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Electoral Continuity and Political Volatility in Himachal Pradesh, 1985–2022: A Quantitative Decomposition of Alternation, Vote-Seat Elasticity and Constituency Turnover

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Abstract

Himachal Pradesh's government has changed hands at every Assembly election from 1990 to 2022, a regularity known locally as the riwaz. This paper asks a quantitative question that its companion studies do not: given that the direction of alternation is nearly constant, how stable is the mechanism that converts votes into seats, and how does a modest vote movement become Himachal's characteristically large seat swings? Using a nine-election state series (1985–2022) compiled from Election Commission of India returns and constituency-level margin panels for 1998–2022, we compute an INC seat-vote elasticity (swing ratio) for each of the eight election-to-election cycles. Measured against INC's raw vote share, the elasticity ranges from 3.8 (1985–1990) to 20.1 (2012–2017), includes one negative value (−7.0, 1998–2003), and stands at 12.7 for 2017–2022. A robustness check using INC's share of the two-party (INC + BJP) vote shows that most of this dispersion reflects vote flows between BJP and third parties rather than instability in seat conversion: the 1998–2003 sign reversal disappears, seven of the eight cycles fall between 3.4 and 6.5, and a pooled estimate across all eight cycles is 4.64 (SE 0.39; $R^2 = 0.96$), significantly above the cube-law benchmark of 3. A disaggregated Pedersen index, computable for three cycles, shows that the conventional three-category

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approximation understates volatility by between 0 and 1.5 points. At the constituency level, a seat's 2017 margin does not predict its 2022 margin ($r = 0.138$, $p = 0.261$), and seats that changed hands in 2022 were won as comfortably as seats that were retained ($t = 0.457$, $p = 0.649$). Extending the persistence test to three earlier pairs gives a mixed picture: weak positive persistence on the pre-2008 delimitation (1998→2003: $r = 0.245$, $p = 0.044$; 2003→2007: $r = 0.260$, $p = 0.032$), which does not survive correction for multiple comparisons, and none on the current delimitation (2012→2017: $r = 0.056$, $p = 0.651$). We conclude that Himachal's alternation is sustained by a closely balanced two-party contest in which a stable and unusually high swing ratio converts small net vote movements into decisive seat changes, while the identity of the marginal seats reshuffles from one election to the next.

Keywords: *Himachal Pradesh; electoral volatility; seat-vote elasticity; swing ratio; cube law; Pedersen index; anti-incumbency; constituency competitiveness; delimitation; riwaz*

1. Introduction

1.1 What remains to be explained after 'the government always changes'

That Himachal Pradesh's incumbent government has lost office at all eight Assembly elections held between 1990 and 2022 is well documented in this research series, and is consistent with the broader evidence that incumbency is more often a liability than an asset in Indian state elections [11]. A companion paper examines whether that record is a structural, delivery-blind norm or one that policy delivery quality nonetheless shapes at the margin [1], and a second companion paper maps where, geographically and representationally, the 2017–2022 realignment occurred [2]. Neither paper asks a question that is fundamentally about measurement: given that alternation itself is close to a constant in this series, how much does the underlying quantitative relationship between votes and seats vary, and does that variation tell us anything the alternation record alone cannot?

This distinction is not academic. A government can change because the electorate shifts by a large margin, or because a small shift is mechanically amplified by a first-past-the-post system into a large seat swing. These are different phenomena with different implications: the first suggests a genuinely mobile electorate, the second a structurally sensitive seat-conversion system operating on a comparatively stable electorate. Distinguishing them requires a seat-vote elasticity — in the electoral-systems literature, the swing ratio [7, 8] — which, to our knowledge, has not previously been computed for Himachal Pradesh's full 1985–2022 election series.

1.2 Contribution and scope

This paper's contribution is deliberately quantitative and deliberately narrow, to avoid duplicating either companion study. First, it computes INC seat-vote elasticity for all eight 1985–2022 cycles, identifies which cycles were vote-driven and which conversion-driven, and tests the stability of the series with a two-party robustness check and a pooled swing-ratio estimate benchmarked against the cube law. Second, it refines the three-category Pedersen volatility approximation used in the companion papers with a multi-category recomputation for the three cycles (1985–1990, 2012–2017, 2017–2022) where minor-party vote shares are known with enough precision to support it, quantifying how much the simpler approximation understates volatility. Third, it tests constituency-level margin persistence directly — does a seat's competitiveness in one election predict its competitiveness in the next — for 2017→2022 and three earlier consecutive-election pairs, a test neither companion paper performs. We do not repeat the transition matrix, continuity index, or aggregate apple-dependency correlation already reported in the companion papers; where those results are needed for context we cite them. Section 2 sets out the conceptual distinction between alternation, volatility and elasticity and the related literature; Section 3 states research questions and hypotheses; Section 4 describes data and methods; Sections 5 to 7 present the elasticity, refined-volatility and margin-persistence results; Section 8 summarises them; Section 9 proposes a seat-conversion framework; Sections 10 and 11 discuss findings and limitations; and Section 12 concludes.

