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ELECTORAL ACCOUNTABILITY AND THE NATURAL RESOURCE CURSE: THEORY AND EVIDENCE FROM INDIA

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Abstract

Does secession yield economic dividends for natural resource rich regions? We exploit the formation of new Indian states in 2001 to uncover the effects of political secession on the comparative economic performance of natural resource rich and natural resource poor areas. We show that resource rich areas fare comparatively worse within the new states. Since the management and control of extraction rights in the Indian context resides with state-level institutions, we argue that these patterns reflect effects of political reorganisation on the quality of state governance in relation to natural resources. We describe a model of collusion between state politicians and local natural resource rent recipients that can account for the relationships we see in the data on how natural resource abundance shapes post-breakup local economic outcomes.

JEL Classification: D72, H77, O13

Keywords: Natural Resources and Economic Performance, Political Secession, Fiscal Federalism

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Secession with Natural Resources*

Amrita Dhillon† Pramila Krishnan‡ Manasa Patnam§ Carlo Perroni¶

This version: June 2018

Abstract

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1 INTRODUCTION

Does secession lead to better economic outcomes? Secessionist movements are driven by the belief that independence will yield dividends through better administration and policies that cater to a more homogeneous population; but it is not clear how much of this belief is based on fact. Rodríguez-Pose and Stermšek (2015), for example, examine successive secession movements in the former Yugoslavia and find no evidence of an independence premium; indeed, the only new countries that did well after break up were simply those that had the least conflict as a result of secession demands. Neither is it clear that staying together is best, since size is not always an asset: Rose (2006) uses a panel dataset of two hundred countries over forty years and asks if there is a "scale effect", i.e. whether larger countries perform better in terms of levels of income, wellbeing, institutions etc; he finds no evidence that a larger size is beneficial, and finds instead that political rights, civil rights and various governance indicators are worse in larger countries.[1] Theoretical analyses of the question (e.g. Boffa et al. 2016) have also pointed to a trade-off in decentralisation between the gains from policies that are better matched to local preferences and the potential loss of political accountability that can occur in smaller jurisdictions.

Secessionist movements are often motivated by economic incentives, and in several cases these incentives relate to natural resource endowments – e.g., the secession of South Sudan, rich in oil, from the rest of Sudan.[2] The fact that natural resource rents accrue with ownership is a particularly potent driver of demands for secession (Collier and Hoeffler 2006).[3] But political secession can also produce effects on governance that both go beyond the direct effects of a reallocation of natural resource rights, and which possibly may even be shaped by such reallocation. Despite the importance of natural resources as a factor in secession demands, however, there is relatively little research on the economic outcomes of secession episodes in which natural resources played an important role.

In this paper, we exploit the formation of three new Indian states in 2001 to examine how post-secession outcomes for local economies are shaped by the local distribution of natural resources – more specifically mineral deposits. A key feature of the 2001 Indian secession is that two of the original states contained a significant share of India's natural resources, and these were concentrated within specific geographical areas – two of the three states we study contain forty-five per cent of the reserves in iron ore and coal and eighteen per cent of copper (see Indian Bureau of Mines 2008, and TERI 2001).

Figure 1 shows the states that were involved: the states that seceded are Jharkhand, Chhattisgarh and Uttarakhand; the associated rump states are Bihar, Madhya Pradesh and Uttar Pradesh. Figure 2 illustrates the dramatic shift in control of mineral deposits from the original state to the new states.[4] Table 1 gives a summary of the spatial distribution of natural resource rich (NRR) constituencies pre and post break up, in Columns 1 and 2. The Bihar-Jharkhand state pair witnessed a large change in the distribution of natural resources upon breakup, with Jharkhand (the new state) obtaining almost all of the resources relative to Bihar. The breakup of Madhya Pradesh did mean that a substantial part of resources accrued to the new state of Chhattisgarh, nevertheless Madhya Pradesh remains one of the states that are highly rich in natural resources. Finally, the Uttar Pradesh-Uttarakhand state pair saw a high proportion of mineral deposits go to Uttarakhand.[5]

[1] Alesina et al. (2005) also investigate the relationship between size of countries and growth. They argue that the link between size and growth is inextricably linked to openness and trade – small countries can be as efficient as large countries as long as trade is relatively free across borders.

[2] Sablik 2015 offers a useful summary.

[3] The link between natural resources and demands for secession is perhaps best illustrated by the case of Scotland, where the slogan "It's Scotland's Oil" was used to promote the cause of independence.

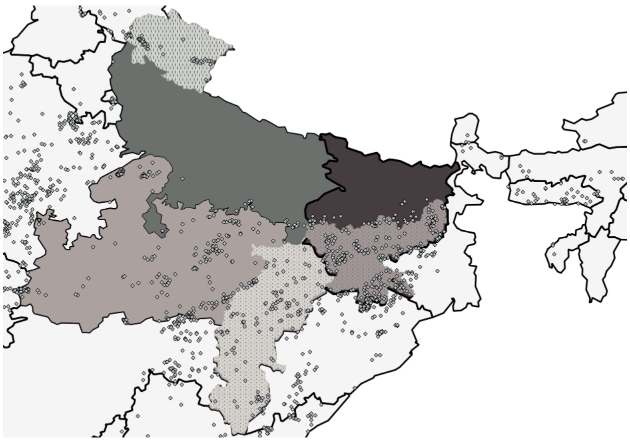
[4] We use the location of mineral *deposits* rather than active mines to capture natural resource wealth.

[5] One can find parallel examples at the cross country level elsewhere. Norway seceded from Sweden in 1905, but oil was discovered much later in the 1970s. Norway's growth rate went down from 6.3% to 1.1% from 1961 to 2016 while Sweden

Figure 1: Reorganisation of states in 2001

The figure shows the breakup of states in 2001. Areas shaded by dots represent newly created states; these are the states of Jharkhand, Chhattisgarh and Uttarakhand, which broke away from Bihar, Madhya Pradesh and Uttar Pradesh respectively.

Figure 2: Distribution of mineral deposits across the reorganised states



The figure shows the distribution of mineral deposits in India, across the states that were reorganised in 2002. Mineral deposits are indicated by small circles.

Table 1: Endowment of natural resources and growth across states

	Proportion of Mines		Average Growth Rate (Planning Commission)	
	Pre-breakup	Post-breakup	Pre-breakup	Post-breakup
State Pair 1:				
Bihar	0.2	0.05	4.9	11.4
Jharkhand (New state)		0.65	3.6	6.3
State Pair 2:				
Madhya Pradesh	0.4	0.35	4.7	7.6
Chhattisgarh (New State)		0.54	3.1	8.6
State Pair 3:				
Uttar Pradesh	0.05	0.02	4	6.8
Uttarakhand (New State)		0.23	4.6	12.3

This table reports the level and change in the proportion of natural resource rich constituencies (i.e, those with mining deposits) after state reorganisation, as well as the level and change in growth rate (measured by gross state domestic product), for each state. Figures for the annual growth rate of each state were obtained from the Planning Commission of India's figures for state-wise growth.

The secession episode thus gives us a natural testing ground for examining how natural resource endowments interact with political reorganisation (secession). We observe outcomes for a large number of administrative units (assembly constituencies or *ACs*) that are natural resource rich (NRR) as well as for administrative units that are natural resource poor (NRP), before and after secession; and within each category we observe administrative units that were included in the seceding states and units that were not. We can therefore examine how seceding NRR units perform relative to rump NRR units and how seceding NRP units perform relative to rump NRP units. The borders of the assembly constituencies remained the same after secession making meaningful comparisons possible. Focusing on within-country comparisons allows us to circumvent some of the problems in cross-country analyses.[6]

Using a combined spatial discontinuity with difference-in-difference design we examine the differential effects of the breakup across new (seceding) and old (rump) states by examining the evolution of economic activity, proxied by luminosity, for 1,124 constituencies in the three pairs of states, comparing outcomes across the new state borders for 186 constituencies that are natural resource rich and for 938 constituencies that are not, over the period 1992-2010. In order to identify the effect of state breakup on development outcomes, we make use of the geographic discontinuity at the boundaries of each pre-breakup state. We additionally exploit the time dimension of our data as a further source of identification. Essentially, we use the observed *changes* in outcomes to difference out *fixed,* initial dif-

went from 5.7% to 3.2% over the same period (World Bank). More recent cases include the secession of South Sudan in 2011 with extensive oil resources but facing conflict and negative rates of growth (World Bank). On the other hand we have the case of Bangladesh, with no significant natural resources: it seceded from Pakistan and subsequently has had higher growth rates (7.1 vs 5.7 in 2016).

[6]Cust and Poelhekke (2015) discuss these advantages and document other related studies on natural resources in a within-country context.

ferences between units on either side of the border. Our identifying assumption is, therefore, that the other (initial) underlying discontinuities at the cutoff (for example, due to pre-defined administrative boundaries, like districting, or language differences) are not changing over time, so that the differenced estimates should be unbiased for the local average treatment effect.

The results we obtain are striking. Specifically, natural resource rich constituencies perform comparatively worse in the seceding (new) states; comparative economic outcomes for natural resource poor constituencies, on the other hand, are less affected by secession. Our findings are supported at the aggregate level by figures from the Planning Commission (Table 1, columns 3 and 4), which show that although on average new states do better relative to rump states, post break up, we see heterogeneity in outcomes: areas in new states that end up with a much larger abundance of natural resources (Jharkhand) do worse than the rump state, while others perform better. The heterogeneity in outcomes at the local and state level is mirrored in the distribution of natural resources across the newly-formed states. Table 1 shows that the proportion of assembly constituencies which are rich in mineral deposits, is much higher post break up in Jharkhand (65%) compared to Chhattisgarh (54%) and Uttarakhand (23%).

To interpret these findings, a natural starting point is to look for explanations that are directly related to the most immediate effect of political secession, namely a change in political institutions. Indeed, our main finding of the *interaction* effect between natural resource abundance created by secession at the state level together with natural resource abundance at the assembly constituencies (AC) level is strongly suggestive of a channel flowing through a change in the political relationship between states and natural resource rich ACs following secession.

In looking for such explanations, we begin by considering a number of features that are peculiar to the Indian context: (i) in India, property rights to natural resources belong to states rather than to ACs; (ii) power is concentrated at the state level in terms of policing and public goods; (iii) royalty rates on minerals were very low in the period we consider;[7] (iv) there is a well-documented association between rent seeking, criminal activity and the abundance of natural resources (Vaishnav 2017; Aidt et al. 2011).

In Section 3, we describe a theoretical model that builds on this picture and that is able to account for the patterns emerging from our empirical analysis. The model focuses on the political bargain between state-level politicians and local rent recipients, characterising it as an exchange of votes for rents. This exchange generates negative economic spillovers that are salient to voters and thus involve a political cost for state-level politicians, a cost that they must trade off against the direct gains in political support they can receive in exchange for the concessions they make to local patrons who are the recipients of natural rents. The larger the state government's dependence on local level patrons to deliver votes in return for rents, the lower is political accountability in the state, i.e. the less "diluted" is the influence of natural resource rich districts. The theory then predicts that, if state secession leads to change in the proportion of natural resource districts within a state, this political trade-off changes, and states that inherit a comparatively large fraction of natural resource rich areas can experience a loss of political accountability, which in turn leads to more intense rent grabbing and worse economic outcomes in those areas.

The remainder of the paper is organised as follows. Section 2 describes the institutional context. Section 3 presents a theoretical model that links political structure with the governance of natural resources. Section 4 presents the data used for analysis and lays out the identification strategy for estimating the effect of breakup. Section 5 reports the empirical results. Section 6 concludes.

[7] Royalty rates here are not directly comparable to other international rates since they are based on weight rather than value. Shortly after the breakup, in 2004-05, royalty revenues as percentage of total revenue varied from 3.7% in Madhya Pradesh to about 12.5% in natural resource rich Jharkhand.

2 The institutional context

2.1 The governance of natural resources in India

India has a federal structure, with both national and state assemblies. Members of the twenty-nine state assemblies are elected in a first past-the-post system. The leader of the majority party or coalition is responsible for forming the state government. States have executive, fiscal and regulatory powers over a range of subjects that include education, health, infrastructure and law and order.

There is an overlap in authority between the federal government and state governments in the governance of natural resource extraction, with both exerting regulatory authority: major minerals such as coal and iron ore are regulated by the central government, while minor minerals are entirely under state control as laid down in the Mines and Minerals Development and Regulation (MMDR) Act of 1957. Royalty revenues accrue to state budgets, but rates are set by the central government, which controls rates on output as well as any "dead rent" that accrues in the absence of extraction, and also decides on environmental clearances for mining. Property rights to land reside in the states, which are the legal owners of all major mineral resources (except uranium), and claim all royalties. The main power of the states derives from the legal authority to grant licenses. However, until recently, there was no requirement for the royalties and returns from mining to accrue to local areas and the entire proceeds accrue to the state budget.[8] There are thus three players involved in royalty on minerals: the Central Government which fixes the royalty rate, mode and frequency of revision; the State Government, which collects and appropriates royalty; and the lessee who might be in either the public or private sector sector and who pays the royalty according to the rates and terms fixed by the centre to the State.

