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Tailwinds

How governance and grievance change moves across India, and how to forecast it

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ABSTRACT

Weather and influenza forecasters map where change is and where it is heading, and score themselves against outcomes. This working paper argues that governance research in India can do the same by treating governance change as something that moves over institutional distance: the administrative ladders, schemes, organisations and community networks that carry it. Three demonstrations on public data show the range. Right-to-services laws spread across Indian states as a front, with no more neighbour-to-neighbour contagion than chance would produce. Natural farming spread as a wave, carried by farmers, self-help groups and resource persons, with state and national policy following the practice. The Unified Payments Interface, a national rail carried by private apps and merchants, began as a wave of district-to-district take-off and finished as a nationwide front, and crossed state borders without a seam. The paper sets out carriers and brakes of rule diffusion as testable propositions and describes how forecasts can be made usable, in the sense of fit, interplay and interaction.

KEYWORDS

institutional diffusion; governance; digital payments; usability; forecasting; commons; India

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Weather services and influenza forecasters show where a front or an epidemic is now, where it is heading, and how confident they are; they score themselves every season against what actually happened. Environmental and governance research in India now rests on excellent data libraries and evidence maps, built patiently by public agencies and research institutes. They make the next step possible: showing how a rule, a shock or an exclusion travels from a ministry to a district to a household, and forecasting where it will arrive next.

This paper argues that governance change moves over *institutional distance*, the distance along the administrative ladders, schemes, insurers and networks that carry it, rather than across the map. This public edition presents three demonstrations on public Indian data: a law that moved as a front, a farming practice that moved as a wave, ahead of policy, and a payment rail that began as a wave and finished as a front. Further demonstrations and the forecasting architecture are available to partners on request. It closes with what would prove the idea wrong and what each reader can do with it.

13 of 22

states that adopted a right-to-services law after the first had an earlier-adopting neighbour: no more than chance ($p = 0.43$). The law moved as a national front.

DERIVED

+0.15 quarters

added by a state line to the gap in UPI take-off between neighbouring districts, which cannot be told from zero: a national payment rail crossed state borders without a seam.

DERIVED

1.76 million

farmers in Andhra Pradesh's community-managed natural farming by 2025, up from 40,000 in 2016: a practice carried by farmers and self-help groups, with national policy arriving in 2024.

REPORTED

1

The problem: libraries of snapshots

India now publishes more governance data than it ever has. The India Data Portal at the Bharti Institute of Public Policy, Indian School of Business, relaunched on 31 October 2023 with 120 datasets and more than 3,400 indicators under a "visualisations first" approach, and it keys its data to Local Government Directory codes so that datasets can be joined. The Ministry of Statistics and Programme Implementation launched eSankhyiki on 25 November 2024 with an application programming interface for official series. Evidence gap maps, promoted by 3ie and others, chart where impact evaluations exist and where they do not.

This paper owes these efforts a great deal; the demonstrations below would not be possible without them. Each answers the question *what is the value here, at this moment*, and answers it well. Building on them, a further set of questions comes within reach, the ones a district collector, an insurer or a farmer organisation most often asks: where is this change coming from, how fast is it moving, where will it arrive next, and who sits in its path. Evidence maps show what we know; the natural complement is a map of what is moving.

The usability literature gives this complement its terms. Lemos, Kirchhoff and Ramprasad (*Nature Climate Change* 2, 2012) describe "a gap between what scientists understand as useful information and what users recognize as usable in their decision-making," and show that information becomes usable through its fit with the decisions users face, its interplay with the knowledge they already hold, and the quality of interaction between those who produce it and those who use it. A forecast of where governance change is heading is one way to carry India's data libraries further across that gap.

Other fields made this leap. The Famine Early Warning Systems Network has projected food insecurity since 1985, founded after the 1984 to 1985 famines in Sudan and Ethiopia. The ViEWS system publishes monthly forecasts of political violence. The Centers for Disease Control and Prevention has run the FluSight challenge every season since 2013 to 2014, and its ensemble forecast ranked among the top performers every year. The field has also learned from Google Flu Trends, which predicted more than double the doctor visits for influenza-like illness recorded by the CDC in 2012 to 2013, and missed high in 100 of 108 weeks from August 2011, a lesson Lazer and colleagues drew with generosity: new data work best as a supplement to measurement on the ground.

Taken together, the lesson is exact. Forecasting social change is possible when four things exist together: a state variable measured the same way everywhere, frequent observation, a model of how the change propagates, and a loop that scores forecasts against outcomes. Governance research in

India already has much of the first two, thanks to the portals above; the third and fourth are the open opportunity.

2

What the field already knows

Geography gave the study of diffusion its founding text. Torsten Hägerstrand's *Innovation Diffusion as a Spatial Process* (1953; English translation 1967) showed that innovations spread through neighbourhood contact, hierarchy and barriers, and that their spread could be simulated. Political science later specified why governments copy one another: Shipan and Volden (*American Journal of Political Science* 52(4), 2008) distinguish learning, economic competition, imitation and coercion by higher levels of government.

Network epidemiology supplied the missing geometry. Brockmann and Helbing (*Science* 342, 2013) showed that complex spatiotemporal patterns of disease reduce to simple, regular waves once conventional geographic distance is replaced by an effective distance defined over the travel network, and that this distance predicts arrival times even when the epidemiological parameters are unknown.

