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**Measuring Electoral Competitiveness:
With Application to the Indian States**

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Abstract

We consider alternative methods of measuring the competitiveness of a majoritarian electoral system in the context of an analysis of Indian State elections. Our analysis highlights a number of weaknesses in the construction and interpretation of commonly used measures such as the effective number of parties, the first versus second place vote margin and safe seats, while presenting these and their proposed alternatives for 14 major Indian states from 1952 to 2009. The alternative indexes we present are based in part on ideas that are longstanding in the literature but have not been fully adopted within the Indian context. These indexes incorporate vote volatility, allow for multi-party competition at the constituency level, and adjust for asymmetry among parties of safe seats in the legislature. We argue that these newly computed indexes capture distinct but related dimensions of electoral competition better than do the extant commonly used measures. The analysis of these indexes is then extended to consider the role of caste, class, regionalism and level of development to reveal interesting patterns of commonality and difference in electoral competition across the states.

Key words: electoral competitiveness, effective number of parties and Tpartytness, volatility adjusted vote margins, asymmetry adjusted safe seats, Indian states, caste and class

JEL codes: A12, D02, D72, O1

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1. Introduction

In this paper we consider how to measure the competitiveness of the electoral process in a majoritarian system with single member districts.¹ The analysis is both methodological and quantitative. We identify a number of weaknesses in the construction and interpretation of some commonly used measures, while presenting these and our proposed alternatives for 14 major Indian states from 1952 to 2009. The analysis of our preferred set of indexes is then extended to consider the role of caste, class, regionalism and level of development to reveal interesting patterns of commonality and difference in electoral competition across the states. The underlying assumption throughout is that the competitiveness of elections matters for the well-being of individual citizens and for the society as a whole.²

There are three approaches to measuring competitiveness in elections that have been relied upon in the literature. Each emphasizes a different dimension of competitiveness, all of which we regard as complements rather than as mutually exclusive alternatives. A first approach makes use of an analogy to private markets and focuses on the effective number of parties, where the usual assumption is that more parties involves a greater degree of electoral competition.³ A second general approach emphasizes the *ex ante* uncertainty of elections, with elections for which the outcome is 'to close to call' being more competitive.⁴

These two approaches have been applied to both majoritarian and proportional electoral systems. A third approach combines electoral uncertainty with the winner-take-all characteristic of the majoritarian electoral system to focus on the relative advantage held by one of the contending parties, with the absence of any such advantage indicating a high degree of competition.⁵ All of these approaches face the problem of distinguishing *ex ante* competitiveness from *ex post* outcomes: an election can be highly competitive *ex ante*, but still exhibit lopsided results *ex post*.

¹ This paper forms one part of an ongoing project on the meaning, measurement and consequences of electoral competitiveness in Canada and India. We have Indian state data up to 2012, but 2009 is the last year of our complete sample for which competitiveness measures can be constructed for most of the 14 states we consider. The indexes presented here could also be applied to study elections for the Lok Sabha. For recent interesting empirical studies of Indian national elections, see Borooah (2016) who devises and studies various indexes (but not competitiveness) characterizing national elections in the country as a whole from 1962-2014, and the contributions in Palshikar et al (2014) that consider party competition (mostly state by state, and without the sort of indexes presented here) after the decline of Congress.

² A competitive contest for office under well-defined and stable rules encourages the formation and dissemination of information on citizen preferences, induces opposing candidates and parties to propose policies that better reflect the wishes of voters, and through the fear of defeat at the polls, induces incumbents to be responsive to minorities. See, for example, Strom (1989), Sen (1999), Besley and Burgess (2002), Przeworski (2010), Ashworth (2012) and Golden and Min (2013) among many others. Vigorous competition is also likely to reduce rents arising in governance by inducing an increase in the efficiency by which the output of the state is provided (e.g., Ferris et al (2008), Besley et al (2010), and Ashworth et al (2014), among others).

³ See McDonough (1971), Banerjee and Iyer (2010), and Ashworth et al (2014) among others who use the number of parties, and Chhibber and Kollman (2004), Chhibber and Nooruddin (2004), and Diwakar (2007) among others who use the effective number of parties.

⁴ See, for example, Holbrook and Van Dunk (1993), Rogers and Rogers (2000), Blais and Lago (2009), Grofman and Selb (2009) and Kayser and Lindstädt (2014). Applications to India include Banerjee and Somanathan (2007), Banerjee and Iyer (2010), Dash and Mukherjee (2015), Afridi et al (2016) and Mitra and Mitra (2017).

⁵ See, for example, See Riker and Ordeshook (1973), Elkins (1974), Persson and Tabellini (2000, chapter 8), Johnston et al (2012), and Barkovic-Parsons et al (2017).

We analyze these three approaches to the measurement of competitiveness as we apply them to the majoritarian electoral systems of the states of India. We point to ambiguities in the interpretation of some widely used measures, including the effective number of parties and the first versus second place vote margin. The alternative indexes we propose are based in part on longstanding ideas in the literature, but not yet implemented for the Indian states. We argue that these indexes better capture the key dimensions of electoral competition identified in the general approaches listed above.

The analysis of the general characteristics of existing and the newer indexes we consider is intended to apply to electoral systems generally, and especially to majoritarian ones. Of course the application to India poses its own special set of issues affecting the form and intensity of competition. Many authors point to variations in the use of clientelism as a competitive mechanism by which parties target potential supporters (Bardhan and Mookherjee 2012, Anderson et al 2015, Auerbach 2016). Parties compete against a background of heterogeneous caste and religious allegiances (Chandra 2004, Palshikar 2006, Banerjee and Somanathan 2007, Roy 2012, Jaffrelot 2012). And the competitiveness of the electoral system is always under threat of being undermined through corruption (Aidt et al 2011, Tiwari 2014, Daxecker and Prins 2016). Variations in these factors are likely to arise in different degrees across the Indian states. Coping with this variation in the empirical work here presents challenges as well as opportunities.

The analysis we conduct makes use of a panel of fourteen major Indian states comprising about 85% of the population. Data at the state rather than national level allows for a much larger set of electoral observations (187 versus 15).⁶ This in turn permits the use of variation in a carefully selected set of social and economic variables against the background of which our preferred set of indexes can be placed. However, while each state is unique in some manner, we argue that the construction of overall state averages does carry significant meaning, particularly with respect to trends over time. In addition, the national aggregates provide a base from which the specific outcomes arising for different social and economic groupings can be uncovered and studied. We use the commonalities among groups of states, together with some of the more striking differences, to draw tentative conclusions about the historical evolution of electoral competitiveness across India's major states.

The paper proceeds as follows. In section two we focus on the difficulty of comparing market competition with electoral competition, and the implications of this for the interpretation of the effective number of parties as a measure of competition. In section three, we contrast the measurement of competitiveness as uncertainty using the first versus second place winning margin within constituencies with a more comprehensive measure based on early work by Przeworski and Sprague (1971). This index captures additional dimensions of elections that are crucial for understanding competitiveness at a constituency level, specifically the multiplicity of parties competing in elections, especially important in India, and the volatility of electoral support across elections. We then move, in section four, from considering competition among candidates at the constituency level to competition between parties in the state as a whole. Here we present a new measure, based on an old idea that in majoritarian electoral systems what matters for party competition is the number of marginal (or safe) seats in the legislature. To this we add adjustment

⁶ Although Assam has held elections since 1951, its division in the 1960s and 1970s resulted in variations in the number of electoral constituencies and instability in the party system over the first three decades. In Jammu and Kashmir, representatives are elected for terms of 6 years as opposed to 5 years. Moreover, due to insurgency related issues, elections in Jammu and Kashmir are often held amid heavy security, usually with low voter turnout. We have therefore omitted these states from our sample.

for the asymmetry in such seats among the parties contesting an election. This idea was first used by Ferris, Winer and Grofman (2016) to measure competitiveness in the Parliament of Canada over the history of the modern state. To our knowledge, no study has yet attempted to understand the nature of electoral competitiveness in India using these more sophisticated measures.

In the fifth and sixth sections we consider whether using the mean value of a panel of fourteen major Indian states is truly representative by examining the composition of these metrics across two different sets of state groupings. One grouping is based on the importance of caste and associated class divisions in electoral politics, and the second is based on economic differences across states at different stages of development. In a concluding section we summarize our methodological arguments and selected aspects of our substantive findings for India.

An Online Appendix provides correlations among the indexes we discuss; explains our treatment of delimitation or redistricting; presents an alternative to the effective number of parties index that is not included in the main text; deals at length with the classification of states by caste and class; and provides further details about the measurement of vote volatility.

Before turning to explore the first of the three approaches to competition, it should be noted that in addition to competition in elections, political competition broadly defined involves the formation and exit of parties, competition in the legislature between elections, as well as competition within government and between states. Although the first of the three approaches outlined above allows for entry and exit, our focus is primarily on the competitiveness of the electoral process.

2. Electoral competitiveness defined by analogy to economic competition

The first approach to measuring competitiveness is built upon an analogy between electoral competition and competition in private markets. If individual firms in a market have no influence over price, firms have no market power and the industry is said to be highly or perfectly competitive. While this feature of private markets cannot be observed directly, the concept of the absence of market power can be translated into a measure of economic competitiveness through the logic that the more firms there are, with each supplying a smaller share of market demand, the ability of any individual firm to influence the market price is increasingly reduced. The Hirschman-Herfindahl (hereafter *HH*) index is designed to encapsulate this logic and is defined as the sum of the squared market shares of the firms in an industry:

$$HH_j = \sum_{n=1}^N s_{nj}^2, \quad (1)$$

where s_{ij} is the output share of the i th firm of N in industry j . The *HH* index will equal one if one firm supplies the entire market and will approach zero as the number of firms increase and each firm's market share declines.

The *HH* measure of the concentration of market power has crossed over into political science as the effective number of candidates or parties (*ENP*), defined as one over an *HH* index constructed using candidate vote shares or party vote or seat shares (Laakso and Taagepera 1979, Taagepera 2007)⁷. The (unweighted) national average, vote based *ENP* in election t with $j = 1, 2, \dots, J$

⁷ *ENP* is also referred to as N_v or N_s depending on whether vote shares or seat shares is used.

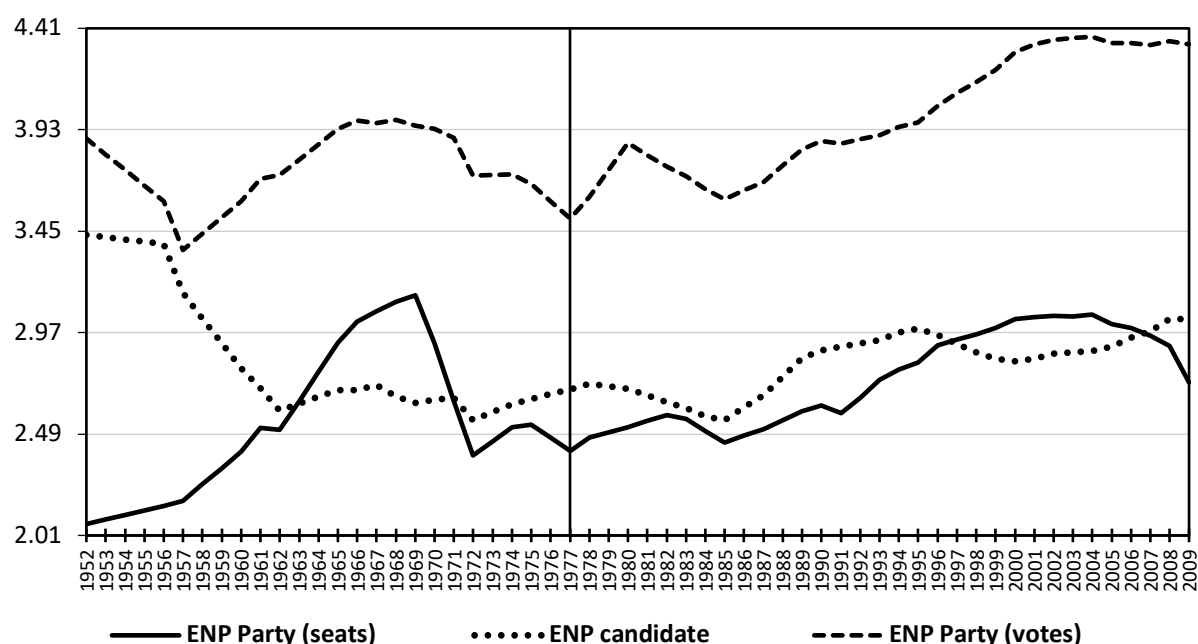
constituencies is:

$$ENP_t = \sum_{j=1}^J (ENP_{jt}) / J, \quad (2)$$

where $ENP_{jt} = 1 / \sum_{i=1}^I v_{ijt}^2$ is the effective number of candidates at the constituency level and v_{ijt} is the vote share of candidate i in constituency j in election t . Alternatively, we can employ the vote or seat shares of political parties at the national level to define a national party-based analogue to (2). In either case ENP will equal 2 if two candidates or parties equally share the vote and will rise as the number of candidates or parties increases and individual vote (or seat) shares decline.

In Figure 1 we present the averages over all 14 states of the candidate, constituency level version of (2), along with two alternative national average ENP measures, one based on state level party vote shares and the other on state level party seat shares. The data here, as in the following figures, are calculated for each election in each state, and then linearly interpolated for convenience of exposition, and for time series investigations. Here and below we draw a vertical line at time of the Emergency (declared by Prime Minister Indira Gandhi from 25th June 1975 until 21st March 1977), to facilitate comparison across the figures, some of which involve different spans of time according to our ability to compute competition indexes of different types.

Figure 1: Party and Candidate ENP Measures: 14 Indian States, 1952-2009



To a considerable extent the use of the HH index in political science derives from the desire to test the predictions made by Duverger (1954) about the effective number of candidates and parties that will arise in an electoral equilibrium.⁸ Duverger (1954) argues that in a single member district, plurality rule electoral system, the number of political parties at the district or constituency level tends towards 2 in the long run.⁹ In a majoritarian parliamentary system,

⁸ Cox (1997) and Taagepera (2007) provide extensive discussions of Duverger's work and references to the associated literature.

⁹ It is widely agreed that Duverger's Law is a statement about two-party competition within individual constituencies. However, the two parties at the local constituency level may differ across regions, thus leading

factions are forced together into two parties *before* the election by the winner take all aspect of the electoral system. Cox (1997, 30) attributes the Law to elites – opinion leaders, contributors, party officials, etc. – who do not want to waste their influence on hopeless candidates, and to strategic choices made by individual voters for the same reason, with uncertainty in the process introduced by the problems for elites and voters of coordinating to decide who is, and who is not, a serious candidate.