The split of authority between federal and state agencies with respect to the governance of natural resources means that the effects of policy decisions at each level are not fully internalised. The royalty rates set by the central government are widely seen as being inefficiently low,[9] lowering incentives for states to allocate extraction rights to efficient operators and to police illegal mining, since royalties from mining contribute so little to their budgets: royalty revenues in these states, as a percentage of total revenue, averaged to two percent in 2009, while the mining sector's share of state domestic product is an average of 10-11 percent for Jharkhand and Chhattisgarh over the period 2004-2011 (Chakraborty and Garg 2015). Low royalty rates also mean that there is little scope for state politicians to translate their control rights over natural resources directly into "political rents" for themselves (e.g. by using royalty revenues to finance popular public projects or transfers), which in turn means that in order to do so they must use indirect channels to do so (e.g. using allocating natural resource rights to buttress political support). The fact that the authority for policing resides with the state governments while the federal government decides on which areas can host mining activity produces incentives to evade environmental regulations by operating outside the areas given clearance by the federal government. All of this has led to conflict between Centre and State about the weak policing and monitoring by state governments.[10]

Given this institutional context, the politics of resource extraction in India takes on a different flavour from that seen in some other federal states. Natural resource rents are controlled by local operators but power resides at the state level- in particular, as mentioned before, the provision of

[8] The recent Mines and Minerals (Development and Regulation) Amendment Ordinance, 2015 provides for the creation of a District Mineral Foundation (DMF) and a National Mineral Exploration Trust (NMET), funded by a percentage of royalties paid by lessees and in principle, affording some re-distribution to local communities.

[9] It is difficult to compare royalty rates with international rates as the latter are mostly ad valorem while in India royalty rates have been based on weight until recently. A switch to ad valorem rates in 2009 increased revenues on iron ore ten times (Vanden Eynde 2015).

[10] For an article which discusses the difficulties of Centre/State coordination in policing, see http://bit.ly/1OHFIRM.

education, health, law and order and rural electrification is firmly under state control. This institutional setting creates the conditions for state-level politicians and local leaders to strike a political bargain where they trade "subterranean rents" for loyalty and votes.[11] This link between state-level politicians and local rent-seekers is incontrovertible: the political scientist Milan Vaishnav documents this in detail in his account of the criminality of politicians (Vaishnav 2017). He argues that the rising cost of elections and a shadowy election financing system where parties and candidates under-report collections and expenses means that parties prefer "self-financing candidates who do not represent a drain on the finite party coffers but instead contribute 'rents' to the party"; and tells of how, in the state of Jharkhand, the minister in charge of mines (Koda) once disposed of 48 cases in one hour. Indeed, the corruption is so institutionalised that one of the chairmen of Coal India in West Bengal says that ministers would fix monthly payment targets with senior executives of Coal India and this was one of the main sources of funding for political parties. According to some reports almost 15-20% of revenues are creamed off every month (see Spectator Magazine, 2009).

At the local level, natural resource rents give rise to widely documented forms of "rent grabbing", both legal and illegal. Legalised rent grabbing consists of comparatively less efficient but politically connected producers successfully securing resource extraction rights.[12] Illegal rent grabbing mainly consists of illegal mining. Collusion of local "rent grabbing entrepreneurs" with corrupt state-level politicians is required to sustain either form of rent grabbing.[13] Not only do states grant licenses and leases, but the Mines and Minerals Development and Regulation Act 1957 empowers state and central government officers to enter and inspect any mine at any time. Thus, illegally extracting minerals from these areas requires a degree of endorsement from the state – e.g. the police turning a blind eye to illegal activity, or favouritism in allocating leases. These rent grabbing activities generate visible economic costs for local economies, ranging from losses in production efficiency and a deterioration of law and order, to environmental degradation, displacement of local residents, disruption of local infrastructure — all leading to a crowding out of other economic activities (Baland and Francois 2000, Mehlum et al. 2006).[14]

The lack of response by state-level governments, despite the fact that they have jurisdiction over all mining matters, suggests that there is a bargain being struck, in NRR ACs, between state-level politicians and the local-level political entrepreneurs/patrons, with payments for concessions made by politicians in relation to natural resource rents – directly, through the allocation of mining rights, and indirectly, through lax controls on how those rights are managed at the local level – taking the form

[11] Indeed, many times the local rent grabbing entrepreneurs become politicians themselves. Asher and Novosad (2016) documents how local mineral rent shocks cause both adverse selection and worse behaviour of politicians in office. They describe how local politicians have direct control over mining operations from which they derive rents. Aidt et al. (2011) shows how stiff competition between parties in India creates an inherent advantage for criminal politicians who can buy votes or intimidate voters.

[12] The allocation process itself, however, is often fraught with irregularities: in 2014 the Supreme court ruled that more than 214 out of 218 coal licences awarded by governments between 1993-2010 were illegal (see BBC News).

[13] The Shah Commission Report available at http://www.mines.nic.in provides an ongoing saga of the types of excesses that go on in mining areas.

[14] As a specific example, take the case of coal: "It is a murky subculture that entwines the coal mafia, police, poor villagers, politicians, unions and Coal India officials. Coal workers pay a cut to crime bosses to join their unions, which control access to jobs, according to law-enforcement and industry officials. Unions demand a 'goon tax' from buyers, a fixed fee per tonne, before loading their coal. Buyers must bribe mining companies to get decent-quality coal. The mafia pays off company officials, police, politicians and bureaucrats to mine or transport coal illegally.... Corruption is largely local: "The rackets include controlling unions and transport, manipulating coal auctions, extortion, bribery and outright theft of coal. Popularly known as the 'coal mafia', their tentacles even reach into state-run Coal India, the world's largest coal miner, its chairman told Reuters." (from Reuters Special Report 2013). For other accounts, see http://www.firstpost.com/india/sukma-maoist-attack-malaise-of-naxal-violence-lies-deep-in-illegal-mining-and-political-funding-3408728.html. Also see https://www.spectator.co.uk/2009/09/the-dark-heart-of-indias-economic-rise/ and http://www.scottcarney.com/article/fire-in-the-hole/.

of either bribes or increased political support from local constituencies. The latter relies on local rent recipients being able, through either persuasion or coercion of local voters, to deliver a certain volume of votes to whichever candidate or party they choose.

The lax enforcement of law and order and the high prevalence of patronage politics is exemplified by the higher likelihood of criminal politicians being elected in the mineral rich constituencies. Table C7 shows that, in a sample of 179 Parliamentary Constituencies (electing federal level MPs), the likelihood of a politician with a criminal record being elected is increasing in the density of mines in that constituency (the coefficient from a simple OLS specification is positive and significant at the 5% level). There is also evidence, as shown in Table C8, that vote buying and electoral fraud takes place relatively more in the mineral rich areas: using survey responses from the State Election Survey for Jharkhand in 2005, which posed questions to individual voters about perceptions of voting malpractices, and running a logit specification of perceived voting malpractice within a district against the number of mines within that district, including district fixed effects and controls for household characteristics, gives a coefficient of 0.28 that is significant at the 1% level.

2.2 State breakup

Tillin (2013) explores how the breakup of existing states in 2001 came about. She suggests four possible explanations. The first explanation proffered is that of distinct cultural identities in the breakaway areas that have consistently made demands for secession, demands that have progressively gained prominence since 1947. The basis on which state borders were originally drawn by the State Reorganisation Act of 1956 was along linguistic boundaries, but this criterion tended to ignore other ethnic and social boundaries, leading to large tribal populations in some states seeing themselves as ethnically distinct and socially neglected. It should be noted, however, that the sharp distinctions along ethnic, social and linguistic lines, in pre-independence have been reduced in time, since migration and changing demographics have meant more homogeneity particularly along existing sub-regional or district borders – this point is explored in further detail below when we examine the balancing of characteristics along the border between states (see Table C2). Furthermore, not all these demands were centered around statehood, but they did involve claims for more local representation and local management of natural resources, both mines and forestries.[15] Second, and tied closely to our explanation here, Tillin suggests that natural resources were a factor: private interests might have considered it easier to increase resource extraction and intensify production in a smaller jurisdiction, which she terms "extension of capitalist interests".[16] The third explanation relates to the changing federal election context since 1989, when the leading coalition partner, the Bharatiya Janata Party (BJP), first favoured granting statehood to boost their popularity in the areas concerned. This is plausible but as we explain in Section 4.1, a decade later all political parties had reached a consensus on agreeing secession in these states (Kumar 2010). A final explanation is that the sheer size of the old states made them difficult to govern and that the breakup was attractive to the central government because it meant better governance and more ease of administration – as well as an acknowledgment of local identities. In brief, all of these played a

[15]Tillin (2013) writes "All three of the regions that became states in 2000 saw the emergence of distinctive types of social movement in the early 1970s: Chipko, the people's forestry movement in the Uttarakhand hills; the trade union movement among miners, the Chhattisgarh Mines Shramik Sangh; and the worker-peasantry movement in Jharkhand led by the Jharkhand Mukti Morcha (JMM). In all three cases, the issues raised by social movements related primarily to the role of the state in the management of natural resources and the rights of local communities to substantive economic inclusion."

[16]Tillin (2013) summarises the views, both pre and post breakup, of Tata Steel, the major investor in Jharkhand, and that of other industrialists. Tata Steel was happier with a larger state where "politicians were farther away in Bihar" and less likely to meddle, while others favoured a smaller state where they hoped there would be better law and order and less corruption. However, seven years after secession, things were perhaps even worse in the new state according to them. In brief, there were clearly mixed views and, far from the urge to expand resource extraction, issues of infrastructure, electricity provision and law and order loomed large in favouring breakup and evaluating its success.

role in motivating secession but to explain the resulting heterogeneity in outcomes post secession, we require deeper explanations.

Given that in the Indian context states have legal control of natural resources, changes in state governance that are triggered by changes in state institutions can, in principle, directly affect how natural resources are managed, which would not be the case (at least, not obviously so) if NR were controlled by local administrations. This also means that secession cannot translate into windfall gains or losses for local administrations (as is the case for Brazil; Brollo et al. 2013). These stylised facts guide our theoretical model.

A direct, mechanical effect of secession is a change in the structure of political competition within states: each new state features fewer districts, each accounting for a larger share of the total votes. Thus, if control over natural resources is used by state politicians as a means of securing political support in relevant districts, it is plausible that secession would change the calculation of the political costs and benefits involved. In particular, if boosting political support in natural resource districts comes at the cost of undermining it in natural resource poor districts, a change in the proportion of natural resource rich districts in the newly formed states may affect how state-level politicians approach the management of natural resources. And indeed, if we look at how secession has affected the comparative density of natural resource districts across states, we see that the change in some cases has been dramatic: in the case if Bihar, for example, about 65% of all districts in the newly formed state of Jharkhand are natural resource rich, whereas the corresponding proportion pre-breakup was 20% (see Column 2, Table 1).

In the theoretical discussion that follows, we formalise these political costs and benefits and how they can be altered by secession.

3 Political secession, natural resources and vote trading

Our focus here is on how state breakup might affect the quality of institutions, as reflected in natural resource governance outcomes. Specifically, in our empirical analysis, we ask how the relative economic performance of natural resource rich and natural resource poor areas was affected by secession, which should reveal how secession affected the public management of natural resources. As we noted earlier, in the Indian context not only are royalty revenues small, but, crucially, they accrue to states, not to local administrations. Thus, unlike in the Brazilian case studied by Brollo et al. (2013) and by Caselli and Michaels (2013), state breakup in the Indian case would not have produced windfall revenues at the local level that could directly encourage corruption.[17] As we have discussed in Section 2, the political bargain between local and state level leaders can be mediated through bribes or votes. In the Indian case, however, there is no clear reason to expect bribery incentives to be much affected by secession, given that state breakup does not change the economic value of mining concessions and that the influence of state politicians on the allocation of rents remains unchanged.

On the other hand, political reorganisation might directly affect incentives to exchange natural resource rents for local political support. Secession alters the balance between the political costs and benefits associated with an exchange of votes for concessions to local rent grabbers because it affects the relative weight of natural resource rich and natural resource poor districts within a state. An increase in the proportion of natural resource rich districts where votes can be bought in this way reduces, in relative terms, the negative political spillovers that these activities can have in natural resource poor jurisdictions, where votes cannot be bought as easily, intensifying rent grabbing activities. In other

[17]Anecdotal evidence suggests that most corruption takes place at the stage of the allocation of licences, and that only a fraction of actual production of minerals is officially reported – see, e.g., https://www.spectator.co.uk/2009/09/the-dark-heart-of-indias-economic-rise/ and http://www.scottcarney.com/article/fire-in-the-hole/.

words, natural resource poor jurisdictions can restrain state politicians sanctioning natural resource rent grabbing in exchange for votes and thus improve accountability; a reduction in their relative weight within a state reduces the power of such restraints. We formalise this idea in this section.

In what follows we develop a stylised theoretical political-economy framework that derives predictions on how the changes in the concentration of natural resources brought about by secession can translate, through an electoral accountability mechanism which operates at the state level, into changes in economic outcomes at the local level.

The electoral accountability channel arises from a bargaining game in NRR ACs between vote sellers/patrons at the local level and vote buyers or parties at the state level. The more valuable the votes are, the higher will be the concessions (the "price" paid for votes) to the local level intermediaries. These concessions/favours generate negative economic spillovers on the rest of the economy, which erode political support in the electorate. These political costs must be balanced against the political gains from directly securing votes by the use of patronage politics in the NRR ACs. The price of votes is therefore positively related to the concessions given to local leaders in return for political support as well as to the net loss in political support to the incumbent party.