The synthesis is the open opportunity. Diffusion research in the social sciences has explained adoption with great care; the next step is to map the medium that carries change and to publish forecasts that can be scored.

3

Institutional distance

The central proposition is that governance change travels along institutional channels, and that distance measured along those channels predicts its spread better than distance on the map. Two neighbouring districts on either side of a state line can be further apart, institutionally, than two districts a thousand kilometres apart that share a state government, an insurer and a scheme portal.

The channels are specific. Change moves down Uphoff's ten levels of decision-making, from the national to the individual; through the delivery chains of schemes and the firms that run them, such as insurers, banks and oil marketing companies; through party and bureaucratic networks between states; and through markets, kin and migration. A wave of exclusion that starts with a national mandate reaches a household only after it has passed through each of these links, and each link can amplify it, delay it or stop it.

Three propositions follow, and each is testable with public data:

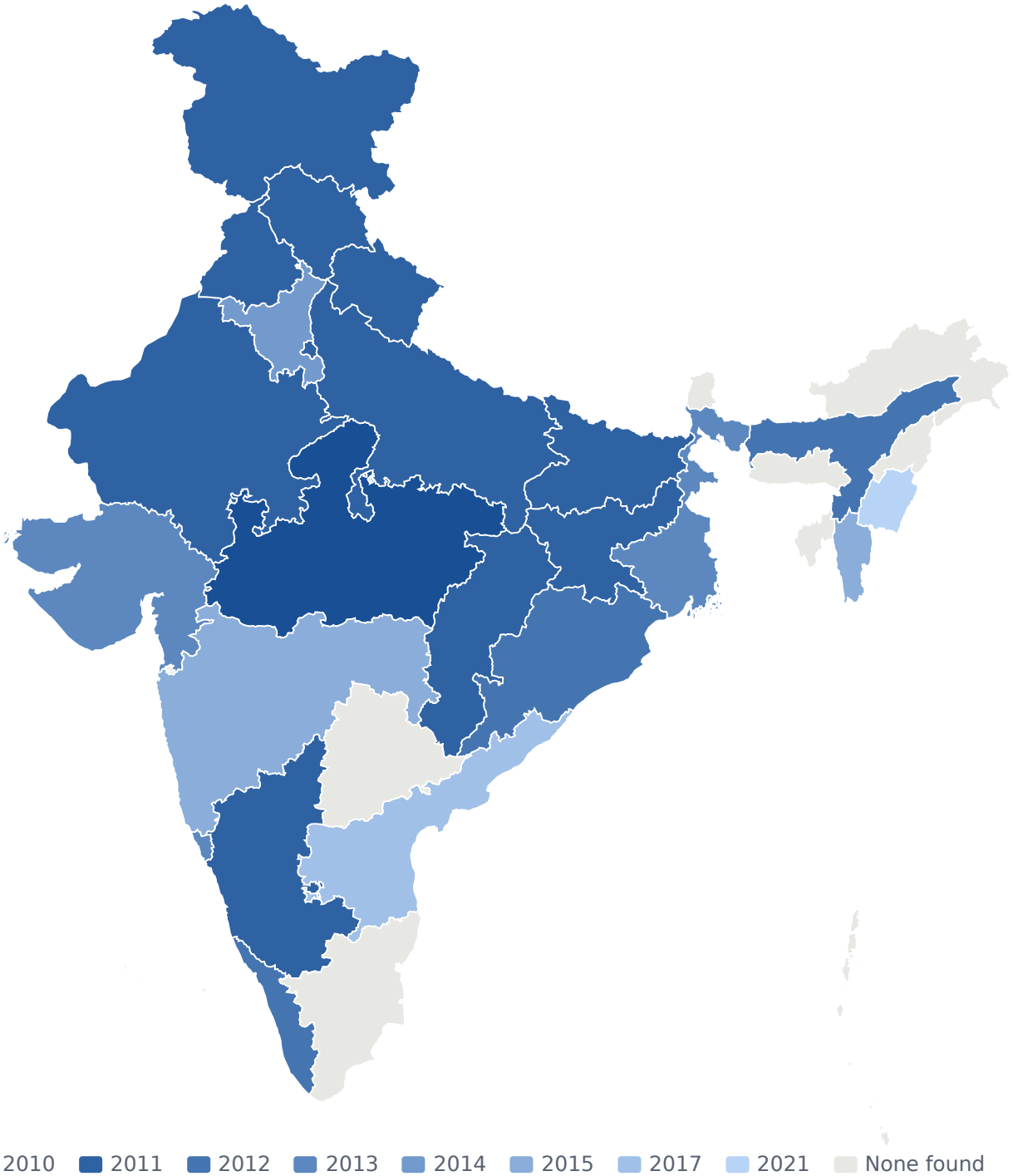
1) Where a change is carried by state institutions, neighbouring districts in different states will diverge more than neighbouring districts in the same state. **2)** Where a change is carried by a national signal, adoption will arrive as a front across many states at once, with little neighbour-to-neighbour contagion. **3)** Where a change is carried by a mandate, grievances will follow exclusion with a measurable lag, and their time signature will reveal the mandate before official statistics do.

