Dirty Politics: Mining Booms and Politician Behavior in India *

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Abstract

We study how natural resource wealth affects the selection and behavior of holders of public office. Using global price shocks to thirty-one different minerals, and nationwide geological and political data from India, we show that local mineral wealth shocks cause the election of criminal politicians. We also find a moral hazard effect: politicians commit more crimes and accumulate greater wealth when mineral prices rise during their term in office. There are no local fiscal revenue effects in this context; we thus isolate the direct impacts of mining sector operations on politics.

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1 Introduction

There is a widespread perception that mining is a dirty business that attracts criminals and corrupts politicians, especially in developing countries (Ross, 2015; van der Ploeg, 2011).[1] The mining sector generates significant rents, and politicians control key regulatory resources required by mineral extraction firms, creating significant opportunities for graft (Ross, 1999). However, studying the impact of natural resource extraction operations on politician behavior has proven challenging, for two reasons. First, mineral deposits are fixed in space and correlated with other geographic factors, making identification difficult. Second, natural resource wealth generates fiscal windfalls which can have adverse effects on political outcomes, even in the absence of resource extraction (Brollo et al., 2013; Caselli and Tesei, 2016; Ferraz and Monteiro, 2012). If the directly corrupting effects of mineral extraction operations are large, then better management of fiscal resources may be insufficient in mitigating the risks of natural resource wealth.

In this paper, we estimate the impact of mineral wealth on political outcomes by exploiting changes in the value of multiple subsurface mineral deposits in India, changes driven by global price shocks to thirty-one different minerals. We show that increases in local mineral wealth raise the probability of electing criminal politicians, in spite of apparent increases in electoral competition. Once in office, elected politicians engage in more criminal behavior and accumulate substantial wealth when the value of local minerals rises during their electoral terms. We find neither effect on politicians who competed for office but were not elected – the increases in crime and wealth are limited to election winners. The implication is that an active mineral extraction sector increases the monetary value of being in office to all

[1] A famous example from India encapsulates this notion. In 2009, the mining baron Reddy brothers were accused, among other things, of moving the official border demarcation between Andhra Pradesh and Karnataka, so that their existing iron mines would fall in the state where they had official mining permits. They later become key ministers in the government of Karnataka, and were finally arrested and removed from office on charges of corruption and illegal mining, bringing the government down with them.

politicians, but criminals are better at winning elections when rents are high. Surprisingly, state institutions do not appear to mitigate this effect: the results on both the election of criminals and on politician asset growth appear equally strongly in states with relatively good and bad institutions.[2]

Our empirical approach has three strengths. First, by combining pre-existing geographic variation in the locations of mineral deposits with global mineral price shocks, we identify exogenous variation in the value of natural resources over time, with political institutions and data sources held constant.[3] We thus address a major challenge in the study of resource effects, which is that natural resource wealth is correlated with other consequential geographic factors, and the minerals in a given location are static. Resource-rich places are often mountainous or remote, and settled explicitly for resource extraction; place-based counterfactual stories are thus inherently challenging to defend.[4]

Second, the predominant adverse channel discussed by the existing literature, the fiscal windfall channel, is absent in our context. Political agency models predict that increased government revenue may lead to adverse political outcomes (Brollo et al., 2013). This is a central channel in many theoretical discussions of the political impacts of natural resources (Robinson et al., 2006), and confounds attempts to identify the direct role of resource extraction operations. The fiscal windfall channel is a factor in all country-level studies of mineral resources, as well as in most regional studies. But in India, taxes and royalties from mineral extraction do *not* lead to greater government spending in the local areas where extraction

[2] Like many papers on crime, we use prosecuted cases as a proxy for actual crimes committed. Empirical evidence using the same data source on politician criminality, discussed below, suggests this is a good proxy for actual crime.

[3] India contains considerable variation in mineral deposits but overall production is small relative to world totals, mitigating potential reverse causality from local political outcomes to global mineral prices. Results are robust to the exclusion of coal and iron, the possible exceptions to the above.

[4] In particular, compensating differentials suggest that settlements located on or near mineral deposits would likely lack natural advantages found elsewhere, such as productive agricultural land, or access to rivers or ports. In India, for example, mining areas tend to be far from major cities, populated by ethnic minorities, and low in education and earnings.

takes place. National and state governments are the only claimants of mineral taxes and royalties; states are large and minerals are locally concentrated, so mining regions do not benefit mechanically from greater public spending. We can therefore rule out the possibility that the adverse effects of mineral wealth shocks are driven by fiscal windfalls.

Rather, we argue that mining booms create opportunities for politicians to seek rents directly from the operations of mining firms.[5] Three characteristics of the resource extraction sector make it particularly vulnerable to political interference and rent-seeking. First, the sector has high fixed costs and low marginal costs, leading to windfall rents and expropriation risk. Second, extractive resources are typically point-source, concentrating rents in individual companies or individuals who can then be held up. Third, operations in resource extraction require a large number of regulatory inputs, such as land grants and environmental clearances, giving politicians a legal justification to hold up firms until bribes are paid (Isham et al., 2005; Ross, 1999).[6] The public debate around the mineral sector emphasizes graft from mineral operations as strongly as it does the management of fiscal windfalls; in India, mining scandals are almost entirely centered on the former.[7] In Section 2, we elaborate on the mechanisms by which politicians can obtain rents from mineral extraction operations.

Finally, we can distinguish between two key channels through which mineral extraction can degrade the quality of leadership. First, bad types may be more likely to seek office when potential rents are high, a selection effect. Second, there could be a moral hazard effect: all types may commit more crimes when the return to doing so is higher, as they are

[5] In Asher and Novosad (2016), we find that mining clearances are more frequently granted in constituencies of politicians who have closer connections to state power. For additional evidence that politicians act as intermediaries through which citizens and firms gain access to state services, see (Iyer and Mani, 2012; Jensenius, 2013b; Lehne et al., 2016).

[6] As with most other studies on politics and natural resource wealth, we do not treat agriculture as a natural resource, exactly because it lacks these three characteristics.

[7] The Extractive Industries Tranparency Initiative, the current international standard for reducing corruption in the mineral sector focuses transparency in five domains: (i) contracts and licenses; (ii) production; (iii) revenue collection; (iv) revenue allocations; and (v) social and economic contribution. The first three relate to graft from mining sector operations; the last two relate to the management of fiscal windfalls.

likely to be during mining booms.[8] We find evidence of both effects. Criminal politicians' greater propensity for victory during mining booms indicates a selection effect. This does not appear to be driven by entry of criminals into politics: mineral price shocks have no effect on the number of criminals who contest elections. Rather, the criminals already in the candidate pool win more elections when mineral prices are high. This result appears to be driven by greater criminal effort in elections, rather than voter disinterest or voter preference for criminal candidates.[9,10]

We isolate the moral hazard effect by testing for the impact of mineral price shocks that occur after a politician has entered office. Leaders' wealth gains and increased criminal behavior in response to these shocks indicates that mineral wealth has a corrupting effect over and above the selection effect described above. The finding that adverse selection and moral hazard are independently and equally important has important policy implications: neither cleaner, more transparent elections (which address adverse selection) nor better monitoring of candidates in office (which addresses moral hazard) is likely to independently contain the corruption associated with mineral wealth.

Our study relates to a wide literature on the political impacts of natural resource wealth.[11]

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[8] These channels are formalized by the model of Brollo et al. (2013), which we discuss in Section 4.

[9] It is also possible that parties are choosing to run criminal candidates in booming constituencies; their incentives to do so would fit closely with the mechanisms we describe.

[10] It is unlikely that voters explicitly prefer criminal candidates; criminal politicians in India deliver worse outcomes (Chemin, 2012; Prakash et al., 2015), and are disliked by voters in vignette experiments (Banerjee et al., 2012; Chauchard, 2015).

[11] The historical cross-country literature on the subject suggests that resource wealth is correlated with good outcomes in democracies (such as the United States and Norway), and adverse outcomes in non-democracies (such as Chad or Democratic Republic of Congo) (Mehlum et al., 2006; Arezki and Bruckner, 2012; Bhattacharyya and Hodler, 2010). The major limitation of these studies is that resource wealth is potentially correlated with many unobservables that could also influence economic and political outcomes. A second generation of research on the subject addresses this bias by exploiting resource discoveries, price shocks or rent allocation formulas. Bruckner et al. (2012) find that positive shocks to oil-exporting countries increase the likelihood of democratic transition. Carreri and Dube (2014) find that positive oil shocks lead to violent voter suppression and increased success of right-wing parties in oil-rich districts in Colombia. Using price shocks to countries' primary commodity, Caselli and Tesei (2016) find that resource booms lead to repression, but only in moderately entrenched autocracies. For a more thorough review of studies on the relationship between political outcomes and resource wealth, see Ross (2015).

