#### CHAPTER 27

# **India Stack**

# Authority and Innovation in a New Financial Infrastructure

J. P. Singh

#### 1 Introduction

In 2009, the Indian government began work on introducing a twelve-digit biometric identity card known as Aadhaar, which means "foundation" in Hindi. By 2024, almost all adults in India had an Aadhaar ID, which has facilitated direct identification and provision of government payments to beneficiaries. In 2016, around the time there were one billion Aadhaar IDs, a Unified Payments Interface (UPI) was overlaid on Aadhaar to facilitate payments among banks. The third layer of the financial infrastructure, "Data Empowerment and Protection Architecture," is meant to secure and verify digital identities necessary for any transaction. The three-layered financial infrastructure has enabled almost seamless commercial transactions among consumers, vendors, and banks, from payments to a taxi driver to a utility provider. In 2023, identity verification moved increasingly toward cloud-based platforms such as the Aadhaar-backed DigiLocker, made possible through the Ministry of Electronics and Information Technology (MEITy). The three infrastructural layers of identity, payments, and verification have made "India Stack" possible: The set of application programming interfaces (API) that, in February 2024, generated 8.6 billion transactions monthly, worth \$170 billion (Indiastack.org, 2024). India's vibrant startup culture, which largely rests upon the ease of making payments, would not be possible without India Stack.

Artifacts have politics (Winner, 1980). India Stack is no exception. The term stack implies a physical layering, in this case of APIs above the identity and payment layers. Understood in an infrastructural sense, the layering results from the actions of multiple agents, including the state, business, and society. This chapter discusses the political economy facets of the relationship between the Indian state and the unlikely rollout of a mega-scale financial architecture such as India Stack. How did a state historically inadequate at providing public goods at scale roll out a postindustrial project of megaproportions in record time? What are the distributional outcomes and the social meanings that arise from such an undertaking?

The short answer lies in the three interrelated c's of state legitimacy in India: calculation, coercion, and creativity. The interrelationships show that the current "materiality" of India Stack rests upon the historical continuations of - or (in some cases) departures from - collective understandings in society and business about the role of the state. The longer explanation focuses on the three c's in more detail: (1) The financial architecture parallels the Indian state's historical habits of authority or postcolonial calculations that favored large-scale projects; (2) the calculations now encompass the imagination and creativity of groups such as India's skilled and entrepreneurial IT talent; and (3) state legitimacy in India purportedly mobilizes market provision for social inclusion (e.g., in the name of "financial inclusion"), but like artifacts, markets also represent politics. While a supposedly inclusive financial infrastructure is made available to over a billion people, a set of coercive and exclusionary adjacent policies have raised surveillance and human rights concerns regarding minority religions and civil society groups, and have led to an overall decline in India's democracy.

The India Stack project, described later in this chapter, strengthens state authority through bureaucratic and technical creativity. State authority is also enabled through a set of historically contextual cultural and economic calculations - and coercions. The financial infrastructure reflects the prerogatives of state meaning-making or legitimacy through what anthropologist James Scott terms an "administrative ordering of nature and society" (Scott, 1998, p. 4). The India Stack project also belies claims about the weakening of the postcolonial state that cannot make territories and people "legible" or provide them with material comfort (p. 2). This underestimates the idea that the state is weak, as well as the state calculations about demographics and coercion enabled through digital networks that rest upon the identity of citizens. It is often argued that postcolonial states such as India turn to authoritarian populism as, in their view, neoliberal economic policies fail to encourage social inclusion and

employment (Chacko, 2018). This chapter shows state calculations about demographics and coercion are enabled alongside creative provision of goods and services through the India Stack architecture.

The administrative ordering of Indian society through the Aadhaar identity card thus sits alongside the state's historic monopoly on violence (Tilly, 1985). Arjun Appadurai notes that recognizing "calculative action as a central feature of twentyfirst century economics" is important for understanding how financial markets (or capitalism in general) function (Appadurai, 2012, p. 14). This calculative tradition can be traced to the classical political economies of Adam Smith, Karl Marx, or Max Weber. Understanding the social meanings and distributional impact of India Stack entails situating its utilitarian calculations within the political and cultural anthropology of everyday life in India. As Chapter 1 of this volume notes, an "infrastructural gaze helps piece together and pierce through the complexities of finance" but "big-picture concerns of power, authority, legitimacy" in this chapter are revealed through the three interrelated aspects of calculation, creativity, and coercion.