State secession changes the distribution of NRR and NRP ACs within the newly formed states, and thus alters the political tradeoffs involved in vote buying, which in turn affects economic outcomes within NRR and NRP ACs.

We begin our discussion by presenting a single-state model of vote selling in political equilibrium and then extend it to characterise effects of secession in a two-state scenario.

3.1 Votes for sale

Policy preferences

Focusing on a single state, suppose that there is a local-level monopoly seller in each AC (or, equivalently, multiple local sellers perfectly colluding with each other) who sell (blocks) of votes to the incumbent party at the state level. We later discuss how these results are robust with respect to alternative assumptions.

There is a given unit mass of citizens/voters. Each voter has an ex-ante ideal point in ideology/policy space, denoted by $i \in [-1/2, 1/2]$. A voter's utility is quadratically decreasing in the distance of the actual policy from her ideal policy, i.e. the payoff levels a voter i obtains from policy i' is $-(i-i')^2$. The distribution of ideology across voters is uniform over the support $[-1/2, 1/2]$.

There are two parties, L (the incumbent) and R (the challenger), competing for a state-level election. The L party has an exogenously specified platform located at $-1/2$ in ideology space, while the R party has an exogenously specified platform located at $1/2$. The payoff levels a voter i obtains if L and R are elected are respectively $U_i^L = -(-1/2-i)^2$, and $U_i^R = -(1/2-i)^2$, with the voter with the median ideology ($i = 0$) being indifferent between the two political contestants. Additionally, there is an incumbency-related ideology shock, s, with uniform support $[-1/2, 1/2]$, that shifts the ex-post ideology of voter i to $i+s$.[18] For a given ideology shock, s, the share of votes for L and R are therefore respectively given by $1/2-s$ and $1/2+s$. In the absence of any vote trading, the probability of the L party winning is therefore the probability that $s < 0$, and the probability of the R party winning is the probability that $s > 0$, both of which are equal to $1/2$ given the assumed distribution of shocks.[19]

[18]This incumbency related shock could be thought of, for example, as being linked to a common but unpredictable assessment by voters of the incumbent's performance while in office. s is a shock in favour of the R party.

[19]We can assume that if $s = 0$ each of the two parties wins with equal probability; but since this is a measure zero event, it makes no difference to the analysis.

The winning party, $j \in \{L, R\}$, obtains political rents, W, which we assume to be unity without loss of generality. The incumbent party thus aims at maximising expected political rents, $P_j^W W = P_j^W$, where $P_j^W(x)$ is the probability of party j winning, given the vote trading outcome. The seller's expected payoff if votes are sold to party L (the incumbent) for a price x is $P_L^W x$.

The price of votes

In a given state, there is a continuum of constituencies of mass one, each having identical population. A fraction $q \in (0, 1)$ of those constituencies are natural resource rich (NRR) constituencies, with a potential level of natural resource rents rents equal to r; the remaining fraction, $1-q$, of constituencies are natural resource poor (NRP) and have no natural resources. In each NRR constituency, a local leader controls a fraction, $v \in (0, 1/2)$ of the total votes (through intimidation or persuasion).[20] In Appendix B we discuss an extension in which there is a continuous distribution of natural resources across jurisdictions and where the proportion, q, of ACs where vote sales take place is endogenised on the basis of an economic calculation linking the value of natural resource rents with the cost of procuring votes.

We assume that the given tranche of votes, v, can only be delivered to a single party for a price, x. This price is a payment in kind consisting of targeted, natural resource related concessions delivering rents to the sellers, such as, for example, granting exploitation rights as well as relaxing restrictions and policing of abuses by those exploiting the natural resources illegally. The net value of these concessions to the sellers is zx ($z > 0$). The price can be delivered to the seller only if the vote buyer wins the election.

The favours that are delivered in exchange for votes, however, entail a political opportunity cost for the incumbent. Rent grabbing activities generate a loss in the constituency for those who do not partake in them, as well as negative spillovers for other constituencies. These losses only occur upon delivery of the promised payment if the party buying the votes is elected, and therefore translate into a loss of votes for the party that buys votes, which has the same effect as that of an ideology shift towards the R party among all those voters who do not sell their votes. The extent of this shift depends on the extent of spillovers – which in turn depends on q and x. Rent grabbing in any given NRR constituency generates negative spillovers in all constituencies. In NRR constituencies the political cost arising from the spillovers is offset by the political gain from buying votes, but in NRP constituencies it is not. Because of this asymmetry, an increase in the proportion, q, of NRR constituencies makes vote buying more attractive, raising the price of the votes that are available for sale:

Proposition 1: *Consider the a single (collusive) vote seller making a take-it-or-leave-it offer to a single buyer. The unique payoff maximising price for the seller is* $\tilde{x} = \dfrac{v}{\lambda(1-v) + \rho(1-qv)}$. *This price is decreasing in* ρ *and increasing in q, and its elasticity with respect to changes in q is also increasing in q. The corresponding equilibrium values of* P_L^W *are also decreasing in* ρ *and increasing in q.*

(The proof is in Appendix B.)

Allowing for multiple buyers or sellers does not change conclusions. (This is shown in Appendix B.) The results of Proposition 1 also carry over to a scenario where neither party has all the bargaining power. Under sequential bargaining with alternating offers (Rubinstein 1982), we obtain the following result:[21]

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[20] These local leaders are often union bosses who control how much mining can be carried out via control over transport and workers.

[21] Qualitatively analogous results obtain under Nash bargaining.

Proposition 2: *The equilibrium level of x under sequential bargaining is decreasing in ρ and increasing in q. The corresponding equilibrium values of P_L^W are also decreasing in ρ and increasing in q.*

(The proof is in Appendix B.)

An increase in the density of natural resources, operating through a political channel, raises x and thus lowers welfare for individuals (other than the vote sellers) in the NRR constituencies as well as in the NRP constituencies, albeit to a lesser extent. The reason for this result is as follows. In its choice of x, the incumbent party balances the net gain in vote share from raising x in NRR constituencies with the net loss in NRP constituencies. As the proportion of NRR constituencies (q) becomes larger – and the proportion of NRP constituencies $(1-q)$ becomes smaller – the positive vote gains from vote buying in NRR constituencies increasingly come to dominate the political "dilution" effect that comes from the purely negative political spillovers in NRP constituencies, and so the net political value of vote buying (and hence the maximum price that can be paid for it) increases.

Proposition 1 also says that this dilution effect fades progressively faster as q increases: intuitively, the strength of the dilution effect of NRP constituencies is related to the ratio $(1-q)/q$, which decreases with q at at an increasing rate (in absolute value). As a result, the adverse effects of an increase in the proportion of NRR ACs become progressively larger as their proportion gets larger.

In the next section, we apply these results to characterise welfare effects of state breakup.

3.2 Effects of state breakup

In this section we apply the results to draw conclusions about the welfare consequences of state breakup for local economies.

Consider a unified state, U, with N_U constituencies, a fraction q_U of which are NRR constituencies. Assume that the unified state breaks up into two new states, A and B, each with N_A and N_B constituencies and with proportions q_A and q_B of NRR constituencies. Then, abstracting for the time being from effects associated with tax revenues from natural resources (effect (a) above), utility for a citizen, i, in a NRP constituency in state A can be expressed as

$$U_A^{NRP} = K_{iA} - \rho \frac{N_A}{N_U} q_A x_A - \gamma \rho \frac{N_B}{N_U} q_B x_B. \tag{1}$$

while that for the citizen in a NRR constituency is:

$$U_{iA}^{NRR} = U_{iA}^{NRP} - \lambda x_A, \tag{2}$$

where K_{iA} is a constant representing an idiosyncratic component of utility (stemming both from ideology and from other factors that do not depend on x_A); and where $\gamma \leq 1$ reflects a possible mitigating effect on transboundary spillovers coming from the separation of state institutions.[22] The corresponding expressions for B are symmetrically identical. Voting choices in A only affect x_A, and so only the terms that involve x_A in (1) and (2) are relevant for characterising voting choices. Thus, in order to derive conclusions about how breakup affects x_A and x_B, we can simply focus on the effects that are captured by the first two terms in the above expressions, whereas when characterising the welfare effects of the breakup, all terms must be accounted for.

In the single state analysis of Section 3.1, ρ was fixed. With state secession, spillovers due to $x > 0$

[22]Breakup need not in itself affect the extent of the spillover. It is however plausible that it might; e.g. if separate states have separate police forces, and spillovers flow through the corruption of police officers within the police force, then secession would provide some degree of isolation. The higher is γ the higher is the effect of spillovers across state borders.

change. Thus the predicted effect on x of the breakup – i.e. the predicted gap between x_U and x_A – coincides with the predicted effect in the model of a *combined* change in q and ρ from q_U to $q' = q_A$ and from ρ to $\rho' = (N_A/N_U)\rho < \rho$. Then, by Propositions 1 and 2, the effect of the breakup on x_A through q will be positive or negative depending on whether q_A is greater than or less than q_U, and the effect of the breakup on x_A through ρ will always be positive as long as $\rho > 0$ – since $\tilde{x}$ is decreasing in ρ and since $\rho' < \rho$; this second effect arises because in a smaller state voters only internalise a fraction of the overall spillovers. This amounts to voters' calculations in a single-state scenario being made as though ρ was $\rho' < \rho$.

Then, if $q_A > q_U$ the overall effect on $\tilde{x}_A$ will always be positive – both because the state is smaller than before and voters do not internalise the spillovers from other states and because of the increase in q; if $q_A \leq q_U$, it can be positive or negative, depending on whether the positive effect of ρ dominates the negative effect of a lower q:

Proposition 3: *Following breakup: (i) if $q_A \geq q_U$, then $x_A > x_U$; (ii) if $q_A < q_U$ then $x_A < x_U$ if $N_A/N_U > (1-q_U v)/(1-q_A v)$, and $x_A \geq x_U$ otherwise.*

(The proof is in Appendix B.)

We are now in a position to draw conclusions concerning the welfare consequences of secession. The welfare change for a representative NRP constituency that belongs to A post breakup is

$$\Delta U_A^{NRP} = -\rho\left((N_A/N_U)\, q_A x_A + \gamma\,(N_B/N_U)\, q_B x_B - q_U x_U\right). \tag{3}$$

The first two terms in brackets represent the post-breakup spillovers originating from NRR ACs located respectively in A and in B and the third term is the spillover from NRR before breakup. The welfare change for a representative NRR constituency that belongs to A post breakup is

$$\Delta U_A^{NRR} = \Delta U_A^{NRP} - \lambda\,(x_A - x_U); \tag{4}$$

i.e. the same as for NRP ACs except for an additional direct effect coming from the change, $x_A - x_U$, triggered by the breakup. These welfare effects thus depend on how q_A changes in comparison with q_U, both directly – q_A and q_B appear directly in (3) – and indirectly through the effect of q_A and q_B on x_A and x_B, as described by Proposition 3. The relative sizes of A and B also matter (through the ratios N_A/N_U and N_B/N_U), because they change the relative importance of spillovers from within-state and off-state NRR ACs. Finally, the effects of breakup depend on γ, the intensity of the spillovers from the neighbouring state. If separation brings about an abatement in the trans-border spillover ($\gamma < 1$), then secession can improve welfare by giving a degree of isolation – and if γ is sufficiently small, this mechanical "small is beautiful" effect can always dominate any other effect.

One can nevertheless find specific scenarios for which we can make an unambiguous prediction that parallels the result of Proposition 2: characterising such a scenario can help better understand the implications of the model. Suppose that a state U is broken up into two identically sized states with $N_A = N_B = N_U/2$. Then before break-up, voters internalised all the spillovers from NRR areas. Post break up, voters in state A have the same q as before ($q_A = q_B = q_U$), but only internalise one-half of the spillovers (because their voting choice only affects outcomes within A), which will result in a higher x; however, we can always find a value of γ (the trans-border spillover coefficient) such that the negative effect on welfare due to the incomplete internalisation of spillovers following political separation is exactly offset by a reduction in the intensity of the spillover from off-state NRR ACs, leaving welfare unchanged. Denote this value as $\tilde{\gamma}$. This must satisfy $(1/2)(1+\tilde{\gamma})\,\tilde{x}\big(q_U, \rho_U/2\big) = \tilde{x}\big(q_U, \rho_U\big)$. For $\gamma = \tilde{\gamma}$, we can then derive a clear prediction about the welfare effect of state breakup: the breakup of a state into equally sized states lowers welfare in the NRP constituencies of the new state A if $q_A > q_U$, and raises it if $q_A < q_U$, i.e. under the same conditions that come into play in Proposition 1;[23] in NRR constituencies, state breakup unambiguously lowers welfare if $q_A > q_U$; if $q_A < q_U$ it unambiguously raises welfare if $N_A/N_U = 1/2 > (1-q_U\nu)/(1-q_A\nu)$ (and thus $x_A < x_U$), and has an ambiguous effect otherwise.[24]

As previously discussed, secession also produces effects that flow through the redistribution of government revenues from the taxation of income from natural resources. This effect can be measured by $\mu(q_A - q_U)\,tr$, where $\mu > 0$ is the (constant) marginal valuation for publicly provided goods, and t is the rate of income taxation. Through this effect, an increase in q can potentially raise welfare and a decrease in q lower it.[25]

The overall effects on welfare for NRR ACs and NRP ACs are ambiguous. A higher q produces losses in both NRR and NRP ACs through its effect on governance outcomes, as well as a positive effect associated with the redistribution of government revenues from natural resources or industries associated with mining. If government revenues from natural resources are small, the first effect will dominate the second. If government revenues from natural resources are comparatively large, this conclusion can be reversed. As the negative effects on local governance outcomes from a higher q are larger in the NRR ACs than in NPR ACs ($\lambda > \rho$), it is also possible for NRP ACs to experience a net welfare gain and for NRR ACs to experience a net loss. And since, as discussed in Section 3.1, the adverse effects of an increase in q are increasing with q, as the diluting influence of the remaining fraction, $1-q$, of NRP ACs becomes progressively smaller, the second, negative effect is more likely to dominate the first one if the proportion of NRR ACs is large to begin with.