This paper is most similar to three papers which exploit the plausibly exogenous allocation of Brazilian federal transfers and offshore oil royalties to examine the impacts of resource wealth on local politician selection and behavior. These studies have found that fiscal windfalls lead to: (i) increased municipal spending with little impact on municipal public goods (Caselli and Michaels, 2013); (ii) increased public employment and short-term incumbency advantages (Ferraz and Monteiro, 2012); and (iii) the election of less educated and more corrupt mayors (Brollo et al., 2013). In terms of underlying mechanism, however, our study is a perfect complement to these. Because the Brazil studies focus on offshore oil or federal transfers, the political effects in these papers are driven almost entirely by increases in fiscal revenue: rents are allocated by formula to municipalities that are otherwise not directly affected by resource extraction industries, nor do political leaders have significant holdup power over the wells that drive their windfalls.[12] Thus, the results in these papers are driven by a channel that we can explicitly rule out.

To our knowledge, this is the first paper that isolates the impact of rent-seeking from the operations of the natural resource extraction industry on politician behavior. While the fiscal revenue channel is evidently important, there is significant public concern over the corrupting role of resource extraction operations in developing countries, which we address directly. This is also the first paper to isolate the moral hazard channel, by which existing politicians appear to engage in more crime during mining booms, as well as the first to show that mining booms lead to the enrichment of elected officials.[13,14]

[12] Brollo et al. (2013) study the impact of federal transfers which are not directly related to natural resources; nevertheless their results and theoretical model are relevant, in that resource wealth is typically associated with comparable exogenous windfalls.

[13] Andersen et al. (2012) present indirect evidence of the enrichment of leaders, showing that oil shocks lead to increased tax haven bank deposits from autocratic oil-exporting countries. Brollo et al. (2013) provide suggestive evidence that the moral hazard channel is important, in that controlling for candidate education does not change the effect of fiscal windfalls on corruption.

[14] For a summary of recent literature on the growth impacts of natural resource stocks and flows, see van der Ploeg (2011). A parallel literature on the relationship between natural resources and conflict remains inconclusive. Adverse economic shocks (which are broader than shocks to the value of mineral resources) have been found to cause conflict, (Miguel et al., 2004; Bruckner and Ciccone, 2010) as have positive economic

This work also ties into a growing body of research on the determinants and welfare costs of criminal politicians. Vaishnav (2012) finds that criminal candidates are fielded by parties because they are good at winning elections (they provide "election booth management" services), while Aidt et al. (2011) find that political parties choose more criminal candidates when literacy levels are low and electoral outcomes are uncertain. A voter information experiment by Banerjee et al. (2012) in Uttar Pradesh suggests that voters prefer non-criminal candidates, but have imperfect information or a lack of alternatives.[15] In related work, Fisman et al. (2013) show that private returns to political careers in India are high; we use the same politician asset data.

The rest of the paper is organized as follows. Section 2 gives background information on mining in India, Indian political organization, and the mechanisms thought to underlie mining sector corruption. Section 3 describes the sources of data and the construction of variables. Section 4 presents the conceptual framework that guides our empirical investigation. Section 5 explains our empirical strategy. Section 6 presents and discusses the results. Section 7 concludes.

2 Mining and politics in India

2.1 The mineral industry in India

In 2010, the mining sector in India employed 521,000 workers and produced 2.5% of Indian GDP from over sixty different minerals (Indian Bureau of Mines, 2011). While India is thus not particularly natural resource-dependent, mineral output is nevertheless economically

shocks (Angrist and Kugler, 2008). Dube and Vargas (2012) rationalize some of these results, arguing that resource production increases conflict over rents, but also raises the opportunity cost of militants' time. In Colombia, they find that positive shocks to the rent-thick oil industry lead to increases in conflict, while positive shocks to coffee, the benefits of which are dispersed more widely, have the opposite effect. However, in a global sample, Cotet and Tsui (2013) find that oil discoveries have a precisely zero impact on conflict.

[15] Less directly related, Axbard et al. (2015) find in democratic South Africa that mine openings reduce crime, but they do not look at political behavior or political crime.

large, and the output share of the mineral sector is much higher in the localized regions where extraction takes place.

Historically, Indian mines were predominantly state-owned until significant privatization in the 1990s. In 2010, 2229 of 2999 mines were private, representing 36% of total production value (Indian Bureau of Mines, 2011). Significant mineral deposits are found across the country. The mining sector is jointly regulated by the federal and state governments; royalties and taxes paid by mining corporations go directly to state and federal governments.[16] Importantly, there is no requirement for fiscal proceeds from mining to be spent in communities affected by mines, nor is there any indication that they are.[17] The lack of local capture of mineral revenue allows us to rule out a fiscal windfall channel in our analysis.

The mining sector in India was associated with political corruption in the press throughout the period of our study (2003-2013). Many of the reported corruption scandals were directly linked to the role of government in the mineral sector; management of fiscal windfalls played little role as they were treated as general funds by state and federal governments. These include but are not limited to: (i) underreporting of mineral output to avoid tax and royalties; (ii) conducting prospecting and mining in areas without official permits, including wilderness preservation areas; (iii) violation of environmental regulations; and (iv) bribe-taking by state officials in exchange for mining permits. Politicians are also frequently the owners of major mines, and enforcement authorities are frequently implicated in corruption – for example, in 2010, 600,000 metric tons of illegally mined iron ore were seized in Belekeri, Karnataka, but then then subsequently disappeared from custody.[18] The situation was

[16]Major minerals such as iron ore are jointly regulated by the national and state governments, while minor minerals such as granite are regulated by state governments only.

[17]In 2015, India revised the Mines and Minerals Act to require a share of mineral royalties to be paid to district development fund. Even these districts are eight times the size of constituencies, the unit of observations in this study, and to date, no such payments have yet been made. Local taxation systems exist, but operate at jurisdictional levels with no direct relationship with the legislative assemblies.

[18]For more information on illegal activity in the mining sector, see the various state reports of the Ministry of Mines Shah Commission. The Commission was formed in 2010 to investigate illegal ore mining in several states. See also the report of the Karnataka Lokayukta (an anti-corruption commission) on iron ore mining

sufficiently concerning that in 2011 the Supreme Court of India banned iron mining in three major states (Chaturvedi and Mukherji, 2013).[19,20]

2.2 Political context

India is a federal parliamentary democracy. Members of the state legislative assemblies (MLAs), the focus of this paper, are elected in first-past-the-post, single elector constituencies. State governments are led by a chief minister, the leader of the ruling party or coalition in the state legislative assembly. State government ministers are drawn from the ranks of MLAs in the ruling party or coalition. Electoral boundaries are set by a Delimitation Commission; one redistricting took place in 2007-08, approximately in the middle of our sample period.

State politicians are major players in the allocation and granting of prospecting and mining permits. Indian States have ownership rights over all minerals within their boundaries; while some federal clearances are required for the mining of certain minerals, states have hold up power over these as well. Local politicians do not have a formal role in the permitting process, but research suggests that they play a significant informal role. A major daily role of local politicians is to help citizens obtain services from the state (Jensenius, 2013b); they also exert significant authority over ostensibly neutral bureaucrats through their ability to reassign them (Iyer and Mani, 2012). Multiple permits and clearances are required before mining operations can begin, including reconnaissance permits, prospecting licenses and mining leases, clearances from the ministry of environment, surface rights (often to

(July 27, 2011).

[19] Beginning in 2013, the bans were loosened. We thought of exploiting this ban as an additional identification strategy, but the sample of iron mining constituencies and election years under the iron ban was too small. Mining may also have continued illegally.

[20] The highest profile scandal of the period was known as CoalGate. Beginning in 2004, the government was found to have manipulated the allocation process of previously state-owned coal blocks. This scandal is therefore analogous to other corrupt privatization processes in India and elsewhere, and is not directly linked to the special characteristics of the natural resource sector described above.

government-owned land); political factors influence the allocation of these permits (Asher and Novosad, 2016). Expansion or alteration of existing leases (for example to increase production or land use during a mining boom) trigger additional permitting processes.

In 2014, 34% of elected politicians at the federal level in India were facing criminal charges. This is known due to Supreme Court rulings in 2002 and 2003, which declared that all candidates for elected office must submit criminal, financial and educational information in order to be eligible to contest elections. Three prevailing hypotheses explaining the success of criminal politicians are: (i) voters prefer to elect non-criminal candidates, but lack information about the criminality of candidates (Banerjee et al., 2012); (ii) voters penalize criminal candidates, but may nevertheless choose them for ethnic reasons (Chauchard, 2015); and (iii) parties deliberately select criminal candidates because they are self-financing and good at winning elections (Vaishnav, 2012). In this paper, we treat open criminal cases as a proxy for criminal behavior or corruption, and use the terms criminality and corruption interchangeably.