From the introduction of railroads and telegraph in colonial India to fintech in the postcolonial twenty-first century, the constitution of authority and governance in India has been based on technology.

#### 2 Calculations

Infrastructures are material artifacts with social and political meaning (Biejker, Hughes, and Pinch, 2012; Bernards and Campbell-Verduyn, 2019). The technoimaginary found in policy is indicative of political and social possibilities for the present and the future (Jasanoff and Kim, 2013). Rodima-Taylor and Campbell-Verduyn (2023, p. 17) note "how collectively held visions (imaginaries) materialize into existing sociotechnical relations (infrastructures)." Imaginaries and infrastructures, therefore, reveal calculations from states and providers

about the intended beneficiaries and the collectively held meanings by the providers and the users of the infrastructure. In India's case, the calculations of the Indian state and bureaucracy have been crucial to the technoimaginary informing infrastructures, the latest iteration being India Stack.

A historic example in India is that of railways. More was spent on raiways than on any other forms of infrastructure in India during the colonial era. The railways safeguarded British governance and investments. In postcolonial India, railways became a key means of transport and an indispensable part of India's indigenously focused importsubstitution industrialization strategy. From 1924, during the colonial era, until 2016 the Indian railways budget was presented to parliament as separate from the union (or federal) budget because of railwayss' importance to the country. It was not a coincidence that the railwayss' and union budget were combined in 2017, just as India turned its attention to postindustrial infrastructures.

While railways and telegraphs were considered important to the British Empire's governance of India, the telephone, which is now at the core of India Stack, was viewed as a luxury in postcolonial India and deemed unimportant for development (Singh, 1999; see also Handel, this volume, for an analogous understanding of the telegraph). Instead, postcolonial imaginary emphasized the radio, and later television, for developmental communication. Programming was colored by secular and inclusive constitutional norms (regardless of the reality of Indian society). The field of development communication coevolved with such communication infrastructures in India and other parts of the developing world (Gudykunst and Mody, 2002). Radio and TV broadcasting companies, along with a limited number of telecommunication providers, were either entirely state-owned or were public goods.

Three types of calculations from the Indian state, starting in the 1980s, pushed India toward thinking about new types of information-driven infrastructures that would later form the basis for Aadhaar and

India Stack. First, India had a bureaucratic and engineering skillset that would assist with these efforts. The calculations from the Indian state rely on "sarkar" or a vast bureaucracy and elected officials with huge influence over people's daily lives. At the top of the hierarchy is a set of officials from the Indian Administrative Service (IAS) who constitute an elite meritocracy within the state. In 2023, there were about 5,000 IAS bureaucrats in the country, with around 180 IAS selected yearly from over a half a million people who take the competitive civil service exams every year. Nothing in postcolonial or current India moves forward without the consent or vision of IAS officials. Therefore, the rollout of India Stack involved several IAS officials who either aided (or thwarted) the Aadhaar and other efforts.1 India has also developed important science and technology education institutions in the postcolonial era - the foremost being the Indian Institutes of Technology - that provide graduates with the skillsets to make an IT-led infrastructure feasible. Interestingly, nearly two-thirds of those selected from the highly competitive Indian Civil Services exams are from engineering backgrounds (Economic Times, 2023). Natural science and engineering fields historically made it easier for examinees to score high on the civil service exam and get selected.

Second, India began prioritizing telecommunication in its development strategies in the 1980s and information technologies starting in the 1990s, and moved away from the state provision of telecommunications. While the rollout of telecommunications until 2000 was slow, that of mobile telephony after 1999 through private firms grew exponentially. By the end of the first decade of cell phone provision there were over 600 million cell phone subscribers, and, by 2020, over a billion. Beginning in 1991, India also veered away from its Import Substitution Industrialization (ISI) strategy to allow private actors to provide goods and services that had traditionally been seen as public goods. The state had provided landline telephones, but the private sector was allowed into the mobile telephony

market. One of the main failures of the ISI strategy was an overly regulative state known as the license-quota-permit-Raj. As India liberalized, there were corruption scandals, some of the biggest being around spectrum allocation for mobile provision. Nevertheless, parallel developments provided some regulatory oversight through the Telecommunication Regulatory Authority of India and Telecom Disputes Settlement and Appellate Tribunal, which together sought to create impartial rules and ensure interoperability among providers.