4.1

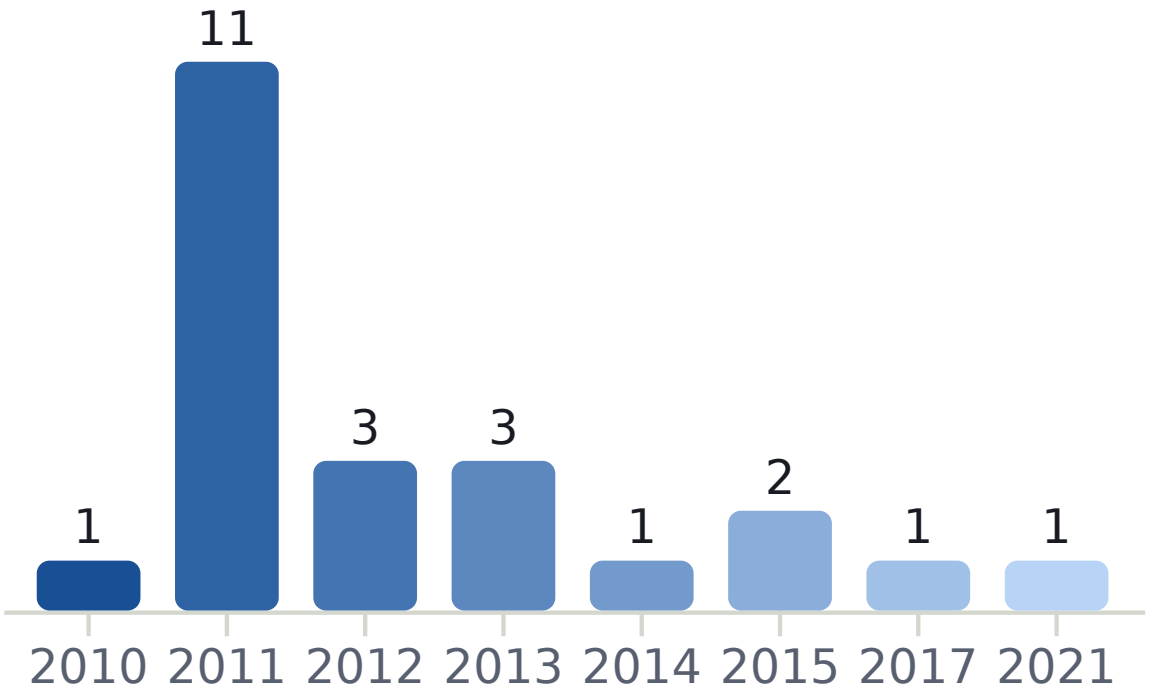
A law that moved as a front, not a wave

Madhya Pradesh enacted the first public services guarantee law in India on 18 August 2010. By 2021, twenty-three states and union territories had right-to-services laws, and eleven of them enacted theirs within calendar year 2011. If these laws spread by neighbourly learning, a state should be more likely to adopt after a neighbour has. The test compares the observed share of adopters with an earlier-adopting neighbour against the share expected if adoption years were shuffled at random among the same states.





ADOPTIONS PER YEAR



59%
followers with an earlier neighbour (observed)

56%
expected if years were random (5,000 shuffles)

p = 0.43
chance of a share this high by shuffling

Figure 1. Right-to-services laws by year of enactment. States in grey had no such law in the sources consulted. Hover a state for its act year, the party in government, and any neighbour that adopted first. Enactment years from the Wikipedia list of state laws, SAFAR's scoping study (Andhra Pradesh, 2017) and PRS India (Manipur, Act 8 of 2021); party in government coded from state records and flagged for verification.

Of the 22 states that followed Madhya Pradesh, 13 (59.1%) had a neighbour that adopted in an earlier year. Shuffling the adoption years 5,000 times among the same states produces an average of 56.2%, and a share at least as high as the observed one 43% of the time. There is no evidence that neighbours carried the law.

The pattern is a front. Adoption crossed party lines, with ten laws passed under Bharatiya Janata Party governments, six under Congress governments and seven under seven other parties, and it arrived in a single year across the north, the south and Jammu and Kashmir. That is the signature of a national signal acting on many states at once; in Shipan and Volden's terms, imitation and pressure from above rather than learning from neighbours. The burst of 2011 coincided with the national anti-corruption mobilisation of that year, a plausible carrier that this test cannot confirm.

> **LIMITS**
>
> Seventeen of the twenty-three dates are known only to the year, so neighbours that adopted in the same year count as simultaneous, which biases the neighbour share downward. The list comes from a secondary

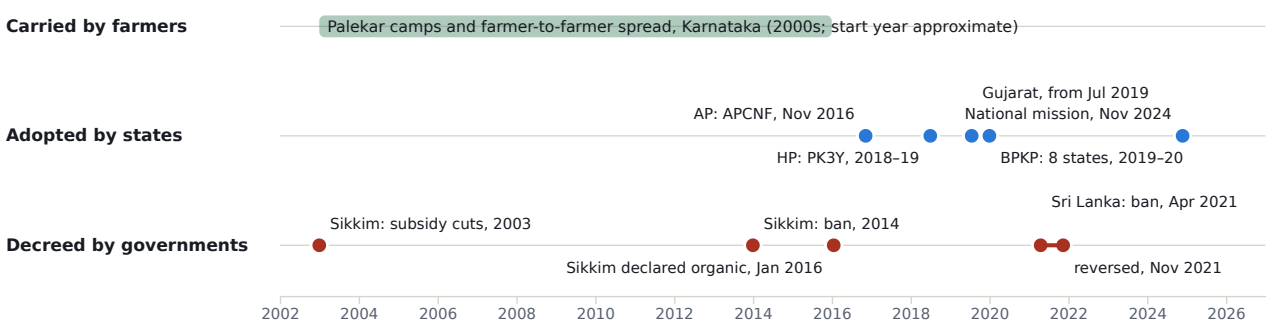
> compilation and should be checked against each act on India Code. The test has little power with twenty-three events; it can reject strong contagion, not detect a weak one.