2. Conceptual Framework: Alternation, Volatility and Elasticity Are Three Different Quantities

Government alternation is a binary state-level outcome: did the incumbent formation retain office? Aggregate electoral volatility, conventionally measured by the Pedersen index [6], is a continuous measure of how much party vote shares moved between two elections, independent of whether that movement changed who governs. Seat-vote elasticity is a third, distinct quantity: the rate at which a change in a party's vote share converts into a change in its seat share, which depends not only on how much the vote moved but on where it moved and how that movement was distributed across marginal constituencies. A system can exhibit constant alternation with widely varying volatility (as the companion papers show for this dataset) and, independently, with varying elasticity — the same vote shift can produce very different seat outcomes depending on how many constituencies sit near the margin in a given election. This paper is the first in the series to isolate and measure the third quantity.

Each of these quantities has an established literature. Electoral volatility has been used to characterise the stability of party systems comparatively [13, 14] and across Indian states [12]. The relationship between votes and seats in plurality systems has been studied since the 'cube law', which holds that the ratio of seats won by two parties approximates the cube of the ratio of their votes [7]. Differentiated at an even contest, the cube law implies that a one-point gain in two-party vote share yields roughly three points of seat share. Tufte [8] generalised this into an empirically estimated swing ratio, and later work separated responsiveness from partisan bias and developed methods for estimating both from district-level returns [9, 10]. In the Indian context, research on anti-incumbency has shown that incumbent candidates in state legislatures are, on average, disadvantaged rather than advantaged [11]. What the Himachal case adds is a setting in which alternation is nearly constant, so that the vote-to-seat conversion mechanism can be examined against an essentially fixed outcome.

3. Research Questions and Hypotheses

RQ1. How does INC's seat-vote elasticity vary across the eight observed 1985–2022 election cycles, and which cycles are outliers?

RQ2. Does the 2017–2022 cycle — the subject of detailed constituency analysis elsewhere in this series — show unusually high or low elasticity relative to the historical series?

RQ3. How much does a refined, multi-category Pedersen calculation change the volatility reading for cycles where it can be computed, relative to the simpler three-category approximation used elsewhere?

RQ4. Does a constituency's competitiveness in one election predict its competitiveness in the next, or is competitiveness itself volatile?

H1: Seat-vote elasticity measured on INC's raw vote share will vary substantially across cycles, with at least one cycle showing anomalous (including negative) elasticity.

H2: The refined multi-category Pedersen index will exceed the three-category approximation in cycles where a distinct minor party enters or exits. Because the refined index can never be lower than the approximation (Section 4.2), the substantive question is the size of the gap.

H3: Constituency-level margins will not persist significantly from one election to the next, consistent with a system in which competitiveness is itself volatile rather than a fixed property of certain seats.

4. Data and Methods

This paper uses the same nine-election state series (1985–2022) as its companion papers, drawn from Election Commission of India (ECI) statistical reports [3], and the same 68-constituency 2017/2022 panel, both compiled by the authors [4, 5]. Constituency results for 1998, 2003, 2007 and 2012 were compiled from the same source to extend the persistence tests (Section 4.3), and BJP's statewide vote share, also from [3], is used for the two-party robustness check (Section 5.2). We do not reproduce the full state-level election table here; it appears in the companion Riwaz paper ([1], Table 1) and is cited by year where needed. We likewise do not reproduce the transition matrix, continuity index, or the regional and apple-dependency tables that are the subject of the companion geography paper [2].

4.1 Seat-vote elasticity

For each pair of consecutive elections, we compute INC's seat-share change (percentage points, using each year's Assembly size as recorded in the dataset — 67 seats in 1990 and 68 in all other years) and INC's vote-share change (percentage points), and define elasticity as the ratio of the two. An elasticity of 1 would indicate proportional conversion of votes into seats; values above 1 indicate amplification, values below 1 dampening, and a negative value indicates that seat share and vote share moved in opposite directions — which, as Section 5 shows, happened between 1998 and 2003. We report INC elasticity as the primary series because INC's seat share is the reference quantity in the companion papers. Two weaknesses of this per-cycle ratio are well known: it becomes unstable when the vote change in the denominator is small, and a party's raw vote share ignores votes moving between its principal rival and third parties, which in a plurality system matter as much as the party's own movement. We therefore also compute the ratio on INC's share of the two-party vote, V2 = INC / (INC + BJP), and estimate a pooled swing ratio by regressing the eight seat-share changes on the corresponding vote-share changes (ordinary least squares with an intercept). The pooled estimate is compared with the cube-law benchmark of 3 [7, 8].

4.2 Refined multi-category Pedersen index

The Pedersen index [6] used in the companion papers is $P = 0.5 \times \Sigma|\Delta \text{ vote share}|$, computed over three categories: INC, BJP and a residual 'Others'. This is a lower-bound approximation whenever compositional change occurs within 'Others' — for example, if a party that won 10% in one election is entirely replaced by a different party winning 10% in the next, the three-category calculation records zero change in 'Others' despite complete turnover within it. Because $|a + b| \leq |a| + |b|$, splitting a category can never reduce the index: the refined figure is always at least as large as the approximation, and equal to it whenever the separated components move in the same direction. For three cycles where minor-party vote shares are recorded precisely enough to disaggregate the residual category — 1985–1990 (Janata Dal's 10.83% in 1990), 2012–2017 (the shift from Independents to CPI(M)) and 2017–2022 (the Independent, AAP, BSP and RDP composition) — we recompute the index using four or five categories and compare the result with the three-category figure.