Third, the colonial and postcolonial Indian state, in contrast to most in the developing world, had and has a high capacity for collecting statistics and calculating demographics. In doing so, the state has employed "a cadastral lens" that simplifies and makes visible some characteristics of populations over others (Scott, 1998). The ten-year census survey was a prime example. In 2002, the central government proposed a National Population Registry (NPR) that would serve as a precedent for and, later, a competitor to the Aadhaar program. There was a security dimension in maintaining a population register, as proposed by Prime Minister L. K. Advani, leader of the Hindu-aligned Bharatiya Janata Party (BJP) that currently governs India under Narendra Modi. A controversial Citizenship Amendment Act (CAA) in 2019 extended Indian citizenship to persecuted religious minority refugees from neighboring countries, except if they were Muslim. CAA set off fears and protests that even Indian Muslims would face discrimination in proving their citizenship.

The historical precedent in the three calculations presented is apparent in the dirigisme and the skillsets within the state, and was fostered through public institutions and the state's imagination about its demographics. There were other connections, such as those reflecting the ISI strategy. The shift to information technologies featured Indigenous solutions. Narayana Murthy, CEO and founder of Infosys, one of India's biggest IT firms and one of the four firms in the country with a market capitalization above \$100 billion,

mentioned the 500-line switch from government's Center for Development of Telematics in the 1980s as a foundational vision that would assist India's adoption of IT and spread rural telephony (Murthy and Murthy, 2009, p. 114). The market liberalization strategy did not immediately dismantle state ownership. In fact, initially it endowed state officials with tremendous power to decide between corporate winners and losers, and it resulted in many well-known corruption scandals.

The introduction of Aadhaar in 2009 followed the three aforementioned calculations, and linked them with finance and biometrics. The Unique Identification Authority of India (UIDAI) was created as a government body to assist with Aadhaar efforts. Nandan Nilekani, one of the Infosys founders, was brought in from the private sector to lead UIDAI. Nilkeni's appointment is representative of collaboration with the private sector and reflects the growing economic and political importance of information technologies. The first Aadhaar card was issued in September 2010 and, by 2024, there were 1.31 billion Aadhaar cards in the country. Nilekani relied on a team of industry and highly competent bureaucrats, including several IAS officers, to plan the Aadhaar strategy (Ramnath and Assisi, 2018). Aadhaar was initially conceived as a voluntary ID card to facilitate the provision of public goods, especially income transfers and government subsidies, which were enjoyed by nearly half of the Indian population. By one estimate, before Aadhaar was launched only 15% of government subsidies reached the intended beneficiaries because intermediaries would siphon off some of the funds (Raghavan, Jain, and Varma, 2019). An Aadhaar registry would facilitate payments directly to the beneficiaries.

# 3 Creativity

Aadhaar was initially planned as a voluntary scheme, but it increasingly took on compulsory dimensions for Indian citizens and became a central and inescapable

component of proof of identity in India. Aadhaar identity is now a prerequisite for verification for almost all private and public services. Aadhaar is also the foundation of the financial infrastructure in India that links banks with public and private providers of goods and services. Although conceived by the Congress-led central government in India, the current BJP-led government embraced it in 2014 when it came to power. Therefore, the India Stack project also reveals continuities rather than breaks in the Indian state's historical steerage of its financial infrastructure.

The term creativity is employed in this section for the financial affordances or possibilities enabled through the India Stack platform described later in the chapter (Earl and Kimport, 2011). The creativity of India Stack lies in affordances that were unavailable earlier. This includes payments and receipts, access to public records, registrations, and – most importantly – the foundational layer for the startup culture in India that has benefited from the API architecture that rests upon Aadhaar and the UPI payments system.