4.2

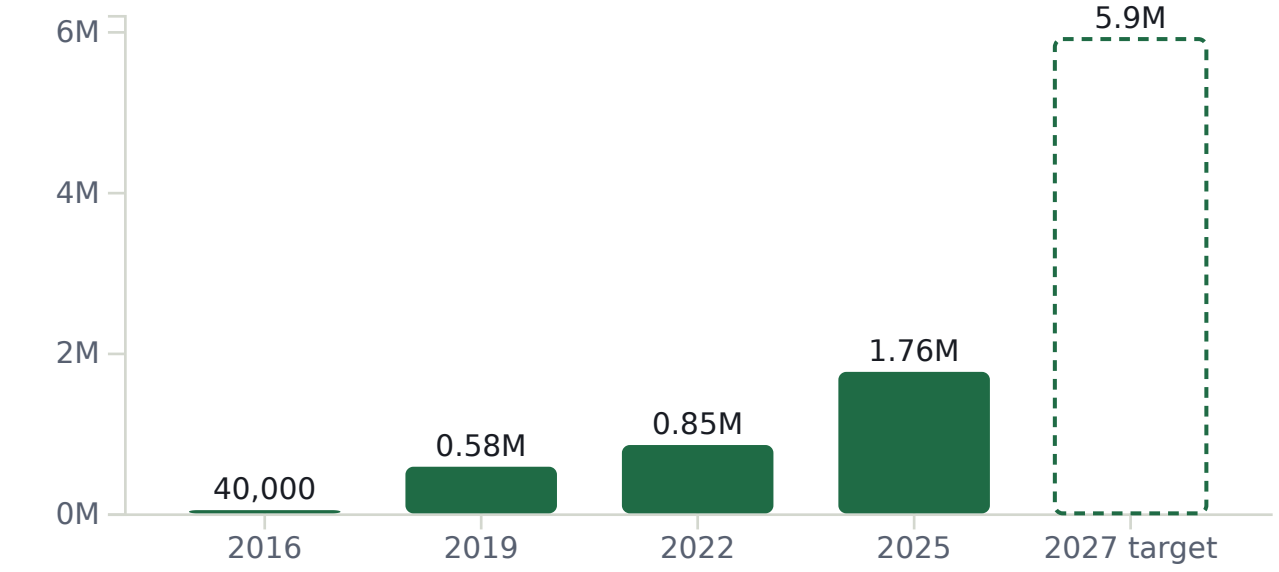
The foil: a practice that moved ahead of policy

The right-to-services laws in 4.1 moved as a front, through legislatures, in a single year. Natural farming moved the other way. Zero Budget Natural Farming began as a farmer movement around Subhash Palekar in Karnataka and spread through training camps and farmer-to-farmer networks, as Khadse and colleagues documented in the *Journal of Peasant Studies* (vol. 45, no. 1, 2018). States followed the farmers, and the Centre followed the states.

THREE WAYS A PESTICIDE-FREE PRACTICE HAS TRAVELLED, 2003–2026



ANDHRA PRADESH COMMUNITY-MANAGED NATURAL FARMING: FARMERS ENROLLED



~10,000
community resource persons, one per village organisation

0.84 million
women's self-help groups in the delivery platform

7 months
Sri Lanka's national ban on agrochemicals lasted before reversal

REPORTED · APCNF, IWMI

Figure 2. Top: carried by farmers, adopted by states, decreed by governments. Bottom: APCNF farmers enrolled as reported by the programme, with the 2027 target from ISB's Bharti Institute; the dashed bar is a target, not an outcome. Sources in the reference list.

Andhra Pradesh mandated Rythu Sadhikara Samstha to run the programme by G.O. Rt No. 764 of 10 November 2016. It started with 40,000 farmers in 615 gram panchayats, reached 0.58 million farmers by 2019, 0.85 million by 2022 and 1.76 million by 2025, carried by about 10,000 community resource persons and a platform of 0.84 million women's self-help groups. Himachal Pradesh launched its own scheme in 2018–19 and reports more than 1.65 lakh farmers and 99.3 percent of panchayats reached. When Acharya Devvrat moved from Raj Bhavan in Shimla to Gandhinagar in July 2019, the practice moved with him into Gujarat. The Centre funded eight states under the Bhartiya Prakritik Krishi Paddhati from 2019–20, covering 4.09 lakh hectares by March 2023, and on 25 November 2024 approved a National Mission on Natural Farming with an outlay of ₹2,481 crore, a target of one crore farmers and 7.5 lakh hectares, and more than 70,000 trained Krishi Sakhis.