In India, studies by Chhibber and Kollman (2004), Chhibber and Nooruddin (2004), Wilkinson (2004), Heath (2005), Chhibber and Murali (2006), Diwakar (2007, 2010), Sáez and Sinha (2010), Mayer (2013), and Chhibber et al (2014) use *ENP* to study the evolution of party system and party competition in India. In a variant, Goyal and Hahn (1966), McDonough (1971) and Yadav and Palshikar (2003) use the number of parties rather than the effective number of parties to distinguish between bi-party and multiparty competition.¹⁰

The reasoning that links more firms or parties with less market power in a market presupposes that the goods competed over are private (i.e., excludable) as opposed to public or non-excludable goods, and that cost conditions do not disadvantage multiple producers. But the good being competed over in a political market is the right to govern the entire electorate, the production of a set of policies that applies simultaneously to all voters. This characteristic of publicness, together with the scale economies associated with providing these public services, means that reasoning lying behind private market concentration ratios is not applicable. Rather, these characteristics imply that the right to govern in a democracy is a natural monopoly where the absence of competitive producers is often countered by regulation setting performance rules to offset the incentive the single producer has to reduce output and raise price.

However, in a provocative article entitled “Why regulate utilities?”, Demsetz (1968) argued that the fact that there can be only one efficient producer does not preclude competition from being used to improve upon the welfare generated within a natural monopoly. By the splitting of two usually conjoined rights, the right to own industry assets and the right to determine the use of these assets, competition among potential managers over the dimensions of industry output and the prices at which output is marketed can be used to better approximate an efficient solution. In this way competition among potential managers over promised levels of industry output and the prices to be set can be used to achieve better market outcomes and reveal the insider information that would otherwise be needed by regulators to set the appropriate output and pricing terms.

In just such a way, democratic elections encourage political parties to compete for the right to govern by offering to voters competing sets of policy platforms and 'management teams'. To the extent that competition is effective, successive elections will produce the iterative steps that move public policy towards the efficient equilibrium described by Demsetz. For such competition to enhance welfare, there must exist not only parties competing for voters through promised sets of alternative policies, but also parties making promises that voters view as credible. That is,

to more than two at the center or national level. (See for example Riker (1982), Gaines (1999), Chhibber and Kollman (2004) and Grofman et al (2009), in addition to Cox and Taagepera). To go from localized two-party competition to national competition between the *same* two parties requires additional assumptions.

¹⁰ Palshikar et al (2014) study electoral competitiveness at the state level during the period 2008-2013 using a number of different quantitative and qualitative measures while both Banerjee and Somanathan (2007) and Ghosh (2010) use the index of *Fragmentation* ($= 1-HH$), due to Rae (1967), as their measure of competitiveness. Note that *Fragmentation* is a simple transformation of *ENP* and is highly correlated with it (at about 0.99 in our sample using all statewide averages).

promises in themselves are ineffective unless the proposing party can credibly step in and perform should the performance promised by the incumbent be renegeed upon or not offered.

In this view, contestability in the sense developed by Baumol (1982) and his co-authors – the ability to credibly replace the incumbent producer – is the key mechanism by which the benefits of competition can be realized effectively by the community. In the political arena, competition in an election arises through the set of policies that competing parties view as better reflecting the wishes of the electorate. However the public good characteristic of governance means that effective competition comes not from the multiplicity of policy alternatives on offer but from the set that can be provided by the credible alternative which must include the likelihood that particular policy set will be implemented. Here the instability of minor parties in single member plurality rule (SMP) systems highlighted by Duverger becomes critical. The incentive not to waste one's vote by supporting a nonviable alternative implies that the greater is the degree of party fragmentation, the less effective will second or third placed parties be as a constraint on the performance of the governing party. Because greater fragmentation means that each of the smaller parties is less likely to win a majority, and since coalitions are difficult to arrange and maintain in SMP systems, each of these parties becomes less credible as a threat to the incumbent government. In such a fragmented system, the pressure on the governing party to keep election promises is thus diminished. Hence from the Duverger-Demsetz perspective, as we shall refer to it, a rise in *ENP* above 2 signals a decline in effective electoral competitiveness (Ferris et al 2016).¹¹

The evolution of the three *ENP* measures for the Indian states, shown in Figure 1 for 1952–2009, illustrates three general features of Indian state electoral competitiveness seen through the evolution of *ENP*. First, in common with most other parliamentary democracies and as predicted by Duverger, the constituency vote based measure (*ENP_Candidate*) always lies below the party vote based *ENP* measured at the state level (*ENP_Party (votes)*). The higher state-wide party measure reflects the fact that within a heterogeneous political jurisdiction, different parties often have different regional strongholds.

Second, while the average *ENP* index in terms of state wide party votes lies above the other indexes, that for seats at the state level (*ENP_Party (seats)*) is similar to the index based on constituency level votes by candidate. This indicates that while on average across the states different parties have substantial strength in different regions of each state, that regional strength does not on average translate into seats in the state assemblies. In contrast, *ENP* by seats in the national parliament, the Lok Sabha, lies above *ENP* by votes based on aggregating up from the national constituency level. (See Chhibber and Kollman 2004, 168).¹² Figure 1 also shows that despite the difference in levels for the state based measures, the movements of *ENP_Party (seats)* and *ENP_Party (votes)* are similar; their correlation is about 0.8.

Third, with the exception of the initial rise (fall) in the seat based (vote based) *ENP* series, through the early 1960's, all three *ENP* measures can be seen to gradually increase from about the time

¹¹ There is an additional source of inefficiency stemming from the possibility that as the number of parties increases, each party is forced to focus its electoral promises on ever narrower segments of the electorate, thus moving the public sector towards special interests and away from the provision of public services. See Bueno de Mesquita et al (2001) and Lizzeri and Persico (2005) for interesting explorations of this view and Chhibber and Nooruddin (2004) and Winer et al (2018) for a similar hypothesis concerning the Indian states.

¹² In Canada, as for India, the analogue to Figure 1 for national elections shows that *ENP* by party seats in Parliament lies substantially above *ENP* calculated using votes at the national constituency level, because in Canada, regionally based parties win seats in different parts of the country (See Ferris et al (2016) for the graph corresponding to Figure 1).

of the emergency in the late-1970s onward. This likely reflects the gradual erosion of support for the Indian National Congress (INC) Party that had dominated elections both at the center and in the states over the first two decades following Independence. During that early period political competition was primarily internal, within different factions of the Congress Party. In the 1970s and 1980s, however, state-specific parties were formed based on regional issues. These parties gradually gained prominence and successfully challenged the Congress Party's dominance, particularly at the state level, so that in the late 1980s, all variants of *ENP* began to trend upwards. Interpreting this pattern from a Duverger-Demsetz perspective suggests an early period of consolidation of candidates about parties in the first few decades, followed by a few decades of stable contestation and then a slowly growing fragmentation of the vote that reduced the credibility of parties attempting to compete with the incumbent. In this interpretation then, competition as contestability has been slowly declining in Indian state elections since the late 1980s.

Before accepting such a conclusion, however, we note that a problem arises with using *ENP* defined by vote shares as a basis for testing Duverger's Law. That is, while *ENP* is equal to 2 when two parties have equal shares, a value of 2 can also originate with share distributions such as (0.666, 0.167, 0.167) where one party is dominant. Conversely, an *ENP* above 2 can represent a state with a more equal division of votes between two major parties, as with shares (0.40, 0.40, 0.20) for which $ENP = 2.78$.¹³ The latter example appears to represent a more competitive and contestable system than does the former where one party dominates with a two-thirds share.

Such examples have led to the development of other indexes on which to base a test of Duverger's Law, which we may now think of as the proposition that contestability will increase over time as the number of parties converges on 2 from above. Two of these have been proposed by Gaines and Taagepera (2013).¹⁴ The first index, *T-partytiness*, is designed to incorporate information on the votes received by all parties *other than* the top two. This is an attempt to avoid the problem that $ENP = 2$ can result from vote patterns that otherwise suggest one party dominance, and other patterns that exaggerate departures from 2 when two party dominance is likely (Gaines and Taagepera 2013, 2). The *T-partytiness* index is defined as

$$Tpartytiness_{jt} = (v_{2jt} - v_{3jt})(v_{1jt} + v_{2jt})/v_{1jt}. \quad (3)$$

where v_{3jt} refers to all other parties. It has a maximum of 1 when exactly 2 parties have equal vote shares and decreases as the share captured by other parties rises.

Gaines and Taagepera also propose a second measure of the deviation from 2; the Euclidean distance of vote shares from an equal share for two parties, (1/2, 1/2, 0), in the case of three parties. The index is again normalized to lie between 1 and 0. (When one party has all the votes, $D2 = 0$). More generally with J parties,

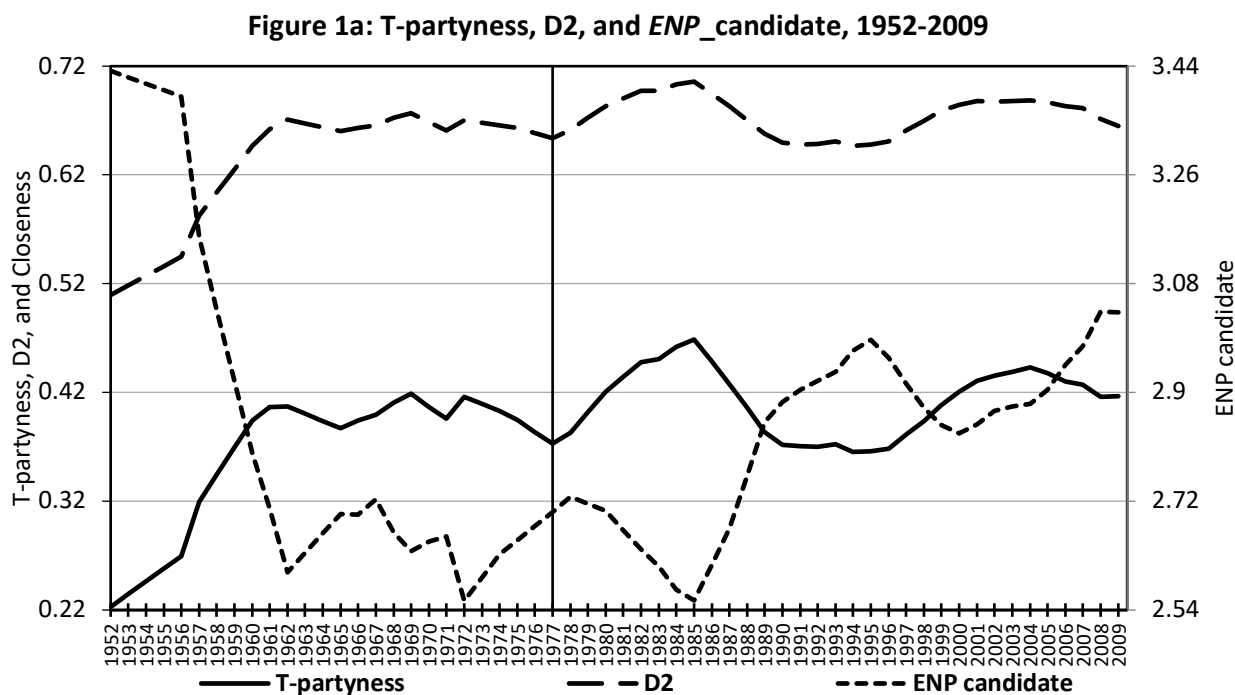
$$D2_{jt} = 1 - \sqrt{2} d_{2j},$$

$$\text{where } d_{2j} = \sqrt{(0.5 - v_1)^2 + (0.5 - v_2)^2 + (0 - v_3)^2 \dots + (0 - v_j)^2}. \quad (4)$$

¹³ These examples are supplied by Rein Taagepera (personal communication).

¹⁴ A third alternative to *ENP*, the *Closeness* index of Endersby et al (2002), is presented in the Appendix. It turns out to be highly correlated with the $D2$ index of Gaines and Taagepera.

In Figure 1a below we present the time paths of these two alternative measures, built up from the constituency level to the state level, and then averaged over our fourteen states for each election, where $J = 6$ for the $D2$ measure. ENP (using candidate vote shares) is also included here for comparison purposes. As can be seen from that figure, the two measures differ in level. But neither exhibits a significant time trend nor, except for the very early period, do they exhibit a different pattern of change over time. When compared to ENP , however, we see a challenge to the interpretation that competitiveness has declined in Indian state elections in the post-1980 time period. Unlike ENP which has trended upwards after 1985, T -partytness and $D2$ both vary without trend from about 1960 onwards.



One should note that it is likely that Indian states had low T -Partytness before 1977 due to the dominance of Congress, and then about the same values after 1990 due to the entrenchment of multi-partytness following the decline of Congress. Whether contestability was equal in these situations is not clear however. Moreover, we note that none of the indexes in Figure 1a is designed to measure the credibility of the opposition as a government in waiting. Thus it seems wise to remain agnostic about the evolution of contestability across the Indian states, a clearly superior index of which, in our view, remains to be constructed.

3. Electoral competitiveness as *ex ante* uncertainty

A second approach to electoral competitiveness focuses on the *ex ante* uncertainty or unpredictability of election outcomes. An appeal to the uncertainty of an election focuses on a different dimension to competitiveness than does contestability. From the contestability perspective, an election is competitive if the incumbent can be replaced credibly by an equivalent or superior alternative. However, a contestable election need not also be highly uncertain. While contestability constrains the options of the incumbent, replacement will arise only when the incumbent behaves 'badly' or miscalculates the nature of voter preferences. If a candidate or party is superior in terms of performance, we may observe long periods of one-party dominance

even in a highly competitive system, a point also made by Buchler (2010).¹⁵

In the limit, in this second approach, a perfectly competitive election would be unpredictable in the sense that the *ex ante* distribution of possible outcomes would not be biased in favor of the incumbent. A strong version of this view, as a hypothesis, might be formulated as: *ex ante* there is no available information that can be used to predict the outcome of the upcoming election. In this form, the statement is analogous to the efficient markets hypothesis.¹⁶

Whether or not we can link economic and political understandings of uncertainty in this way, the idea that a competitive election is 'too close to call' has a long tradition in both the political science literature and popular discourse. (For recent contributions, see, Blais and Lago (2009), and Grofman and Selb (2009)). It is important to recognize that the logic tying together closeness, uncertainty and competitiveness is *ex ante*: the expectation must be formed prior to the revelation of election outcomes. This generates a problem for interpretation when realized outcomes are used. If, in operationalizing 'too close to call', we simply replace the *ex ante* concept with its *ex post* election outcome (plus a random term), we are implicitly invoking rational expectations and hence adopting the strongest version of the hypothesis stated above. No matter what information is used, however, all attempts at measurement must deal with this important *ex ante* - *ex post* distinction.