4.3 Margin persistence

We test whether a constituency's margin in one election predicts its margin in the next (Pearson correlation), and whether seats that retained their prior winning party differ in current margin from seats that changed party (independent-samples t-test), for the 2017→2022 pair and for three earlier consecutive-election pairs (1998→2003, 2003→2007, 2012→2017). Pairs on the pre-2008 delimitation are matched by constituency name, and pairs on the current delimitation, first used in 2012 [15], by constituency number; the 2007→2012 pair is excluded because the 2008 delimitation redrew constituency boundaries, so seats cannot be matched one to one. All tests use the winner-minus-runner-up approximate margin defined in the companion papers; we do not repeat the derivation and caveats of that approximation here beyond noting that it is applied identically to every election year, which is what the paired comparisons in Section 7 require. Because four correlation tests are reported, we also note whether results survive a Bonferroni-adjusted threshold ($\alpha = 0.05/4 = 0.0125$).

5. Seat-Vote Elasticity, 1985–2022

Table 1 reports INC's vote-share change, seat-share change and resulting elasticity for all eight cycles. The series is highly non-uniform. The 1985–1990 cycle, a landslide by any measure, shows the lowest positive elasticity (3.8): INC's vote share fell by 18.9 points and its seat share by 71.9 points — close to the ceiling of what seat share can lose, since INC held 85.3% of seats in 1985, which mechanically caps the ratio. The 2012–2017 cycle shows the highest (20.1): a 1.1-point fall in INC's vote share accompanied a 22.1-point fall in its seat share. The 2017–2022 cycle sits at 12.7 — high by historical standards but not the series maximum. Two features of the table qualify these readings. First, the three largest ratios (2003–2007, 2012–2017 and 2017–2022) all occur among the four cycles with the smallest INC vote change (1.1 to 2.5 points), where a small denominator inflates the ratio. Second, INC's raw vote share does not register votes moving between BJP and third parties. Section 5.2 addresses both points.

Table 1. INC vote-share change, seat-share change and seat-vote elasticity by cycle, 1985–2022

Cycle	INC vote-share Δ (pp)	INC seat-share Δ (pp)	Seat-vote elasticity
1985–1990	−18.92	−71.86	3.80
1990–1993	+12.28	+63.04	5.13
1993–1998	−5.31	−30.88	5.82
1998–2003	−2.51	+17.65	−7.03 (anomalous)
2003–2007	−2.10	−29.41	14.01
2007–2012	+3.90	+19.12	4.90
2012–2017	−1.10	−22.06	20.05
2017–2022	+2.20	+27.94	12.70

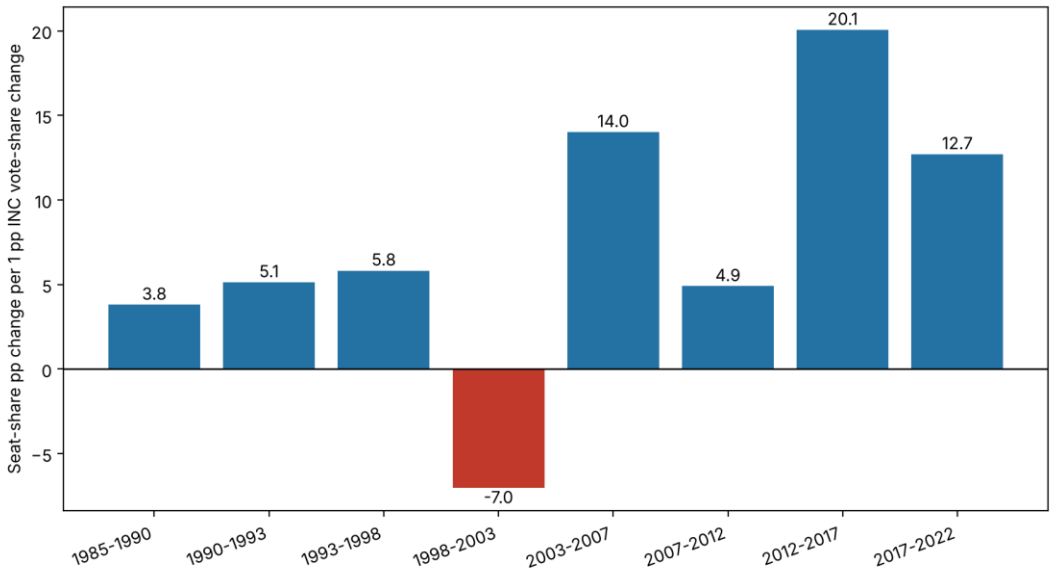

Figure 1. INC seat-vote elasticity by cycle, measured on INC's raw vote share. The 1998–2003 value is negative because INC's seat share rose while its raw vote share fell; Section 5.1 explains why.

5.1 The 1998–2003 anomaly

The negative elasticity in the 1998–2003 cycle is not a computational error, but neither is it a product of the 1998 coalition outcome. In 1998 INC won the most votes (43.51%) and tied BJP on seats (31–31), and BJP formed the government with the support of the Himachal Vikas Congress (HVC) and an independent (see [1]). Government formation, however, does not alter seat counts and so cannot enter a seat-vote ratio. The explanation lies in third-party movement. Between 1998 and 2003 INC's vote share fell by 2.51 points, but BJP's fell further, from 39.02% to 35.38%, while HVC contracted from 9.63% of the vote and five seats to 5.87% and one seat [3]. INC's lead over BJP therefore widened from 4.49 to 5.62 points, and INC's share of the two-party vote rose from 52.72% to 53.68%. In a plurality contest it is this relative position, not a party's absolute share, that determines seats; measured on the two-party basis, the 1998–2003 elasticity is positive. The cycle is best read not as a perverse relationship between votes and seats, but as a demonstration that elasticity computed on raw vote share is sensitive to third-party entry and exit — the point developed in Section 5.2.