The decreed routes tell the other half. Sikkim cut fertiliser subsidies from 2003, banned synthetic inputs in 2014 and was declared fully organic in January 2016, yet farmers reported falling yields, missing bio-inputs and absent price premiums. Sri Lanka banned agrochemicals in April 2021 and reversed the ban in November 2021, after rice harvests fell by 32 percent and tea by 18 percent.

Taken together, the foil sharpens the thesis. Where the carriers were people and community institutions (trainers, self-help groups, resource persons, a governor), the change travelled slowly, as a wave, and policy chased it. Where a government decreed the change without the carriers, it stalled or collapsed. Institutional distance here is measured in the density of community networks, and a forecast of where natural farming will spread next should watch the carriers rather than the gazette.

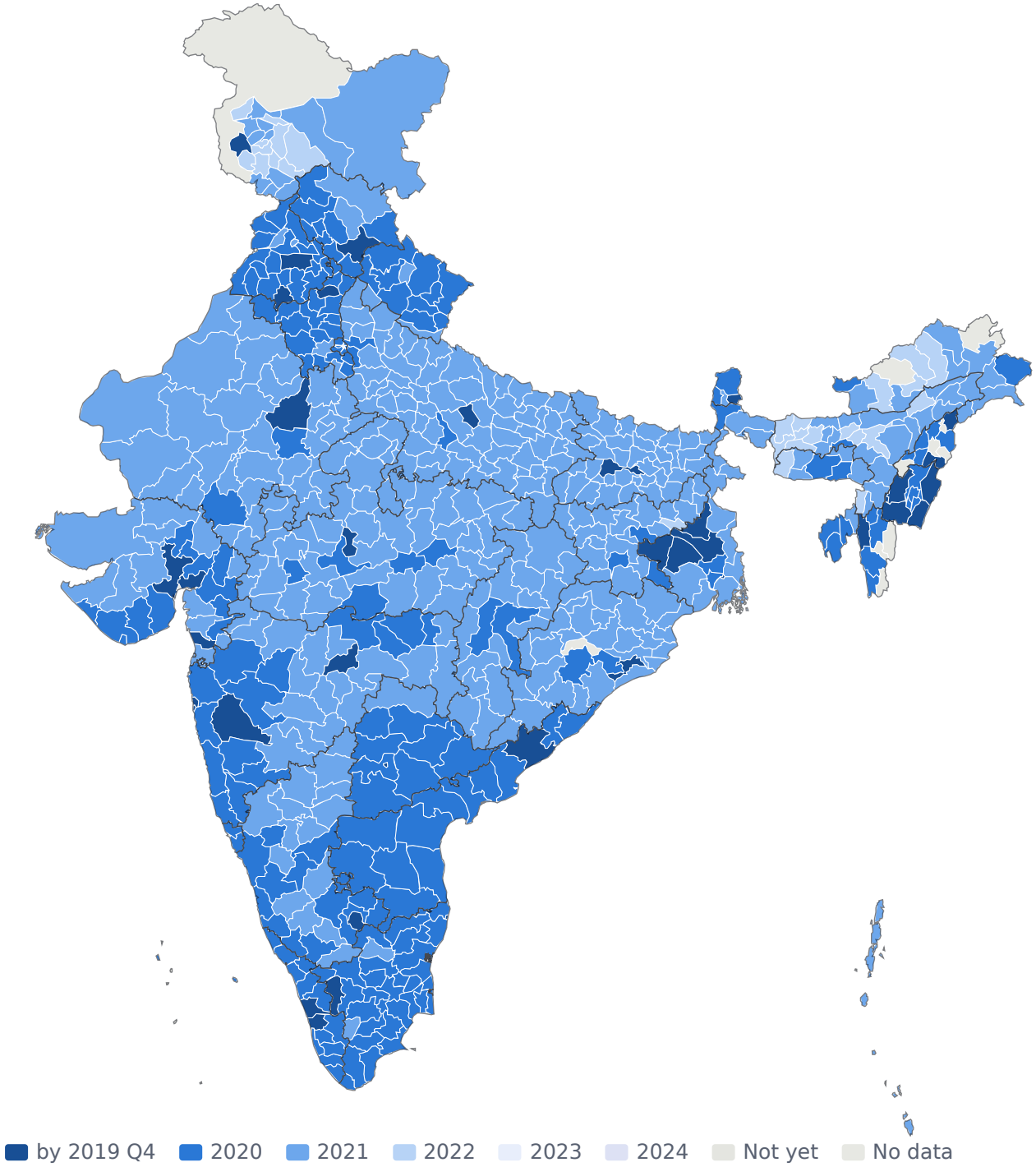
> **LIMITS**
>
> Enrolment counts are the programme's own reports. APCNF and the Bharti Institute both report 4,116 gram panchayats, for 2020 and 2024 respectively, so that figure is unresolved. Himachal's count is undated on the department page. Karnataka's movement has no reliable farmer count. This is a comparison of cases, not a statistical test; a district-level panel of APCNF enrolment would allow one.