In India, as in other democratic states, many studies have used the observed first versus second place vote margin to measure electoral competitiveness. Here an election is seen as highly competitive if the actual first versus second place vote share margin, $v_1 - v_2$, is 'small', where v_i is the vote share of candidate or party i . For example, Chhibber and Nooruddin (2000), Wilkinson (2004), Arulampalam et al. (2009), Crost and Kambhampati (2010), Banerjee and Iyer (2010), Sáez and Sinha (2010), Jha (2014), Dash and Mukherjee (2015), Afridi et al (2016), and Mitra and Mitra (2017) all use the winning margin in their work.¹⁷

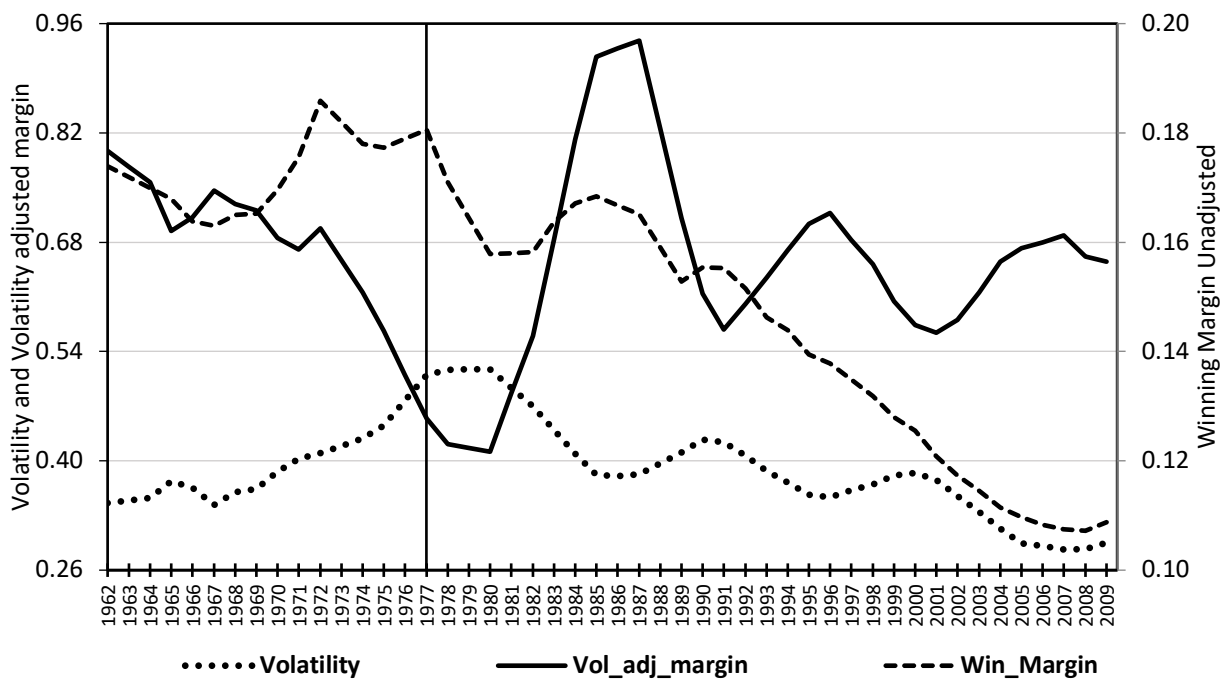
In Figure 2, the dotted line graphs the average first versus second place winning margin (denoted *Win_Margin*) across the constituencies of the fourteen Indian states. This is done from 1962 instead of 1952 as in Figure 1 because of the need to deal with delimitation or redistricting, as explained below and in more detail in section A2 of the Appendix. If we interpret the size of the winning vote margin (scaled on the right-hand axis) as a measure of how close the election outcome was, and thus an inverse measure of the degree of competitiveness, the time pattern exhibited suggests that electoral competition has gradually risen over time. Viewed more closely, the first versus second winning margin remained fairly constant through the mid-1980s, at about 17 percent, before beginning a period of continuous decline. Between 1984 and 2008 the winning margin fell about 40 percent (from 17 to about 11 percent) seemingly signaling a rise in electoral competitiveness within India's state constituencies.¹⁸

¹⁵ The inverse, however, need not hold. One-party dominance *by itself* is not a good indicator of the degree of competition and this of course makes an assessment of the relationship between the duration of incumbency and the competitiveness of the electoral system a complex matter.

¹⁶ A weaker version of this hypothesis requires only that past election outcomes cannot be used to predict current ones.

¹⁷ The study by Besley and Burgess (2002) uses a variant of the winning margin, the difference in seat shares of the Congress Party and its main competitor(s).

¹⁸ One may note that the simple constituency first versus second place winning margin is highly negatively correlated with *ENP_Candidate*, at -0.84.

Figure 2: Winning Margin, Volatility and the Volatility Adjusted Winning Margin, 1962-2009

One reason for caution in relying upon the evidence in Figure 2 is that a close outcome or a small expected winning margin can be quite safe for an incumbent if that party's vote in the constituency varies little across elections, while even a large margin may be effectively small if a large number of voters typically switch their vote from election to election. This point has been recognized for some time. (See, for example, Przeworski and Sprague (1971), Elkins (1974), and Bartolini and Mair (1990)). To more accurately reflect the relevant margin facing candidates in each constituency, vote margins must be adjusted for vote volatility.¹⁹ It turns out empirically that this adjustment is crucial.

Adjusting the vote margins for volatility is not easy to do over long periods of time because of redistricting. To deal with this issue, we link administrative districts with electoral constituencies and use party averages across the district in which a new constituency lies to construct a proxy for the past history of the new constituency.²⁰

The volatility measure at time t for each constituency is defined following Przeworski and Sprague (1971) by

$$Volatility_{jt} = \frac{\sum_{p=1}^7 |v_{pjt} - v_{pjt-1}|}{2}, \quad \forall j = 1 \dots N, \quad (5)$$

where v_{pjt} is the vote share of party p in constituency j in election t .²¹ Our constituency level measure uses the sum over the top six party candidates plus an *Other*, residual category, where a (major) party is defined as one appearing in the top ten vote receiving state parties in three successive elections, or as those receiving more than 8 percent of the vote in at least one election.

¹⁹ Volatility by social and by income grouping of states, introduced later on, is presented in Appendix A4.

²⁰ Appendix A1 describes how administrative districts are used to link constituencies across time, along with further details on the construction of volatility.

²¹ See also Pedersen (1979). Volatility is constructed by using vote shares on a party basis.

(Others are put into the residual category). Note that the volatility index will incorporate changes in both the size of the franchise and voter turnout.

The average constituency level vote volatility across 14 states is plotted against the left-hand margin of Figure 2 above from 1962 instead of 1952 because of the difficulties of dealing with redistricting. As can be seen from that diagram, *Volatility* exhibits a different time pattern than does the unadjusted vote margin *Win_Margin*, first rising and then falling from the late 1970s onwards, with an overall correlation with the *Win_Margin* for 1962–2009 of just -0.04.²²

Volatility adjusted, first versus second place vote margins are constructed at the constituency level by dividing the first versus second place winning margin by the constituency's volatility, and then aggregating using the constituency's share of the aggregate state vote. Formally, a state's weighted average volatility adjusted winning margin is defined as

$$\text{Volatility Adjusted Winning Margin}_t = \sum_{j=1}^J \frac{(v_{1jt} - v_{2jt})}{\text{volatility}_t} \cdot \text{adj_vw}_{jt}, \quad (6)$$

where $\text{adj_vw}_{jt} = \text{votes in constituency } j \text{ at } t / \text{aggregate state votes at } t$.

The average across states of the state level volatility adjusted winning vote margin, labeled *Vol_adj_margin* is shown relative to the left-hand axis in Figure 2. Here a larger number represents *less* competition. What is immediately apparent is that the volatility adjusted measure exhibits a dramatically different time pattern than does the unadjusted winning margin. The correlation between them is just 0.29. Also, while *ENP_Candidate* and the unadjusted winning margin are negatively correlated at -0.84, the volatility adjusted winning margin is more or less uncorrelated with any of the *ENP* measures over the 1962 to 2009 period.

Instead of suggesting a continuous improvement in competitiveness as does the unadjusted margin, the volatility adjusted measure implies a period of rising competitiveness at the beginning of our period in 1962 through 1978, followed by a dramatic decrease in competitiveness throughout the early 1980s, before rising back to an intermediate and stable level from the early 1990s onwards.

3.1. More inclusive competition measures using multi-party vote margins

A weakness of the volatility adjusted winning margin, and hence with any story based on it, is that this index reflects competition arising only in relation to the first versus the second place candidate, a consideration that is problematic in a multi-party system like India, where third and fourth place candidates can make life difficult for the incumbent, and where smaller parties sometimes join in a coalition government.²³ Following Przeworski and Sprague (1971), we have therefore developed a multi-party volatility adjusted margins measure of competitiveness, based

²² We recall that correlations are found in Table A1. Nooruddin and Chhibber (2008) use aggregate vote shares at the state level and note a similar decline in volatility from the late 1970's onward. Appendix section A5 shows the pattern of volatility when states are grouped according to caste and class, and when grouped according to level of development. The patterns there are both about the same as for *Volatility* in Figure 2 - that is, humped shaped with a peak around the time of the emergency or a few years after.

²³ Generally speaking, the vote share of 3rd and 4th place candidates started increasing in the 1970s and 80s after state-specific regional parties became more prominent. The role of 3rd and 4th place candidates varies across states. For example, in UP and Bihar, where parties formed in the 1980s based on caste, the number of effective parties increased and 3rd and 4th place candidates' vote shares in these two states subsequently grew to become

on the view that every (nonincumbent) candidate's objective is overcoming their vote deficit vis-a-vis the previous winner.

This vote deficit is expressed as $h_{pj}^t = (v_{1jt-1} - v_{pjt-1})$ for all parties or candidates, p , in constituency, j , other than the incumbent, whose $h_{1j}^t = 0$ and who is excluded. As with the simple winning margin, the distance to be overcome becomes more meaningful when the vote deficit h_{pj}^t is adjusted for volatility,

$$h_{pj}^t = \frac{(v_{1jt-1} - v_{pjt-1})}{Volatility_{pt-1}}, \quad (7)$$

where volatility is the same measure as that used in (3) above. Using (7), a competitiveness index for a party or candidate is then defined as follows:

$$c_{pj}^t = \begin{cases} 1 & \text{if } 0 \leq h_{pj}^t \leq 1 \\ \frac{1}{h_{pj}^t} & \text{if } h_{pj}^t > 1 \end{cases} . \quad (8)$$

When $c = 1$ the vote deficit or 'distance to go' faced by that party or candidate is smaller than the portion of the electorate that switched parties last time. Hence the candidate challenging the leader in the last election is a fully credible rival. Otherwise the index is less than one and falls as the margin to overcome grows relative to volatility.

Aggregating across all the candidates (except the one in first place who is omitted) within each constituency j , using as weights the vote share that each candidate in a constituency receives, yields a multi-candidate, constituency level measure of competitiveness:

$$C_j^t = \sum_{p=1}^P c_{pj}^t v_{pjt} . \quad (9)$$

A $C_j = 0$ indicates no competition among the challengers in that constituency (and is used to represent any constituencies in which the election was uncontested). Perfect competition is a situation where all parties face a distance to go to overcome the vote share of the leader that is less than historical volatility, in which case $C_j = 1$. Aggregating across all constituencies, using the constituency's share of the aggregate state vote, then yields the candidate based multi-party volatility adjusted margins index for each state C_{sj}^t :

$$C_s^t = \sum_{j=1}^J C_j^t adj_vw_{jt}, \quad (10)$$

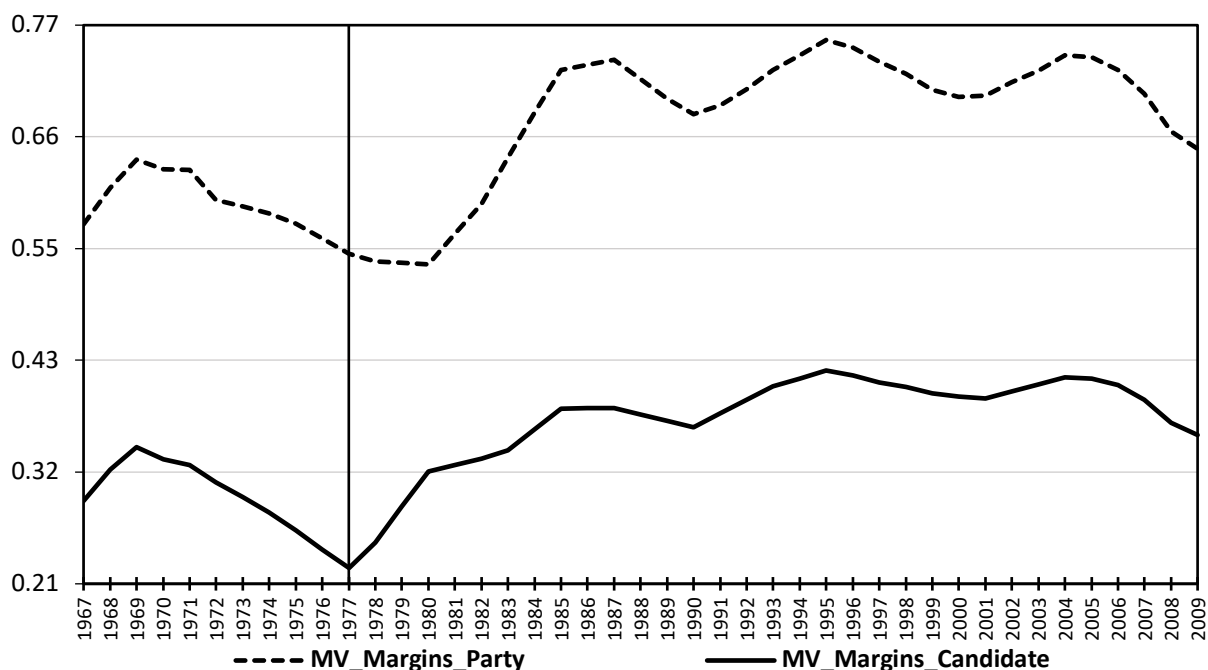
where adj_vw_{jt} is defined as in (6). We shall refer to this multi-party, volatility adjusted measure of competitiveness at the constituency level as the *MV_Margins_Candidate* index. In a similar manner we can construct an alternative party version of (10) by first aggregating the party c 's in (8) across all constituencies *for the same party*, and then aggregating at the state level *across parties* using as weights the vote shares of the state parties. We shall refer to this variant as the *MV_Margins_Party* index.

relatively large compared to other states. We also note that in our sample as a whole, there are only a few coalition governments before 1990, but from 1990 onwards about 50% of state governments are coalitions.

It is important to note that as described above, both of these measures use data from the prior election and hence are *historical* or predetermined measures. *MV_Margins* measures using current election outcomes can also be used to construct adaptive multi-party competition indexes by constituency and by party, which are weighted averages of historical and current values, and which are highly correlated (at above 0.96) with the historical values. (Both types of measures will be available in the accompanying Online Data).

The national averages of the two versions of the state level historical *MV_Margins* indexes are presented in Figure 3. There it can be seen that these multi-party competition indexes exhibit a similar pattern of movement over time – the correlation between them is 0.94 – but are different in terms of their levels; the party based measure is roughly double the size of the candidate measure.