The model's predictions can thus be summarised as follows. Secession is more likely to raise welfare in the breakaway state if natural resource density in the breakaway state is lower in comparison with the parent (rump) state (q is lower post breakup), and more likely to lower welfare in the breakaway state if natural resource density in the breakaway state is higher in comparison with the parent state (q is higher post breakup) – and, other things equal, the more so the larger is the density of natural resources in the original, combined state.

4 DATA

We examine differences in local outcomes (assembly constituency level) across states in the context of the breakup of three states in India in 2001. We use two main sources of data in examining the relationship between natural resources and economic outcomes. First, we rely on luminosity data[26] to proxy the evolution of outcomes between 1992-2010, thus capturing the period 1992-2001, pre breakup and 2002-2010, the period post breakup. We use data on the evolution of luminosity as a proxy for the evolution of economic activity (see Henderson et al. 2011; Chen and Nordhaus 2011; Kulkarni et al. 2011; Alesina et al. 2016) and construct measures of changes in the outcome variables based on an index of aggregate luminosity within Assembly Constituencies (ACs). The data consist of

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[23]The condition identifying $\tilde{\gamma}$ gives $\tilde{\gamma} = 2\,\tilde{x}(q_U, \rho_U)/\tilde{x}(q_U, \rho_U/2) - 1 = \lambda\big((1-\nu)/\nu\big)\,\tilde{x}(q_U, \rho_U)$. Substituting this into the expression for ΔU_A^{NRR}, letting $q_B = 2q_U - q_A$ (since $q_A + q_B = 2q_U$), differentiating the resulting expression with respect to q_A, and evaluating the resulting derivative at $q_A = q_B = q_U$, we find that ΔU_A^{NRP} is decreasing in q_A.

[24]If $q_A < q_U$ but $x_A > x_U$, then, under the given normalisation of γ, there is a positive effect on the component of U_A^{NRR} that coincides with U_A^{NRP}, and a negative effect on the term $-\lambda x_A$ in U_A^{NRR}.

[25]There may be other effects of the breakup on welfare that are independent of the endowment of natural resources – effects that our analysis abstracts from. For example, the smaller size of each state post breakup might make administration easier, as well as allowing a better representation of the electorate.

[26]The night time image data is obtained from the Defense Meteorological Satellite Program Operational Linescan System (DMS P-OLS). The DMSP satellites collect a complete set of earth images twice a day at a nominal resolution of 0.56 km, smoothed to blocks of 2.8 km (30 arc-seconds). The data, in 30 arc-second resolution (1km grid interval), covers 180° West to 180° East longitude and 65° North to 65° South latitude.

imaging of stable lights obtained as a global annual cloud free composite where the ephemeral lights from fires and other sources are removed and the data are averaged and quantified in six bits, which in turn might result in saturation for urban settings but does mean that dimmer lights in rural settings are captured. Each grid (1 sq km) is assigned a digital number (DN) ranging from 0 to 63 and luminosity is measured as the DN3/2. The luminosity of an area is thus obtained as a sum of lights over the gridded area which in our case is defined as the assembly constituency. We use GIS data on the administrative boundaries of states and assembly constituencies to enable the aggregation within constituencies.[27]

There are three main reasons why we rely on luminosity data. The first is that panel data on households, by assembly constituencies[28] that could capture the evolution of incomes or consumption pre and post breakup does not exist. The second reason is that, despite the measurement difficulties inherent in the use of such a proxy, there is convincing evidence to suggest that luminosity is strongly correlated with standard socio-economic outcomes. We offer corroborative evidence for this by looking at the relationship between luminosity and these measures; in brief, we use data on income, wealth and education from the National Election Survey in the year 2004, which surveys voters at the constituency level to examine the correlation of standard economic indicators with luminosity. The correlation with wealth is about 0.6, while that with income and education lies between 0.4 and 0.45.[29] This relationship also holds at the more aggregate level of the district: Chaturvedi et al. (2011) and Bhandari and Roychowdhury (2011) examine this correlation at the district level in India and find similar effects. We restrict our analysis to the years 1992-2010 because constituency borders have since been re-drawn.[30] The third (and most important) reason for relying on luminosity evidence is that our identification strategy focuses on *changes* in outcomes rather than levels. This means that sources of persistent heterogeneity across ACs in the relationship between luminosity levels and levels of economic activity are not a concern.

To corroborate our measure of night-time lights, we use data from two waves (1992 and 2004) of the India Human Development Survey (IHDS). Finally we also use data from the Census of India, state election results (obtained from the Election Commission of India) and state electricity prices (obtained from India Stat) to support our identification strategy, described in the next subsection. Appendix A provides further details on these data sources.

The second set of data we use are data on the location, type and size of mineral deposits from the Mineral Atlas of India (Geological Survey of India, 2001).[31] Minerals are grouped into nine categories, and each commodity is classified by size, which is proportional to the estimated reserve of the deposit. The definition of the size categories for each commodity is in terms of metric tons of the substances of reserves contained before exploitation or actual output. This provides comprehensive information about the mineral resource potential of the deposits.[32]

[27]We are grateful to Sam Asher and Paul Novosad who provided the geographic data necessary for matching electoral constituencies to mineral deposits which in turn comes from the MLInfomap Pollmap dataset, which contains digitised GIS data based on maps published by the Election Commission of India.

[28]Districts are at a higher level of aggregation than assembly constituencies.

[29]The National Election Survey collects information from voters in each parliamentary constituency. To obtain the correlations, we aggregate the night-time lights data to the parliamentary constituency level.

[30]The boundaries for constituencies were fixed in 1976 but new boundaries based on the 2001 census figures were meant to be re-drawn. This was mandated by the Delimitation Act of 2002, which constituted a delimitation commission to redraw the constituency boundaries. However, there was substantial delay in compiling the necessary data and in creating the new boundaries, the first election with redrawn boundaries was only held in Karnataka in 2008. Consequently, the period between 1976 and 2009 in these states had fixed constituencies boundaries allowing for the comparison of luminosity across time.

[31]Resources are usually classified as point resources and dispersed resources, the former being the most easily appropriated. Our focus in this paper is on minerals that are point source resources.

[32]We are particularly grateful to Sam Asher for sharing his data obtained from the Mineral Atlas and to officials at the Geological Survey of India, Bangalore for clarifying the observations on size.

We use data on location specific mineral resources or deposits rather than its value to avoid issues of endogeneity inherent in such analysis. The price of minerals found in these deposits is time-varying and can be affected by various unobservables such as election cycles, and other demand and supply factors that tend to be correlated with growth and inequality. Our strategy relies on a spatial discontinuity design with comparisons across borders over time (in brief, combined with a difference-in-difference strategy), where deposit types are similar, obviating the need to examine values. Furthermore, as will be clear below, our fixed-effects strategy allows us to net out the fixed location specific unobservables associated with deposit coverage. Further, the location of deposits is strictly of geological origin, and the location was mapped before 1975 and hence its exploration cannot be said to be controlled by subsequent political and economic incentives or institutional factors.

4.1 Identification and estimation

In what follows, we conventionally define the states that have broken away as those "treated" by the act of secession. Admittedly, post breakup, the rump state is also a new creation and is thus affected by the treatment. So, what we are actually picking up are the differential effects of the treatment (secession) between old and new states.[33]

The list of explanations Tillin (2013) offers for the 2001 breakup flags two potential difficulties in looking at secession as a true natural experiment. The first relates to how borders between the rump state and the breakaway state were determined. This turns out not to be an issue at all because the boundaries of these three new entities have never been in dispute; the areas comprising the new states were separate entities before independence from British rule in 1947. For instance, Sharma (1976) discusses a memorandum to the State reorganisation commission in 1955 asking for a separate state of Jharkhand, naming the six districts in Bihar that were eventually separated from Bihar in 2000 (Hazaribagh, Ranchi, Palamu, Singhbhum, Santhal Parganas and Dhanbad, then Manbhum).[34] The Uttarakhand Kranti Dal, the regional party formed in 1979 for a separate hill state was determined to unite the eight hill districts in a separate entity. The borders of Uttarakhand were thus determined by the borders of the eight hill districts that maintained their separate identity on the basis of geography and cultural distinctiveness; again, these borders were not in dispute. The borders of Chhattisgarh comprised the eighteen districts where Chhattisgarhi was spoken, and, again, these district borders have remained the same since independence.[35]

The second potential difficulty pertains to the timing of the breakup. This timing was determined by the success of the BJP at the National elections in 1998. The BJP had led a minority government in 1996 and had promised to grant statehood to the three new states if it was returned to power. It was returned again at the head of a coalition government, but by this time there was a general consensus both at national and state levels: the other leading party of the Congress supported the change, as did the state assemblies of the original states before breakup. While there might have been a initial spurt of political activity by the BJP,[36] by this time there was little political opposition anywhere to

[33]This convention is also consistent with the idea that the rump state retains the old institutions and government structures while the new state must create new structures, even if similar to those in the rump state. Rump states saw no reorganisation apart from the loss of territories and thus a lower population and smaller administration.

[34]It was the case that the borders were formally decided so as to include the districts that consisted of 'Scheduled Areas' as defined in the Constitution, which in turn may have followed the Simon commission of 1930 that defined certain 'partially excluded areas'. The list of scheduled areas (which are still mentioned as part of the old states) is available at the Ministry of Tribal affairs website here http://tribal.nic.in/Content/StatewiseListofScheduleAreasProfiles.aspx.

[35]Since 2012 these borders have been redrawn to give nine new districts.

[36]The BJP and its previous incarnation, the Bharatiya Jan Sangh had always opposed any state breakup until the 1990s, and therefore their agreement was perhaps of note only because of the change; other leading parties had by then allowed that this was desirable (Mawdsley 2002).

the demands for statehood. In fact, these demands had grown less vociferous since the early 1990s because it was clear that all the major parties were in accord. Part of this unanimity lay in the fact that all three new states lie well within the external boundaries of India and thus posed little threat to the Union of India, and, equally important, it was clear that there was no political gain to any of the parties in opposing secession. It might be thought that the timing of breakup was related to particular advantages of the party in power at the Centre; however, given the consensus across parties and the fact that state assemblies pre breakup gave their willing assent to the breakup without much dissent, this also turns out to be a non-issue (Kumar 2010). Finally, given that we concentrate on the role of resources, it should be emphasised that the prices of minerals played little part in the timing: mineral prices worldwide see a surge only after 2004, four years after breakup. In summary, neither the borders of the states nor the timing of breakup can be traced to any particular economic or political advantage for the breakaway states.

In order to identify the effect of state breakup on development outcomes, we make use of the geographic discontinuity at the boundaries of each pre-breakup state and employ a Regression Discontinuity Design (RDD). For each geographic location, assignment to "treatment" (or new state) was determined entirely on the basis of their location. This key feature of the state breakup allows us to employ a sharp regression discontinuity design to estimate the causal effect of secession on growth. Such a discontinuity is clearly supported by Figure 3, where local polynomial estimates of the *growth in light intensity* – the variable relevant for our difference-in-difference combined with RDD identification strategy described below– around the distance to the threshold before and after breakup are displayed. Figure 4 assesses the validity of the identifying assumption with the McCrory (2008) test for breaks in the density of the forcing variable at the treatment border with negative distances to state border for old states and positive distances for new states. The figure clearly shows that the density does not change discontinuously across the border suggesting that for the window around the coverage border there seems to be no manipulation. This is to be expected given the firm exogeneity of the borders, but it is reassuring all the same.