A payment rail that began as a wave and finished as a front

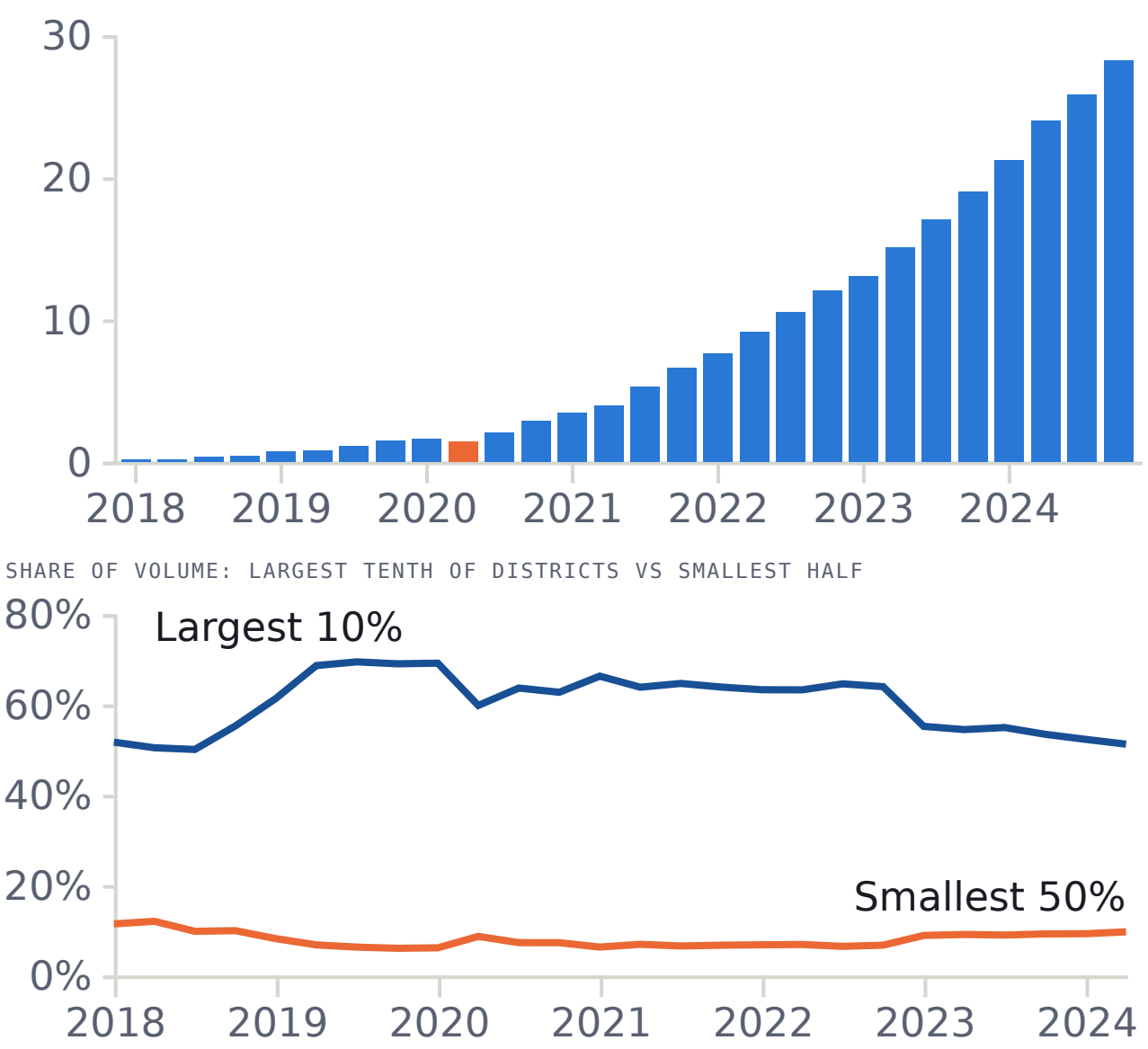
The Unified Payments Interface offers a third kind of carrier, neither a legislature nor a farmer network. The Reserve Bank of India's governor, Raghuram Rajan, launched the pilot on 11 April 2016 with 21 member banks, and bank apps reached the public that August. The National Payments Corporation of India runs the rail under one national rulebook; private apps, banks and merchants carry it to people. In August 2026 it handled 24.51 billion transactions worth ₹29.82 trillion, about 791 million a day.

So UPI is a market–state hybrid: the rule is public and national, and the carriers are firms and shopkeepers. Section 3 predicts what that should look like. With no state government in the chain, a state line should not stop it. PhonePe's open Pulse data, which publishes its UPI transactions for every district and quarter since 2018, allow the test. For each district, the take-off quarter is the first in which transactions reached 10 percent of that district's own mid-2024 level; the halfway quarter is the first to reach 50 percent.





PHONEPE UPI TRANSACTIONS PER QUARTER, BILLIONS



0.42 → 0.18
neighbour clustering (Moran's I), take-off → halfway

+0.15 qtr
added by a state line to the take-off gap (95%: -0.07 to 0.37)

77%
of districts crossed halfway in Jan–Jun 2023

Figure 3. Left: districts shaded by the quarter in which their PhonePe UPI transactions first reached 10 percent (or 50 percent) of their own level in April–June 2024; press Play to watch the rail arrive. State borders drawn over districts. Right: national quarterly volume, 2018–2024, and the share of volume in the largest tenth and smallest half of districts. Data: PhonePe Pulse (CDLA-Permissive-2.0), matched to DataMeet 2011 district boundaries.