Figure 3: *MV_Margins* Measures of Candidate and Party Competitiveness, 1967-2009



When compared to the time path of the simpler volatility adjusted winning margin in Figure 2 where, to recall, a bigger index number represents *less* competitiveness, we see that the multi-party volatility adjusted indexes are quite different. The overall correlation between these two sets of indexes is *positive*: 0.43 for *MV_Margins_Candidate* with the simpler (first versus second) *Vol_adj_margin* in Figure 2, and 0.58 for *MV_Margins_Party*. Thus when the simple volatility adjusted margin indicates (by its *decline* in value) that an *increase* in competitiveness has occurred, the multi-party volatility adjusted indexes defined in (10) tend to indicate the opposite. Clearly the multi-party context of Indian state elections matters.

In Figures 2 and 3, we see that elections just after the emergency were highly (Figure 2) or more competitive (Figure 3) than in 1977. But the simple adjusted margin in Figure 2 shows that elections were becoming more competitive before and up to the emergency, while the more complex indexes in Figure 3 indicate the opposite. Over the decade of the 1980s, the patterns are also quite different: in the first of these figures using the simple volatility adjusted win margin, we see declining competitiveness up to the mid-1980s, and rising competition for the rest of that decade, while in Figure 3 using the multi-party volatility adjusted index *MV_Margins*, the pattern

is opposite in nature. After 1990 both of these indexes exhibit a similar absence of trend, though fluctuations in the indexes are also to some degree opposite in nature. Electoral competition on a volatility adjusted vote margin basis evidently looks quite different depending upon whether third and lower placed competitors are included.

It is also interesting to compare the *MV_Margins* measures with the assessment of competitiveness that arises from the Duverger-Demsetz interpretation of *ENP* shown in Figure 1. For example, while the Duverger-Demsetz interpretation suggests competitiveness as contestability of a credible alternative is trending downwards from about 1985 to 1995 when *ENP* is rising, the *MV_Margins* indexes indicate that competitiveness falls from about 1985 until 1990 and then *rises* until the mid-1990s.

4. Electoral unpredictability and risk in the competition among parties for power

Although the volatility adjusted multi-party vote margins tell us something about the unpredictability of the representative electoral contest at the constituency level, they do not explicitly incorporate an adjustment for the riskiness of an election outcome for a party at the state level. The third type of competitiveness index we propose does so.

As is well known, a good election strategy in a single member district parliamentary system is to target marginal constituencies – districts especially susceptible to changing hands in an election.²⁴ This suggests that the proportion of marginal constituencies would be a useful measure of the degree of competitiveness in the electoral contest of that state. If every constituency is perfectly safe for its incumbent, there is no competition. And if every seat is marginal, every seat is a battleground, as Bodet (2014) puts it. We could then say that an election with a high proportion of marginal seats is highly contestable (at the state level) in the sense of Demsetz and Baumol, and use the proportion of marginal seats as a competitiveness index. However, because the party with relatively more of the safe seats will have an important electoral advantage, at least in its ability to target resources towards competitive constituencies relative to its competitors, we should incorporate an adjustment to the number of marginal seats to allow for asymmetry that may arise across parties in the distribution of such contested constituencies.

To operationalize the idea that electoral competitiveness depends on the proportion of asymmetry adjusted marginal seats or marginal constituencies, we must define what marginal means. Hartle (1985) suggests that a marginal constituency is one from which economic rents cannot be taken and redistributed to other constituencies without serious risk of electoral defeat. This is an attractive definition, but one that is impossible to apply without being able to measure the distribution of rents across constituencies. Previous empirical work on safe seats includes Lovinck (1973) and more recently Bodet (2014), both of whom study Canada's electoral history. Bodet's definition of a safe seat is one that lies in the upper tail of the distribution of vote margins. He uses a one standard deviation above the mean standard to judge safeness, based on the distribution of vote margins that arose in the previous election (along with other ancillary criteria). Any constituency with a winning margin above this level is considered to have a vote cushion sufficiently large to provide 'safeness' to the incumbent.

Let the historical volatility adjusted winning margin for incumbent *party p* (which won at time

²⁴ See Persson and Tabellini (2000, chapter 8), Moon (2006), and Barkovic-Parsons et al (2017) for recent exposition and tests.

t-1) in constituency j in election t in a given state be defined as

$$IPmargin_{pjt} = \frac{(v_{1pjt-1} - v_{2jt-1})}{Volatility_{t-1}}. \quad (11)$$

Here we are defining incumbency by party, not by name of candidate, as with volatility. (At issue is party competition.) Forming a distribution of constituencies by the size of their $IPmargin$ s across a rolling average of three past consecutive elections, and applying a one standard deviation cutoff rule leads to the number and hence proportion of seats considered safe in each election, ψ_t . We then compute the proportion of marginal seats in each election, MS_t ,

$$MS_t = 1 - \psi_t, \quad (12)$$

as a measure of the competitiveness of the election as a whole. $MS = 1$ indicates that all of the seats in the state assembly are marginal and hence that the electoral system is highly competitive in this sense.

While a smaller overall proportion of safe seats implies that more seats are up for grabs, how safe seats are distributed among competing parties also matters, as noted earlier. Adjusting the proportion of marginal seats MS_t by the degree of asymmetry among parties in their holding of safe seats produces a new measure of electoral competitiveness at the state level. To do so, we use the idea behind the $D2$ measure of Gaines and Taagepera (2013) referred to earlier. This involves measuring the Euclidean deviation from a three-party equal sharing of safe seats, $\phi3_t$, to reflect the degree to which the distribution of safe seats departs from the case where safe seats are equally distributed, where the third party is a residual consisting of the parties other than the top two:

$$\phi3_t = \sqrt{3/2} * \sqrt{(1/3 - S_{1t})^2 + (1/3 - S_{2t})^2 + (1/3 - S_{3t})^2}, \quad (13)$$

Here S_{pkt} = the seat share in the state legislature of the party in k th place in terms of seats. If the safe seats are symmetrically distributed, $\phi3_t = 0$, and if one party has all safe seats, $\phi3_t = 1$. In this calculation as we carry it out, the third 'party' will refer to all parties other than the dominant two. However if the third party vote is substantial and it is desirable to ignore smaller parties, party vote shares could be renormalized among the top three competing parties so that the party vote shares sum to 1.

The computation of the asymmetry adjusted index of marginal seats begins by first adjusting the proportion of safe seats for the asymmetry in their distribution:

$$AS_t = \psi_t \phi3_t, \quad (14)$$

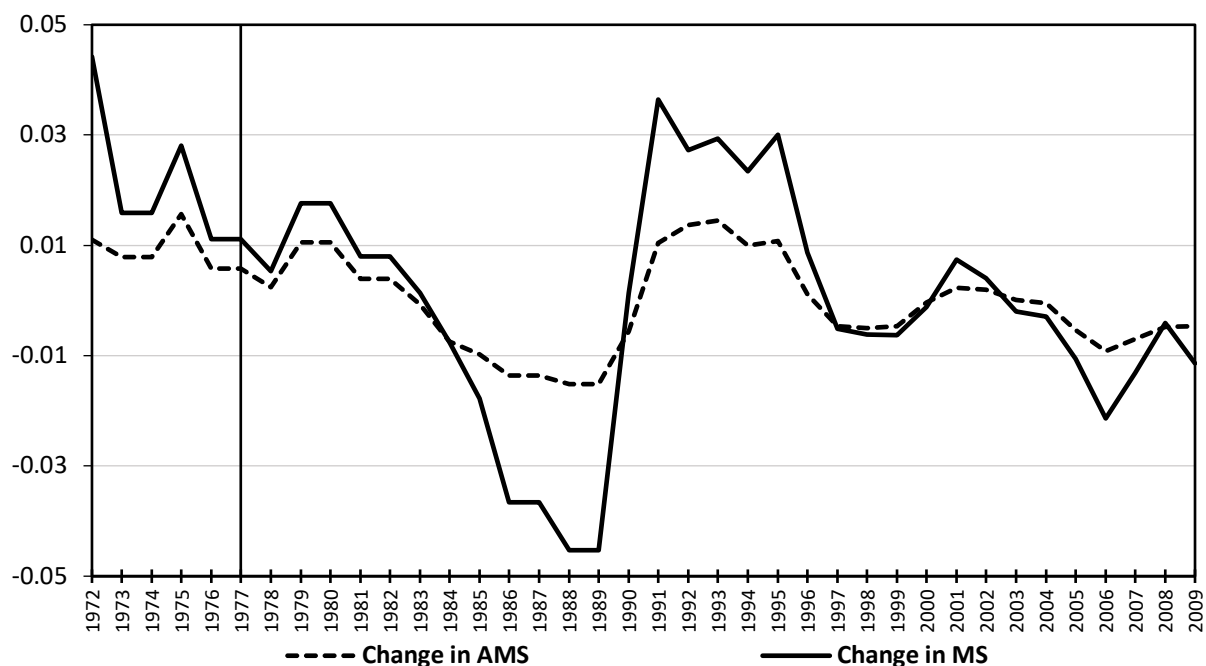
so that $AS_t = 0$ if safe seats symmetrically distributed, and $AS_t = \psi_t$ (the proportion of safe seats) if one party has all the safe seats. We then use AS_t to define the asymmetry adjusted index of marginal seats as

$$AMS_t = 1 - \{\psi_t \phi3_t\}. \quad (15)$$

Hence $AMS_{+t} = 1$ if all safe seats are symmetrically distributed, and $AMS_t = 1 - \psi_t$ (the proportion of marginal seats) if one party has all the safe seats.

Since, by construction, *AMS* will always lie above *MS* on a graph as long as there is any asymmetry in safe seats, additional insight comes from looking at changes in the two measures as signals of whether or not there has been a change in electoral competitiveness and for what reason. Hence in Figure 4 below we present the first differences of these two measures and note that through their co-movement they tell a similar story for the evolution of party competitiveness at the state level. However the less dramatic swings in *AMS* relative to *MS* also indicate that changes in the asymmetry of safe seats has worked to moderate the degree of change that would otherwise be indicated by proportion of marginal seats. In the case of Indian states, changes in the proportion of marginal seats will overstate the variation in electoral competitiveness at the state level by ignoring the moderating effects that offsetting changes in asymmetry in the distribution of safe seats have had on electoral competition.

Figure 4: Change in Competitiveness as Signaled by Changes in MS and AMS, 1972-2009



With the adjustment for asymmetry across safe seats, the changes in *AMS* suggest that the overall trend throughout the 1970s was one of state elections gradually becoming less competitive, with a notable exception for the period after the emergency when asymmetry adjusted marginal seats rose. This trend reversed dramatically in the late 1980s and early 1990s when competitiveness (according to the *AMS* measure) increased substantially. It then dipped downwards until about 2000, after which time it varied with little trend.

What is also of interest is that for the 1980s, a comparison of our measures of competitiveness at the constituency level – the volatility adjusted winning margins *MV_Margins_Candidate* and *MV_Margins_Party* in Figure 3 – show a dramatic increase in constituency competitiveness at the same time as competitiveness across the major state parties as shown by *MS* and *AMS* was just as rapidly falling. The early 1990s exhibit a similar reversal in competitive predictions as do subsequent sub-periods. Taken together these comparisons suggest that competition among candidates and parties at the constituency level is quite different from competition among the major parties at the state level. Even more strongly, the results suggest that the two may be inversely related, with more intense competition at the constituency level undermining the

competitiveness of elections viewed as a contest between parties at the higher level. This is a tentative hypothesis that may deserve further investigation.

5. Electoral competitiveness and social and ethnic differences across Indian States

In an ethnically heterogeneous country like India, social identities play an important role in all aspects of the electoral system, with the major ethnic divisions being caste, social class, language and religion. All such group identities have been used by political parties in their attempts to win support. Of these, caste-based identity is probably the single most important factor in the formation of bonds between voters and parties. The oft-used phrase 'Indians vote their caste while casting their vote' reflects the centrality of caste in Indian politics.²⁵

This section of the paper focuses on how competitiveness varies with caste and class. We rely on the classification in Church (1984) and Harriss (1999, Table 2, 3371), with adjustments for political developments since these papers were written. We divide our set of 14 states into four broad groupings, which are:²⁶

Group 1: *states where caste forms the organizational basis for political parties (Bihar and Uttar Pradesh).*

Group 2: *states in which class and regional concerns form the basis for party structure (Kerala, Tamil Nadu and West Bengal).*

Group 3: *states where the middle castes or classes and commercial interests dominate party structure (Andhra Pradesh, Gujarat, Haryana, Karnataka, Maharashtra, and Punjab).*

Group 4: *states where upper caste or class dominance persists (Madhya Pradesh, Odisha, and Rajasthan).*

The reasoning behind the classification is discussed at length in section A4 of the Appendix. We consider the comparative evolution of competitiveness across these groups using a menu of indexes of competitiveness. Figures 5 through 8 present the *ENP_Candidate* index, the *Volatility adjusted, first versus second place winning margin*, the multi-party volatility adjusted index *MV_Margins_Candidate*, and the asymmetry adjusted marginal seats index *AMS*, each for the four separate state groupings outlined above.

²⁵ See, for example, Jaffrelot's (2012) chapter in the *Routledge Handbook of Indian Politics* for just such an observation on caste alliances with political parties in India.

²⁶ Church (1984) develops a fourfold caste and class hierarchy to study caste and class centric politics in 7 major Indian states (Bihar, Gujarat, Kerala, Karnataka, Maharashtra, Uttar Pradesh, and West Bengal).²⁶ Harriss (1999) extends this framework to include 6 more major Indian states (Andhra Pradesh, Madhya Pradesh, Odisha, Punjab, Rajasthan, and Tamil Nadu). The fourfold class-based caste hierarchy includes the 'upper' castes, 'middle' castes, 'lower' castes, and 'scheduled' castes. Upper castes consist of such sub castes as brahmans, kshatriyas and banias. These castes have long dominated society and politics as landlords in rural India and as businessman and influential professionals in urban India. Middle castes constitute the major farming castes such as jats, yadavas, kurmins, marathas, and so on. The majority of India's population belong to this caste group, and in caste hierarchy, middle castes enjoy special status below the upper castes. Middle castes dominate politics at the local level as they control land and labor. At the bottom of the social status hierarchy are the scheduled castes. Scheduled castes are ex-untouchables working primarily as agricultural laborers. Lower castes fit between middle and scheduled castes in the caste hierarchy. They are better understood in terms of their professions: marginal farmers, sharecroppers, barbers, boatmen, blacksmiths, carpenters, oil-pressers and so on. The lower and scheduled castes were the last stratum of society to be brought into politics.