3 Data

3.1 Sources

Data on electoral outcomes comes from the Election Commission of India (ECI).[21] This dataset contains candidate-level information on every candidate competing in state legislative assembly elections from 1980 to 2013, including name, gender, party and votes received, along with constituency-level data on turnout. We tracked changes in names and alliances of parties over time in order to identify the local incumbent party in each constituency. To measure political competition, we use the effective number of parties (ENOP, an inverse

[21] While these data are publicly available in pdf format on the ECI website, we thank Francesca Jensenius for generously sharing her cleaned data files. See Jensenius (2013a) for a more detailed description of Indian electoral data.

Herfindahl measure based on vote share (Laakso and Taagepera, 1979)).

Data on politician characteristics comes from sworn affidavits submitted by candidates to the ECI. These include a list of criminal charges currently under prosecution, assets and liabilities of candidates and their relatives, as well as the candidate's age and education. By 2004, such requirements were in place in all states. The Association for Democratic Reform, a Delhi-based non-governmental organization, has collected, digitized and made publicly available these data from 2004.[22] Election laws in India bar convicted criminals from contesting elections; thus, pending criminal cases are the best available measure of politician criminality. Criminal charges are unlikely to be omitted, as they are easily verified from public record and politicians can be fined, disqualified from elections or imprisoned if found with incorrect affidavits. We computed net wealth as assets less liabilities across all family members.[23]

We also constructed a time series of candidates who recontest elections, in order to observe changes in politician wealth and criminal behavior over time. We created this from a combination of data shared by Fisman et al. (2013) and candidates manually linked by the Association for Democratic Reform; we supplemented these data with our own set of manual matches based on candidate name, age, level of education and tax id number. We ended up with a panel of 6,181 recontesting candidates.[24] Figure 1 shows a scan of a submitted affidavit. The list of numbers under the entry marked (iii) in the Figure is a list of sections under the Indian Penal Code under which this candidate has been charged.

Data on the location, type and size of mineral deposits come from the Mineral Atlas of

[22]For data from 2003-04, we use affidavit data that were manually digitized by Fisman et al. (2013) and shared with us.

[23]As in Fisman et al. (2013), we also removed candidates with net wealth less than Rs 100,000 (approximately USD 1500), and winsorized at the 1st and 99th percentile. Alternate choices do not materially affect the results.

[24]The sample of candidates who can be followed over time are not representative of all politicians, because we can only observe those who choose to remain in politics. However, we are able to match 75% of winners in mining constituencies, bounding the potential bias, as we discuss in Section 6.

India (Geological Survey of India, 2001), which reports centroid latitude, longitude, mineral type and size class for all known major mineral deposits in India.[25] We used shapefiles purchased from ML Infomap (the Pollmap datasets) to match mineral deposits to legislative constituencies before and after delimitation. Figure 2 shows a map of mineral deposit locations. Commodity prices come from the United States Geological Survey (Kelly and Matos, 2013), which reports average annual U.S. price from before 1900 to 2013. Where available, we use the price for the ore as it is listed in the Indian deposit data. Where it is not available, we match deposits to the price of the processed output of the mineral deposit (e.g. we use aluminum prices for bauxite deposits). We matched mineral deposits to annual district-mineral production and value data collected by the Directorate General of Mines Safety, and reported in the annual Statistics of Mineral Information. To create a constituency-level measure of mineral production, we divided district production into all constituencies within a district that had matching deposits of the same mineral, weighted by deposit sizes.[26] From a list of 45 minerals for which we have both deposit and price data, we excluded minerals for which the Indian Bureau of Mines does not publish production statistics (on account of their low value), and we excluded constituencies with economically insignificant production in all years.[27]

To account for the fact that mineral deposits may span constituency boundaries, we also assigned production to all constituencies within 10km of an active deposit, using a triangular kernel to put to greatest weight on the nearest deposits.[28] The final sample includes 1325 deposits and 31 distinct minerals, spread across 25 Indian states. Figure 3 is a graphical

[25] All our results except those on election results are from later than 2001; the election results are robust to using data from post-2001.

[26] The average district has approximately eight legislative constituencies.

[27] Specifically, we dropped constituencies where annual production never exceeded USD $100,000. This translates to approximately $0.40 per person in the average constituency. Appendix Table C7 shows main results using cutoffs of $50,000 and $200,000; results are not materially changed.

[28] We show results both for these weighted distance measures and for treating deposits strictly in the constituency of their centroid. This distinction does not affect results.

depiction of the method of assigning production to constituencies, and Figure 4 describes how we arrive at our sample size of 683 constituencies (374 pre-redelimitation and 309 post-redelimitation).

We include several constituency-level control variables that may affect the political environment.[29] We control for the number of deposits within 10km of a constituency, log constituency population, the share of the population living in rural areas, the share of villages with electricity and the per capita number of primary schools, all from the 2001 population census.

A final complication is that India underwent a national redistricting in 2007-08. Since politicians began submitting affidavits with criminal case information only in 2003, our sample contains very few states with multiple observations under the same set of constituencies; for most states, our sample includes one election under each delimitation. In order to control for baseline political outcomes, we created synthetic baseline variables based on the interaction between the constituency maps. For example, if a constituency occupies the space that was previously held by two constituencies, we define the baseline value for that constituency as the size-weighted values of the original constituencies.[30]

4 Conceptual Framework

We seek to understand the channels by which resource extraction operations influence the behavior of politicians and voters. The mining sector generates rents because the market value of resources in the ground exceeds the cost of extraction, often by a wide margin. Some of these rents are transferred to government via taxes and royalties. Politicians have two opportunities to misappropriate funds. First, they can take side payments directly

[29] Given the exogenous nature of the price shocks, these are not strictly necessary but may reduce estimator variance.

[30] As would be expected given the plausibly exogenous nature of international price shocks, inclusion of baseline controls does not affect the results at all.

from mining firms, in return for granting land permits or environmental clearances, or for facilitating illegal mining operations.[31] Second, they can misuse government funds after taxes and royalties have been paid. Our research isolates the first of these channels, as politicians from mining areas in India do not have privileged access to funds from taxes and royalties, but they are closely involved in the regulatory process. We apply the model of Brollo et al. (2013), based on Persson and Tabellini (2000), which is based on an empirical context where, unlike in our context, politicians access rents only *after* they have entered the public treasury. The model is nevertheless well-suited to our context, in that it describes how politician selection and behavior respond to an increase in potential rents.

Politicians are motivated by career concerns and personal profit, and have an underlying ability level, which is imperfectly observed by voters. Low ability candidates are more likely to engage in corrupt actions, and as a result get higher value from political office when potential rents are higher.[32] We treat mining booms as periods where potential rents from corrupt behavior are high. The model thus predicts that during mining booms: (i) corrupt individuals will be more likely to enter politics, and exert greater effort to win elections; (ii) all politicians, whatever their propensity toward corruption, will engage in more corrupt actions; and (iii) elected politicians will get wealthier during their terms in office.

Conditional on entry, whether criminals will win more elections is not ex ante clear, due to two factors outside the Brollo et al. (2013) model. Higher rents motivate criminals to work harder to win elections, perhaps through illegal means, which would raise their probability of winning. However, since the mining boom is common knowledge, voters know that more rents are on the table, and may (i) invest more in learning about candidates; (ii) expect worse behavior from candidates with higher propensity toward corruption. Either of these

[31] Illegal mining could consist of underreporting of output or extending mines beyond legal boundaries. Both practices have been documented in India; the role of politicians in these practices is to deter or enhance enforcement of the law.

[32] Low ability individuals could be prone to corruption because of a lower opportunity cost of getting caught, or they could simply be more venal, and deliver worse services to voters as a result.

factors could mitigate the increased electoral effort of corrupt politicians.[33]

Brollo et al. (2013) predict increased incumbency advantages when potential rents are high, because voters know that the candidate pool has deteriorated, making the known incumbent look better. This prediction becomes ambiguous once we consider that criminals may exert greater effort or cheat to win elections, and potentially have greater financial resources to draw upon.[34] While some voters may know a candidate is low quality, if that candidate spends and cheats more than his or her opponents, he or she may win anyway.

The model offers two mechanisms through which corruption in office can change in response to a mining boom: (i) a selection channel, where criminals are more likely to enter and succeed in politics, while voters might be less likely to vote for them; and (ii) a moral hazard channel, where *all* politicians in office engage in more venal behavior when rents are high. Given data on candidate characteristics before and after their political terms, these two factors can be tested separately. When candidates are observed before they enter office, an increase in criminality of the eventual winner must be driven by adverse selection, since the candidate has not yet been exposed to the rents of office.[35] This selection could be driven by (i) greater criminal success in elections; or (ii) greater entry of criminals into politics. Given information on the full candidate pool, we can independently test these hypotheses.

The moral hazard effect can be tested by observing how candidate behavior responds to price shocks that arrive *after* a politician takes office. The model predicts that elected leaders exposed to positive mineral wealth shocks will engage in more corruption and accumulate more assets during their electoral term.[36] The adverse selection and moral hazard effects

[33] Brollo et al. (2013) treat corruption as unobservable by voters until candidates are in office; whereas in the Indian context, information on politicians' open criminal cases is available to voters before an election. Absent this information, we would not see a voter awareness channel and would unambiguously predict that, conditional on entry, criminals would do better in elections.