Aadhaar from its inception was conceived as an infrastructure that would enable other platform or layers to be stacked upon it. Bernards and Campbell-Verduyn (2019) point out five characteristics of infrastructures, which include their facilitation, openness, and centrality to a variety of activities, their durability over time, and their relative obscurity operating in the background. The uniqueness lies in tracing the scale and the interconnections that allowed the platform to grow and take on several functions. Transfer payments employing the Aadhaar platform began to be made in 2014 through a central government program called PMJDY (Prime Minister's Jan Dhan Yojana), which entailed opening bank accounts through the biometric identification inherent in Aadhaar. By 2018, there were 310 million bank accounts associated with this program (Ramnath and Assisi, 2018, p. 128) and in 2022 there were 460 million (Financial Times, 2022).

The next step came in 2016 with the launch of the UPI enabled through the

National Payments Corporation of India, a nonprofit jointly owned by major banks, which made all banking transactions interoperable. The unique feature of UPI was that it enabled transactions across various payment systems such as Paytm (launched in 2010), Google Pay, and Amazon Pay. After its entry in 2017, Google Pay both boosted and accounted for over half the transactions through UPI. The government launched its own interface for interoperable transactions, called Bharat Interface for Money or BHIM, which enabled transactions among users; this was ostensibly also to deflect the critique that all major existing applications were commercial or foreign owned.

The integration of Aadhaar with UPI and BHIM fed into the creation of India Stack and associated digital security measures that have further boosted the fintech industry and associated startup culture in India. Almost all apps in India are part of India Stack and operate through the underlying UPI. Recent work showing the overlap of often-state-enabled and widely accessible infrastructures with ICT-driven platforms is useful here (Plantin et al., 2018; Westermeier, 2020): The infrastructural layer comprising Aadhaar and UPI overlaps with the set of open interfaces or the platform known as India Stack. India Stack fits the conceptualization of platform capitalism (Sell, 2022).

India's experience has attracted global attention. The digital ID and fintech interfaces being developed globally now regularly cite the Aadhaar and India Stack platforms, and Indian writers - politicians, business leaders, and journalists - point out at length that the experience has attracted attention from international organizations such as the World Bank and the International Monetary Fund, global platforms such as Microsoft and Google, and multiple national governments (Nilekani and Shah, 2016; Ramnath and Assisi, 2018; Kant, 2019). While the creativity of India Stack is often praised in the West and India, the underlying coercions are largely overlooked.

Section 4 describes India's struggles with data laws but, in the meantime, the

technical solutions being developed have led to the MEITy developing the electronic eKYC (Know Your Customer) and DigiLocker as cloud-based services for consent-based digital identity verification. Aadhaar founder Nandan Nilekani has described the platform as follows: "the Aadhar program has now conclusively proven that we need not look only to the Silicon Valley of the world for cutting-edge innovation in technology" (Nilekani and Shah, 2016, p. 46).

# 4 Coercion

The legitimacy of any infrastructure rests upon the way that state, commerce, and society are co-constituted. Sections 2 and 3 have described the calculations and creativity of state and commerce. This section turns to society and its collective understandings and participation in India Stack. Economic sociology rejects the view that states and markets are in opposition to each other or that the increasing role of one decreases that of the other (Block and Evans, 2005). They are, in fact, co-constituted, and market rules are often embedded in social understandings of the roles economic actors perform (Granovetter, 1985). A social understanding that accepts the authority of state and business would be one where the state, through its "cadastral lens," (p. 47) produces a "prostrate civil society" (Scott, 1998, p. 5). In a hierarchical postcolonial society such as India, the temptation to produce a prostrate civil society with authority and coercion, the basis of state legitimacy, is always present. Meritocratic bureaucrats used to enforcing top-down rules or technocrats designing engineering utopias may have scant regard for involving civil society, or fail to understand how social norms and civil society function in a democratic polity. Unfortunately, state coercion has increasingly replaced active and explicit societal consent as the financial infrastructure has evolved in India.

