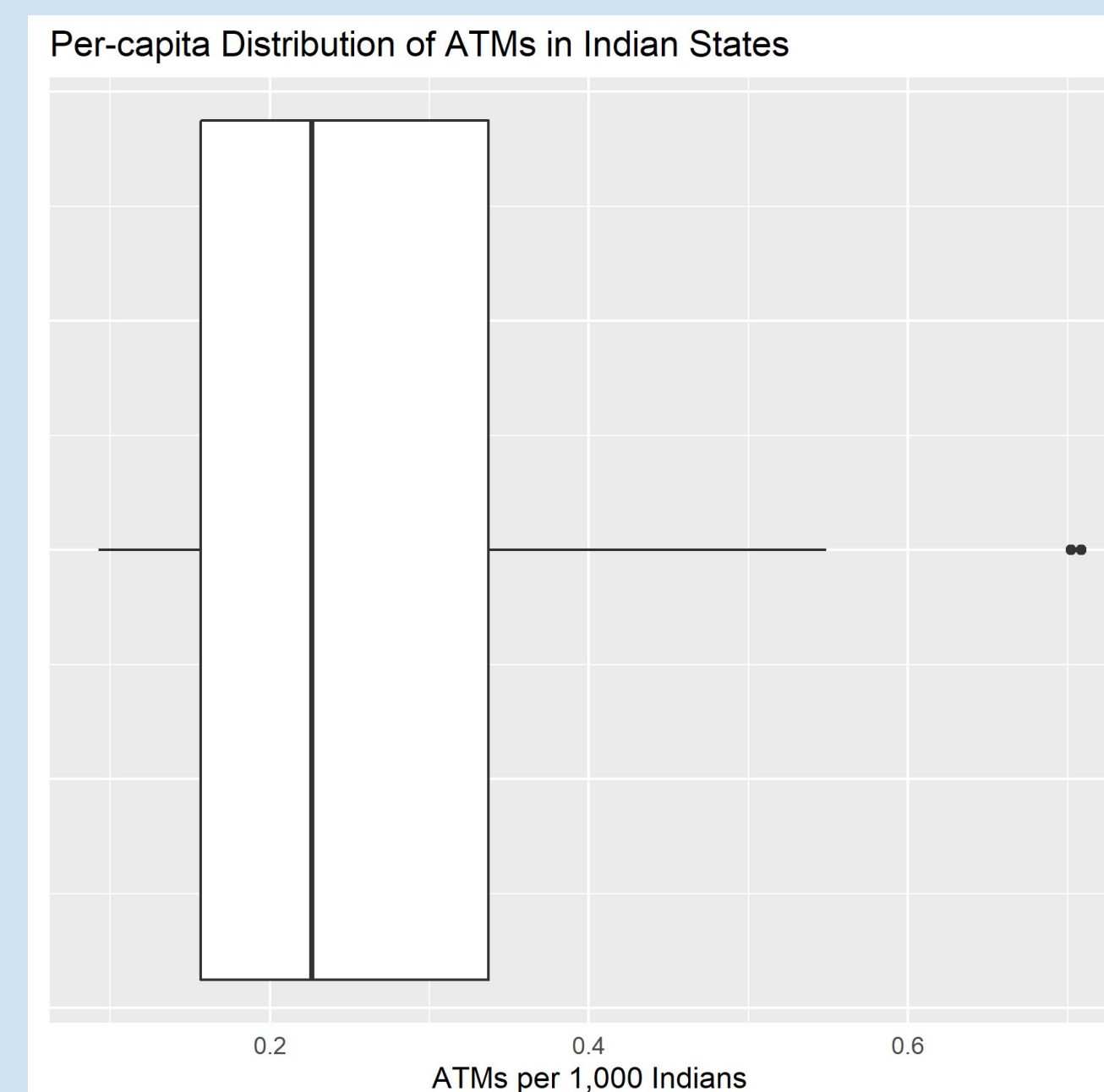


Fig. 3. ATMs would be a necessary intermediary to promote banking without disrupting exchange. Unfortunately, more than three-quarters of Indian states have fewer ATMs per 1,000 people than the global average of 0.4.