We define a variable, D_i, as constituency i's distance to the geographic border d that splits each of these geographic location between old and new states. We then define an indicator for each AC for belonging to the new state as

$$T_i = \mathbb{1}_{[D_i \geq d]}. \tag{5}$$

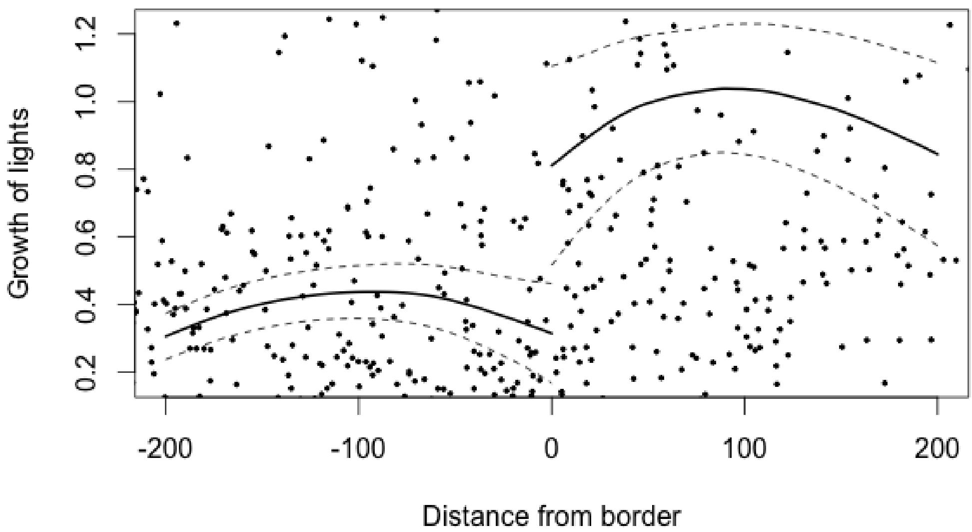
The discontinuity in the treatment status implies that local average treatment effects (*LATE*) are non-parametrically identified (Hahn et al. 2001). Effectively we compare outcomes of constituencies on either side of the geographic border that determined treatment assignment or being in a New State. Formally, the average causal effect of the treatment at the discontinuity point is then given by (Imbens and Lemieux 2008):

$$\tau_a = \lim_{g \to d^+} \mathbb{E}[Y_{it} \mid D_i = g] - \lim_{g \to d^-} \mathbb{E}[Y_{it} \mid D_i = g] = \mathbb{E}[Y_{it}(1) - Y_{it}(0) \mid D_i = d], \tag{6}$$

where Y_{it} is the satellite light density of constituency i in year t.

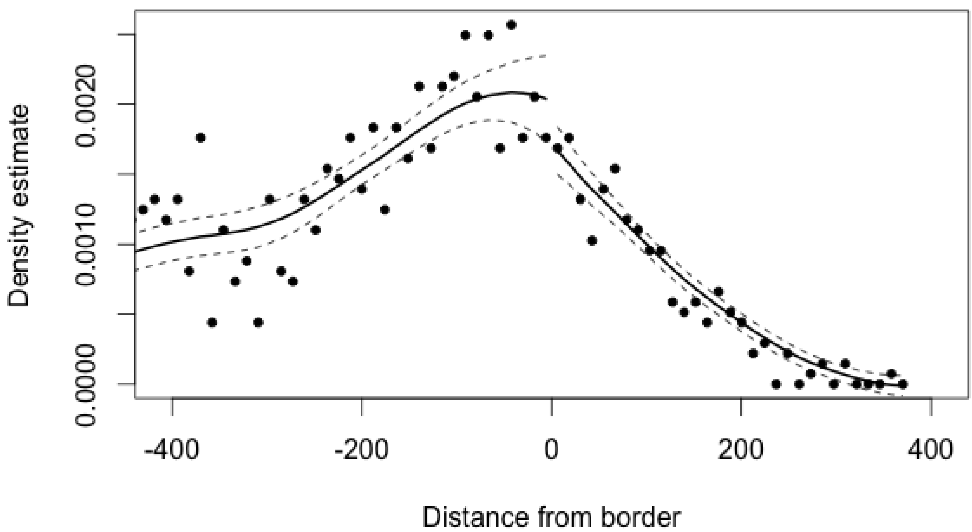
An important feature to note in the above-mentioned design is that the discontinuity is geographical, i.e., it separates individuals (ACs) in different locations based on a threshold along a given *distance-based border*. Using (6) to estimate the causal effect would ignore the two-dimensional spatial aspect of the discontinuity. This is because the *border line* can be viewed as a collection of many points over the entire distance spanned by the border. For example, an individual located north-west of the border is not directly comparable to an individual located south-east of the border. For the comparison to be accurate, each "treatment" individual must be matched with "control" individuals who are in close proximity to their own location *and* to the border line. We address this issue as follows. We divide the border for each state into a collection of points defined by latitude and longitude spaced at equal

Figure 3: Growth in light intensity after secession



The figure plots the local polynomial estimates of the growth in light intensity, defined as the difference in average light intensity post (2001-2009) and pre (1992-2000) the secession, around the threshold distance.

Figure 4: RD validity: density smoothness test for distance to state border



The figure plots test for density smoothness proposed by (McCrary 2008). The distances are normalised, such that positive values indicate distances for new states while negative values indicate distances for old states.

intervals of 15 kilometers. We then measure the distance of each grid or AC to the border and include polynomials of distance and its interactions with the treatment variable. We then condition on the post-breakup interacted, border segment fixed effects in all the specifications, so that only ACs within close proximity of each other are compared.[37]

The local average treatment effect can be estimated using local linear regression by including polynomials of distance to the border (controlling for border segment fixed effects) to a sample of units contained within a bandwidth distance h on either side of the discontinuity.

We additionally exploit the time dimension of our data as a further source of identification. The identification strategy described so far exploits differences across nearby bordering units, post state breakup to investigate the effect of breakup. Even then, it is possible that there is an underlying administrative discontinuity at the border cutoff in the absence of breakup, since the geographical border was laid around existing districts. To address this issue, we use the observed *jump* in outcomes to difference out such *fixed*, initial differences between units on either side of the border. Our identifying assumption is, therefore, that the jumps at the cutoff are not changing over time in the absence of treatment, so that the differenced local Wald estimators will be unbiased for the local average treatment effect. Our overall identification strategy effectively combines the RDD design with a difference-in-difference approach.

With this in mind, the specification we estimate is

$$Y_{it} = \alpha_i + \beta_t + \gamma T_i \times Post_t + \delta^{'} V_{it} + \varsigma_s \times Post_t + \varepsilon_{it}, \tag{7}$$

where Y_{it} is the satellite light density of grid i in year t. α_i is the fixed effect for each AC. The variable of interest, the new state effect, is denoted by the interaction of T_i, being located in the new state, and $Post_t = \mathbb{1}_{[t \geq 2001]}$. We control for border segment fixed effects, ς_s (interacted with $Post_t$ to account for the panel dimension). The terms α_i and β_t represent constituency and time fixed effects respectively. The V_{it}'s are defined as

$$V_{it} = \begin{pmatrix} \mathbb{1}_{[D_i < d]} \times Post_t \times (D_i - d) \\ \mathbb{1}_{[D_i \geq d]} \times Post_t \times (D_i - d) \end{pmatrix}. \tag{8}$$

The regressors V_{it} are introduced to avoid asymptotic bias in the estimates (Hahn et al. 2001, Imbens and Lemieux 2008). Standard tests remain asymptotically valid when these regressors are added.

A panel fixed-effects estimator around the distance thresholds, h, is equivalent to using a uniform kernel for local linear regression, as suggested by Hahn et al. (2001). We employ several bandwidths in our analysis, based on the optimal bandwidth calculations of Imbens and Kalyanaraman (2011). With the selected bandwidths, we compute OLS-FE estimates using observations lying within the respective distance thresholds.

5 Estimation Results

5.1 Descriptive evidence and validity of identifying assumptions

Before presenting our results, we briefly summarise all the relevant variables that we use for the analysis. Table C1 (in Appendix C) disaggregates the summary statistics by different samples that we use for analysis. Crucial to our identification is the spatial discontinuity induced by the state secession. For this reason we compare ACs lying within a certain distance threshold of the newly created state borders. We therefore report the mean and standard deviation of all variables, by each distance threshold

[37] See Black (1999), who first discussed the use of the border segments in a regression discontinuity framework. For a recent application, see Dell (2010), who extends the approach to incorporate a semi-parametric regression discontinuity design.

(bandwidth) sample. The table shows that the distribution of most variables remain similar across the different samples. Mineral quality, however, increases slightly close to the border (at BW 150 km).

The spatial discontinuity design we use compares ACs across borders, with the basic notion that differences in patterns of local activity, controlling for trends before breakup can only be attributed to differences by state rather than differences due to local environment and geography effects. This in turn depends on the variation in observable attributes including human and physical geography. The demarcation of the borders here are historically determined, based on ethno-linguistic differences as they were present in 1947 at independence, or even earlier. If the historical demarcation implies a different settlement by these groups today, this in turn might pose a threat to identification. To examine this, we used information from the IHDS on household size, incomes and consumption expenditures, together with measures of health, proxied by infant mortality and public goods, proxied by the availability of drinking water, to check if these variables were different across border areas before breakup. We conclude they are not, apart from the availability of drinking water which was significantly different at the 10 percent level. Irrespectively, our difference-in-difference strategy does control for fixed pre-breakup differences such as water availability – this is less of a threat to identification than time varying differences, such as those arising from income variations.

To account for potential differences in human geography, we use data from the census to examine whether there are significant differences in the concentration of scheduled tribes and castes and in literacy rates across border areas, as well as the previously discussed effect on electricity tariffs. Table C2 summarises the details of this exercise, comparing differences across boundaries. While there are trend increases in the concentration of scheduled tribes post 2000, we do not find a significant difference across states.[38]

5.2 RDD ESTIMATES

We begin with the overall effect of state breakup on the difference in luminosity in Table 2, before moving on to our main results on AC-level outcomes and how they vary with state-level natural resource abundance. The variable *Post* captures the trend across states post breakup while '*Post*×*New State*' captures the difference between the new and rump states on average, post breakup. The first two columns of the table report the OLS estimate of breakup for the entire sample of ACs across all six states, reporting effects without and with border segment fixed effects. The naive OLS specifications suggest that while all states experience trend increase in luminosity, on average new states did better than the rump states.

There may be other unobservables linked to state borders that might bias the OLS estimates. To address these concerns, we present RDD estimates in columns (3)-(5) of the table. We choose three bandwidths with distance thresholds of 150km, 200km and 250km throughout our analysis. We choose these thresholds based on our calculations of the optimal bandwidth (Imbens and Kalyanaraman 2011). Our calculations indicate an average optimal bandwidth of 181.36, across all post-breakup years. Its year-wise value ranges from 165.04 to 204.32, all values lying well within our chosen bandwidth span. The RDD estimates suggest the same pattern of results as the OLS, albeit with a much smaller positive growth effect for the new state. We find that the new states did better than the rump states, with a differential in luminosity of 35 percent. Note that the last four columns include border-segment fixed effects allowing the absorption of any unobserved characteristics that are similar across shared boundary segments (Black 1999).

[38]Trend increases can be potentially explained by the fact that, since the border was drawn, re-settlements over time have affected the relative strength of settlements and there has been spillovers in settlements across borders. Census data since 1881 have shown a gradual decline of tribal populations in Jharkhand and Chhattisgarh. The main reason for this pattern are the low birth rates and high mortality rates among the tribes as well as the loss of traditional land.

Table 2: RDD estimates of state breakup on log light intensity

	OLS		RDD		
			BW 150	BW 200	BW 250
Post × New State	0.824***	0.718***	0.348**	0.647***	0.669***
	(0.094)	(0.102)	(0.168)	(0.150)	(0.143)
Post	0.944***	2.015***	2.050***	2.148***	2.172***
	(0.079)	(0.183)	(0.194)	(0.191)	(0.187)
Border segment F.E.	No	Yes	Yes	Yes	Yes
Observations	20,232	20,232	9,720	11,970	13,608
R^2	0.123	0.153	0.186	0.188	0.182

The table reports results for the effect of breakup on the log of total luminosity in each AC. The specification includes, AC fixed effects, year fixed effects, border segment fixed effects (in column 2-5) border segment interacted with the *Post* indicator and controls for distance to the border by treatment status. BW refers to the area bandwidth, used for selecting ACs on either side of the border for the analysis. *Post* refers to the years after breakup i.e., year 2001 onwards: *New State* is an indicator for the newly created state. Standard errors, clustered at the AC level, are reported in parentheses. * indicates significance at 10%; ** at 5%; *** at 1%.

In order to validate the luminosity measure, our proxy for economic growth, we also present the effect of state breakup on various household level outcomes (Table C3). Using data from the IHDS we examine the effect of breakup on a few development indicators of sample households located in districts that lie along the border of the old and new state. We use two rounds of data on the same household, utilising information from the 1992 (pre breakup) and 2005 (post breakup) surveys to form a household level balanced panel. The outcomes we examine are per-capita income, infant mortality, water availability and monthly food expenditure. Overall we find positive effects of breakup on all household level outcomes, mirroring our results from Table 2 which uses luminosity as an outcome variable. Specifically, we find that households in new states saw an increase of INR 3737.45 (approximately US$50) in their total income and a 15 percent increase in their access to piped water.[39]

Outcomes improved in all of the new states. However, if we next look at how breakup affects outcomes separately in each of the new states, by using a specification where the single *New State* indicator is replaced by state-specific indicators (Table 3), a mixed picture takes shape. Effects in one new state (Uttarakhand) are better than that its rump, Uttar Pradesh, but worse for Jharkhand and Chhattisgarh relative to their rumps, and these differences are strongly significant. These stark differences are matched by an equally stark variation in how the natural resource rich (NRR) regions were distributed between the rump state and the new state post break up (Table 1 Column 2). The patterns in evidence in Table 3 suggest that secession produced comparatively worse outcomes in those states that experienced a significant increase in the proportion of ACs that are natural resource rich, and where this increase resulted in a high proportion of NRR to NRP ACs post breakup. Note that the

[39]Changes in luminosity could also be driven by changes in the price of electricity. To examine this, we use available data on electricity prices by state and year (an unbalanced panel) and examine their evolution across states. Results of panel regressions suggests that, while there were trend increases in prices across states, there are no significant differences between new and old states. Note that such concerns should also be dissipated by the fact that we use regression discontinuity techniques and compare areas around state boundaries.