There are two ways to examine the role of society in India Stack. One looks at the direct involvement of societal actors in deliberating

and formulating the rules that went into the formation of India Stack. However, infrastructures also reflect their political environments and societal hierarchies (Winner, 1978). A polity's overall vision and rules informing societal engagement with the state are, therefore, equally important. Both are discussed in what follows.

The Congress Party-led government, in power until 2014, had a difficult time passing legislation that would make Aadhaar a legal instrument. At issue was its status as a voluntary instrument when introduced, to it increasingly becoming a compulsory undertaking. Eventually the legislation was passed as a "money bill" in the Indian Parliament in 2016. Money bills do not require the consent of the upper house, and so are easier to pass. A civil society challenge to the money bill did not succeed in the Indian Supreme Court. The plaintiff in both Indian Supreme Court cases was a retired judge from the Karnataka High Court and the cases are known as the Puttuaswamy cases after him.

The societal contestation over Aadhaar and India Stack at first glance might point at anything other than a prostate civil society. For example, a successful civil society challenge from the Internet Freedom Foundation in 2016 defeated moves that would have compromised net neutrality. Another challenge resulted from Aadhaar's data collection and breaches, and fears regarding the surveillance capacity of the state or other actors with access to Aadhaar data. One of the most fundamental revisions to the legal framework came from a 2017 Supreme Court case that enshrined privacy as a fundamental right in India and enjoined the central government to come up with a data privacy framework. In August 2023, the Indian Parliament passed the Digital Personal Data Protection Act (DPDPA). It was critiqued for providing enormous powers to the central government and introducing the language of "deemed consent" or implicit consent of individuals rather than explicit consent (Sabharwal, 2023). In early 2024, the Editors Guild of India, a national journalists' organization, filed a petition with the government, noting that "deemed

consent" could also be used against journalists reporting any story about individuals.

The preceding narrative points to legal recourse for Indian civil society and journalists, but this is in the context of legal charges being filed against journalists by the BJP-led central and state governments for reporting unfavorably about Aadhaar and of widespread attacks on civil society organizations in India. The rollouts of Aadhaar and India Stack have been top-down processes with hardly any direct consultation with Indian society. Therefore, most accounts of civil society engagement are either in the form of challenges in courts to the infrastructure or to the perceived legitimacy of these state maneuvers. An analysis from Mahrenbach and Pfeffer (2023) showed the declining legitimacy of Aadhaar in the first 10 years of its operation from an analysis of nearly 250,000 tweets.

This analysis tracks a period when the Aadhaar efforts were new and during the time when the Supreme Court cases took place. Critiques of Aadhar are hard to find on Twitter now, especially from media and civil society leaders, and press freedom has declined in India. The restrictions on civil society groups and nongovernmental organizations continue to increase.

Most broad indicators about democracy or democratic deliberation in India present a bleak picture. India's rank in the World Press Freedom Index at its inception was 80 in 2002, declining to 122 in 2010, and in May 2023 stood at 161 out of 180 countries. In 2000, the V-Dem scores for Indian democracy were as follows: 0.66 for deliberative democracy, 0.97 for electoral democracy, 0.58 for liberal democracy, and 0.48 for participatory democracy (see Figure 27.1). In 2022, these score had declined substantially from being at par with prosperous liberal democracies to among the lowest worldwide: Deliberative democracy was 0.29, electoral democracy 0.4, liberal democracy 0.31, and participatory democracy 0.26 (Coppedge et al., 2023).

Civil society involvement has been marginal in the evolution of Aadhaar and India Stack. The Indian government can claim electoral mandate and global attention as constitutive of societal consent. As shown, India continues to decline on almost all measures of democracy. Society is envisioned mostly as a recipient or a consumer in India Stack calculations rather than as a deliberative entity – questioning, contesting, or engaging with Aadhaar and India Stack policies. With the decline of deliberation, Scott

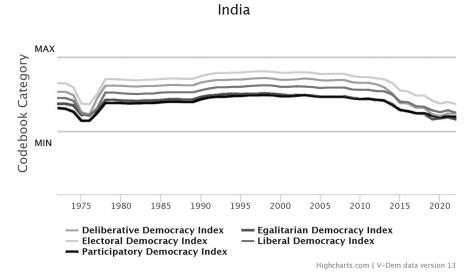


Figure 27.1 V-Dem scores for India, 1972–2022. Source: Author's elaboration based on data in Coppedge et al. (2023).