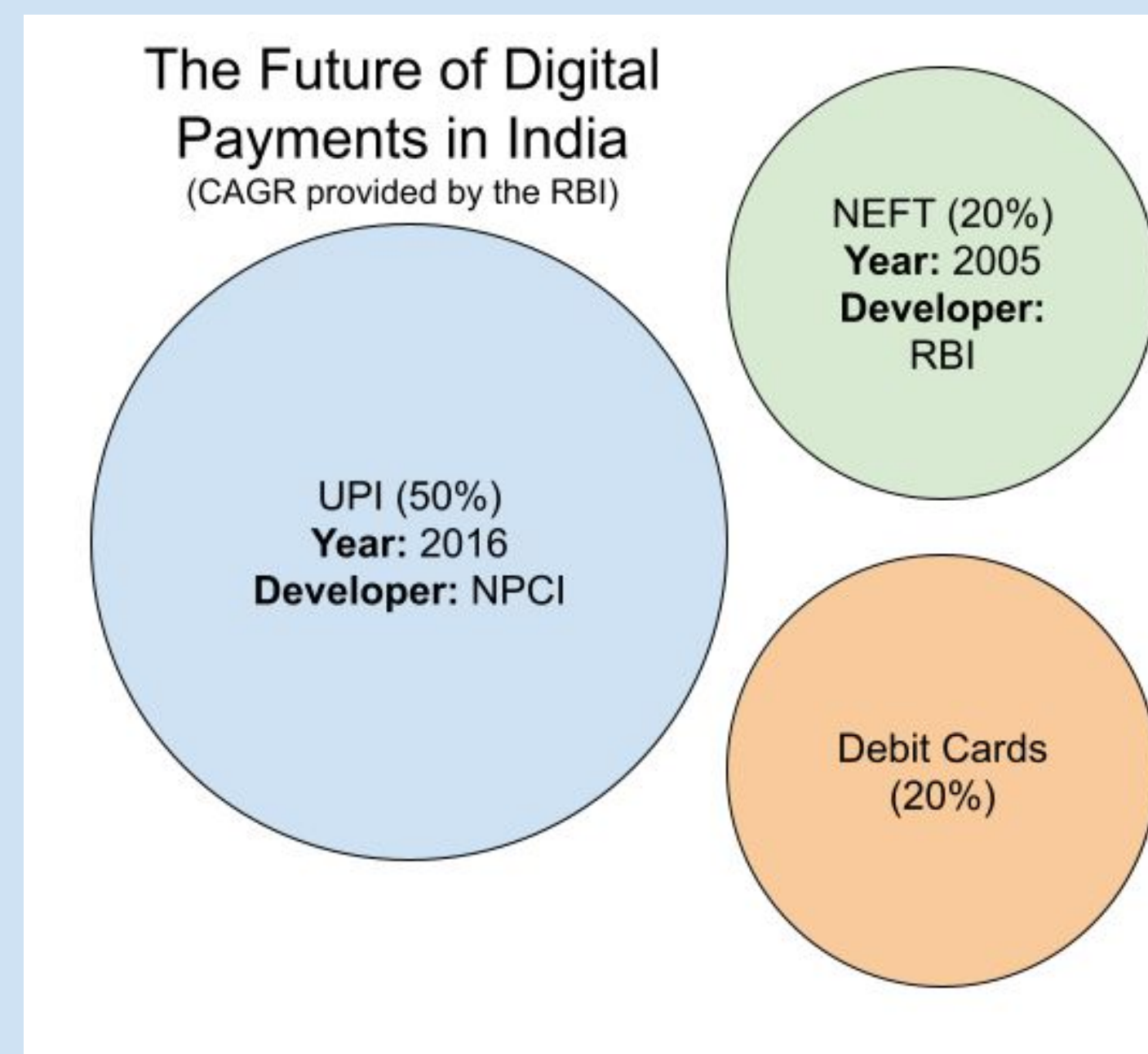


Fig. 4. India's robust technology sector has quickened the pace of financial system modernization. The Unified Payments Interface, used in apps like PhonePe, has simplified peer-to-peer transactions and online payments. Consequently, the RBI forecasts a projected 50% Compound Annual Growth Rate for the technology by 2025.



Fig. 2

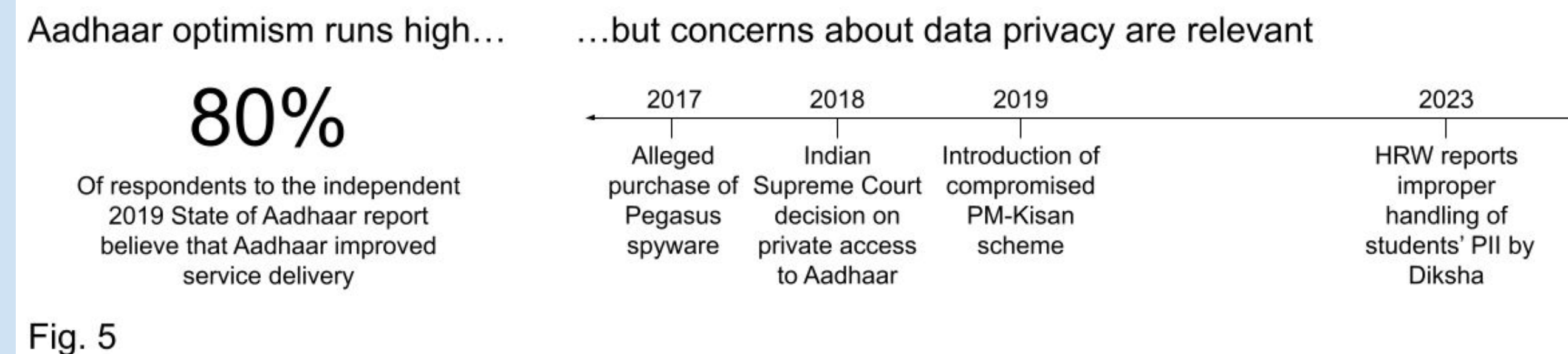


Fig. 5



Works Cited



Code for Plots

ACKNOWLEDGEMENTS

Special thanks to my grandfather, Dr. Hanumantha Rao Machiraju, an economist with the World Bank and Reserve Bank of India, for providing me with the inspiration to take on this project.