[Figures 5 - 8 here]

Figure 5: ENP_Candidate Measures by Social Groupings, 1952-2009

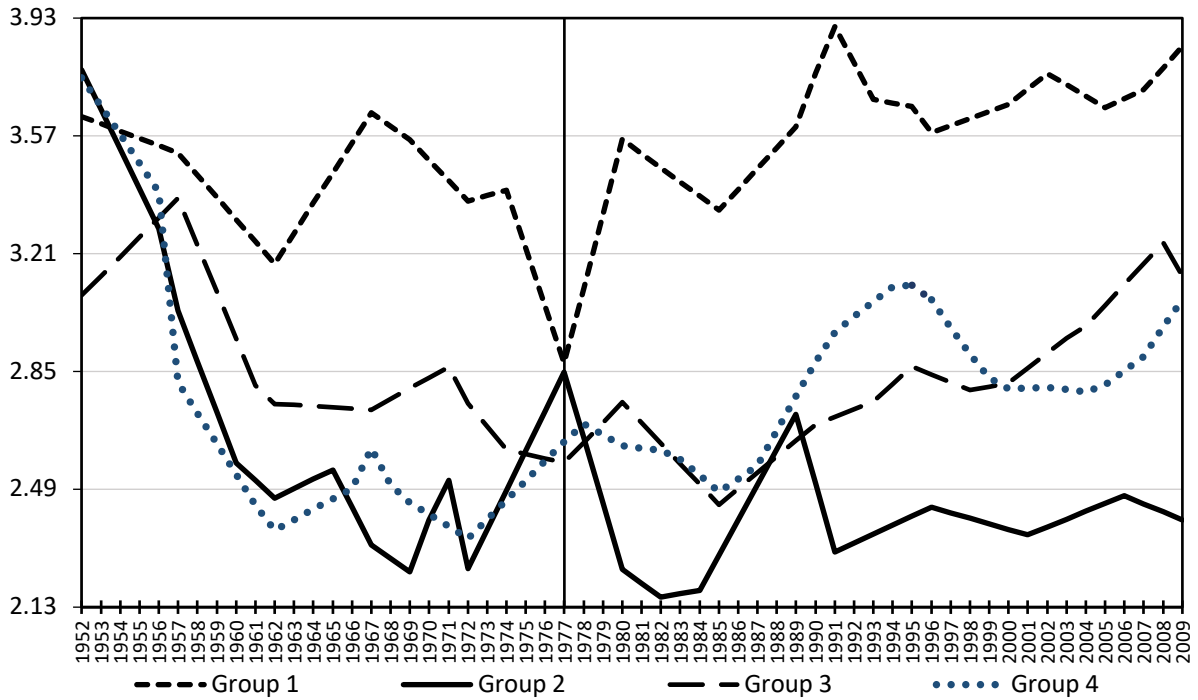


Figure 6: Volatility Adjusted (1 vs. 2) Winning Margin by Social Groupings, 1962-2009

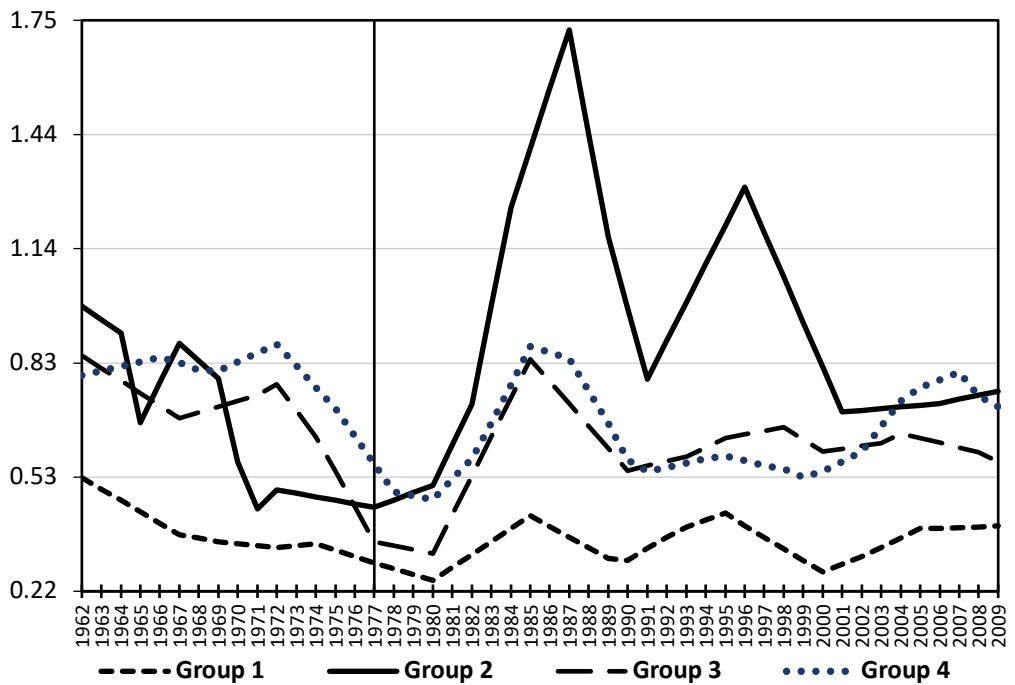


Figure 7: MV_Margins_Candidate Measures by Social Groupings, 1967-2009

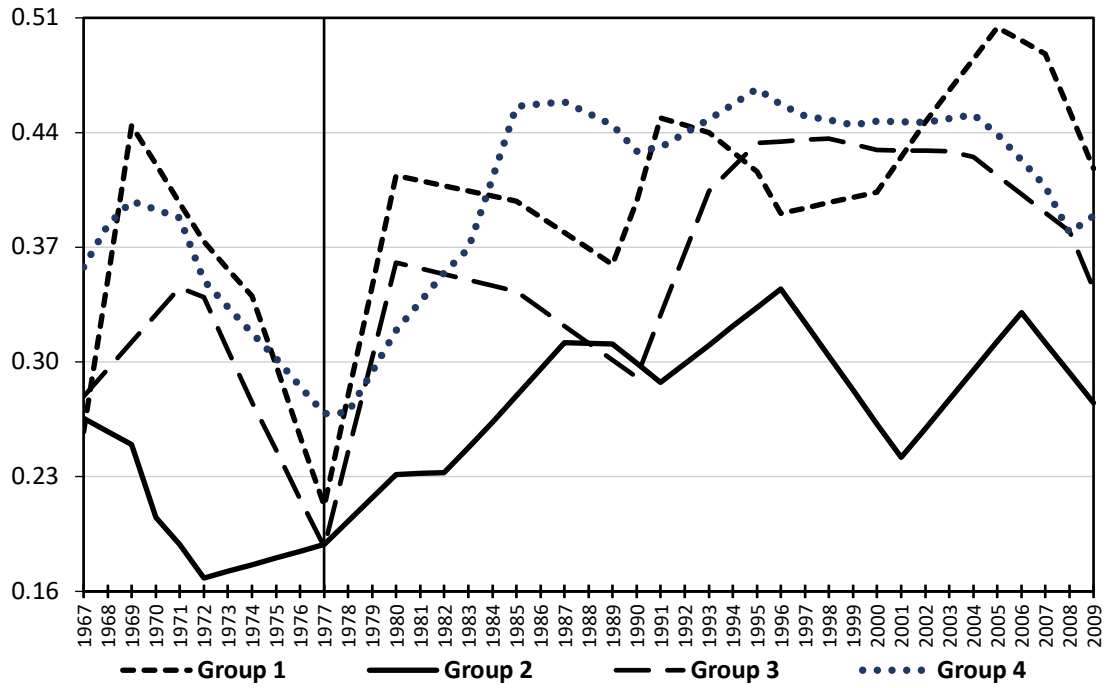
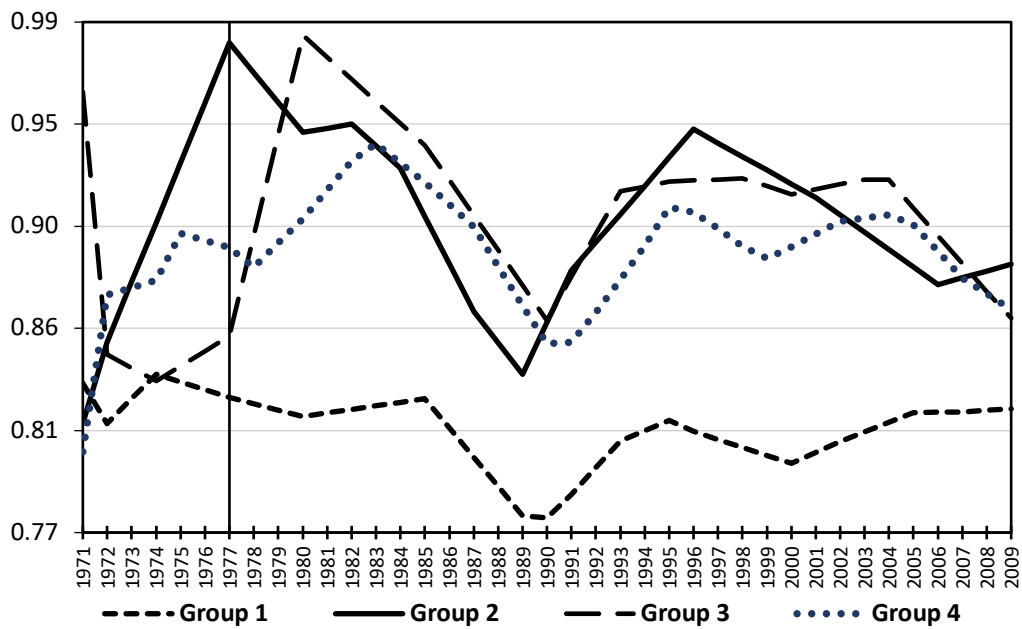


Figure 8: Asymmetry Adjusted Marginal Seats by Social Groupings, 1971-2009



5.1 Observed differences in electoral competition across the four caste and class groupings

We immediately see when looking at these figures collectively that while the separate group measures often differ widely in their levels and sometimes produce particular group-specific timing responses, all four groupings exhibit a similar pattern of movement across time.²⁷ For example, if we look at the evolution of the four *ENP_Candidate* groupings in Figure 5 and treat the elections arising during the emergency in 1977 as an outlier, then the four groupings move more or less in parallel with Group 1 at the top, Group 2 at the bottom and Groups 3 and 4 varying in between. Similarly, in Figure 6 the height ordering of the group positions on the diagram is reversed but the time series follow a common pattern through time. Figure 7 is more problematic, but allowing for sometimes dramatic differences in scale, Figure 8 reproduces a common pattern of movement through time. On the whole, then, disaggregation by caste and class based groupings suggests that the movement of the state averages may well be representative of common changes arising across the states lying beneath the social and economic differences with which they have been classified.

A formal test for whether the groupings do exhibit a common linkage through time must consider whether the groups are cointegrated within each category. Table 1 reports the Adjusted Dickey Fuller (ADF) statistics resulting from a unit root test for each of the four group time series reported in Figures 5 through 8. They indicate that typically three of the four series for each of the competitive measures are nonstationary or $I(1)$, while the remaining series is stationary. It follows that the data for the four caste/class groupings are consistent with the presence of a common stochastic trend or long run equilibrium relationship) within each index type if the residuals of a linear regression involving the four separate time series are found to be stationary.

Table 1: Unit Root Tests for each Index across the four Socio-Ethnic Groupings

1% (5%) Critical Values = -3.57 (-2.92)		Group 1	Group 2	Group 3	Group 4
<i>ENP_Candidate</i>	Level	-2.86	-3.86	-2.26	-1.99
	First Difference	-5.09		-4.23	-3.28
Volatility adjusted winning margin	Level	-4.03	-3.17	-2.81	-4.44
	First Difference		-5.59	-3.55	
Multiparty volatility adjusted winning margins	Level	-2.50	-4.06	-2.45	-2.31
	First Difference	-3.82		-6.64	-6.62
Asymmetrically adjusted marginal constituencies	Level	-1.82	-1.78	-1.88	-1.78
	First Difference	-7.08	-6.70	-7.76	-6.40

Tests for the presence of a cointegrating relationship across groups for each of the four indexes are shown in Table 2. The regressions reported are fully modified ordinary least squares (FMLS) equations that adjust for serial correlation arising among the covariates and for the presence of both $I(0)$ and $I(1)$ variables in each equation.²⁸ The results of the unit root test on the regression residuals are reported at the extreme right end of each equation. Together with exhibiting very high adjusted R^2 values, the reported ADF statistics imply that the residuals for three of our four competitive measures are stationary. For the fourth, marginal seats adjusted for asymmetry, there is a strong suggestion of coordinated movement through time: -3.22 is significant at 10%.

²⁷ Because some state governments do not last their full term, state elections are not coordinated over time. This has a small effect on the timing of peaks and troughs in the individual series.

²⁸ Note that the inclusion of a stationary variable in the cointegrating equation implies that the stationary variable integrates with the stationary combination of $I(1)$ variables.

Table 2: Fully Modified Ordinary Least Squares Regressions
ENP (1960 – 2009); VOL (1962-2009); MV_Margins (1960-2009); AMS (1960-2009)

	Constant	Group2_i	Group3_i	Group4_i	Statistics
ENP_Candidate Group1 where i = ENP_Candidate	2.71*** (4.53)	-0.605*** (3.47)	0.427*** (2.66)	0.405*** (3.13)	AdjR ² = 0.678 ADF (resid) = -3.55
VOL_Group1 where i = Volatility adjusted winning margin	0.218*** (4.92)	0.024 (0.733)	0.394*** (3.20)	-0.138 (1.12)	AdjR ² = 0.538 ADF(resid) = -5.12
MV_Margins_Group1 where i = Multiparty volatility adjusted winning margins	0.002 (0.196)	0.434 (1.58)	0.856*** (4.03)	-0.068 (0.261)	AdjR ² = 0.976 ADF(resid) = -3.79
AMS_sd Group1 where i = Asymmetrically adjusted marginal constituencies	0.0005 (0.080)	0.169 (1.60)	0.044 (0.510)	0.692*** (5.06)	AdjR ² = 0.996 ADF(resid) = -3.22

Note: McKinnon 5% critical value for the residuals of three additional variables = -3.34

Thus the visual indication in Figures 5 through 8 that there are common trends across the groups for each index is not deceptive. Despite the major differences in the social composition of Indian states, each of the four measures of electoral competition exhibit a common stochastic trend. The determinants of these common trends remain to be identified.

While the cointegration observed is striking, so is the difference in levels across groups for each index of competitiveness. We have space to consider only one of these differences here, for Group 1 states Bihar and Uttar Pradesh. In Figure 8, Group 1 has a smaller proportion of asymmetry adjusted marginal seats consistently appearing at the bottom of the diagram, while the other three groups all have a much higher and similar proportion of contestable seats. Figures 6 and 7 together suggest that the first versus second winning margin in Group 1 is low in part because the percentage of the vote held by second and third place parties is relatively high. The multiplicity of similar sized parties in combination with a relatively high degree of seat safeness across constituencies reinforces the fragmentation character of Group 1 states shown in Figure 5. Thus we see that the fragmentation of the vote in combination with the larger proportion of safe seats makes the elections in Group 1 less contestable and less competitive overall despite their relatively narrow, first versus second place winning margins. Other groups may be analyzed in analogous fashion.