The early years look like a wave. Take-off came on average in the first quarter of 2021, with a spread of two and a half quarters, and districts took off close to when their neighbours did (Moran's $I = 0.42$ across 1,708 neighbouring pairs; no random shuffle of 999 came close). Kerala, Delhi, Punjab and the southern states led; Bihar, Assam and Jammu and Kashmir followed four to five quarters later. Size mattered only a little: the largest quarter of districts took off less than one quarter ahead of the rest.

The later years look like a front. Seventy-seven percent of districts crossed their halfway mark in the same two quarters, January to June 2023, and neighbourhood clustering fell to less than half its earlier strength (I = 0.18). Once enough shops and customers were on the rail, it tipped everywhere at once.

The state line barely registers. State averages differ, and the differences hold after allowing for smooth geography, but at the border itself they fade. Neighbouring districts in different states took off 1.8 quarters apart, against 1.4 for neighbours in the same state; allowing for differences in size, the border adds **0.15 quarters** (95% interval −0.07 to 0.37), which cannot be told from zero. By the halfway mark, neighbours across a border were *closer* in timing than neighbours within a state (−0.28; −0.44 to −0.13). This is the contrast institutional distance predicts: the state line is a wall for what state governments carry, and open ground for what they do not.

Volume tells a quieter story about the tail. The largest tenth of districts carried 52 percent of PhonePe's UPI volume in early 2018, rose to 69 percent by 2019, and fell back to 51 percent by mid-2024; the smallest half fell from 11 to 6 percent and climbed back to nearly 10. The cities went first, and the rest of India caught up. The first COVID-19 lockdown briefly cut national volume, from 1.62 billion transactions in January to March 2020 to 1.45 billion in April to June, and cut it hardest in the cities.

Read with sections 4.1 and 4.2, UPI completes a set. The right-to-services laws moved as a front because legislatures carried them. Natural farming moved as a wave because farmers and self-help groups carried it. UPI began as a wave, carried by apps, banks and shopkeepers from district to district, and finished as a front once its network effects took hold, and at no stage did it stop at a state line, because one national rule left no jurisdictional brake to apply.

> **LIMITS**
>
> Pulse covers PhonePe only, about 47 percent of UPI transactions in April 2026 and 42 percent in January 2021, so the timing mixes UPI's spread with PhonePe's own. Take-off is measured against each district's own later level, so a small district with a handful of early users can cross 10 percent early; this may explain early marks in some small north-eastern states. Of 723 Pulse districts, 662 were matched to 2011 boundaries, covering 96.4 percent of volume; districts created after 2011 are left out, and the analysis covers 630 districts. The share series steps up in early 2023, which may reflect changes in how districts are assigned. The data begin in 2018, twenty months after launch.

5

What would prove this wrong

A concept that cannot lose is not worth building on. The Tailwinds approach fails if any of the following holds on better data:

1) Cross-border and same-state neighbour gaps prove equal once language, terrain and baseline levels are controlled. **2)** Distance along institutional networks predicts arrival no better than map distance for programmes, mandates and prices. **3)** Grievance signals lag official statistics instead of leading them. **4)** Forecasts built on institutional distance fail to beat a naive baseline, such as last period's value, when scored out of sample.

Each of these can be tested within a year, and the fourth is the one that matters: the approach earns trust only by publishing forecasts and scoring them, as FluSight does.

6

For each reader

For scholars

A research programme with a falsifiable core, joining spatial diffusion, policy diffusion, institutional analysis and network epidemiology. Section 6.1 sets out the carriers and brakes of rule diffusion as testable propositions, with designs for comparative and administrative data.

Read section 6.1

For governments

Useful information becomes usable when it fits the decision at hand, interplays with what officials already know, and grows out of repeated interaction with them (Lemos, Kirchhoff and Ramprasad 2012). Tailwinds is designed on those three terms. It **fits** the units in which departments decide: the district, the week and the scheme. It **interplays** with the systems officials already trust, building on their MIS, grievance portals and Local Government Directory codes. And it is built through **interaction**: forecasts are reviewed with departments, revised on their feedback, and scored in the open, so that each cycle becomes more usable than the last.

For funders and partners

A public good with a sustainable core. Tailenders Analytics would serve as a

boundary organisation, translating, mediating and communicating between data producers and the people who act on the data, in the sense Lemos and colleagues describe. The platform needs three things: a joined, versioned data spine; a citizen-side sensor network through grievance agents and partner organisations; and a forecasting unit that publishes scored forecasts and revises them iteratively with users.

6.1

For scholars: carriers, brakes and testable propositions

Diffusion research has explained with care how individuals adopt innovations (Rogers 2003) and how governments adopt one another's policies (Shipan and Volden 2008). Institutional rules share features with both and differ in three respects. A rule is a shared prescription whose value to any one adopter depends on others following it. It must be made compatible with the rules already in use. And it travels with organisations and people whose reach is uneven (Crawford and Ostrom 1995; Cleaver 2002). We therefore model the spread of a rule as the joint product of *carriers*, which move it, and *brakes*, which bind it, and we specify each so that it can fail.