Table 3: RDD estimates of state breakup on log light intensity: heterogeneity

	OLS		RDD		
			BW 150	BW 200	BW 250
Post × Jharkhand (new state)	0.421***	−0.335***	−0.855***	−0.639***	−0.644***
	(0.101)	(0.124)	(0.237)	(0.192)	(0.180)
Post × Chhattisgarh (new state)	0.477***	0.764***	−0.324	0.175	0.305*
	(0.050)	(0.052)	(0.284)	(0.203)	(0.169)
Post × Uttarakhand (new state)	1.746***	1.915***	1.444***	1.784***	1.805***
	(0.253)	(0.240)	(0.202)	(0.217)	(0.220)
Post	0.944***	2.119***	2.198***	2.282***	2.287***
	(0.079)	(0.175)	(0.187)	(0.183)	(0.179)
Border segment F.E.	No	Yes	Yes	Yes	Yes
Observations	20,232	20,232	9,720	11,970	13,608
R^2	0.136	0.172	0.210	0.210	0.205

The table reports the heterogeneous effect of breakup on the log of total luminosity in each AC. The specification includes AC fixed effects, year fixed effects, border segment interacted with the *Post* indicator and controls for distance to the border by treatment status. BW refers to the area bandwidth, used for selecting ACs on either side of the border for the analysis. *Post* refers to the years after breakup i.e., year 2001 onwards: *New State* is an indicator for the newly created state. Standard errors, clustered at the AC level, are reported in parentheses. * indicates significance at 10%; ** at 5%; *** at 1%.

OLS coefficient estimates for Jharkhand are negative when border-segment fixed effects are included in Column 2; clearly, controlling for shared unobservables within border segments drives this pattern.[40]

State-level results, however, still hide a considerable degree of heterogeneity across ACs. Table 4 shows how local post-breakup effects are shaped by local natural resources. While ACs with a high concentration of deposits do relatively better across all states, they do worse in comparative terms if they are in the new states, post breakup. So, while natural resource rich ACs do better than natural resource poor ACs on average following the break-up, and ACs in new states do better on average relative to ACs in rump states, natural resource rich ACs do *comparatively* worse in the new states. Since the identification strategy we employ isolates the effects of state breakup from the effects of other possible concurrent factors, these results show that these effects come from an interaction between state breakup and natural resource endowments at the AC level, with the interaction effect operating differently in the new states and the rump states. This is consistent with the predictions of the theory, where the NRP constituencies act as a deterrent to the rent extraction activities generating excessive negative spillovers from the NRR constituencies, a deterrent that becomes increasingly and vanishingly smaller as the proportion of NRR constituencies rises and that of NRP constituencies falls. Thus, the heterogeneity we observe here is in line with both the relative changes and the resulting levels in the share of NRR constituencies post secession.

[40]We emphasise this point since OLS estimates give us an average across the state and the positive coefficient in Column 1 might be thought to be coming from an average positive effect in the interior of the state. The inclusion of border segment fixed effects that overturn this pattern suggest that this is not so.

Table 4: RDD estimates of state breakup on log light intensity: mineral area

	OLS		RDD		
			BW 150	BW 200	BW 250
Post × New State	0.838***	0.738***	0.381**	0.674***	0.693***
	(0.098)	(0.104)	(0.168)	(0.152)	(0.146)
Post	0.944***	2.013***	2.037***	2.140***	2.168***
	(0.079)	(0.184)	(0.194)	(0.191)	(0.187)
Post × Mineral	−0.246	0.814	1.626**	1.599*	0.968
	(0.418)	(0.545)	(0.773)	(0.844)	(0.631)
Post × New State × Mineral	−0.388	−1.679**	−2.758***	−2.313**	−1.739**
	(0.735)	(0.802)	(0.951)	(1.001)	(0.842)
Border segment F.E.	No	Yes	Yes	Yes	Yes
Observations	20,232	20,232	9,720	11,970	13,608
R^2	0.123	0.154	0.187	0.188	0.183

The table reports results for the effect of breakup on the log of total luminosity in each AC. The specification includes, AC fixed effects, year fixed effects, border segment interacted with the *Post* indicator and controls for distance to the border by treatment status. BW refers to the area bandwidth, used for selecting ACs on either side of the border for the analysis. *Post* refers to the years after breakup i.e., year 2001 onwards: *New State* is an indicator for the newly created state; *Mineral* refers to the total quality of mines within each AC. Standard errors, clustered at the AC level, are reported in parentheses. * indicates significance at 10%; ** at 5%; *** at 1%.

There are of course other potential explanations for the different effects of breakup across states that have little to do with natural resources. One potential issue is the role of transfers from the Centre to the states upon breakup, which might have affected the evolution of outcomes over time. As the figure on transfers and devolution from the Centre to States (Figure 5) indicates, however, the pattern of transfers favours the old rump states, particularly Uttar Pradesh.[41] This picture of transfers in the aggregate cannot explain the relative success of Uttarakhand, but might explain the relatively poor performance of the other two new states. But as we discuss below, controlling for state-specific time trends does not change the pattern of heterogeneity we see, which emanates at the more local level of the assembly constituencies.

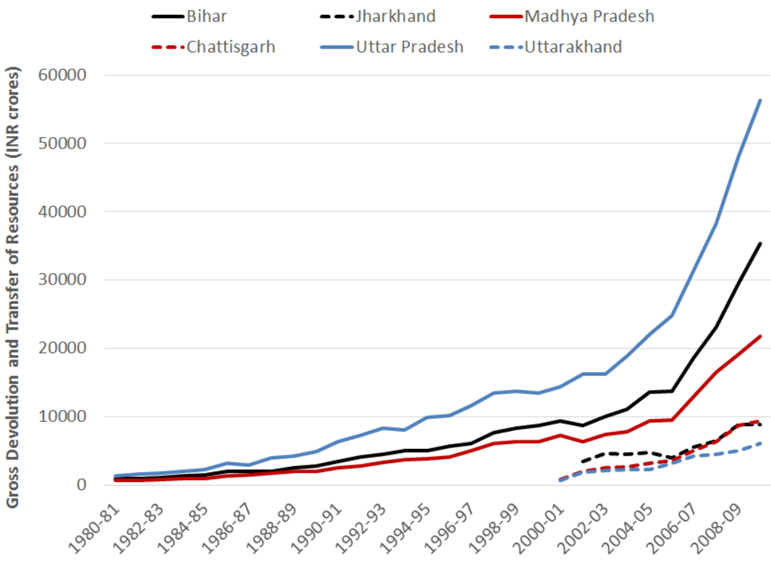
5.3 Robustness checks

We investigated the sensitivity of our results to variations in the estimation approach and to the inclusion of additional controls. First, to account for spatial correlation in our dependent variable, we apply a spatial correction (Conley 1999) to our method of inference. Table C4 presents our main results with spatially adjusted standard errors and shows that our results are robust to the presence of arbitrary spatial correlation.

Next, we investigated the role of conflict, primarily from Marxist (Naxalite) rebellions and differential mineral price trend effects, in driving the state secession results. Mineral rich areas are also

[41]Note that the transfers measured here include all taxes, grants and loans to the state from the Centre.

Figure 5: Trends in devolution and transfer of resources to new and old states



The figure shows the amount (in INR crores) of money transfered from the center to the new and old states between 1980-2010. Source: OpenBudgetIndia

areas with heightened violence and conflict, and so the mineral resource effects we find may merely reflect developments in active conflicts in these states around the same time when state borders were redrawn. Additionally it could be that mineral prices (typically endogenous) trended differently after the state-breakup, affecting outcomes in new vs. old states. To investigate this, we included a measure of conflict, as proxied by the number of Maoist rebels-related incidents, and dummies for mineral type interacted with year in all specifications. The mineral type by year fixed effects allow us to flexibly control for differential price trends specific to an AC and its mineral deposit without having to include (a potentially endogenous) mineral price variable. Table C5 shows that our results are not affected by the inclusion of conflict or mineral-price trends; furthermore, while the coefficient on the conflict variable is negative throughout, it is mostly statistically insignificant. Column (3) presents results on the effect of mineral resources post breakup on economic activity, after controlling for conflict and mineral-price trends. Here again, we find that our results are robust to controlling for the incidence of conflict and differential mineral prices post-breakup.

We also carried out two placebo-style checks (Table C6), both intended to confirm that the effects we observe are directly due to the date and action of secession. First, we artificially move back the date of secession to 1996, four years before the actual breakup occurred. Columns (1)-(3) present results from this exercise; we find throughout that the *Post*×*New State* effect is statistically insignificant, suggesting that the positive discontinuity in outcomes for new states only started revealing itself after the states were formally split in 2000. In the second instance, we examine the effect of a false, 2001 breakup on luminosity in the southern states of Andhra Pradesh (AP) which is resource-rich relative to the new state of Telangana and where breakup occurred only in 2014. We take this as a placebo and ask whether the results here mimic those of the other three states if we pick the date of breakup as 2001. A potential concern is that the effect of concentrated resource endowments might have occurred with or without breakup if, for instance, an increase in returns from mining or opportunities to extract rents had changed for some reason post 2001. These results, in columns (4)-(6) of the table, strongly support the notion that breakup matters. There is, as for our other specifications, a strong positive trend in outcomes post 2001, but there is no particular effect of the pretended "treatment", nor is there any particular effect of local mineral endowments that might independently have been affected post

2001 by a change in prices or rents over time.[42]

5.4 Political alignment

Our theoretical discussion has made no distinction between ACs whose elected representative is aligned with the state government and those where that is not the case; or between those ACs that are "swing" ACs – in the sense that the fraction of voters who firmly support either party (partisan voters) is small – and those where voters firmly support one party. However, we might expect that if the locally elected politician is aligned with the incumbent party, this could make it easier to buy votes for the state level party, whereas if the local elected politician is not aligned with the incumbent party, a vote-for-favours transaction might be less feasible. We might also expect votes to be comparatively more valuable in "swing" ACs. To see this, consider an asymmetric variation of our symmetric setup, in which there are two NRR constituencies, 1 and 2, both having the same fraction, v, of votes for sale, but featuring electorates with different median ideologies. If 100% of the voters in AC 1 always support the incumbent irrespectively of whether or not votes are bought, then the votes that are for sale in AC 1 have no value (or equivalently, they can be had for free), and therefore, an asymmetric equilibrium with constituency-specific "prices" x_1 and x_2 will always feature $x_1 = 0$. On the other hand, if 100% of the voters in AC 1 always support the challenger, then it may be prohibitively costly for the local seller to procure votes (i.e. there would be no votes for sale in that AC), and so again we would have $x_1 = 0$. Thus, if resource rich ACs are aligned or swing ACs we expect outcomes to be worse post breakup, relative to non-aligned or non-swing ACs.

Results of RDD estimates that includes this further interactions are presented in Table 5. These are directly consistent with our theoretical predictions: the negative effects (on growth and inequality, respectively) of breakup in the resource rich ACs for states which experience an increase in q post breakup are exacerbated when these ACs are aligned or swing. A possible alternative mechanism for how political reorganisation can affect local-level outcomes is that it may affect change the "aligned" or "swing" status of ACs, due to a change a change in the organisation of political parties at the state level, and that this change is in turn reflected in a change in the dispersion of resources from state governments to local areas. The prediction would then be that an AC that becomes swing or aligned post break up does better than an that is not swing or aligned post break up. We observe the opposite.

Our theoretical model offers a plausible channel for the differential effects we observe at the local level in the three states post break up. We explained above why the alternative explanation of changes in swing and aligned status of ACs cannot account for the observed differences between swing/aligned NRR ACs and others. Other alternative explanations such as the windfall gain in revenues at the state level (which is endogenous) are not able to account for the differential effects across NRR ACs post break up.[43]

6 Concluding remarks

In this paper we exploit the breakup of three of the largest states in India, comprising areas with some of the largest concentration of mineral resources in the country, to examine how secession interacts with natural resources. Given that so many secessions are indeed motivated by greed for natural resources,

[42] This result holds even when pooling the "placebo" sample with the original six states sample and testing for the effect of new state interacted with placebo state pair. The coefficient on this interaction is statistically insignificant.

[43] Another possible effect of abundant natural resources might be a "voracity effect" (Lane and Tornell 1999), which predicts a positive relationship between conflict and natural resource abundance. However, such an effect at the local level could only be mediated through an increase in the size of resources at the state level, which is consistent with our explanation of the increase in negative spillovers in resource abundant states post break up.