5.2 Robustness: the two-party swing ratio

Table 2 recomputes the cycle-level ratio using INC's share of the combined INC and BJP vote. On this measure the dispersion narrows sharply. Seven of the eight cycles fall between 3.4 and 6.5; the 1998–2003 sign reversal disappears; and the two largest raw values shrink substantially — 2012–2017 from 20.1 to 3.4, because BJP's 10.3-point gain (38.47% to 48.79%) came mostly from Independents and smaller parties rather than from INC, and 2017–2022 from 12.7 to 6.3. The one remaining outlier, 1998–2003 (18.4), is again a small-denominator case: INC's two-party share moved by less than one point.

A pooled estimate avoids the small-denominator problem. Regressing the eight seat-share changes on the corresponding two-party vote changes gives a swing ratio of 4.64 (SE 0.39; 95% CI 3.68–5.60; $R^2 = 0.96$), with an intercept (4.8 points) that is not significantly different from zero ($p = 0.21$). The same regression on INC's raw vote share gives 4.41 (SE 0.79; $R^2 = 0.84$). Both estimates lie above the cube-law benchmark of 3; for the two-party measure the difference is statistically significant ($t = 4.18$, $p = 0.006$). Figure 2 shows the fit. Read together with Table 1, the evidence indicates that the conversion of votes into seats in Himachal Pradesh is a comparatively stable and unusually responsive property of the system, and that the apparent cycle-to-cycle instability of the raw elasticity is largely produced by movement between BJP and third parties and by small denominators.

Table 2. INC two-party vote share, two-party swing ratio and raw elasticity by cycle, 1985–2022

Cycle	INC two-party share, start → end (%)	Δ two-party share (pp)	Two-party swing ratio	Raw elasticity (Table 1)
1985–1990	64.44 → 46.65	−17.78	4.04	3.80
1990–1993	46.65 → 57.46	+10.81	5.83	5.13
1993–1998	57.46 → 52.72	−4.74	6.51	5.82
1998–2003	52.72 → 53.68	+0.96	18.41	−7.03
2003–2007	53.68 → 47.05	−6.63	4.44	14.01
2007–2012	47.05 → 52.67	+5.62	3.40	4.90
2012–2017	52.67 → 46.09	−6.58	3.35	20.05
2017–2022	46.09 → 50.52	+4.44	6.30	12.70
Pooled OLS (8 cycles)	—	—	4.64 (SE 0.39)	4.41 (SE 0.79)

Note: Two-party share = INC / (INC + BJP) × 100. Seat-share changes as in Table 1. Pooled estimates are OLS slopes of seat-share change on vote-share change with an intercept. Source: ECI [3]; authors' calculations.

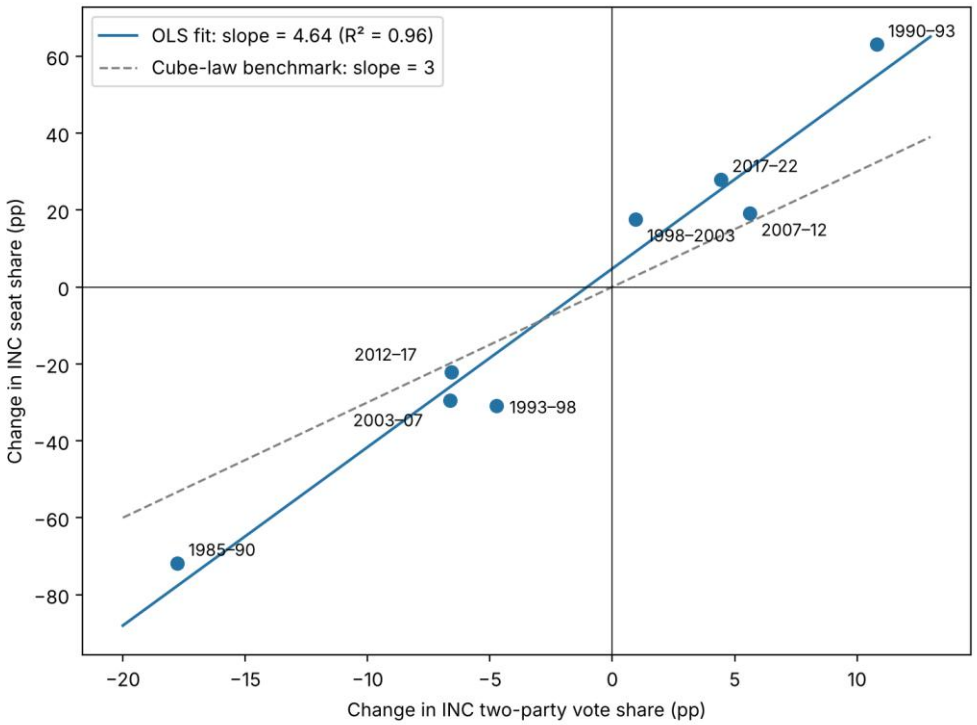

Figure 2. Change in INC seat share against change in INC two-party vote share, eight cycles 1985–2022. The solid line is the pooled OLS fit (slope 4.64); the dashed line is the cube-law benchmark (slope 3).