(1998, p. 4) is right in calling attention to a "prostrate civil society" whose primary interaction with the infrastructure is to partake of its core functions that have been internalized as collective understandings.

# 5 Conclusion

The three c's discussed in this chapter each reveal alternative facets of India Stack across different realms of state authority in India. The state's infrastructural gaze has been central to the endeavor of the fintech infrastructure that offers both continuities and departures from the way the Indian state has functioned historically. With the liberalization of Indian markets in the 1990s, the envisaged pluralistic political-economy realm in liberal thought, in which firms would check state power, has instead evolved into the coproduction of state legitimacy and coercion through an identity-based infrastructure that the state controls. Large-scale projects often consolidate state control and coercion (Acemoglu and Robinson, 2012).

From the railroads to artificial intelligence (AI), large infrastructures are part of the legacy of state techno-imaginaries in India. The state authority sector in India is understaffed: There are only 3.2 million federal government employees for a population of 1.4 billion people (Sinha, 2023). State authority is better understood as unrivaled and farreaching, especially through the actions of its competitively selected bureaucracy - the IAS – two-thirds of which is now drawn from engineering schools. Nevertheless, these vast infrastructural calculations have included Indigenous capacity-building, whether the locomotives or engines for the railroads, or the rise of Indian startups and unicorns for the AI infrastructure.

The Indian fintech infrastructure, enabled in its everyday usage through the India Stack platform, is unique and is already looked up to as a development model by several developed and developing countries and international organizations. In the mid-2010s, India seemed to be behind in fintech

and in mobile money infrastructures (Singh and Flyverbom, 2016), and it seemed that the extant banking sector and government regulations had thwarted mobile money efforts. Instead of allowing mobile payments through SIM cards, as the pioneering Kenyan government did for M-Pesa, the Indian government demanded that bank accounts be linked to these payments. In hindsight, the rollout of Aadhaar and the UPI, and the facilitation of government payments and subsidies, have led to an exponential increase in bank accounts and, subsequently, mobile money in India. The identity and payment layers have also now led to India Stack being central to India's vibrant startup sector with regard to information technologies and AI. Despite the continuities, the departures also demonstrate a creative state. The twenty-firstcentury Indian state works closely with business; the twentieth-century postcolonial state kept it at arm's length.

There has always been a beneficial payoff for the Indian state in large infrastructures. For the British Empire, technologies of telegraph and the railroads were those of colonial extraction and of maintenance of the empire. Postcolonial India arguably needed these same forms of carriage and communication to extend governance over a vast territory and people. The railroads budget had symbolic importance and railroads were part of the popular imagination of being Indian. The fintech architecture, endorsed by all political parties in power for the last fifteen years, extends and expands the control of the Indian state. The license-quota-permit-Raj is gone. Businesses now grow in a liberalized marketplace and the classic British or postcolonial Raj or governance is history. In its place is the identity-surveillance-silencing Raj of an increasingly autocratic Indian state. The fintech architecture both represents and replicates that control.

Do AI-driven fintech architectures or all platform architectures in AI drive toward autocratic control? At the core of AI is data that identifies people (in this case Aadhaar), which is activated through algorithms for service provision – be this social media or

fintech applications. However, the indicators correlating AI infrastructures with autocracy point to a mixed picture (Singh et al., 2025).

First, there are dissimilarities across AI infrastructures themselves. Not all states with fintech and AI offer a similar architecture with inadequate data controls. The European Union, with its 2016 General Data Protection Regulation and 2023 AI Act, is a strong exception, but even countries such as Kenya and Colombia have strict regulations on data. Second, the debate on platforms and their entanglement with the state needs further research and evidence before grand claims can be warranted. For every grand claim, there is contestation. India's fintech architecture works within a controlling state, but also with continuities of history and enormous creativity. India's precipitous decline in V-Dem and press freedom scores is also not unique. The 2023 V-Dem report on the state of democracy worldwide is ominous and points to a decline in democracy in the Global North and South (Papada et al., 2023). The democracy levels in 2022 worldwide were those of 1986, with the most precipitous declines in Asia-Pacific, followed by Latin America and Central Asia. V-Dem makes special note of the decline in India. The declines in democracy seem correlated with per capita incomes more than how deeply AI fintech infrastructures have permeated a country. Our own policy research also shows that there are varieties of AI infrastructures with varying values across states, and it would be inaccurate to correlate all AI platforms with autocracy (Singh et al., 2025).