Table 5: Interactions with political indicators

	Dependent variable: log light intensity		
	Swing Cutoff: 2%	Swing Cutoff: 5%	Political Alignment
Post × New State	0.397**	0.383**	0.340**
	(0.187)	(0.194)	(0.164)
Post × New State × Mineral	−0.507	−0.396	−1.335*
	(0.823)	(0.808)	(0.778)
Post × Mineral × Swing	1.783**	2.676***	
	(0.826)	(0.747)	
Post × Mineral × Alignment			0.978
			(0.617)
Post × New State × Mineral × Swing	−4.278**	-4.454**	
	(2.003)	(2.033)	
Post × New State × Mineral × Alignment			-1.973*
			(1.183)
Observations	11,034	11,034	9,195
R^2	0.183	0.183	0.136

The table reports results for the effect of breakup on the log of light intensity within each AC, for a distance bandwidth of 200 km. The specification includes AC fixed effects, year fixed effects, border segment interacted with the *Post* indicator and controls for distance to the border by treatment status. All specifications also control for all possible interaction combinations, not reported, but which are mostly insignificant. *Post* refers to the years after breakup i.e., year 2001 onwards: *New State* is an indicator for the newly created state; *Mineral* refers to the total quality of mines within each AC; *Swing* refers to whether the margin of victory in the pre-breakup election year for less than 2% (Column 1) or 5% (Column 2); *Alignment* is a (time-varying) binary indicator for whether the constituency's winning candidate belongs to the (leading) ruling party of the state. The specification in Column 3, uses only observations prior to delimitation in 2008. Standard errors clustered at the AC level are reported in parentheses. * indicates significance at 10%; ** at 5%; *** at 1%.

the parallel changes induced by state breakup in the distribution of mineral deposits across new and old states offer unique within-country evidence about this question. Our estimation results suggest that natural resource rich areas do better both at the state level nor at the local level. However, when states get a very large share of natural resources (i.e. if the difference in the proportion of NRR areas between the new state and rump state is over a threshold) then local level NRR areas in such states do worse relative to comparable NRR areas in rump states.

It is not immediately clear why and through which mechanism state breakup should affect institutional quality. We argue that a plausible channel for the effects we observe is a reduction in electoral accountability in new states that inherit a large fraction of NRR areas relative to the rump state, a conjecture that is consistent with the patterns we see in the data. The accountability channel we describe operates in a context where political power resides at the state level but where the power to influence voters resides at the local level, and where states have no control over royalty rates and thus have limited direct incentives to oppose rent grabbing by local groups. In this context, we suggest that the political bargain between local-level elites and state-level elites is a key part of the story. This bargain is shaped by the diluting influence of interests that are not related to natural resources; and it is strengthened by an increase in the relative importance, at the state level, of local natural resource rents, as this reduces the diluting influence of competing interests. Our interpretation reflects the distinctive features of the Indian institutional context – the way property rights for natural resources are allocated between the three layers of government, the way that royalties are set, the way revenues from natural resources are divided between the three layers and the majoritarian election rules. Comparing the Indian case with with other institutional setting – e.g. Peru (Loayza et al. 2013) where part of the revenues from mineral deposits go to the local area – could provide interesting insights as to how crucially the effects that we find for the Indian case depend on the particular institutions.

Our conclusions suggest the question of how to develop institutions to harness the positive effects of natural resources is an important one for economic development, as poorer countries rely comparatively more on natural capital (van der Ploeg 2011). Overall, our results lend support to the literature that argues that promoting a sense of ownership among local populations with abundant natural resources can improve economic and political outcomes (see e.g. de la Cuesta et al. 2017). Second, the adverse effects of patronage politics could be mitigated by redrawing constituency borders so as to reduce the weight of NRR areas within individual ACs and so make it more difficult to buy a large fraction of the total votes – although it has been shown that vote trading is itself a function of the level of development (Aidt and Jensen 2017). Third, the analysis suggests that welfare outcomes in natural resource rich areas could improve if the response to demands for secession were met by higher fiscal redistribution towards the areas that threaten to secede, rather than by creating new political entities (although, of course, this may create a moral hazard problem). Indeed, Aidt and Dutta (2016) shows the importance of the design of fiscal federalism institutions in the face of different types of externalities between local regions. Finally, changing the current allocation of decision powers with respect to mineral concessions and royalty rates, as well as the way public revenues from natural resources are allocated across state and local communities, may be an effective way of mitigating the curse.[44]

[44]The federal government that was instated in 2014 has proposed an amendment to the original Bill of 1957 that would address some of the problems we have mentioned – principal amongst them the excessive separation between the powers to set royalty rates and the powers to grant concessions – establishing District Mineral Foundations (DMFs) in areas affected by mining related operations (Narain 2015). These new institutional arrangements might well hold the key to improved performance for areas with concentrated resources that might succumb to a local natural resource curse otherwise. However, the incentives for local capture of the DMFs cannot be readily discounted.

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A DATA SOURCES

In this section we describe in detail the axillary data used for the analysis.

National and State Election Study 2004: The survey is conducted by the CSDS. The survey interviews respondents immediately after polling and enumerates information on the political behaviour, opinion and attitudes of voters alongside their demographics. The survey uses a dummy ballot box for capturing the respondent's voting choice wherein respondents were asked to mark their voting preference on a dummy ballot paper and drop it in a dummy ballot box. Sampling for the survey is carried out using a multi-stage stratified random sampling design. The first stage involves stratified sampling of Assembly Constituencies by state proportional to their size. In the second stage, polling stations are sampled from each of these ACs, again proportional to electorate size. In the final stage respondents are selected from the Electoral Rolls provided by the Election Commission. Respondents are sampled by the Systematic Random Sampling (SRS) method, which is based on a fixed interval ratio between two respondents in the polling booth. More information on the sampling and questionnaire modules of the 2004 NES can be found in Lokniti (2004).

AC and PC Maps: The Assembly Constituency (AC) and the Parliamentary Constituency (PC) map, shape files were obtained from the Election Commission of India website (http://eci.gov.in/). This data was cleaned and geo-referenced using projections provided by Sandip Sukhtankar[45] and INRM Consultants, New Delhi. Note that the AC maps for Uttarakhand are only available post delimitation. However, only a small fraction of constituencies are affected by the delimitation procedure in Uttarakhand and are results are robust to dropping these constituencies. Distances to the border for each AC was calculated by taking the centroid of each AC polygon and measuring its Euclidean distance to the state border line. Finally, we also divide the entire border line into segments which we include as fixed effects in our specifications.

Data on Conflict: The data on the conflict as measured by Maoist incidents is compiled by Gomes (2015)[46] and comes from four different sources: Global Terrorism Database (GTD) I: 1970-1997 & II: 1998-2007; Rand-MIPT Terrorism Incident database (1998-present); Worldwide Incidents tracking system (WITS); National Counter Terrorism Centre (2004-2007); South Asia Terrorism Portal (SATP).

Data on Criminal Politicians: Data on criminal politicians in India is taken from Fisman et al. (2014), who compile this information from candidate affidavits. These are held on the the GENESYS Archives of the Election Commission of India (ECI) and the various websites of the the Chief Electoral Officer in each state. The archives provide scanned candidate affidavits (in the form of pictures or PDFs) for all candidates.

Household Panel Data, IHDS: We use data from two waves (1992 and 2004) of the India Human Development Survey (IHDS). This is a nationally representative survey of 41,554 households in 1,503 villages and 971 urban neighbourhoods across India. Data are publicly available through ICPSR. For details on the survey see Desai et al. (2007).

State Election Results: We use the results of all state elections held in the six states analysed, between the years of 1992 and 2009. This data is obtained from the Election Commission of India.

Human Demographics: We use data on district-level migration and literacy from the two census waves conducted in 1991 and 2001. This data is available on the census of India website.

Electricity Prices: Data on electricity tariff is compiled at an annual level for each state by India Stat.This data is sourced from the annual reports on the working of state electricity boards and electricity departments as well as the Planning Commission reports.

B PROOFS

PROOF OF PROPOSITION 1

As only one buyer (the incumbent party, L) can buy votes, the votes for sale have no alternative use, and so if the buyer has all the bargaining power and can make a take-it-or-leave-it offer to the vote sellers, it will be able to buy the votes at a price $x = 0$. On the other hand, if only the incumbent party, L, can buy votes, but the sellers

[45] Retrieved from http://www.dartmouth.edu/ sandip/data.html

[46] We are very grateful to Joseph Flavian Gomes for sharing his data on district level conflict in India.

have all the bargaining power and operate as a single seller (i.e. they collude), then the take-it-or-leave-it offer price can be derived as follows.

The overall effect for a NRR constituency from $x > 0$ is given by $(\lambda + \rho q)x$, whereas the effect for a NRP constituency is given by $\rho q x$. The utility of voters in a NRR constituency from the L party being elected under shock s is now given by $U_i^L = -(-1/2 - i + s)^2 - (\lambda + \rho q)x$,[47] and a voter i is therefore indifferent between the L and R parties (i.e. $U_i^L = U_i^L$) iff $-(-1/2 - i + s)^2 - (\lambda + \rho q)x = -(1/2 - i + s)^2$. This gives the cutoff ideology conditional on shock s as $\hat{i}^{NRR} = -(\lambda + \rho q)x/2 - s$, and in an NRP constituency the cutoff ideology is $\hat{i}^{NRP} = -\rho q x/2 - s$. The vote share of the L party among the $1 - v$ voters in q NRR constituencies who do not sell their votes is then given by $\hat{i}^{NRR} + 1/2 = 1/2 - (1/2)(\lambda + \rho q)x/2 - s$. The loss of votes due to $x > 0$ in an NRR constituency is $L_R = (\lambda + \rho q)x/2$. The vote share of the L party among the voters in each of the $1 - q$ NRP constituencies is given by $\hat{i}^P + 1/2$, and the loss of votes in an NRP constituency due to $x > 0$ is $L_P = \rho q x/2$.

Suppose that party L buys the qv votes at price x in a state. The total vote share conditional on shock s is given by $V_{LB} = qv + q(1 - v)(1/2 - s - L_R) + (1 - q)(1/2 - s - L_P)$. The L party wins if $V_{LB} \geq 1/2$, i.e. iff $qv + (1/2 - s)(1 - qv) + q(1 - v)(-L_R) + (1 - q)(-L_P) \geq 1/2$, or

$$\frac{qv}{2} - \frac{q(1-v)\lambda x}{2} - (1 - qv)\frac{\rho q x}{2} \geq s(1 - qv). \tag{9}$$

Using the fact that s is uniformly distributed on $[-1/2, 1/2]$, the probability of winning is

$$P_L^W = \frac{1}{2} + \frac{1}{2(1-qv)}\big(qv - q(1-v)\lambda x - \rho q x(1-qv)\big) \equiv \Phi(x). \tag{10}$$

Then, the maximum price the buyer is willing to pay is that for which $\Phi(x) = 1/2$, which gives $x = v\,/\,\big(\lambda\,(1-v) + \rho\,(1-qv)\big) \equiv \tilde{x}$. The seller's payoff, $P_L^W x = \Phi(x)x$, reaches a maximum at $x = 2\,\tilde{x}/(3\,q\,v)$, which, for $v \leq 1/2$, is always greater than $\tilde{x}$. Thus, $\tilde{x}$ is the value of x that maximises the seller's payoff subject to the constraint $P_L^W \geq 1/2$.

Two buyers or multiple sellers

If both the L and the R parties can buy votes from a single seller where the seller makes a simultaneous take it or leave it offer to the buyers, $\tilde{x}$ remains unchanged. The sequence of actions is as follows. The seller posts a price. Each buyer can accept or reject the price. If both buyers accept the offer, the votes are sold, at the posted price, to one of the buyers selected at random. If one buyer accepts while the other buyer rejects, the accepting buyer gets the votes. If both buyers reject the offer, another offer can subsequently be made according to the same protocol. We focus on subgame perfect equilibria of this game.

Allowing for multiple sellers also does not change conclusions, as the following discussion demonstrates. Suppose that there is a mass, q, of N NRR equal-sized constituencies, each of them having mass q/N; and suppose that sellers simultaneously post prices $x_1, x_2, ...x_N$, and make a take it or leave it offer to the buyer. Each seller chooses its price given the conjectured prices of the other sellers. If the seller of a single NRR constituency, j, sells v votes for a price x_j, while all other sellers in NRR constituencies post a price x_0 (assuming symmetry), the loss of votes (among the $1-v$ voters in the NRR districts) to the incumbent in constituency j is $(1/2)\big(\lambda x_j + \rho\big(x_j + (N-1)x_0\big)q/N\big)$. In the Natural Resource Poor (NRP) constituencies, the loss of votes is $(1/2)\rho(x_j + (N-1)x_0)q/N$. Hence the probability of winning is

$$P_{Lj}^W = \frac{1}{2} + \frac{1}{2(1-qv)}\Big(qv - q(1-v)\big(\lambda x_j + \rho(x_j + (N-1)x_0\big)q/N - (1-q)\big(\rho(x_j + (N-1)x_0\big)q/N\Big). \tag{11}$$

The best offer from the perspective of seller j is then that which makes the above expression equal to $1/2$ (the buyer's reservation value), given the other sellers' choice, x_0. Solving for this optimal x_j, as a function of x_0, and then focusing on a symmetric solution with $x_j = x_0$, we obtain a value $\tilde{x}$ that is the same as that with full collusion. The intuition for this result is that each seller, no matter how small, acts as a monopolist for its votes against the given buyer's total reservation payoff of $1/2$.

[47] Note that we ignore spillovers from other constituencies that are not in the state, as voters do not include those in the calculation since they cannot affect those spillovers.