6. A Refined, Multi-Category Volatility Check

Table 3 compares the three-category Pedersen approximation used in the companion papers with a refined calculation for the three cycles where minor-party detail supports it. The refined figure is higher in two of the three cycles and identical in the third. Because the refined index cannot fall below the approximation by construction (Section 4.2), the informative result is the size of the gap: up to 1.5 points, or about 15% of the 2012–2017 index.

Table 3. Three-category versus refined multi-category Pedersen index

Cycle	Categories used in refined calculation	3-category Pedersen	Refined Pedersen	Difference
1985–1990	INC, BJP, Janata Dal (1985: Janata Party + Lok Dal), Others (residual)	18.92	18.92	+0.00
2012–2017	INC, BJP, Independent, CPI(M), Others (residual)	10.30	11.80	+1.50
2017–2022	INC, BJP, Independent, AAP, Others (residual)	5.80	6.70	+0.90

The 1985–1990 cycle shows no difference. Treating the Janata Party and Lok Dal (together 3.53% in 1985) as the predecessors of the Janata Dal, which won 10.83% in 1990, both the Janata Dal component and the residual 'Others' category rose between the two elections, so no offsetting movement is concealed inside the three-category aggregate

— the equality condition noted in Section 4.2. If the Janata Dal were instead coded as an entirely new party, the residual 'Others' would show a fall and the refined index would rise to 22.00, a correction of about 3 points; the 1985–1990 figure is therefore sensitive to how party lineage is coded. The 2012–2017 and 2017–2022 cycles both show the expected upward correction (1.50 and 0.90 points respectively), because in both cycles a meaningful share of the 'Others' vote in one year was not simply a continuation of the 'Others' vote in the other, but reflected the entry (CPI(M) contesting seriously in 2017; AAP debuting in 2022) or exit of a specific minor party. The practical implication is that the three-category Pedersen figures reported in the companion papers should be read as conservative: a fully disaggregated index — which would require complete minor-party vote shares for all nine elections — would necessarily be at or above the three-category figure in every cycle, and probably above it wherever minor-party turnover was substantial.

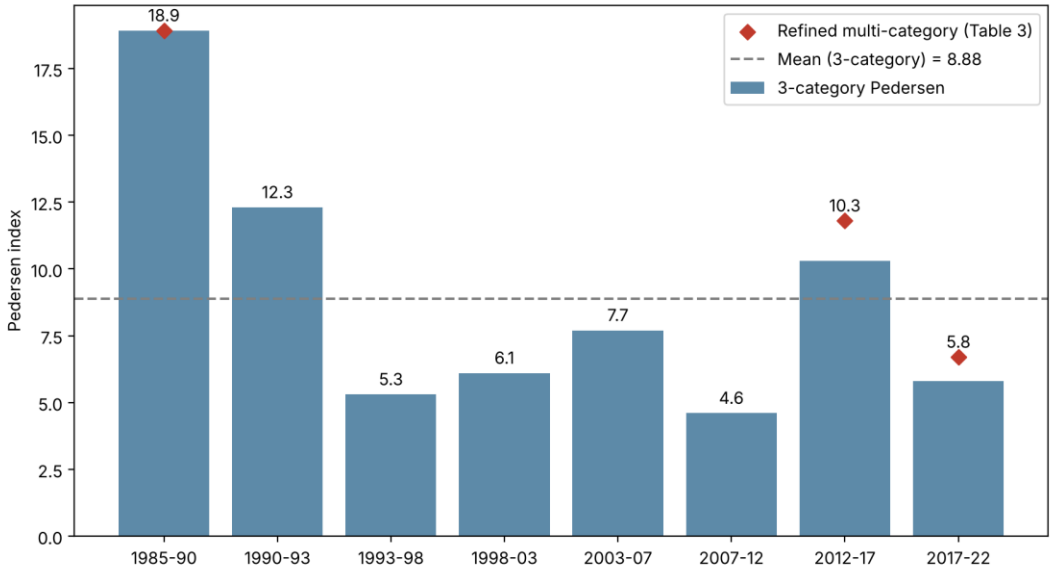

Figure 3. Pedersen index by cycle. Bars show the three-category index (companion-series baseline); diamonds show the refined multi-category values for the three cycles in Table 3, which equal (1985–1990) or exceed (2012–2017, 2017–2022) the three-category figure.

7. Does Constituency Competitiveness Persist? Tests Across Four Transitions, 1998–2022

Using the full 68-seat panel, we correlate each constituency's 2017 approximate margin with its 2022 approximate margin, and extend the same test to three earlier consecutive-election pairs: 1998→2003 and 2003→2007 (both on the pre-2008 delimitation, matched by constituency name) and 2012→2017 (on the current delimitation, matched by constituency number). The 2017→2022 result is a weak, non-significant positive correlation ($r = 0.138$, $p = 0.261$, $N = 68$): a seat's competitiveness in 2017 accounts for less than 2% of the variance in its competitiveness in 2022. Figure 4 plots this relationship, distinguishing seats that retained their 2017 winning party (37 seats) from those that changed hands (31 seats).