[34] The affidavit data includes campaign spending, but official campaign spending represents a tiny fraction of what is actually spent during election campaigns, in part due to extremely low official spending limits (Kapur and Vaishnav, 2011).

[35] An exception would be if criminal incumbents win more during mining booms, a possibility that we explicitly tested and ruled out.

[36] As there are no term limits in Indian politics, we were not able to test whether the re-election incentive

may be present simultaneously; their relative importance is an empirical question.

5 Empirical strategy

Our goal is to estimate the impact of local natural resource wealth on the criminality and asset growth of elected politicians. Natural resource wealth is likely to be endogenous to the quality of local political institutions for at least two reasons. First, minerals are typically found in rugged terrain, which affects local economic structure; settlements driven by natural resource wealth may be more remote or have fewer other natural advantages. Second, productive mines require not only the presence of mineral deposits but also political inputs such as infrastructure, clearances and capital; a given deposit may be more productive if the state can supply these inputs efficiently.

We address these concerns by identifying plausibly exogenous changes in the subsurface wealth of mineral-producing areas. We do this by interacting a global mineral price index with the presence of local productive mineral deposits, an approach analogous to the cross-country mineral price shocks of Bruckner and Ciccone (2010). For each constituency, we weight global price changes by the average production value of minerals in or near that constituency. This defines the constituency-specific independent variable *Price Shock*; we also control for the log baseline value of constituency mineral production. While the initial level of production in a given constituency may be endogenous to constituency characteristics other than the mineral deposit, the price shock is driven only by exogenous global price movements. We define local mineral production as the average value from 1990-2003.[37]

mitigates corruption.

[37] We define baseline production using pre-2003 data to ensure production cannot be affect by our outcomes variables, which begin in 2003. Results are robust to using different base years to construct these averages (Appendix Table C1). We use an average rather than production in a given year for two reasons. First, we are missing data for approximately on third of the years, for which we were not able to obtain editions of *Statistics of Mineral Information*. Second, year-to-year changes in production numbers are very large, possibly indicating errors or misreporting, the latter which could be correlated with price shocks. The average is thus a better estimate of potential constituency production, and misreporting will not be correlated with

As legislative assembly terms are five years in length, we define the price shock as the change in the global value of the weighted mineral basket from years $t = -6$ to $t = -1$, relative to an election in year $t = 0$. Under the assumption that mineral prices follow a random walk, this specification captures whether mineral prices are expected to be disproportionately high during the coming electoral term.[38] Figure 5 presents the price shocks that would be calculated for an election that took place in 2010. Figure 6 shades constituencies according to the same mineral price shock.

We estimate the following equation at the constituency-year level:

$$Y_{c,s,t} = \beta_0 + \beta_1 * pshock_{c,s,t-6,t-1} + Y_{c,s,t-5} + \zeta * X_{c,s} + \gamma_{s,t} + \epsilon_{c,s,t}, \tag{1}$$

where $Y_{c,s,t}$ is a constituency-level political outcome (in the primary specification, an indicator for whether the elected representative is facing criminal charges) in constituency c, state s and year t. $pshock_{c,s,t-6,t-1}$ is the trailing price change of the production-weighted basket of mineral deposits found in constituency c, $Y_{c,s,t-5}$ is a lagged dependent variable, $X_{c,s}$ is a vector of time invariant constituency controls, including log mineral production, and $\gamma_{s,t}$ is a vector of state-year fixed effects.[39] The coefficient β_1 identifies the effect of a mineral price shock on the outcome. As we are using state-year fixed effects, our estimates are driven by variation in mineral value changes within a given state in a given election. To take into account the colocation of minerals, standard errors are clustered at the district-year level. In addition to the above specification, we estimate a placebo specification, which defines price shocks based on mineral deposits that appear in districts which report very small or zero shocks.

[38] If mineral prices are mean reverting with a sufficiently long half-life, our price shocks also predict mineral rents over the coming political term. If they are rapidly mean reverting, our price shocks would have little predictive power over future mineral rents, biasing our estimate effects toward zero. Cashin and McDermott (2002) estimate the 90% confidence interval of the half-life of commodity price shocks to be between 2.2 and 6 years.

[39] Because of redelimitation of constituency boundaries which occurred in the middle of the sample time period, a constituency fixed effect specification is not possible.

production of that mineral. In this specification, we weight minerals by the deposit size, since production is economically insignificant.

To test the moral hazard channel, it is necessary to identify a mineral price shock that occurs after a candidate has won election and cannot influence candidate selection. We use the same specification as above, but the price shock is measured from the first year after the politician enters office to the year in which the politician recontests office. The price shock variable therefore captures the change in mineral prices while the candidate is in office:

$$Y_{c,s,t+5} = \beta_0 + \beta_1 * pshock_{c,s,t+1,t+5} + Y_{c,s,t+1} + \zeta * X_{c,s} + \gamma_{s,t+5} + \epsilon_{c,s,t+5}, \tag{2}$$

where $Y_{c,s,t+5}$ is a candidate-level characteristic (assets, or open criminal cases), and the remaining variables are defined as in Equation 1. To control for the possibility that all candidates (or all individuals) are increasing wealth during mining booms, we include runner up candidates and interact the price shocks with a dummy variable for the winner. Attrition could potentially bias this strategy, as we are not able to match all candidates to the next election; we discuss this risk in the section on results.

A final feature of our empirical strategy is worth highlighting: it is not biased by misreporting of mineral production, which is thought to be widespread in India. The incentive to underreport mineral production is highest when mineral prices are high for two reasons: (i) mining permits put a ceiling on legal production; and (ii) royalties are a function of output quantity. We use production data only to get a time-invariant within-constituency value weight for each deposit. Because we use define changes in local mineral wealth from international prices, time-variant misreporting of production cannot bias our estimates.[40] Finally, the locations of deposits are defined by a technocratic agency (the Geological Survey of

[40] If mining takes place in areas with no mineral production reported in any year, then it will not appear in our sample; this might bias our estimates downward if illegal mines are the most profitable. However, most of the documented corruption is related to expansion and misreported production at existing mines, hence would be captured by our international price shocks.

India), which to date has remained clear of India's many mining scandals.

5.1 Summary statistics

Table 1 presents summary statistics for the sample. We have 684 constituency-elections that take place between 2003 and 2013 in constituencies with productive mineral deposits; the average mineral-rich constituency has 3.14 different mineral deposits. 30% of candidates face pending criminal cases. The candidate-level sample is limited to candidates who contested two elections, whom we were able to match across time. The share of these facing criminal charges is similar to those in the full set of mineral constituencies; the average candidate has net assets of approximately USD 100,000, and is thus very wealthy by Indian standards. The electoral outcome sample is larger, as we have constituency delimitation data and election results from 1980 but candidate affidavits only from 2003.

To verify that price shocks are not predicted by baseline characteristics, columns 5 and 6 of Table 1 show coefficients and standard errors from a set of regressions of baseline characteristics on forward-looking 5-year price shocks. None of the coefficients are economically or statistically significant, justifying our assumption that global price shocks are exogenous to local political characteristics of Indian constituencies. Finally, we regressed the forward-looking commodity price shock on the joint set of baseline characteristics; the p-value of the joint hypothesis test is 0.42.

6 Results

This section describes estimates from Equation 1, which identifies the effect of changes in local mineral resource wealth on constituency-level outcomes. Table 2 shows the impact of mineral wealth shocks on the likelihood that a constituency elects a criminal candidate, that is, an individual facing formal criminal charges. Column 1 shows the full sample estimate. The point estimate of 0.206 indicates that a 100% increase in the value of local mineral wealth (over the five year period before an election) increases the likelihood of electing a criminal politician by 21 percentage points. The baseline share of criminals among all winning candidates is 30%; going from the 25th percentile price shock (+18%) to the 75th percentile (+90%) would thus lead to a 49% increase in the chance of electing a criminal. Since the sample period is 2003-2013, and elections occur approximately every five years, we have two elections in most constituencies, though these are staggered across 11 years. Columns 2 and 3 show results from splitting the sample into the first and second election in each period; the point estimates are similar and independently highly significant. Column 4 adds the control for whether the constituency elected a criminal politician in the previous election; as predicted under the hypothesis of exogenous price shocks, the coefficient is unchanged.[41] Column 5 defines price shocks using mineral deposits strictly within constituency boundaries; results are unchanged.