Carriers

C1, neighbourhood contact. Following Hägerstrand (1967 [1953]), adoption spreads through proximate contact, so rule similarity between sites should decay smoothly with geographic distance. **C2, diffusion agencies.** Brown (1981) shifted attention from adopters to the agencies that promote a practice; forest departments, NGOs and donor projects should raise rule similarity among the sites they serve, net of distance. **C3, isomorphic pressure.** DiMaggio and Powell (*American Sociological Review* 48(2), 1983) distinguish coercive, mimetic and normative isomorphism. Coercive pressure should produce near-simultaneous adoption across a jurisdiction, a front; mimetic and normative pressure should produce adoption clustered around visible exemplars and professional networks. **C4, complex contagion.** Where adoption "requires independent confirmation or reinforcement from multiple sources," spread depends on the width of bridges between clusters rather than their length (Centola and Macy, *American Journal of Sociology* 113(3), 2007). Collective rules are likely complex contagions, so adoption should rise with the number of

adopting neighbours and travel through clustered ties. **C5, bricolage.** Communities assemble arrangements from existing practice (Cleaver, *European Journal of Development Research* 14(2), 2002), so a borrowed rule should change as it travels, and textual distance from its origin should grow with the number of intermediate adopters.

Brakes

B1, jurisdictional boundaries, where a subnational government carries a programme. **B2, compatibility** with rules already in use. **B3, coordination thresholds**, below which neighbours' adoption does not tip a group. **B4, recognition** of a group's right to devise its own rules (Ostrom 1990). **B5, carrier capacity**: the number and reach of trainers, resource persons and field staff. **B6, resource attributes**: across 152 forest commons in nine countries, local enforcement and forest size shaped regeneration (Chhatre and Agrawal, *PNAS* 105(36), 2008), so the same rule may take hold unevenly across resource settings.

Propositions

H1. Net of geographic distance and ecological similarity, rule similarity between two sites is higher when they share a diffusion agency or a jurisdiction. H1 fails if distance alone accounts for similarity. **H2.** The hazard of adoption rises with the count of adopting neighbours, consistent with a threshold, and not with the presence of any single adopter. H2 fails if one adopting neighbour predicts adoption as well as several. **H3.** Mandated rules arrive as fronts with low textual variation; community-carried rules arrive as waves with higher variation. H3 fails if timing and variation do not differ by carrier. **H4.** Brakes are conditional: jurisdictional attenuation is largest where subnational governments carry the programme, and smallest where a national mission pursues saturation.

Designs

Two kinds of data suit these tests, and both exist thanks to decades of collaborative work. Comparative field data collected with common protocols, such as the International Forestry Resources and Institutions network founded by Elinor Ostrom in 1992, with more than 250 sites in fifteen countries and about 1,000 variables, support dyadic tests of H1 and H4 with permutation-based inference. Administrative registers with adoption dates, such as Nepal's register of community forest user groups (14,258 groups by March 2006, formed under rules dating from 1978), support event-history tests of H2. Coding rules with the institutional grammar of Crawford and Ostrom (*American Political Science Review* 89(3), 1995) and measuring text reuse across bylaws and management plans (Wilkerson, Smith and Stramp, *American Journal of Political Science* 59(4), 2015) allow lineages of borrowed rules to be reconstructed, the institutional counterpart of phylodynamics in epidemiology, and so test H3.

> **LIMITS**
>
> Rules in form are not rules in use, so textual measures must be paired with observed practice. Shared history and ecology can mimic diffusion, which is why each proposition is tested net of distance and ecological similarity. And spread is not success: a rule can travel widely and still fail those it binds, so adoption and outcomes should be measured separately (Rogers 2003 discusses this pro-innovation bias).

7

Ethics and limits

Watching change closely can harm the people it concerns. The service should publish at the district and week, never the household; keep citizen case data under consent and India's Digital Personal Data Protection Rules, notified on 14 November 2025; and never sell an individual's record to the institution it complains about. A district flagged as lagging should draw support, not penalty. Administrative data record what offices are set up to see, and they are the backbone of this work; the citizen layer adds what households experience, so that the two can be read together.

Acknowledgements

With thanks

This paper stands on the work of others, and I am grateful to them. The India Data Portal at the Bharti Institute of Public Policy, ISB, and the Ministry of Statistics and Programme Implementation have made official data far easier to find and join. The International Institute for Population Sciences and its partners conduct the National Family Health Survey; Pratap Vardhan compiled its district factsheets in open form; DataMeet's volunteers built and shared India's boundary maps; and the volunteers of covid19india.org kept a public record of the pandemic when it was most needed. The Department of Administrative Reforms and Public Grievances publishes CPGRAMS reports every month. The IFRI network, founded by Elinor Ostrom, and its collaborating centres have spent three decades building comparative data on forest institutions. The Rythu Sadhikara Samstha and the natural farming programmes of Andhra Pradesh and Himachal Pradesh publish their progress openly. PhonePe publishes its Pulse data openly under a permissive licence, and the National Payments Corporation of India publishes UPI statistics every month; together they make India's payment rail one of the best-observed diffusions anywhere. Any errors of reading are mine.

Sources

Data and references

Figures carry tiers: `VERIFIED` read in the primary document; `REPORTED` from a secondary source quoting an official one; `DERIVED` computed here; `UNRESOLVED` sources conflict. Government portals (data.gov.in, the MoSPI API, India Data Portal, NASA FIRMS) were not reachable from this build and will be used in the next version.

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