The three additional pairs give a mixed answer rather than a uniform confirmation of the 2017→2022 null result. On the pre-2008 delimitation, margin persistence is weak but nominally significant: 1998 margins predict 2003 margins ($r = 0.245$, $p = 0.044$, $N = 68$) and 2003 margins predict 2007 margins ($r = 0.260$, $p = 0.032$, $N = 68$). On the current delimitation, persistence is absent in both pairs: 2012 margins do not predict 2017 margins ($r = 0.056$, $p = 0.651$, $N = 68$), and 2017 margins do not predict 2022 margins. Table 4 reports all four tests together. The two pre-2008

correlations are modest — each accounts for under 7% of the variance in the later margin — and neither survives the Bonferroni-adjusted threshold of 0.0125.

Table 4. Constituency margin persistence across four consecutive-election pairs, 1998–2022 (Pearson correlation of approximate margins, N = 68 per pair)

Transition	Delimitation	Pearson r	p-value
1998→2003	Pre-2008	0.245	0.044
2003→2007	Pre-2008	0.260	0.032
2012→2017	Current	0.056	0.651
2017→2022	Current	0.138	0.261

Note: $p < 0.05$ for both pre-2008 pairs; no pair is significant at the Bonferroni-adjusted threshold of 0.0125 for four tests.

The evidence available cannot settle the cause of this delimitation-dependent split. One possibility is that the pre-2008 map, in use from 1977 to 2007, had settled into more stable local political-organisational patterns than the current map has developed in its three elections to date (2012, 2017 and 2022); another is that the split reflects which particular elections fall on each map rather than the delimitation itself. Given that neither pre-2008 correlation survives correction for multiple testing, the more cautious reading is that seat-level persistence is weak at best on either map. We flag the question as open rather than force a single reading onto both panels.

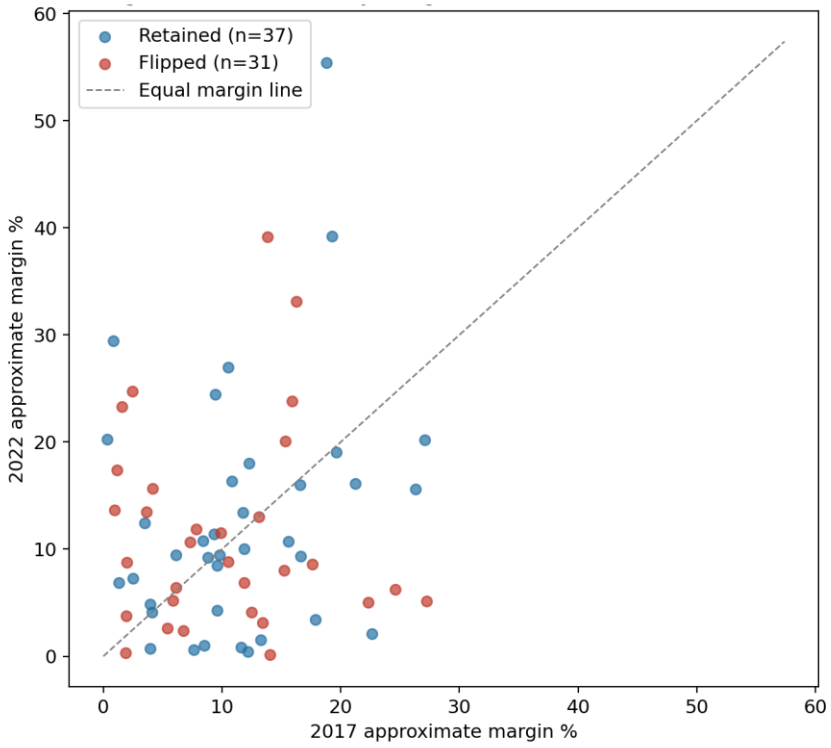

Figure 4. Constituency approximate margin, 2017 vs 2022, by retained/flipped status (r = 0.14, not significant). The dashed line marks equal margins; points far from it indicate seats whose competitiveness changed substantially between elections.

We further test whether the 37 retained seats differ from the 31 flipped seats in their 2022 margin specifically — that is, whether seats a party held onto were held more comfortably than seats that changed hands were won. They were not: retained seats averaged a 12.70-point 2022 margin against 11.52 for flipped seats, a difference an independent-samples t-test does not distinguish from zero ($t = 0.457$, $p = 0.649$). Table 5 also reports the paired comparison of overall 2017 and 2022 margin levels already available in the companion volatility discussion, included here only as the baseline against which the persistence tests above should be read, not as a new finding in its own right.

The same test on the three earlier transitions gives results consistent with the 2017→2022 null finding, with one borderline exception: in 2003, retained and flipped seats did not differ significantly in margin ($t = 0.586$, $p = 0.560$); in 2007, retained seats averaged a somewhat wider margin than flipped seats, approaching but not reaching conventional significance ($t = 1.709$, $p = 0.092$); and in 2017, retained and flipped seats were, remarkably, identical on average (10.83 points each; $t = -0.002$, $p = 0.999$). In none of the four transitions were seats that changed hands won by meaningfully narrower margins than seats that were retained: turnover in Himachal Pradesh does not produce a distinctively narrow set of winners.