Table 3 runs the same specification, but on locations with mineral deposits that have no production. The specifications are ordered as above; none of the price shock coefficients are significantly different from zero.[42]

Next, we examine the impact of local mining booms on politician assets using the time series of candidates. Column 1 of Table 4 shows the impact of the change in mineral prices from the beginning to the end of a politician's electoral term, or the unexpected price shock during his or her term. The dependent variable is the log change in assets from the beginning to the end of the electoral term. The estimate indicates that a doubling of local mineral wealth causes elected politicians' assets to increase by 47 log points over the electoral term. The estimate indicates that going from the 25th to the 75th percentile price shock in our

[41] We cannot control for baseline criminality in the first period, as the data do not exist before 2003.

[42] The small positive values in these specifications (roughly one third of the results in Table 2) may be due to production misreporting, or unmatched data. A small fraction of these placebo constituencies may in fact have significant unreported or unmatched mineral production.

sample would increase assets by 34 log points over a five-year electoral term, or an annualized 7.0% growth premium.[43] To rule out the possibility that assets of all individuals are rising during mining booms, in Column 2 we add runners up to the specification, and interact the shock with a dummy variable indicating the election winner. We do not find an impact of mining booms on unelected candidates; the p-value for the difference between winners and non-winners is 0.01. We discuss non-random selection into our sample below.

Columns 3 and 4 of Table 4 estimate similar regressions to identify the impact of mining booms on the leaders' propensity to commit new crimes. As a dependent variable, we use an indicator variable that takes the value 1 if the number of criminal cases that a given candidate is facing has increased.[44] Column 3 shows that a doubling of constituency mineral wealth causes elected politicians to be 17 percentage points more likely to face new criminal charges. Column 4 confirms that we find no effect on re-contesting candidates who were not elected. The p-value for the difference in estimates between winners and losers is 0.10. Mining booms thus lead to increased asset accumulation and an apparent increase in the criminal behavior of local elected officials.[45]

The candidate time series results could be biased by politicians' options to exit; we can only observe winners and runners up who choose to run again. If elected officials who fail to

[43]The estimate is highly statistically significant. The 5% lower bound on the estimate is 0.20, which implies going from the 25th to the 75th percentile of price shock causes the incumbent's assets to increase by an extra 4.1 percentage points per year.

[44]The clearing of criminal cases (where we would observe a reduction in the number of charges on a candidate's affidavit) should not be a function of a candidate's behavior in office—this is a function of the candidate's behavior before entering office, and the progress of his or her case—so we categorize these as zeroes. However, if a candidate receives a new charge and simultaneously clears a charge, we would not be able to observe this in the data. Results are robust to (i) using the log number of criminal cases a candidate is facing as a dependent variable; and (ii) using an indicator variable for any charges faced, limiting the sample to candidates who face no charges at the beginning of their term in office (see Appendix Table C6). 15% of incumbents report fewer criminal charges when they contest their second election; 75% of these report exactly one fewer charge.

[45]It remains possible that what is changing here is prosecution of crime rather than actual instances of crime. This is an intrinsic concern with all research using crime data as outcome; refer to Section 1 for a description of external evidence suggesting criminal cases in India are a good proxy for actual criminal behavior.

make money during mining booms choose to exit, then the results above could be spurious. Out of all election winners in mining constituencies, 75% were identified in the following term. For our results to be driven by selection bias, it would have to be the case that for the 25% of elected candidates whom we do not observe, mining booms have caused a loss in assets for winners four times larger than our estimates above. This seems implausible, and suggests that selection bias is unlikely to drive our results. Finally, we estimate no impact of mining booms on the probability that an official seeks re-election.[46,47]

The final stage of our analysis digs deeper into the mechanics of why criminals are more likely to win elections when expected mining rents are high. The estimates from Table 2 cannot be driven by the moral hazard effect, because criminality is observed before candidates have been in office.[48] Why, then, do criminals win more elections? Table 5 addresses the question of whether mining booms lead more criminal candidates to enter politics, or whether criminal candidates do better in elections, conditional upon entry. The dependent variable is the mean share of candidates contesting election who face criminal charges and specifications parallel those in Table 2. The point estimates are all close to zero, and the confidence intervals reject the possibility that Table 2 is driven entirely by entry of criminals into the candidate pool. It appears that during mining booms, criminal candidates win more elections, even conditioning upon entry into politics.

Criminals could win more elections when rents are high because: (i) voters prefer criminal candidates; (ii) voters pay less attention during mining booms, perhaps because of good economic fortune; or (iii) criminal candidates exert greater effort to win elections (whether

[46]For runners up, the potential attrition problem is greater—we were only able to find 20% of runners up in the following electoral term. Our estimates for the effect of mining booms on non-winning candidates (Columns 2 and 4 in Table 4) could thus be biased by selection into seeking election again.

[47]Differential selection into continuing to seek office could be partially taken into account with a close election regression discontinuity design as in Fisman et al. (2013), but there are not enough mining constituencies with close elections and recontesting candidates to run this test.

[48]The exception to this interpretation is if candidates' previous employment was in a position with scope for extracting rents from the mineral sector.

legal or illegal). We do not test the first point empirically, but the existing literature suggests that, all things equal, voters systematically prefer non-criminal candidates (Banerjee et al., 2012; Chauchard, 2015), and that outcomes are worse under criminal candidates (Chemin, 2012; Prakash et al., 2015). To test whether voters pay less attention during mining booms, we examine how mining booms affect standard measures of electoral competitiveness in Table 6. We show results for the full sample of elections for which we have data (1990-present), as well as for the set of elections matching the ADR sample (2003-present). We find no evidence of decreased electoral competitiveness, and some evidence of an increase. During mining booms, both turnout and the effective number of parties (an inverse herfindahl measure) increase, and incumbent parties are less likely to be re-elected, though the last result is not statistically significant. This leaves us with the third explanation: criminal candidates are disproportionately good at winning (or fixing) elections when rents are high, in spite of increased political competition and voter turnout.

A natural question is whether institutional capacity or specific institutional characteristics can mitigate the adverse consequences of natural resource wealth. To test this hypothesis, we divided Indian states into those with high and low corruption, according to two external measures of corruption (Transparency International (2005) and the Global Enterprise Survey (2014)), as well as a measure defined by the share of elected state politicians facing criminal charges.[49] Appendix Tables C3 and C4 show the results of our main specifications, estimated separately on these subgroups of states. Surprisingly, we find no differences on either the adverse selection or moral hazard effects of mineral resource wealth. Point estimates are highly similar under the different classifications of corruption. This is not due to a lack of variation across Indian states; based on the 2014 Enterprise Survey, 5% of firms in Karnataka report corruption as a major problem, as compared with 72% of firms in Madhya Pradesh.

[49]The Transparency International indicator is based on a weighted index of responses to household-level corruption-related questions. The Enterprise Survey Indicator describes the share of firms who report corruption as a major or severe obstacle to doing business.

The share of criminal politicians similarly ranges in our sample from 7% in Assam to 36% in Orissa. Institutional quality across states thus does little to mitigate the adverse political consequences of natural resource wealth. We discuss this finding in Section 7.

6.1 Robustness

In this section, we demonstrate that our results are robust to a range of potential specifications and rule out several confounding explanations of our results. First, we test alternate specifications reflecting decisions made in the construction of the data. In our main result, we defined constituency mineral production as the mean value of mineral production across all recorded years from 1990-2014, which match the data we have on elections and candidates. Table C1 shows results from the main specification on electing criminal politicians, with alternate definitions of baseline mineral production. Column 1 shows the result using all years of data from the Statistics of Mineral Information (1980-2014), to verify that the choice of start year does not drive the result. Column 2 limits the data to 1980-2003, to ensure that there is no reverse causal channel from criminal politicians to local mineral production – our data on politician criminality begins in 2003. The results are unchanged. Our results are robust to alternate definitions of the shock period. Our main specification defines a price shock from $t = -6$ to $t = -1$, where the election year is defined as $t = 0$. Column 3 in Table C1 shows results using a price shock calculated from $t = -5$ to $t = 0$; again, the result holds. The results on the candidate time series are similarly robust to alternate specifications.

If a single mineral drives a large share of our results, we might be concerned that a regional increase in criminality happened to be correlated with a specific mining boom. There might also be concern that India is a large player in global iron markets, making global iron and coal prices endogenous.[50] We show here that our results are robust to the

[50] India produces 13% of the world's iron; for all other minerals, India produces less than 10% of global

exclusion of coal and iron (together or separately), which represent 75% of India's mineral output, thus alleviating this concern. In Table C5, we first generate constituency-level price shocks that exclude coal and/or iron deposits (Columns 1-3). We then drop all constituencies that contain any productive coal and/or iron deposits. The effect of mineral price shocks on politician criminality is large and highly statistically significant in all these specifications.