PROOF OF PROPOSITION 2

Let $U^S(x) = \Phi(x)\,x$ and $U^B(x) = \Phi(x) - 1/2$, and let $\big(U^S(x_S), U^B(x_S)\big)$ denote the offer made by the seller, and $\big(U^S(x_B), U^B(x_B)\big)$ the offer made by the buyer. If the seller is the first mover, an equilibrium corresponds to the solution of the two equations: $U^B(x_S) = \delta U^B(x_B)$ and $U^S(x_B) = \delta U^S(x_S)$. A solution gives:

$$x_S = \tilde{x}\,\frac{1+\delta\big(1+\delta-\sqrt{1+\delta(2+\delta-4q\,v(1-q\,v))}\big)/(2v\,q)}{1+\delta+\delta^2}. \tag{12}$$

This is increasing in q. Thus, when some of the surplus accrues to the buyer (the incumbent party, L), an increase in the density of natural resources (a higher q) can make the incumbent's position more secure (it raises P_L^W).

ENDOGENOUS q

Suppose than in any AC, j, there is a cost c for delivering v votes to the buyer. ACs are indexed so that the private net unit value, $z(j)$, of the concessions made by the state in relation to natural resources (net of taxes and any other private costs incurred by the beneficiaries) is increasing in j, with $j \in [0,1]$. Then the vote seller will deliver votes from a given AC, j, iff $z(j)\,x > c$, and will not deliver any votes from that AC otherwise. Since $z'(j) > 0$, if $z(0)\,x < c$ and $z(1)\,x > c$, there will be a cutoff point $\underline{j}(x)$ such that there will be votes for sale only in ACs $j > \underline{j}$, and so $q = 1 - \underline{j}(x)$. The seller's take-it-or-leave it offer, x, together with the proportion, q, of ACs involved in vote sales is then identified by the two conditions

$$\begin{cases} x = \dfrac{v}{\lambda\,(1-v) + \rho\,(1-v\,q)}; \\ z(1-q)\,x - c = 0. \end{cases} \tag{13}$$

For the sake of simplicity, in the rest of our discussion we will assume $z(j) = z_0 + \alpha\,j$, but the arguments can be generalised to any schedule $z(j)$ s.t. $z'(j) > 0$. The mean level of z is $\bar{z} = z_0 + \alpha/2$; solving for z_0, we can then express $z(j)$ as $z(j) = \bar{z} + \alpha\,(j - 1/2)$, where $\bar{z}$ can be interpreted as reflecting the *density* (average value) of natural resources in the state, and α their *concentration* within the state. Replacing this expression into the above system of equations and solving for x and q, we obtain

$$\begin{cases} \tilde{x} = \dfrac{(\alpha - \rho\,c)\,v}{\alpha(\lambda+\rho) - \alpha(\lambda+\rho/2)v - \rho\,\bar{z}\,v}; \\ \tilde{q} = \dfrac{(\alpha/2+\bar{z})\,v - (\lambda\,(1-v)+\rho)\,c}{(\alpha - \rho\,c)\,v}. \end{cases} \tag{14}$$

In an interior solution with $\tilde{q} \in (0,1)$, both $\tilde{x}$ and $\tilde{q}$ are increasing in $\bar{z}$ and decreasing in α; i.e. an increase in the *density* of natural resources leads to more votes-for-favours transactions and more rent grabbing, whereas an increase in their *concentration* has the opposite effect.

PROOF OF PROPOSITION 3

With secession, the effect of $q_A \le q_U$ on x_A dominates the effect of a smaller ρ if $x_A(\rho', q_A) \le x_U(\rho, q_U)$, which is true iff $N_A/N_U > (1 - q_U v)/(1 - q_A v)$.

C ADDITIONAL TABLES AND FIGURES

Table C1: Descriptive statistics

	Full Sample			BW 150			BW 200			BW 250		
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.
Log Luminosity	20232	6.589	2.260	9720	6.188	2.635	11970	6.164	2.582	13608	6.248	2.524
Mineral Quality	20232	0.006	0.050	9720	0.011	0.068	11970	0.010	0.064	13608	0.009	0.061
# of Mines	20232	0.165	0.372	9720	0.191	0.393	11970	0.189	0.392	13608	0.188	0.391
# Conflict Occurrences	20232	0.353	2.613	9720	0.424	1.748	11970	0.417	2.091	13608	0.408	2.166

The table reports summary statistics for the main variables used in our regression analysis. There are 202,32 AC-year observations in the full sample of our data. We also report summary statistics for the sample relevant to each bandwidth (referred to as 'BW') used for the regression discontinuity analysis. BW 150 refers to the sample of ACs lying withing 150km of the state borders. Similarly, BW 200 and 250 refer to the sample of ACs lying withing 200km and 250km respectively of the state borders.

Table C2: Demographics and state breakup

	Border District Demographics, Census (2001-1991)	
	Proportion Literate	Proportion SC/ST
Post × New State	−0.07	0.005
	(0.04)	(0.04)
Post	−0.08***	0.14***
	(0.03)	(0.03)
Observations	63	63
R2	0.58	0.67

The table reports results for demographics. Census data on demographics is available for two periods, 1991 and 2001, at the district level. The analysis in column is restricted to districts around the border of each state (after breakup) and uses district/state fixed effects. *Post* refers to the years after breakup i.e., year 2001 onwards: *New States* is an indicator for the newly created state. Robust standard errors are reported in parentheses. * indicates significance at 10%; ** at 5%; *** at 1%.

Table C3: Effect of breakup on household indicators

	Per-capita Income	Infant Mortality	Water Availability	Food Expenditure
Post × New State	3,737.451**	0.093	0.158**	45.249
	(1462.780)	(0.099)	(0.080)	(41.714)
Post	93.374	−0.130	0.022	174.202***
	(719.003)	(0.083)	(0.021)	(26.988)
Household F.E.	Yes	Yes	Yes	Yes
State Dummy × Post	Yes	Yes	Yes	Yes
Observations	1,040	839	1,040	1040
R^2	0.128	0.062	0.106	0.495

The table reports results for the effect of breakup on various household indicators obtained from the IHD household survey. The sample is restricted to households residing within districts around the border of each state (pre and post breakup). The outcome variables are: *Per-capita Income* which is the household size adjusted total income of a household (in rupees); *Infant Mortality* is the infant mortality rate of the household (reported only for households with children); *Water Availability* is the binary response to the survey question “Is the availability of drinking water normally adequate?”; *Food Expenditure* is the monthly food expenditure of a household (in rupees). The specification includes household fixed effects and state dummies (all 6 states) interacted with the post-breakup indicator. *Post* refers to the years after breakup i.e., year 2001 onwards: *New State* is an indicator for the newly created state. Standard errors, clustered at the household level, are reported in parentheses. * indicates significance at 10%; ** at 5%; *** at 1%.

Table C4: RDD estimates of log light intensity, with spatially adjusted errors

	BW 150	BW 150	BW 150
Post × New State	0.348***		0.381***
	(0.103)		(0.104)
Post × Jharkhand (new state)		−0.855***	
		(0.155)	
Post × Chhattisgarh (new state)		−0.324**	
		(0.149)	
Post × Uttarakhand (new state)		1.444***	
		(0.109)	
Post			
Post × Mineral			1.626***
			(0.530)
Post × New State × Mineral			−2.758***
			(0.635)
Observations	9,720	9,720	9,720
R^2	0.042	0.070	0.043

The table reports results for the effect of breakup on the log of total luminosity in each AC. All specifications include AC fixed effects, year fixed effects, border segment interacted with the *Post* indicator and controls for distance to the border by treatment status. BW refers to the area bandwidth, used for selecting ACs on either side of the border for the analysis. *Post* refers to the years after breakup i.e., year 2001 onwards: *New State* is an indicator for the newly created state; *Mineral* refers to the total quality of mines within each AC. Spatially adjusted standard errors are reported in parentheses. * indicates significance at 10%; ** at 5%; *** at 1%.

Table C5: RDD estimates of log light intensity, controlling for conflict

	BW 150	BW 150	BW 150
Post × New State	0.405**		0.417**
	(0.166)		(0.167)
Post × Jharkhand (new State)		−1.068***	
		(0.236)	
Post × Chhattisgarh (new state)		−0.533*	
		(0.311)	
Post × Uttarakhand (new state)		1.428***	
		(0.208)	
Post	1.334***	1.632***	1.287***
	(0.374)	(0.356)	(0.375)
Post × Mineral			2.488*
			(1.341)
Post × New State × Mineral			−4.221***
			(1.244)
Conflict	−0.403	−0.417	−0.406
	(0.293)	(0.290)	(0.293)
Post × Conflict	0.390	0.386	0.394
	(0.296)	(0.292)	(0.295)
Post × New State × Conflict	−0.047	0.050*	−0.045
	(0.032)	(0.030)	(0.032)
Mineral × F.E.	Yes	Yes	Yes
Observations	9,720	9,720	9,720
R^2	0.222	0.244	0.222

The table reports results for the effect of breakup on the log of total luminosity in each AC. Effects of breakup for each state-pair are also reported. All specifications include AC fixed effects, year fixed effects, border segment interacted with the *Post* indicator and controls for distance to the border by treatment status. Additionally the specifications include (weighted) dummies for each mineral type deposit interacted by year in an AC (*Mineral × F.E.*). The mineral type dummies are weighted by the number of deposits for that mineral in an AC. BW refers to the area bandwidth, used for selecting ACs on either side of the border for the analysis. *Post* refers to the years after breakup i.e., year 2001 onwards: *New States* is an indicator for the newly created state; *Mineral* refers to the total quality of mines within each AC; *Conflict* measures the total number of conflict occurrences, by year, within each AC. Standard errors, clustered at the AC level, are reported in parentheses. * indicates significance at 10%; ** at 5%; *** at 1%.

Table C6: RDD estimates of placebo breakup on log light intensity

	Placebo Breakup 1996			Placebo Breakup AP		
	BW 150	BW 200	BW 250	BW 150	BW 200	BW 250
Post × New State	−0.140	0.134	0.131	0.021	0.038	0.068
	(0.200)	(0.191)	(0.175)	(0.118)	(0.106)	(0.101)
Post	2.524***	2.610***	2.684***	1.672***	1.633***	1.595***
	(0.307)	(0.298)	(0.292)	(0.217)	(0.193)	(0.176)
Post × Mineral	0.409	0.679	0.026	−7.319	−1.346	3.162
	(1.149)	(1.107)	(0.849)	(10.292)	(9.359)	(8.828)
Post × New State × Mineral	−0.912	−1.146	−0.628	0.075	1.694	−2.677
	(1.363)	(1.292)	(1.107)	(15.336)	(9.322)	(8.802)
Observations	4,320	5,320	6,048	4,662	5,364	6,012
R^2	0.183	0.196	0.197	0.221	0.230	0.215

The table reports results for placebo effects. We investigate: (i) in columns 1-3, the effect of a placebo state breakup on luminosity in the pre breakup year of 1996 (four years before the actual breakup occurred); and (ii) in columns 4-6, the effect of a 2001 placebo-breakup on luminosity in the states of Andhra Pradesh (AP) and Telangana (whose breakup occurred only in 2014). The dependent variable for all specifications is the log of total luminosity in each AC. All specifications include, AC fixed effects, year fixed effects, border segment interacted with the *Post* indicator and controls for distance to the border by treatment status. BW refers to the area bandwidth, used for selecting ACs on either side of the border for the analysis. *Post* refers to the years after breakup; *New State* is an indicator for the newly created state; *Mineral* refers to the total quality of mines within each AC. Standard errors, clustered at the AC level, are reported in parentheses. * indicates significance at 10%; ** at 5%; *** at 1%.

Table C7: Criminal politicians and natural resources

	Winning MP criminal	Winning MP criminal
# Mines	3.65*	
	(0.191)	
Mine Density		2.787**
		(1.105)
Observations	179	179
R^2	0.01	0.02

This table reports the correlation between criminal politicians in a **parliamentary constituency** and its mineral resource endowment. The dependent variables is binary, taking the value 1 if the winning candidate of the constituency (MP) has a criminal record, zero otherwise. *# Mines* is the total number of mines within a parliamentary constituency; *Mine Density* is the proportion of assembly constituencies, within a parliamentary constituency, that have at least one mine. Standard errors are reported in parentheses. * indicates significance at 10%; ** at 5%; *** at 1%.

Table C8: Voting malpractices and mineral rich constituencies

	Whether malpractice		Intensity of malpractice	
	Logit	Logit	OLS	Ordered Logit
Mineral	0.118***	0.284***	0.576***	6.268***
	(0.004)	(0.074)	(0.098)	(2.399)
District FE	Yes	Yes	Yes	Yes
Household Controls	No	Yes	Yes	Yes
Observations	642	626	705	705
R^2	0.16	0.18	0.21	0.17

This table reports the correlation between election malpractices, as perceived by sampled households from the State Election Survey, and mineral rich constituencies in the state of Jharkhand in 2004. The dependent variable for Columns (1)-(2) is a binary indicator for whether a household witnessed any electoral malpractice or election irregularities while voting in the state election; the dependent variable for Columns (3)-(4) is an ordered indicator for the extent to which a household witnessed any electoral malpractice or election irregularities, ranging from 0 (no malpractice) to 3 (several malpractices). Household controls include fixed effect for various income categories, whether a household has access to television and telephone/mobile-phone, caste affiliation and a dummy for rural location. *Mineral* refers to the total quality of mines within each AC. Marginal effects are reported for logit specifications; odds-ratios are reported for the ordered logit specification. Standard errors clustered at the AC level are reported in parentheses. * indicates significance at 10%; ** at 5%; *** at 1%.