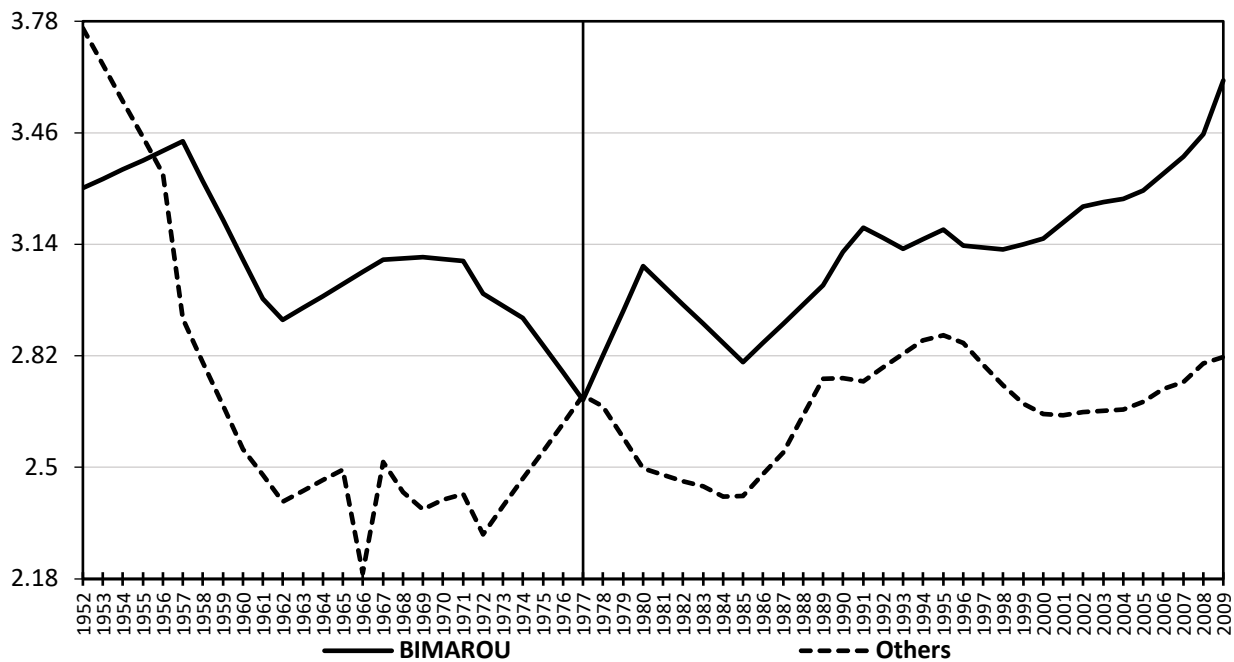
6. Stages of development and electoral competition: BIMAROU versus the others

Finally, we compare the evolution of our measures when the states are divided into groups based on their stage of development. To do so we distinguish between the five BIMAROU or sick states - Bihar, Madhya Pradesh, Rajasthan, Odisha and Uttar Pradesh - and the other nine more developed ones. The BIMAROU states have lagged behind the others in terms of per capita real GDP, access to tap water, electricity, toilets, and so on.²⁹ The four competitive measures when disaggregated into these two groups are shown in Figures 9 through 12, and analyzed below.

[Figures 9 - 12 here]

²⁹ See Ghosh (2016) and Mishra and Mishra (2018) for recent examples of studies grouping states on this basis.

Figure 9: ENP_Candidate by Economic Grouping, 1952-2009



Note: BIMAROU states are Bihar, Madhya Pradesh, Rajasthan, Odisha and Uttar Pradesh

Figure 10: Volatility Adjusted (1 vs. 2) Winning Margin by Economic Grouping, 1962-2009

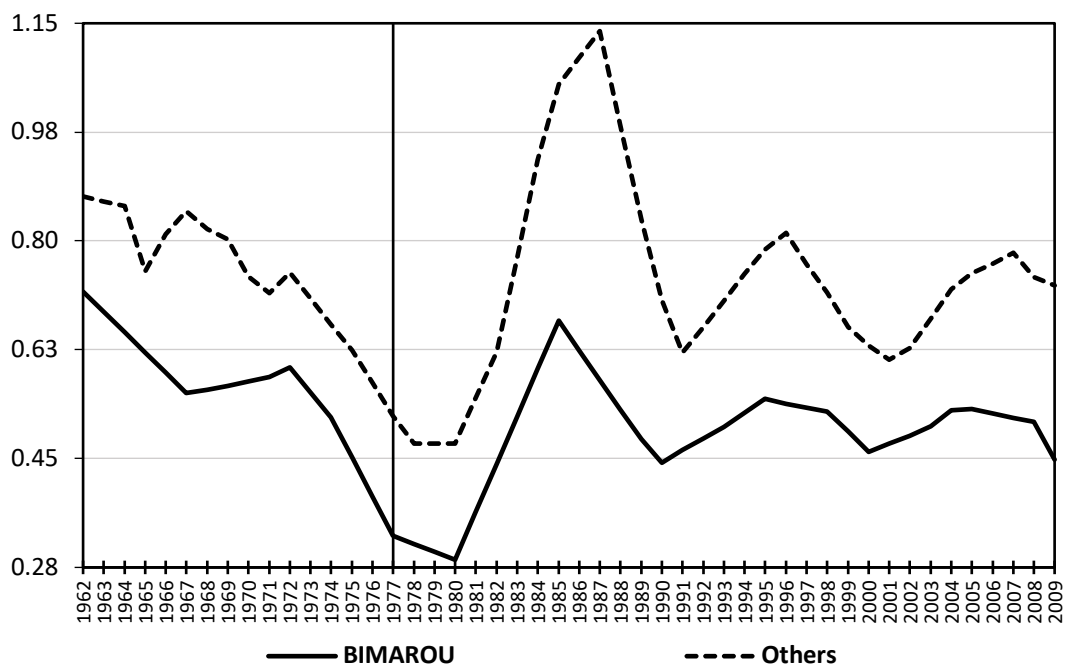


Figure 11: *MV_Margins_Candidate* by Economic Grouping, 1967-2009

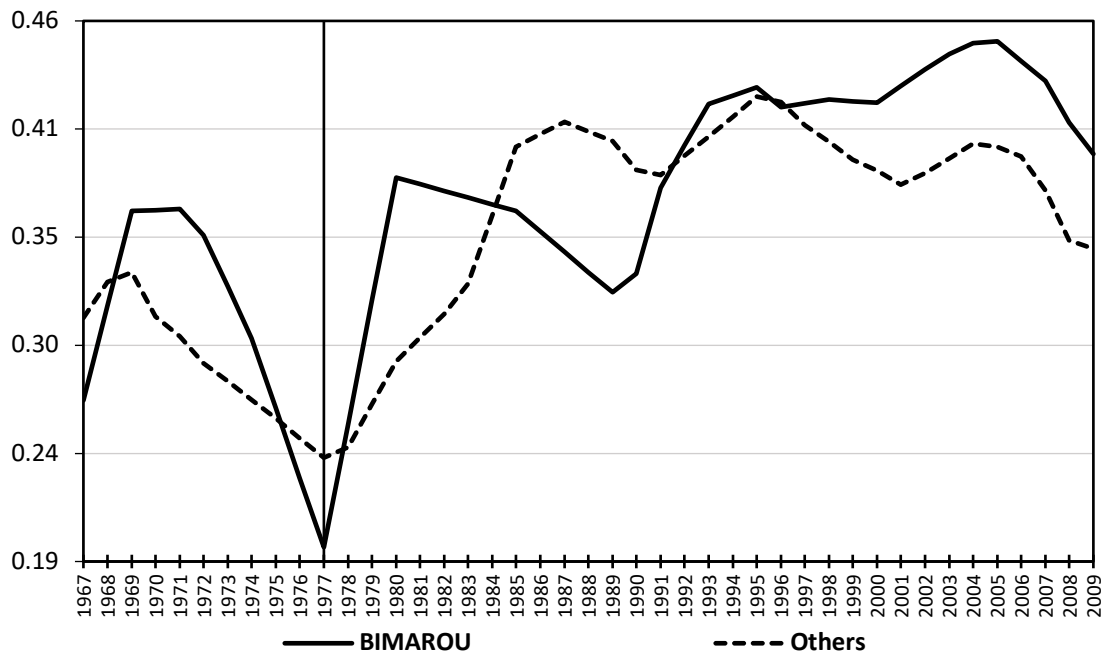
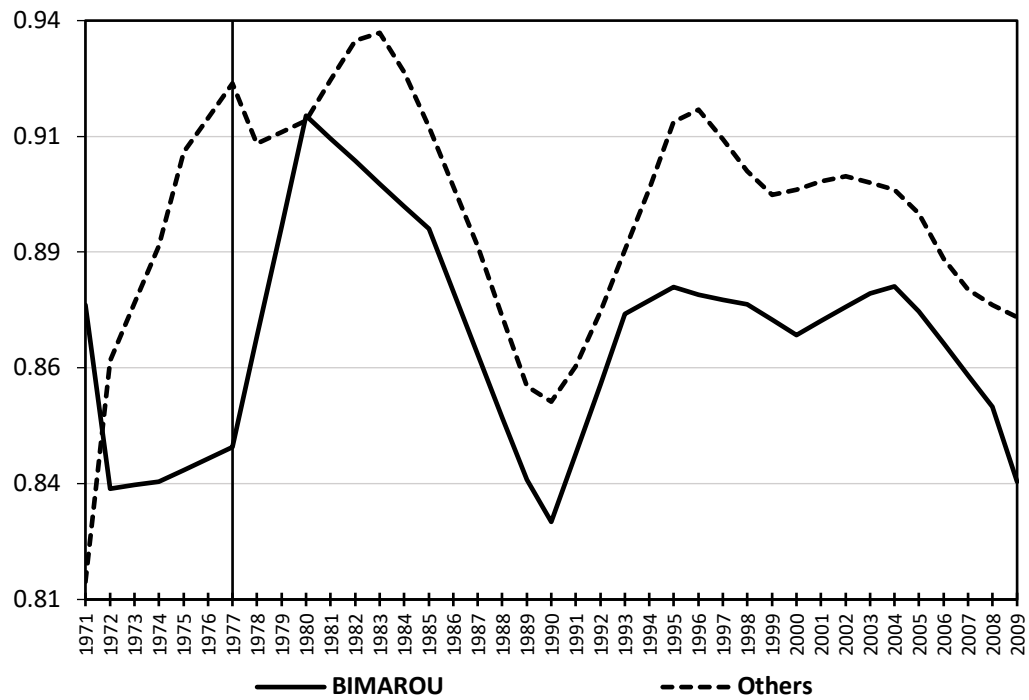


Figure 12: Marginal Seats Adjusted for Asymmetry by Economic Grouping, 1971-2009



It can be seen in these figures that while the heights of the two lines associated with each grouping are different in each case, their pattern of movement is once again broadly similar across time. In fact the sets of correlations between the two economic groupings are higher than they were for the four groupings shown in Figures 5 through 8: - 0.5 for the two *ENP_Candidate* measures, 0.83 for the two volatility adjusted margins, 0.62 for *MV_Margins_Candidate*, and 0.72 for the two *AMS* measures.³⁰ It follows that while the level of electoral competition indicated by our metrics is dramatically different across the two groups, their co-movement through time suggests that they share common influences that are not related to the reasons for regional heterogeneity in Indian development.

If we treat the emergency as anomalous, then a Duverger-Demsetz interpretation of the two *ENP_Candidate* measures in Figure 9 implies a more or less consistent increase in the degree of electoral competition through the mid-1970s (dramatically so for the more developed states) followed by a slow deterioration in the degree of electoral competition that has continued through to the end of our sample. In addition, it can be seen that throughout the whole period, the level of electoral competition by this measure is indicated as being consistently lower in BIMAROU states than in more economically advanced states.

This ranking of the two groups is consistent with that implied by the *AMS* measures in Figure 12 for the major parties competing at the state level. The elections in the BIMAROU states have a consistently lower proportion of marginal seats adjusted for asymmetry available for potential capture than their more developed counterparts. Across the 1972–2009 period, the measures show no overall trend, although the fall-off in both measures towards the end of our time period is consistent with the decline in competition suggested by the rise in *ENP* in Figure 9.

The competition story told by the two volatility adjusted margins at the constituency level, however, is quite different. Figure 10 indicates that the volatility adjusted first versus second place margin is always larger in the more affluent states implying that elections are less competitive there, and the multi-party *MV_Margins_Candidate* measures in Figure 11 reinforce that view, showing that when the additional challenge to the incumbent coming from third and higher placed competitors is accounted for, the BIMAROU constituency elections are still more competitive, except for the second half of the 1980s. The simpler volatility adjusted margins in Figure 10 suggest no real trend in constituency competitiveness. But once additional competitors are incorporated into the measure, as in Figure 11, competitiveness in the constituencies can be seen to trend upwards from the late 1980s.

The difference in these findings, between Figures 9 and 12 on the one hand and Figures 10 and 11 on the other, which mirrors what was found earlier using caste and class divisions across the states, does not necessarily require discovery of the superiority of one of the new measures we have proposed over another. Rather the differences may mean that political competition is more complex than that implied by an analysis that focuses on one metric alone. The contrast between Figures 11 and 12, for example, indicates that what is happening to competition at the constituency level is not the same as, and may be systematically opposite to competitiveness among the major parties at the state level. Also, after 1990 the less developed states are *more* competitive at the constituency level (Fig 11) and *less* competitive at the state, party level (Fig 12). The reason for such contrasting patterns is another interesting subject for further research.

³⁰ These correlations are not found in Table A1. Note that if the dramatic effects of the emergency were ignored in the *ENP* and *MV_Margins* cases, the correlations would likely have been much higher.

7. Summary and concluding remarks

In this paper we have developed measures of electoral competition in a majoritarian system, and applied these measures to study competition across fourteen of the larger, more important states in India. Our study has been guided by three general approaches to political competition, each of which has usually been explored separately rather than as part of a broader, comparative approach. The first approach is based on an analogy between competition in political and in private economic markets. Here we follow Duverger-Demsetz public good reasoning (Ferris, Winer and Grofman 2016) and consider an increase in *ENP* as indicating *less* contestability in an electoral contest. The proposed alternatives to *ENP* measuring departures from Duverger's long run equilibrium level of 2, such as *Tpartytness* are also computed. They paint a similar picture (their correlation with *ENP_candidate* is about -0.8), but differ from *ENP* in India because they have no trend after 1990, unlike *ENP* which trends generally upwards. The lack of trend in *Tpartytness* seems to depend first on the dominance of Congress, and then on the entrenchment of multi-partytness, situations that this measure indicates are equivalent, but which intuitively are not. Our judgement is that a good measure of contestability remains to be devised, and doing so is a first challenge thrown up by our investigations.

Our second approach focuses on competitiveness as ex ante unpredictability of electoral outcomes at the constituency level. We argue, following Przeworski and Sprague (1971), that the usual first versus second vote share margin is unreliable and should be normalized by a measure of the volatility of the electorate. In addition, while use of the first versus second place margin relative to volatility may be satisfactory in a two party system like the U. S., it is less satisfactory for a multi-party system like India's in which many state governments are coalitions. As we have seen, the multi-party volatility adjusted margin measure evolves in a manner that is quite different from the simpler, first versus second place volatility adjusted measure.