A final concern might be that criminal politicians change constituencies in order to follow mining booms. If this was the case, the SUTVA assumption would be violated and we would be at risk of overestimating the effect of mining shocks on the success of criminal politicians. To test whether this is driving our results, we use our candidate time series to estimate to what extent candidates change constituencies from one election to the next. We test for the effect of a mining boom on the likelihood of electing a criminal politician, in the subset of constituencies where the winning candidate is recontesting the same constituency as in the previous electoral term. Because of the redelimitation of constituency boundaries in 2007, the majority of constituencies have changed names. We thus calculate the centroid of each constituency, and measure the distance between the centroid of subsequent constituencies contested by a single candidate. The median candidate has moved 1.3km from one election to the next, relative to a average constituency diameter of 46km. In the columns of Table C6, we respectively show that the effect of a mining boom on criminality is positive and highly significant in (1) the set of constituencies for which we can identify the winner in the previous electoral term; (2) the subset of constituencies where that winner has moved less than 20km since the last election; and (3) the subset of constituencies where that winner has moved less than 10km.[51]

value (British Geological Survey 2014).

[51]The sample is smaller than that in Table 2 because we could not match every winning candidate in a previous election.

7 Conclusion

This paper presents new microempirical evidence on the effect of point-source natural resource wealth on local political outcomes. Our variation comes from exogenous global price changes, which drive different wealth shocks in different parts of India, based on the minerals found in each location. Crucially, by focusing on a context where taxes and royalties go directly to a higher level of government, we isolate the impact of mineral rents captured directly from mining operations, before they arrive in the public treasury. The mechanisms behind corrupt activity at this stage differ from those behind the theft and misallocation of mineral revenue after it has been claimed by the state; earlier studies capture either the latter or the sum of the two mechanisms.

We show that increased mineral wealth makes criminal politicians more likely to gain office. Once in office, the assets of elected politicians rise disproportionately during mining booms, and they engage in more crime as well. These effects occur in spite of greater political competition during mining booms.

Efforts to disentangle the channel by which mineral wealth leads to criminality in politics have significant policy implications. A moral hazard channel implies that politicians have too free a hand when in office, and criminal behavior could be mitigated by greater monitoring or transparency. An adverse selection channel suggests that the harmful effects of mineral resources could be best mitigated by keeping criminal politicians out of office entirely. We find evidence of both channels. The effects are additive, and of similar magnitudes: relative to a 25th percentile price shock, a 75th percentile price shock raises the probability of elected a criminal candidate by 15 percentage points, and the same shock while a candidate is in office raises his or her probability of committing a crime by 12 percentage points.

Given that resource wealth is typically associated with positive outcomes in countries with good institutions (Mehlum et al., 2006), it is perhaps surprising that our findings are just as strong in India's most functional states as in its less functional states. A possible explanation is that mining is an activity that tends to take place far from economic and political centers, and is thus less visible to voters, politicians and the media (Campante and Do, 2014); it may be that institutions are more easily subverted in these remote regions. Indeed, some of India's most infamous mining scandals have emerged along the border of Andhra Pradesh and Karnataka, two otherwise prosperous states with relatively good institutions. There is a growing movement to promote governance standards around mineral operations in developing countries. Our research highlights the importance of monitoring not only the management of fiscal windfalls, but also the rent-seeking opportunities around the direct operations of natural resource extraction firms.

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Table 1

Summary statistics

Variable	Mean	S.E. Mean	N	$Beta_{ps}$	SE_{ps}
Constituency-level (time-invariant)					
Number deposits	3.08	0.20	374		
Average mineral output (Rs 1,000)	258599	51892	374		
People per Primary School	1155	33	373		
Constituency Population	245964	7380	373		
Rural Population Share	0.82	0.01	373		
Share Villages with Electricity	0.89	0.01	373		
Constituency-level (time-variant, baseline)					
Representative Faces Charges	0.30	0.02	684	0.07	0.08
Share Candidates Facing Charges	0.19	0.01	684	-0.03	0.05
Effective Number of Parties	3.09	0.02	1714	0.03	0.19
Election Turnout	0.66	0.00	1605	0.04	0.03
Incumbent Winner	0.35	0.01	1960	0.05	0.07
p-value from F test of joint significance: 0.42					
Candidate-level (time-variant, baseline)					
Log Net Assets	15.60	0.08	380	0.23	0.23
Facing Criminal Charges	0.28	0.03	320	0.11	0.09

The table presents mean values for all variables used. The final two columns show coefficient and standard errors from a regression of Equation 1, with the row variable as the dependent variable. The reported value is the coefficient on the forward-looking mineral price shock (t=1 to t=6) (i.e. the shock that occurs *after* the value is measured). We include state-year fixed effects, and constituency controls for the number of deposits within 10km of a constituency, log constituency population, the share of the population living in rural areas, the share of villages with electricity and the per capita number of primary schools, all from the 2001 population census. Standard errors are robust and clustered at the state-year level.

Table 2

Effect of mineral price shocks on winning candidate criminality

	(1)	(2)	(3)	(4)	(5)
Price shock-6,-1	0.206				0.230
	(0.069)***				(0.071)***
Price shock$_{-6,-1}$ (2004-2008 only)		0.199			
		(0.096)**			
Price shock$_{-6,-1}$ (2009-2013 only)			0.221	0.222	
			(0.095)**	(0.093)**	
Criminal Winner (lagged)				0.218	
				(0.070)***	
Log Base Mineral Output	0.007	0.011	0.005	-0.003	0.021
	(0.012)	(0.016)	(0.017)	(0.017)	(0.013)
State-Year F.E.	Yes	Yes	Yes	Yes	Yes
N	683	374	309	309	476
r2	0.15	0.18	0.14	0.17	0.20

$^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.01$

The table estimates the impact of a local mineral price shock on criminality of the local elected leader. The dependent variable is an indicator that takes the value 1 if the local election winner is facing criminal charges. Column 1 estimates Equation 1 on the full sample. In most constituencies, there are two elections. Columns 2 and 3 respectively split the sample into the first and second election in each constituency. Column 4 adds controls for winner criminality and the price shock for the previous electoral term. Column 5 defines price shocks using mineral deposits strictly within constituency boundaries; sample size falls as some constituencies are close to deposits but do not contain deposits. All regressions include state-year fixed effects, and constituency controls for the number of deposits within 10km of a constituency, log constituency population, the share of the population living in rural areas, the share of villages with electricity and the per capita number of primary schools, all from the 2001 population census. Standard errors are robust and clustered at the state-year level.

Table 3

Placebo price shocks and winner criminality

	(1)	(2)	(3)	(4)	(5)
Price shock$_{-6,-1}$	0.053				0.033
	(0.073)				(0.110)
Price shock$_{-6,-1}$ (2004-2008 only)		0.060			
		(0.098)			
Price shock$_{-6,-1}$ (2009-2013 only)			0.039	0.057	
			(0.114)	(0.119)	
Log Base Mineral Output	0.004	0.004	0.005	0.003	-0.008
	(0.009)	(0.012)	(0.013)	(0.012)	(0.011)
Criminal Winner (lagged)				0.280	
				(0.087)***	
State-Year F.E.	Yes	Yes	Yes	Yes	Yes
N	541	307	234	234	260
r2	0.19	0.17	0.24	0.28	0.28

$^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.01$

The table shows estimates of Equation 1 using placebo locations which have mineral deposits, but do not produce output in those minerals. The dependent variable is an indicator that takes the value 1 if the local election winner is facing criminal charges. Column 1 estimates Equation 1 on the full sample. In most constituencies, there are two elections. Columns 2 and 3 respectively split the sample into the first and second election in each constituency. Column 4 adds controls for winner criminality and the price shock for the previous electoral term. Column 5 defines price shocks using mineral deposits strictly within constituency boundaries. All regressions include state-year fixed effects, and constituency controls for the number of deposits within 10km of a constituency, log constituency population, the share of the population living in rural areas, the share of villages with electricity and the per capita number of primary schools, all from the 2001 population census. Standard errors are robust and clustered at the state-year level.

Table 4
Effect of mineral price shocks on candidate asset growth and criminal activity

	Change in Assets		Change in Crime	
	(1)	(2)	(3)	(4)
Price shock$_{+1,+5}$	0.468		0.166	
	(0.135)***		(0.074)**	
Price shock$_{+1,+5}$ * Winner		0.433		0.162
		(0.135)***		(0.073)**
Price shock$_{+1,+5}$ * Loser		0.032		-0.011
		(0.198)		(0.099)
Winner		-0.388		-0.228
		(0.238)		(0.167)
Log Baseline Mineral Output	-0.004	0.002	0.000	0.003
	(0.025)	(0.024)	(0.019)	(0.014)
*Shock * Winner - Shock * Loser*		0.401		0.172
		(0.168)**		(0.105)
State-Year F.E.	Yes	Yes	Yes	Yes
N	286	380	236	333
r2	0.35	0.32	0.14	0.09

$^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.01$

The table shows estimates of the impact of mineral wealth shocks on politician asset growth and changes in politician criminality. The dependent variable in columns 1 and 2 is the change in a candidate's log net assets over a single electoral term. The price shock is the unanticipated change in mineral wealth in that electoral term. Column 1 estimates the regression on elected officials only. In Column 2, the sample is all politicians observed in both periods, and the price shock is interacted with winner and loser dummy variables. Columns 3 and 4 run respectively similar specifications, where the dependent variable is an indicator for whether the politician is facing more criminal charges at the end of the electoral term than at the beginning. The row below the estimates shows the p value for the difference in estimate of the impact of price shocks between winning and runner-up candidates. All regressions include state-year fixed effects, and constituency controls for the number of deposits within 10km of a constituency, log constituency population, the share of the population living in rural areas, the share of villages with electricity and the per capita number of primary schools, all from the 2001 population census. Standard errors are robust and clustered at the state-year level.