Table 5. Constituency margin tests, 2017→2022 (N = 68)

Test	Statistic	p-value	Interpretation
Pearson correlation, 2017 margin vs 2022 margin (same seat)	r=0.138	0.261	No significant persistence of seat-level competitiveness
Independent t-test, 2022 margin: retained (n=37) vs flipped (n=31) seats	t=0.457	0.649	Retained and flipped seats equally competitive in 2022
Paired t-test, 2022 margin vs 2017 margin (all 68 seats, context only)	t=0.927	0.357	No significant statewide shift in mean margin level (companion result, cited)

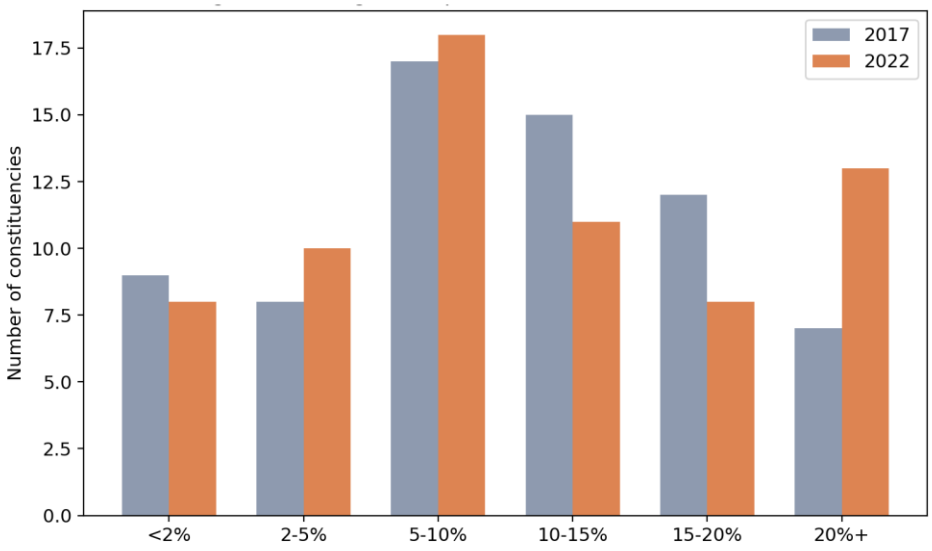

Figure 5. Margin competitiveness band distribution, 2017 vs 2022. The overall shape is broadly similar across the two elections even though, as Tables 4 and 5 show, individual seats' margins are not correlated between them — competitiveness is stable in aggregate distribution but not at the level of individual constituencies.

Taken together — a broadly stable aggregate margin distribution (Figure 5), no seat-level persistence on the current delimitation (2012→2017 and 2017→2022), and weak persistence on the pre-2008 delimitation that does not survive correction for multiple testing (Table 4) — these results indicate that Himachal Pradesh does not have a fixed set of 'always marginal' or 'always safe' constituencies. Which seats are competitive changes from election to election, even though how many seats are competitive changes comparatively little. This is a structural feature of the electoral system distinct from the regional and horticultural patterns examined in the companion geography paper [2], which concern where seats are located, not whether their competitiveness is a stable property over time.

8. Summary of the Quantitative Decomposition

Three results anchor this paper. First, measured on INC's raw vote share, seat-vote elasticity varies by more than a factor of five across cycles (3.8 to 20.1, excluding the negative 1998–2003 value), but this dispersion is largely produced by third-party vote flows and small denominators: on the two-party measure, seven of eight cycles fall between 3.4 and 6.5, and the pooled swing ratio of 4.64 is significantly above the cube-law benchmark of 3. Himachal's constant alternation is thus produced by a stable and unusually responsive seat-conversion mechanism acting on net vote movements of varying size and composition. Second, the three-category Pedersen measure is a lower bound by construction; the refined calculation adds between 0 and 1.5 points in the three cycles where minor-party detail permits it. Third, constituency-level competitiveness does not persist from one election to the next on the current delimitation, and persists only weakly on the earlier one, even though the aggregate distribution of competitiveness is broadly stable — Himachal Pradesh's marginal seats are not the same seats each time.

9. A Seat-Conversion Framework for Himachal Pradesh

The evidence in this paper supports a distinct third framework in this research series, alongside the companion papers' delivery-credibility and regional-geography accounts:

$\Delta S(t) = \alpha + \beta \cdot \Delta V2(t) + e(t)$, where $\Delta S(t)$ is the change in INC seat share in cycle t, $\Delta V2(t)$ the change in INC's two-party vote share, β the system's swing ratio (estimated at 4.64), and $e(t)$ cycle-specific effects such as third-party entry and exit

The framework's central claim is that the swing ratio β is a comparatively stable structural parameter of Himachal Pradesh's two-party contest — roughly one and a half times the cube-law benchmark — so that a net two-party swing of four to seven points, the range observed in every cycle since 1993 except 1998–2003, is enough to transfer 20 to 30 percentage points of seats (roughly 14 to 20 seats in a 68-member house). What varies from cycle to cycle is the size of the net swing and the third-party flows captured by $e(t)$, not the conversion rate itself. This is a different kind of explanation from either companion paper's: it does not ask why voters moved (the delivery question) or where they moved (the geography question), but how efficiently a given net movement is converted into government change. The framework is, at its core, an accounting relationship; its value lies in estimating β and showing that it is stable, which turns the riwaz from a pattern to be described into a mechanism that can be measured.