The third approach combines electoral uncertainty with the winner-take-all characteristic of the electoral system to focus on the advantage held by one of the major contending parties going into an election. This index combines a statistical measure of the proportion of constituencies that are electorally marginal (or not safe) with a Euclidean measure of their departure from safe seat symmetry across major parties at the state level.

We expect that each of the new indexes may be useful in a particular setting. For example, competitiveness at the constituency level as measured by the multi-party index *MV_Margins_Candidate* (either the historical or the adaptive versions) captures a different dimension of competitiveness than does asymmetry adjusted marginal seats *AMS*, the latter reflecting what is happening to party competition at the state level.³¹ The patterns of competitiveness uncovered by the *MV_Margins* and *AMS* indexes shown in Figures 3 and 4, have not been computed for the Indian states before and are done so first with respect to the average of these indexes over all 14 major states for the time period 1967 or 1972 to 2009, and then for averages over states classified by caste and class, and then by level of development.³²

Both indexes suggest that there are at least three important periods of competitiveness: an initial

³¹ The simple correlation between the historical versions of *MV_Margins_candidate* and *AMS* over the 1971–2009 period is -0.01. *ENP_candidate* is only moderately correlated with historical *MV_Margins_candidate* over the same period (0.55) and not well correlated with *AMS* (-0.22). See Table A1a.

³² The time period for the *AMS* index is shorter because of the use of three previous elections to define the distribution that is used to classify constituencies as safe or marginal.

period of declining competition up to about 1980 or, in the case of *AMS*, up to the late 1980s; followed by a decade of instability; and then finally by a period of relative stability (without any obvious trend) until 2009. The effect of the emergency – an increase in political competitiveness – is immediately apparent in the *MV-Margins*, and then after a few years in *AMS* also. The volatile intermediate period at the constituency level (seen in *MV_Margins*) involves rising and then declining competitiveness, with the opposite pattern occurring with respect to party competition at the state level (*AMS*). It remains to be determined if the opposition of these patterns is causal, and if so, why.

When the states are combined into four caste and class based groups, we see different patterns and orderings across the four groups with respect to the *MV_Margins* and *AMS* indexes. However, when each index is considered by itself, the four group specific measures are found to be cointegrated. Providing an explanation for these common trends is another challenge raised by our study. Similarly, the classification of states by level of development is also revealing. With the exception of the 1985-90 period, the five, low income BIMAROU states tend to be more highly competitive than the nine higher income states at the constituency level, as measured by *MV_Margins*, especially after the mid-1990s. At the state level, however, the *AMS* index indicates that the BIMAROU states are consistently *less* competitive. Evidently there is a different pattern to electoral competitiveness among the individual candidates at the constituency level than there is among parties at the state level. Explaining this stylized fact is an additional challenge uncovered by our analysis.

How to combine the different dimensions of competition that we have measured and explored into an overall assessment of competitiveness, if it is desirable to do so, is perhaps the biggest of the unsolved conceptual and quantitative problems. Further work on all of these questions is needed to open the door to a more general analysis, one that can incorporate the different forms of electoral competition studied in the paper and at the same time place electoral competition within the broader context of political competition.

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Appendix

Table A1: Correlations for Periods Corresponding to the Figures in the Text

	ENP candidate	ENP Party (votes)	ENP Party (seats)	Closeness	T-partyness	D2	Win_Margin	Volatility	Vol_adj_margin	MV_Margins_Party_Hist	MV_Margins_Party_Adapt	MV_Margins_Candidate_Hist	MV_Margins_Candidate_Adapt	MS	AMS
Correlations: 1952 – 2009															
ENP candidate	1.00														
ENP Party (votes)	0.11	1.00													
ENP Party (seats)	-0.35	0.79	1.00												
Closeness	-0.78	0.3	0.61	1.00											
T-partyness	-0.79	0.32	0.59	0.94	1.00										
D2	-0.8	0.33	0.63	0.98	0.98	1.00									
Win_Margin	-0.84	0.22	0.53	0.94	0.99	0.97	1.00								
Correlations: 1962 – 2009															
Volatility	-0.45	-0.71	-0.68	0.15	-0.22	-0.1	-0.04	1.00							
Vol_adj_margin	-0.2	-0.08	0.06	0.09	0.3	0.17	0.29	-0.57	1.00						
Correlations: 1967 – 2009															
MV_Margins_Party_Hist	0.57	0.5	0.45	0.14	0.09	0.07	-0.08	-0.7	0.58	1.00					
MV_Margins_Party_Adapt	0.58	0.52	0.46	0.18	0.07	0.07	-0.11	-0.64	0.48	0.99	1.00				
MV_Margins_Candidate_Hist	0.61	0.63	0.53	0.19	0.18	0.17	-0.03	-0.69	0.43	0.94	0.95	1.00			
MV_Margins_Candidate_Adapt	0.71	0.71	0.59	0.13	0.08	0.1	-0.14	-0.63	0.25	0.88	0.92	0.97	1.00		
Correlations: 1971 – 2009															
MS	-0.15	0.06	0.17	0.46	0.44	0.55	0.43	0.12	-0.16	-0.07	-0.03	0.04	0.04	1.00	
AMS	-0.22	-0.12	0.02	0.46	0.35	0.49	0.38	0.27	-0.15	-0.1	-0.05	0.02	0.02	0.95	1.00

Note: Different measures of competitiveness are available for different periods. Correlations in Table A1 are reported in the text.

Table A1a: Correlations for All Variables, 1971 - 2009

	ENP candidate	ENP Party (votes)	ENP Party (seats)	Closeness	T-partyness	D2	Win_Margin	Volatility	Vol_adj_margin	MV_Margins_Party_Hist	MV_Margins_Party_Adapt	MV_Margins_Candidate_Hist	MV_Margins_Candidate_Adapt	MS	AMS
ENP candidate	1.00														
ENP Party (votes)	0.76	1.00													
ENP Party (seats)	0.75	0.94	1.00												
Closeness	-0.55	-0.05	0.02	1.00											
T-partyness	-0.37	0.18	0.08	0.76	1.00										
D2	-0.39	0.15	0.11	0.84	0.97	1.00									
Win_Margin	-0.57	-0.07	-0.14	0.77	0.95	0.93	1.00								
Volatility	-0.63	-0.77	-0.73	0.06	-0.26	-0.16	-0.06	1.00							
Vol_adj_margin	-0.09	-0.05	-0.01	0.29	0.37	0.27	0.34	-0.53	1.00						
MV_Margins_Party_Hist	0.55	0.52	0.63	0.11	0.09	0.07	-0.08	-0.78	0.66	1.00					
MV_Margins_Party_Adapt	0.57	0.54	0.67	0.14	0.06	0.07	-0.11	-0.73	0.57	0.99	1.00				
MV_Margins_Candidate_Hist	0.61	0.66	0.72	0.16	0.18	0.17	-0.02	-0.76	0.5	0.93	0.95	1.00			
MV_Margins_Candidate_Adapt	0.71	0.74	0.8	0.09	0.08	0.09	-0.13	-0.71	0.31	0.87	0.91	0.97	1.00		
MS	-0.15	0.06	0.17	0.46	0.44	0.55	0.43	0.12	-0.16	-0.07	-0.03	0.04	0.04	1.00	
AMS	-0.22	-0.12	0.02	0.46	0.35	0.49	0.38	0.27	-0.15	-0.1	-0.05	0.02	0.02	0.95	1.00

Note: This table reports correlation coefficients of all the measures for the same period, 1971 – 2009, as well as for subperiods corresponding to the figures in the text. The definitions of the indexes are given in the text. Indexes are defined at either the constituency level and aggregated up to the state level, or initially at the state level, and in all cases then averaged across the states. Closeness is defined in Appendix A3. Some abbreviations are used here to save space. ENP (votes) (or seats) refers to ENP at the state level defined by vote shares (or seat shares) in the legislature, averaged across states. 'Win-Margin' refers to the first versus second place vote share margin. 'Vol_adj_margin' is the volatility adjusted Win_Margin. The suffix '_Hist' refers to the historical version of the multi-party index, and '_Adapt' to the adaptive version.

A2. Linking constituencies through administrative districts to deal with redistricting

For almost all measures of electoral competitiveness we develop two alternative metrics: historical and adaptive measures. Historical measures use the electoral outcomes of the previous election, whereas adaptive measures link together current and previous outcomes. Because our measures are based on constituencies, both measures become problematic when the constituency is redistricted. A new constituency has no past, and a past is required to measure volatility and to define historical and ex ante measures.

In India the constitutionally appointed body given responsibility for redistricting constituencies is the Delimitation Commission. As of the present, Delimitation Commissions have met in the years: 1952, 1963, 1973 and 2002 with recommendations implemented in the years: 1957, 1967, 1974 and 2008. Constitutionally a new commission was to be established every 10 years; however, in 1976 the federal government postponed implementation of the 1974 recommendations until after the 2001 census so that the family planning programs of the federal government would not be affected by a change in political representation at the constituency level. Further, the constitution of India was amended in 2002 and this led to the postponement of the next delimitation of constituencies till the first census following 2026. It follows that the next round of constituency redistricting will not take place until after 2031 population census. Taken together this means that no redistricting arose at the constituency level between the years 1974 and 2008.

While construction of competitive measures using current data alone is unaffected by the issue of constituency redistricting, the development of constituency measures that use both current and historical data across elections requires a method of linking current constituencies with the past for the elections before 1974. In this paper we use administrative districts to overcome this problem.

All Indian states are divided into administrative districts whose size is typically much larger than an electoral constituency. On average, an administrative district consists of 5 to 7 constituencies. The Delimitation Commission reports provide details on which constituencies were redistricted and which were not and are available online at http://eci.nic.in/eci_main1/delimitation_pub_rpt.aspx. From these reports we constructed a district-constituency code linking each electoral constituency with their administrative district. For constituencies that were not redistricted, the linking of their current and past historical data is quite straightforward. For constituencies that were redistricted, however, the district-constituency code was used to construct a past history based on the average of that district's non-redistricted constituencies electoral outcomes. That is, in lieu of a constituency past we use the past of a representative constituency from the same district.

Because no redistricting was done in years between 1974 and 2008, the list of districts existing between 1974 and 2008 were used to establish the district-constituency linking code. The code was then used both backwards from 1974 to generate a set of electoral outcomes for 1974 and earlier redistricted constituencies and forward for those elections following 2008. Because there was only a marginal increase in the number of constituencies in the elections between 1962 and 1967, and the number of constituencies in each state has remained constant since, we could use the coding to construct historical measures of our competitive measures all the way back to the state assembly elections held in 1962 without difficulty. However, for elections held before 1962, complications arose because a number of constituencies elected two members and considerable variation arose in both the names and numbers of constituencies. Given these difficulties, our

method for addressing the information loss associated with constituency redistricting here is likely to be somewhat less useful.

A3. Closeness as an alternative to *ENP*, *Tpartytness* and *D2*

We noted in the text that a problem with *ENP* defined by vote shares as a basis for a test of Duverger's Law is that while it is equal to 2 with two equal parties, a value of 2 can also originate with shares such as (0.666, 0.167, 0.167) where one party is dominant, while a rise in *ENP* above 2 from such situations can represent a state with a more equal division of votes between two major parties, as with shares (0.40, 0.40, 0.20) for which $ENP = 2.78$.

Duverger's Law aside, from a competitiveness point of view the latter situation appears to be more competitive in terms of the distribution of vote shares. Moreover, if one is concerned with competitiveness rather than with departures of the number of parties from 2, one can also see that *ENP* mistakenly treats outcomes like (0.5, 0.5; $ENP = 2$) as inherently different than (0.33, 0.33, 0.33; $ENP = 3$), whereas both can be said to be examples of 'close' or, in this sense, highly competitive elections.

In response to examples like these, Endersby et al (2002) use the distribution of vote shares to derive a measure of the *Closeness* of an election that treats examples like those above more appropriately, assuming of course that the objective is to construct an index of competitiveness as closeness. Their index of the *Closeness* of an election, CL , is defined as

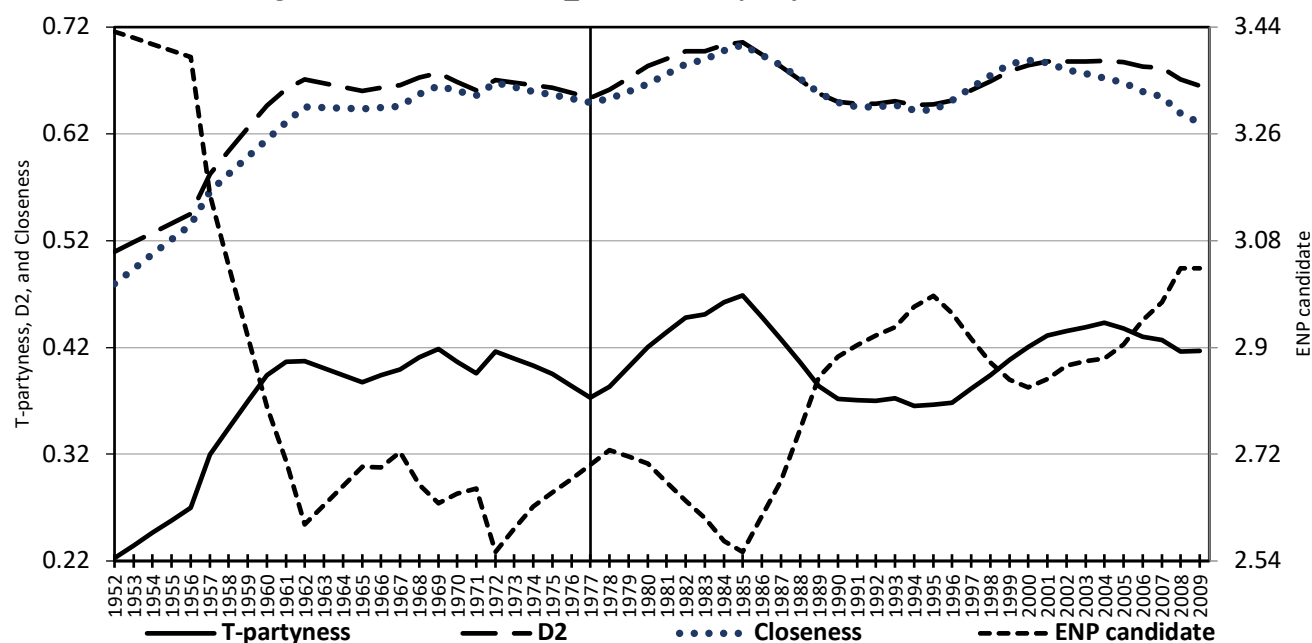
$$CL_{jt} = K^K * \prod_{i=1}^K v_{it} , \quad (A3)$$

where K is equal to the integer value of ENP_{jt} in each state. $CL_{jt} = 0$ if there is an uncontested election ($v_1 = 1$) and $CL_{jt} = 1$ if all K candidates have equal vote shares.