Table 5

Effect of mineral price shocks on mean candidate criminality

	(1)	(2)	(3)	(4)	(5)
Price shock$_{-6,-1}$	-0.005				-0.010
	(0.025)				(0.027)
Price shock$_{-6,-1}$ (2004-2008 only)		0.016			
		(0.036)			
Price shock$_{-6,-1}$ (2009-2013 only)			-0.019	-0.012	
			(0.038)	(0.037)	
Mean MLA Criminality (prev period)				0.096	
				(0.055)*	
Log Base Mineral Output	0.003	-0.001	0.007	0.007	0.006
	(0.005)	(0.008)	(0.007)	(0.007)	(0.006)
State-Year F.E.	Yes	Yes	Yes	Yes	Yes
N	683	374	309	309	476
r2	0.31	0.35	0.22	0.23	0.33

$^{*}p < 0.10, ^{**} p < 0.05, ^{***} p < 0.01$

The table estimates the impact of a local mineral price shock on the mean criminality of candidates contesting election. Criminality is defined as an indicator that takes the value 1 if the local election winner is facing criminal charges; the dependent variable is the mean of this indicator across all candidates contesting election in a constituency-year. Column 1 estimates Equation 1 on the full sample. In most constituencies, there are two elections. Columns 2 and 3 respectively split the sample into the first and second election in each constituency. Column 4 adds controls for winner criminality and the price shock for the previous electoral term. Column 5 defines price shocks using mineral deposits strictly within constituency boundaries. All regressions include state-year fixed effects, and constituency controls for the number of deposits within 10km of a constituency, log constituency population, the share of the population living in rural areas, the share of villages with electricity and the per capita number of primary schools, all from the 2001 population census. Standard errors are robust and clustered at the state-year level.

Table 6

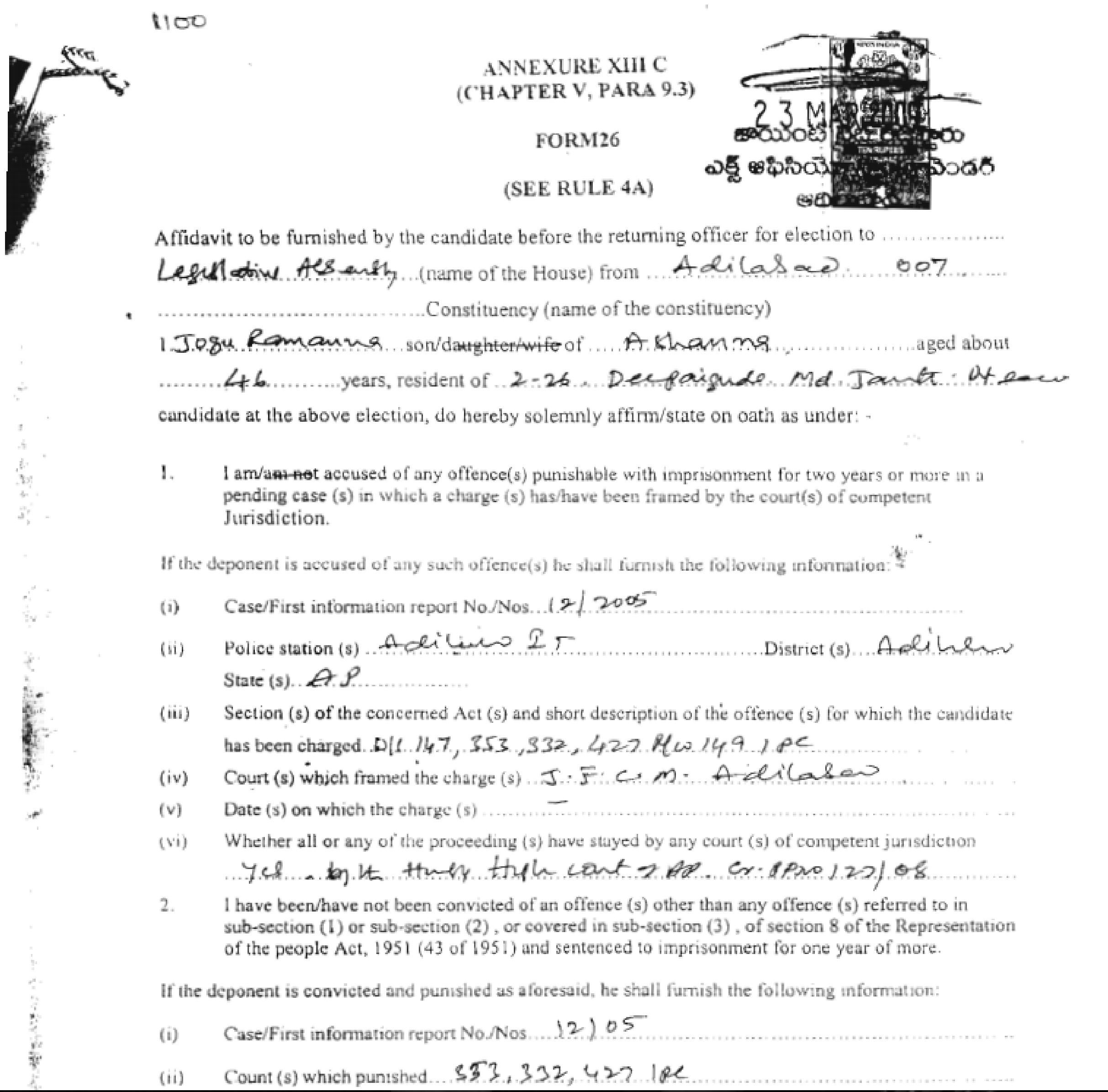
Effect of mineral price shocks on election competitiveness

	Incumbent		Turnout		ENOP	
	(1)	(2)	(3)	(4)	(5)	(6)
Price shock$_{-6,-1}$	-0.093	-0.132	0.039	0.048	0.171	0.347
	(0.067)	(0.095)	(0.014)***	(0.026)*	(0.104)	(0.189)*
Log Baseline Mineral Output	-0.008	0.003	-0.003	-0.000	0.023	0.015
	(0.008)	(0.014)	(0.001)**	(0.002)	(0.012)**	(0.022)
State-Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Years	All	Post-2003	All	Post-2003	All	Post-2003
N	1489	596	1564	395	1556	457
r2	0.13	0.11	0.53	0.46	0.37	0.41

$^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.01$

The table estimates the impact of a local mineral price shock on several indicators of electoral competitiveness. All columns estimate Equation 1 at the constituency-year level. In Columns 1 and 2, the dependent variable is an indicator that takes the value 1 if the local incumbent is re-elected. In Columns 3 and 4, the dependent variable is constituency level turnout. In Columns 5 and 6, the dependent variable is the effective number of parties, or ENOP. All regressions include state-year fixed effects, and constituency controls for the number of deposits within 10km of a constituency, log constituency population, the share of the population living in rural areas, the share of villages with electricity and the per capita number of primary schools, all from the 2001 population census. Standard errors are robust and clustered at the state-year level.

Figure 1
Sample Election Affidavit


1100

ANNEXURE XIII C
(CHAPTER V, PARA 9.3)

FORM26

(SEE RULE 4A)

23 MAR 2009

Affidavit to be furnished by the candidate before the returning officer for election to ....
Legislative Assembly ...(name of the House) from ...Adilabad.......007........
......................................Constituency (name of the constituency)

I Jogu Ramanna ...son/d~~aughter/wife~~ of .....A. Khanna.......................aged about
.........46..........years, resident of ..2-26... Deepaigude Md Jainath Adilabad
candidate at the above election, do hereby solemnly affirm/state on oath as under: -

1. I am/~~am not~~ accused of any offence(s) punishable with imprisonment for two years or more in a pending case (s) in which a charge (s) has/have been framed by the court(s) of competent Jurisdiction.