10. Discussion

The headline finding of this paper is that Himachal Pradesh's consistency at the level of government alternation rests on a stable and highly responsive seat-conversion mechanism, and that the apparent instability of the raw elasticity series is largely a measurement artefact. Read on INC's raw vote share, INC lost seat share at 3.8 points per vote point in 1990 and at more than five times that rate in 2017. Read on the two-party vote, the two cycles convert at 4.0 and 3.4 respectively. The difference lies in what moved: in 1990 INC's own vote collapsed, whereas in 2017 BJP gained

mainly at the expense of Independents and smaller parties. A raw-share elasticity treats these as different conversion processes; the two-party measure shows them to be the same process acting on different vote flows.

The 2017–2022 cycle is a useful anchor for reading the companion papers' findings. The regional-geography companion paper [2] shows that the 2022 swing was concentrated in Kangra and Shimla divisions and comparatively absent from Mandi. This paper's results explain how a swing that was modest in vote terms — 2.2 points of raw INC vote share, 4.4 points of two-party share — produced a seat result that looked like a landslide (40 seats to 25): at the pooled swing ratio, a 4.4-point two-party swing implies a seat-share gain of roughly 20 to 25 points (without and with the intercept), close to the 27.9 points observed. The two findings are complementary rather than competing: the swing ratio quantifies how much amplification occurred in aggregate, and geography indicates where it occurred.

The margin-persistence findings (Section 7) have a practical implication the companion papers do not address. On the current delimitation, competitiveness does not persist at the seat level, so a party cannot identify 'the marginal seats' once and target them in every subsequent cycle; the set of contestable constituencies appears to reshuffle at each election, which argues for fresh constituency-level assessment ahead of every cycle rather than reliance on a fixed target list. The weak persistence observed on the pre-2008 map suggests that this has not always been equally true, and that the degree of seat-level persistence may depend on how long a constituency map has been in use. This operational implication is distinct from, and additional to, the delivery-timing and regional-targeting implications raised in the two companion papers.

11. Limitations

Several limitations bound what this paper can claim. First, the elasticity series contains only eight cycles, so the pooled swing-ratio estimate, though precise relative to its standard error, rests on few observations and is strongly influenced by the large 1985–1990 and 1990–1993 swings; it should be read as descriptive of this series rather than as a parameter estimated from a population of elections. Second, per-cycle ratios are unstable when the vote change in the denominator is small, as in 1998–2003 on either measure, which is why we place more weight on the pooled estimate than on any single cycle. Third, the two-party measure discards third-party votes by construction; in a state where Independents and minor parties regularly win seats, a fuller treatment would model all parties' seat shares jointly, for example by estimating bias and responsiveness from constituency-level returns [9, 10]. Fourth, the refined Pedersen calculation in Section 6 could be attempted for only three of eight cycles, because minor-party vote shares for the remaining cycles are not available to us at sufficient precision, and the 1985–1990 value depends on how party lineage is coded; the refined figures are a proof-of-concept correction rather than a complete recalculation. Fifth, the margin measure is the approximate winner-minus-runner-up margin used in the companion papers; because margins are bounded at zero and right-skewed, the Pearson correlations in Section 7 would usefully be complemented by rank-based tests, and none of the four persistence correlations is significant after Bonferroni correction. Finally, the analysis is confined to one small state with an unusually clear two-party structure, and its findings should not be generalised to more fragmented state party systems without separate testing.

12. Conclusion

Himachal Pradesh's government has changed at every Assembly election from 1990 to 2022. This paper has shown that behind that constant outcome lies a seat-conversion mechanism that is both stable and unusually responsive. Measured on INC's raw vote share, seat-vote elasticity appears highly variable — from 3.8 to 20.1, with a negative value in 1998–2003 — but this variation is largely produced by vote flows between BJP and third parties and by small denominators. Measured on the two-party vote, seven of eight cycles convert at between 3.4 and 6.5 seat-points per vote-point, and the pooled swing ratio of 4.64 is significantly above the cube-law benchmark of 3: a net two-party swing of four to five points is enough to change the government. A refined volatility calculation confirms that the

three-category Pedersen approximation is a lower bound, understating volatility by up to 1.5 points. A persistence test across four consecutive-election pairs from 1998 to 2022 shows that the identity of competitive seats reshuffles from one election to the next — entirely on the current delimitation, and with only weak carry-over on the earlier one — even though the overall level of competitiveness changes comparatively little. None of these findings restates the companion papers' conclusions about policy delivery or regional geography. Together, they establish that the arithmetic of vote-to-seat conversion is a distinct, measurable feature of Himachal Pradesh's electoral system, and that the riwaz is sustained less by large swings in voter preference than by a high and stable swing ratio operating on a closely balanced two-party contest.

Declarations

Funding: The authors received no specific funding for this work.

Competing interests: The authors declare no competing interests.

Data availability: State-level results are taken from the Election Commission of India's statistical reports [3]. The constituency-level datasets compiled by the authors [4, 5] are available from the corresponding author on reasonable request.

Ethics statement: This study uses only publicly available aggregate election returns and did not involve human participants.

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