This chapter has provided evidence that large infrastructures in the past and fintech infrastructures in the present are both steered by, and contribute to, state authority and control in India. There is not enough evidence to state definitively that fintech infrastructure and platform economies always lead to democratic decline, but the negative evidence cannot be dismissed either, including the centralization and manipulation of large national or even global data sets to service a few firms or states. Similarly, the thesis that neoliberalism has created an

underclass in India that must be controlled through authoritarianism needs questioning: The India Stack architecture recently, and neoliberalism since 1991, have created affordances and a secular rise in overall incomes. This chapter locates the rising authoritarianism instead in historical social factors and political calculations.

# Acknowledgments

Thanks are due to the editors of this volume for detailed feedback. This research is supported by a \$1.389 million grant from the Minerva Research Initiative (2022–2025) and a Fulbright-Nehru Professional Excellence Award September 2022–January 2023.

#### Note

1. The UIDAI, which administers Aadhaar, was not associated with any ministry until 2016 and, therefore, faced opposition from powerful IAS officials within ministries such as home affairs, which was developing the NPR. Interestingly, in 2016, UIDAI was integrated into MEITy, which has now overtaken several other government ministries, such as commerce, in India's central government hierarchy of importance.

### References

Acemoglu, D. and Robinson, J. A. (2012) Why nations fail: The origins of power, prosperity, and poverty. New York: Crown Publishers.

Appadurai, A. (2012). "The spirit of calculation." *The Cambridge Journal of Anthropology*, 30(1), pp. 3–17.

Bernards, N. and Campbell-Verduyn, M. (2019) "Understanding technological change in global finance through infrastructures: Introduction to review of international political economy special issue 'the changing technological infrastructures of global finance'," Review of International Political Economy, 26(5), pp. 773–789.

Biejker, W. E., Hughes, T. P., and Pinch, T. (2012) The social construction of technological systems, anniversary edition: New directions in the

- sociology and history of technology. Cambridge, MA: MIT Press.
- Block, F. and Evans, P. (2005) "The state and the economy" in Smelser, N. J. and Swedberg, R. (eds.), *The handbook of economic sociology*. Princeton, NJ: Princeton University Press, pp. 505–526.
- Chacko, P. (2018) "The right turn in India: Authoritarianism, populism and neoliberalisation," *Journal of Contemporary Asia*, 48(4), pp. 541–565.
- Coppedge, M., Gerring, J., Knutsen, C. H., Lindberg, S. I., Teorell, J., Altman, D., Bernhard, M., Cornell, A., et al. (2023) *V-Dem codebook v13*. Available at: https://v-dem.net/(Accessed June 27, 2023).
- Earl, J. and Kimport, K. (2011) Digitally enabled social change: Activism in the internet age. Cambridge, MA: MIT Press.
- The Economic Times (2023) "64% selected UPSC civil servants were engineers, reveals government data," December 8 [online]. Available at: https://economictimes.indiatimes.com/news/india/64selected-upsc-civil-servants-were-engineers-reveals-governmentdata/articleshow/105837647.cms?from=mdr (Accessed February 17, 2024).
- Financial Times (2022) "Unpacking India's claim that its digital prowess reduces graft," August I [online]. Available at: www.ft .com/content/69Ido52I-7f47-4aI9-8ab5-fd59207f696d (Accessed August 2, 2022).
- Granovetter, M. (1985) "Economic action and social structure: The problem of embeddedness," *American Journal of Sociology*, 91(3), pp. 481–510.
- Gudykunst, W. B. and Mody, B. (2002) *Handbook* of international and intercultural communication. Thousand Oaks, CA: SAGE.
- Indiastack.org (2024) "Home" [online]. Available at: https://indiastack.org/ (Accessed February 17, 2024).
- Jasanoff, S. and Kim, S.-H. (2013) "Sociotechnical imaginaries and national energy policies," *Science as Culture*, 22(2), pp. 189–196.
- Kant, A. (2019) Incredible India 2.0: Synergies for growth and governance. New Delhi: Rupa Publications India.
- Mahrenbach, L. C. and Pfeffer, J. (2023) "Measuring political legitimacy with Twitter: Insights from India's Aadhaar program," *New Media & Society*, 25(10), pp. 2704–2723.
- Murthy, N. and Murthy, N. N. (2009) Better India: A better world. Gurgaon: Penguin Books India.