RESEARCH METHODOLOGIES

- **Meta-analysis:**
 - Synthesizing datasets to answer a question
 - Observational
- **Data Sources:**
 - *Quantitative:* Sourced from the Reserve Bank of India, the World Bank, and the media
 - *Qualitative:* Sourced from civil society organizations and the media
- **Analysis Tools:**
 - R programming language & ggplot2 framework
 - GitHub (versioning code & datasets)
 - GSuite productivity tools
- **Research Questions:**
 - How did the composition of India's M_3 money supply change?
 - How are banknote denominations distributed in India's cash economy?
 - How has sensitive data collected by the government been compromised in the past?
 - How do welfare beneficiaries feel about Aadhaar?
 - How is the number of ATMs per capita distributed across Indian states?
 - How has the use of digital banking shifted over time?
 - Which electronic banking protocols have the greatest forecasted growth? Why?

DISCUSSION, ANALYSIS, AND EVALUATION

Fig. 1 indicates minimal changes in the percentage of M_3 money supply held as currency by the public five years before and after demonetization. M_3 was chosen because it avoids overrepresenting the percentage of currency held by the public.

Fig. 2 illustrates the challenges of enforcing financial crimes in India through the *Prevention of Money Laundering Act (PMLA)*. PMLA and the *Foreign Exchange Management Act (FEMA)* penalize tax evasion, remittance fraud, and other illicit financial behavior. No convictions directly related to black money hoarding resulted from either of these laws.

Fig. 3 suggests that India's traditional financial infrastructure is lacking. Chandigarh and Goa are the frontrunners in ATMs per capita (roughly 0.7). However, per Fig. 4, public-private partnerships, like the *National Payments Corporation of India (NPCI)*, have led to high-growth new financial protocols, like the *Unified Payments Interface (UPI)*. Apps on the UPI network, like Paytm and PhonePe, witness rapid adoption, even for low-value transactions. Mobile banking loosens the chokehold of cash on the informal economy.

The Indian public feels optimistic about Aadhaar, despite skepticism from academics and the media (Fig. 5). Regardless, more institutional safeguards are needed to honor the public's trust. For example, despite the Indian Supreme Court's 2018 ruling forbidding private access to the Aadhaar database, certain vendors used it to perform Know Your Customer certifications. Additionally, coordination among institutions during breaches has been problematic: When students' PII from the Diksha learning app passed through unauthorized hands, neither the responsible private contractors nor the Education Ministry took ownership of the situation.

CONCLUSIONS AND NEXT STEPS

Though a novel experiment, demonetization was neither an economic nor law enforcement success. Black money is undoubtedly a problem in the Indian economy, but violators likely found ways to avert conversion limits, such as employing multiple individuals to convert their deposits.

Myriad factors influence the very low conviction rate of cases brought forward through the PMLA. Critics point to the political nature of certain investigations pursued by the Enforcement Directorate of the Finance Ministry.

Undoubtedly, digital banking apps are a **leapfrog technology**, enabling India to modernize its payment system without expanding traditional financial infrastructure. Though cash payments remain prevalent, more Indians conduct transactions digitally. Comparing the results of the **World Bank's Global Financial Inclusion** index survey indicates a **36% decrease** in respondents who receive their wages solely through cash between 2014 and 2021. The simplicity of UPI payments accounts for their unprecedented forecasted growth.

My research suggests that **data privacy** is the largest concern of Aadhaar's growth. Governance must be improved to prevent unscrupulous politicians from manipulating the system to achieve political goals, such as the compromise of **PM-Kisan in Assam**. This does not mean that other concerns are insignificant. Even when the **2019 State of Aadhaar** report was conducted, **102 million Indians** still lacked Aadhaar identification, **75% of whom were children**.

My conclusions about Aadhaar focus on the perspective of the Indian people. I suggest additional research into the government's claims about the administrative savings and waste curtailment of Aadhaar. Reetika Khara of IIT Delhi proposes three categories of welfare fraud: *eligibility*, *identity*, and *quantity*. She disputes government figures about Aadhaar's efficiency, attributing supposed gains to the exclusion of deserving recipients. Without additional data, however, reaching a conclusion is impossible.