This index for the 14 Indian states is graphed in Figure A1 along with *ENP*, *T-partytness* and *D2*. As can be seen from the figure, the average state *Closeness* index mirrors the *D2* Euclidean measure, while differing mostly just in scale from *T-partytness*, a fact that is not obvious from contemplation of the formulas alone. The correlations of *Closeness*, *T-partytness* and *D2* are given in Table A1. *ENP_candidate* is negatively correlated with all of these measures at about - 0.8 and differs from the other by exhibiting a positive trend after the mid 1980s.

[Figure A1 here]

Figure A1: Closeness, ENP_candidate, T-partytness and D2, 1952-2009



A4. Grouping of states by caste and class

As noted in the text, the classification of states by caste and class is based on Church (1984) who develops a fourfold caste and class hierarchy to study caste and class centric politics in 7 major Indian states (Bihar, Gujarat, Kerala, Karnataka, Maharashtra, Uttar Pradesh, and West Bengal), extended by Harriss (1999) to include 6 more major Indian states (Andhra Pradesh, Madhya Pradesh, Odisha, Punjab, Rajasthan, and Tamil Nadu). We use the classification in Harriss (1999, Table 2, 3371), dividing our set of 14 Indian states into four broad groupings, described in some detail here.

Group 1 consists of states where caste forms the organizational basis for political parties (Bihar and Uttar Pradesh). Bihar and Uttar Pradesh constitute the core of the 'Hindi heartland' and hold more than one fourth of India's population. Until the late 1970s, the Congress Party of India ruled both these states largely unopposed. In the early 1980s, the Mandal Commission, set up to consider the reservation of government jobs and places in public universities for Other Backward Classes' (OBCs), Scheduled Castes (SCs) and other 'middle' caste/classes, had a widespread socio-economic impact in India and disproportionately so for the politics of the North Indian states of Bihar and Uttar Pradesh.³³ While the struggle for political accommodation of OBCs and SCs continued through the elections of the 1980s, the inability of mainstream parties to accommodate middle and lower castes led to the formation of caste-based regional political parties. In Bihar and Uttar Pradesh these parties multiplied, with some achieving electoral success. For example, the Samajwadi Party (SP) formed the government in Uttar Pradesh in 1992 while Rashtriya Janata Dal (RJD) formed the government in Bihar in 1997. The emergence of caste-based politics has increased the number of actively competing parties and introduced political instability with elections now contested by parties representing different castes. Because of this fragmentation,

³³ Yadav and Palshikar (2003) discuss the impact of the Mandal Commission on Indian politics in greater detail.

parties struggle to find the required plurality to govern and often must form coalitions in order to form a government. The difficulty of maintaining coalitions has led several governments to fall prematurely.

Group 2 includes states in which class and regional concerns form the basis for party structure (Kerala, Tamil Nadu and West Bengal). Unlike in Bihar and Uttar Pradesh, caste based representation has always been fairly uniform among the political parties contesting elections in the states of Kerala, Tamil Nadu and West Bengal. Here political divisions are based on class concerns and regional interests. In Kerala and West Bengal, the Communist Party of India has enjoyed considerable success by implementing land reforms that have benefited voters in the middle and lower classes. In Tamil Nadu, as early as the 1960s political leaders mobilized voters by targeting an ethnic desire to preserve regional language and culture. Success led to the Congress Party losing control in Tamil Nadu by 1967, and since that time the state has been governed by two similar regional parties, Dravida Munnetra Kazhagam (DMK) and All India Anna Dravida Munnetra Kazhagam (AIADMK). Also facilitating party formation on regional rather than caste lines is the fact that the population share of upper castes in Tamil Nadu is small in comparison with other Indian states. This has restricted the ability of the upper castes to gain or maintain political dominance.

Group 3 is comprised of states where the middle castes or classes and commercial interests dominate party structure (Andhra Pradesh, Gujarat, Haryana, Karnataka, Maharashtra, and Punjab). In the states of Andhra Pradesh, Gujarat, Haryana, Karnataka, Maharashtra, and Punjab the middle castes and classes dominate the state numerically and politically. As with most of the other states, the upper castes dominated politics from Independence through the 1950s and 1960s. However, by virtue of their larger population size and stronger economic presence at the local level, the middle castes in these six states slowly replaced the upper castes through the 1970s and 1980s.

Middle castes have dominated politics in these states for various, state-specific reasons. In only a few pockets of these states do the lower castes have significant political representation. For example, in parts of Maharashtra splinter groups of the Republican Party of India (RPI) have formed an effective alliance with the scheduled castes. But such cases remain the exception with the core of political power held by the middle caste/classes. Even in Andhra Pradesh where lower and scheduled castes make up about 50 percent of the population, their uneven distribution across the state leaves them too fragmented in small sub-caste groups to stand united. Hence even though reddy and kamma constitute only about 20 percent of Andhra Pradesh's population, they have continued to dominate political power by successfully accommodating lower caste interests. The state is now governed by two parties, the Congress Party and a regional party, Telugu Desam Party (TDP). The vokkaliga and lingayat make up about 30 percent of Karnataka's population. As in Andhra Pradesh, these two dominant castes have retained power by catering to the interests of lower castes when necessary.

In Gujarat economic and financial power is held by brahmins, banias, and patidars, whereas rajputs and koli kshatriyas hold political power. Though the caste structure has been weakening in Gujarat, the lower castes have not gained political power (Shah 1990). As with most states, the Congress Party governed Gujarat until the mid-1990s without substantial opposition until the Bharatiya Janata Party (BJP) emerged in 1990s, and as a result, Congress has been out of power since 1998.

The marathas alone constitute about 30 percent of Maharashtra's population. However, it's not just numbers that favour the marathas; they control land and trade at the local level. Even though Maharashtra is one of the few states where scheduled castes are well mobilized and form a sizeable share of the state's population, their lack of participation in land ownership and trade has likely prevented them from challenging the marathas politically. The Congress Party ruled the state on its own until 1995, and has been in a coalition with Nationalist Congress Party (NCP) since 1999.

The caste typology used above is applicable to the Hindu religion. Punjab, on the other hand, is a state where more than two-thirds of the population are Sikhs. Though the sub-castes of Punjab are very different from that of other states, they can be arranged under the four caste/class classification we have adopted. The Sikh jats are successful landowners who constitute more than 20 percent of Punjab's population. This has allowed them to control both the economy and politics in Punjab despite the fact that Sikh artisans and Sikh Scheduled castes make up more than one third of Punjab's population. Unlike most other states, following independence the Congress Party faced the Akali Dal, a strong Sikh-based regional party. These two parties have ruled Punjab since independence.

Haryana was carved out of Punjab in 1966 and retains most of the features of Punjab. It is a predominantly agrarian state. Here the jats constitute about 30 percent of Haryana's population, and as in Punjab have been both economically and politically powerful since the state was formed.

Group 4 consists of states where upper caste or class dominance persists (Madhya Pradesh, Odisha, and Rajasthan). While the princely states of Madhya Pradesh, Odisha, and Rajasthan formally disappeared with Indian independence in 1947, the princes retained power for some time with political leadership provided by the upper castes. In more recent years some progress has been made increasing middle caste and class representation, but the lower castes in these states are still relatively powerless. Sizeable parts of the population in these states, known collectively as Scheduled Tribes (STs), live apart from mainstream society in their tribal areas. The STs usually do not demand political accommodation, and this has helped the upper castes to maintain political dominance. In all three states the Congress Party ruled single-handedly until 1989-90, with occasional challenges from the opposition. Since then it has faced more extensive competition from the Bharatiya Janata Party (BJP) in Madhya Pradesh and Rajasthan, and from Janata Dal (JD) and the Biju Janata Dal (BJD) parties later on in Odisha. Overall, the state party systems in this group have been stable, revolving around two major parties for most electoral periods.

A5. Volatility by social grouping and by income

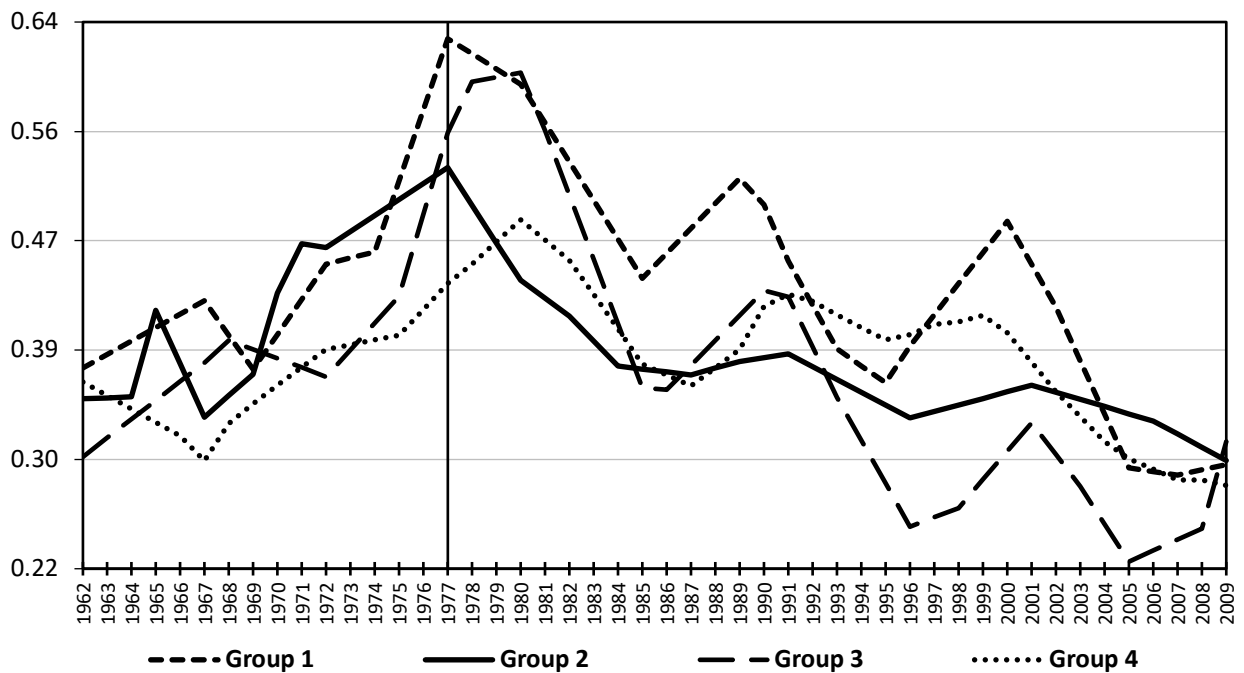
Figures A2 and A3 present vote volatility as defined in the main text, for states classified by social grouping and by level of real per capita income in 2008/09. The grouping by caste was discussed in section A4. Concerning the grouping by income, it may be noted that the ratio of real income per capita in the highest income state to that with the lowest income in 2008/09 is about 5 to 1. Also, on average, real income per capita grows by almost three times over the period from 1952.

[Figures A2 and A3 here]

In both figures, a peak at the time of the emergency in 1977 is apparent, as are the smaller peaks, in the late 1980s when the Congress party began to lose its predominance and during the balance of payments crisis in the early 1990s, and in the early 2000s when multiparty coalitions became more numerous following a severe economic recession. On the whole however, there are two periods - first a period of rising volatility up to the emergency, and then a period of generally declining volatility. This is more or less the same pattern that emerges when using an aggregate volatility index defined over all states without grouping, as shown in Figure 2 of the main text.

As for the indexes by social grouping and income discussed in the main text, we see here that indexes of volatility also appear to exhibit common trends. Thus again, as for the indexes of competitiveness in Figures 5 - 8, it seems that there is something more fundamental underlying the patterns observed that remains to be identified.

Figure A2: Volatility by Social Groupings, 1962-2009



Notes:

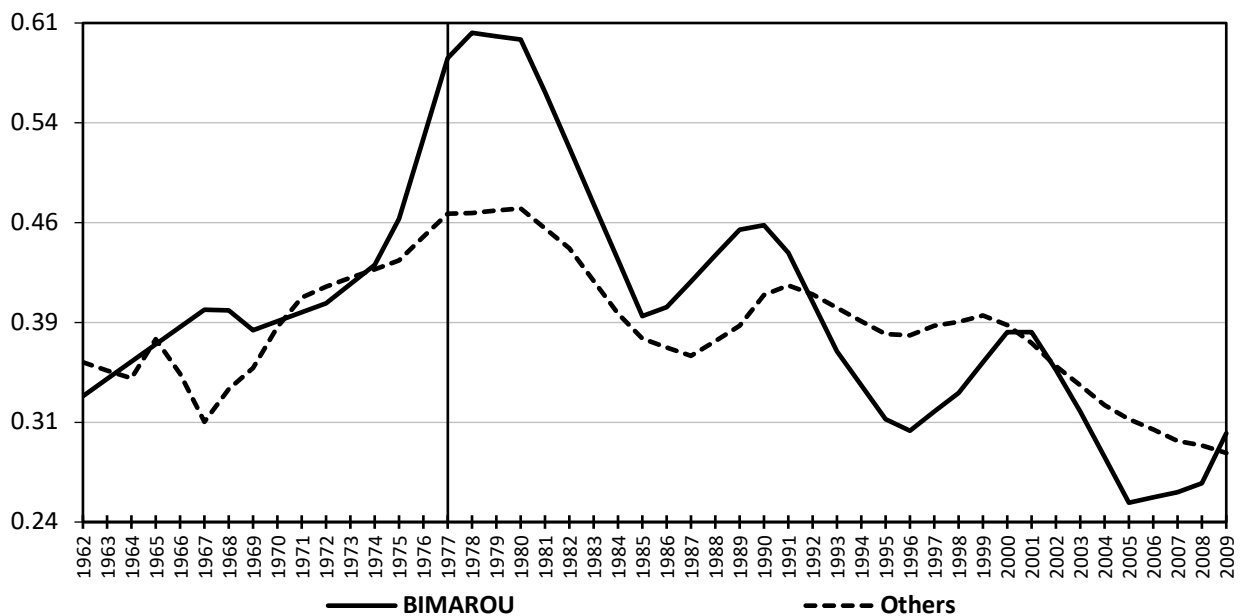
Group 1: states where caste forms the basis for political parties (Bihar and Uttar Pradesh);

Group 2: states where class and regional concerns form the basis for party structure (Kerala, Tamil Nadu and West Bengal);

Group 3: states where the middle castes and commercial interests dominate party structure (Andhra Pradesh, Gujarat, Haryana, Karnataka, Maharashtra, and Punjab);

Group 4: states where upper caste/class dominance persists (Madhya Pradesh, Odisha, and Rajasthan).

Figure A3: Volatility by Economic Grouping, 1962-2009



Notes:

BIMAROU (sick) states: Bihar, Madhya Pradesh, Rajasthan, Odisha and Uttar Pradesh

Others: All other states are included in the second group of more developed states.