Nilekani, N. and Shah, V. (2016) Rebooting India: Realizing a billion aspirations. London: Penguin UK.

- Papada, E., Altman, D., Angiolillo, F., Gastaldi, L., Köhler, T., Lundstedt, M., Natsika, N., Nord, M., et al. (2023) "Defiance in the face of autocratization," Democracy Report, Varieties of Democracy Institute (V-Dem Institute), University of Gothenburg.
- Plantin, J.-C., Lagoze, C., Edwards, P. N., and Sandvig, C. (2018) "Infrastructure studies meet platform studies in the age of Google and Facebook," *New Media & Society*, 20(1), pp. 293–310.
- Raghavan, V., Jain, S., and Varma, P. (2019) "India Stack: Digital infrastructure as public good," *Communications of the ACM*, 62(11), pp. 76–81.
- Ramnath, N. and Assisi, C. (2018) The Aadhaar effect: Why the world's largest identity project matters. New Delhi: Oxford University Press.
- Rodima-Taylor, D. and Campbell-Verduyn, M. (2023) "Reimagining blockchain in a pluriversal world: Digital land governance in the Global South and the metaverse," *Anthropology Today*, 39(4), pp. 17–20.
- Sabharwal, A. (2023) "India's Digital Personal Data Protection Act (DPDPA) demystified," *Forbes*, November 15 [online]. Available at: www.forbes .com/sites/forbestechcouncil/2023/11/15/indias-digitalpersonal-data-protection-act-dpdpa-demystified/?sh=2d500b1e5c1c (Accessed February 18, 2024).
- Scott, J. (1998) Seeing like a state: How certain schemes to improve the human condition have failed. New Haven, CT: Yale University Press.
- Sell, S. K. (2022) "Twenty-first-century capitalism: A research agenda," *Global Perspectives*, 3(1), Article 35540.
- Singh, J. P. (1999) Leapfrogging development? The political economy of telecommunications restructuring. Albany, NY: State University of New York Press.
- Singh, J. P. and Flyverbom, M. (2016) "Representing participation in ICT4D projects," *Telecommunications Policy*, 40(7), pp. 692–703.
- Singh, J. P., Shehu, A., Dua, M., and Wesson, C. (2025) "Entangled Narratives: Insights from Social and Computer Sciences on National Artificial Intelligence Infrastructures," *International Studies Quarterly*. International Studies Quarterly, Volume 69, Issue 1, March 2025, sqafoo1, https://doi.org/10.1093/isq/sqafoo1.
- Sinha, S. (2023) "Budget data: Employee strength in central ministries and departments to reach 35.55 lakh on March 1 next year," *Hindu Business Line*, February 5 [online]. Available at: www.thehindubusinessline.com/news/

national/employeesstrength-in-central-min istries-and-deptartments-to-reach-3555-lakh-onmarch-1-next-year/article66473963.ece/ (Accessed June 15, 2023).

- Tilly, C. (1985) "War making and state making as organized crime" in Evans, P. B., Rueschemeyer, D., and Skocpol, T. (eds.), *Bringing the state back in*. Cambridge: Cambridge University Press, pp. 121–139.
- Westermeier, C. (2020) "Money is data: The platformization of financial transactions," *Information, Communication & Society*, 23(14), pp. 2047–2063.
- Winner, L. (1978) Autonomous technology: Technicsout-of-control as a theme in political thought. Cambridge, MA: MIT Press.
- Winner, L. (1980) "Do artefacts have politics?," *Daeduls*, 109(1), pp. 121–136.