If the deponent is accused of any such offence(s) he shall furnish the following information:

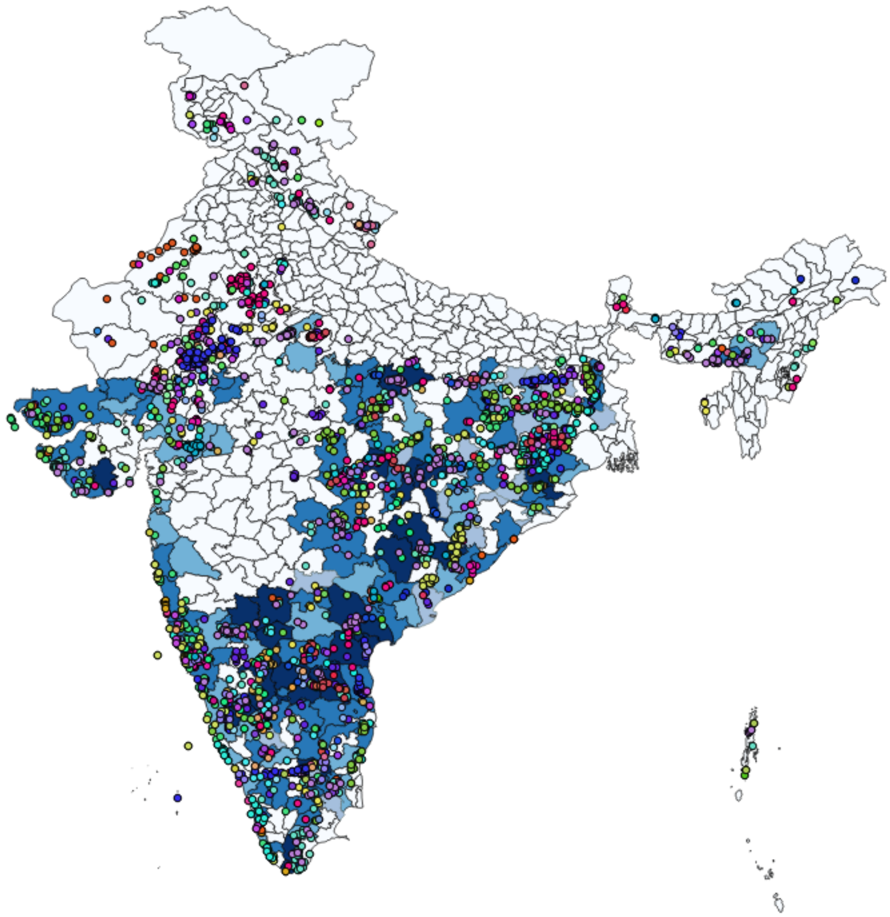
(i) Case/First information report No./Nos...12/2005..
(ii) Police station (s) ...Adilabad I T...............................District (s)....Adilabad
State (s)...A.P.................
(iii) Section (s) of the concerned Act (s) and short description of the offence (s) for which the candidate has been charged...D(1.147, 353, 332, 427 R/w 149 IPC..............
(iv) Court (s) which framed the charge (s) ...J. F. C. M. Adilabad..........
(v) Date (s) on which the charge (s) ....—..
(vi) Whether all or any of the proceeding (s) have stayed by any court (s) of competent jurisdiction
...Yes ...by Hon'ble High Court of AP. Cr. RPno 1221/08...........

2. I have been/have not been convicted of an offence (s) other than any offence (s) referred to in sub-section (1) or sub-section (2) , or covered in sub-section (3) , of section 8 of the Representation of the people Act, 1951 (43 of 1951) and sentenced to imprisonment for one year of more.

If the deponent is convicted and punished as aforesaid, he shall furnish the following information:

(i) Case/First information report No./Nos....12/05...
(ii) Count (s) which punished....353, 332, 427 IPC..

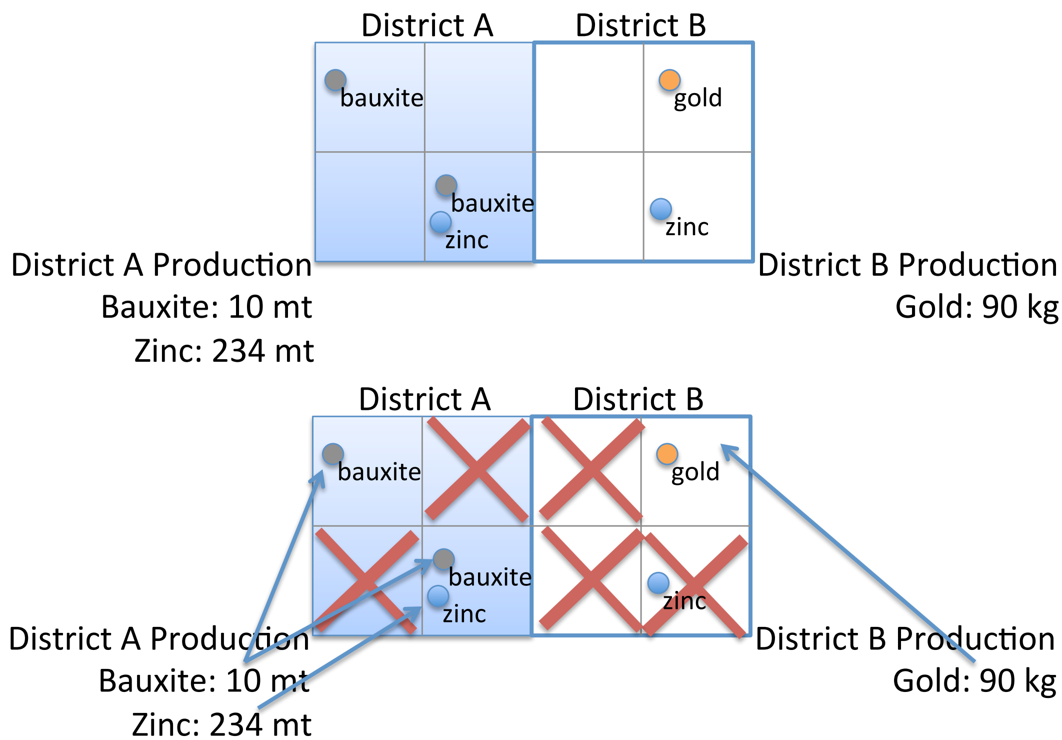
Figure 2
Map of deposit locations and mineral production



Circles indicate the location of mineral deposits, color-coded by mineral type. Shaded polygons show districts that report mineral production, with darker colors indicating higher production deciles. Sources: Mineral Atlas of India (Geological Survey of India, 2001) and Statistics of Mines in India. Nearly all states have major mineral deposits. The major exceptions are in the Indo-Gangetic Plain (Punjab, Uttar Pradesh) and in the northeast of India (Mizoram, Tripura).

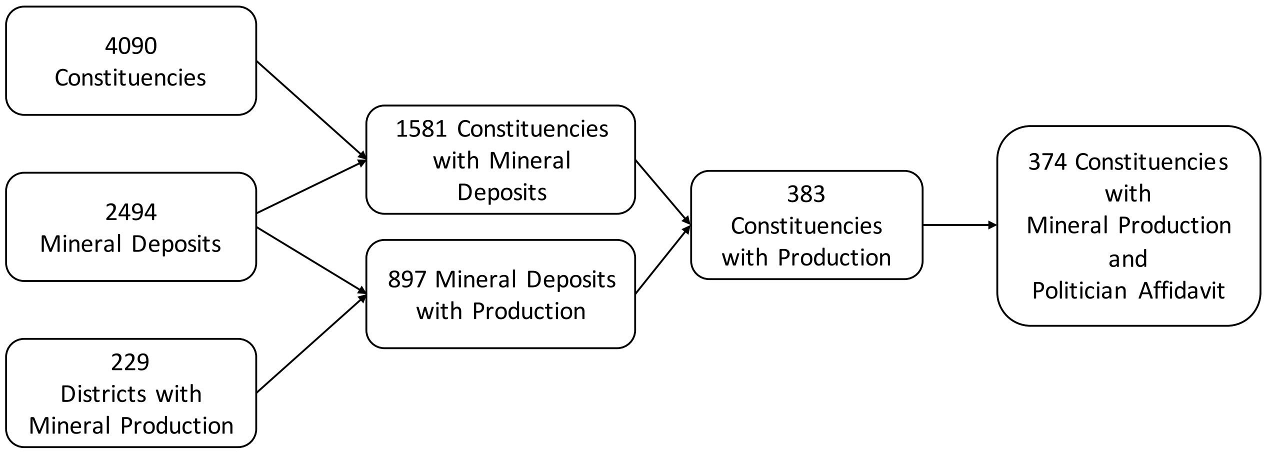
Figure 3

Identifying Production Constituencies



The figure describes the process for defining constituency-level price shocks. The figure shows two districts, each of which contains four constituencies. Mineral production is reported only at the district level. In this stylized example, District A produces bauxite and zinc, while District B produces only gold. The zinc deposit in District B is presumed to be inactive or unproductive. District B's gold production is assigned entirely to the one constituency with a gold deposit; District A's zinc production is also assigned to the single zinc deposit in the district. District A's bauxite production is split equally between the two constituencies with bauxite deposits, weighted by deposit size. Finally, constituencies with no productive mineral deposits are dropped from the sample.

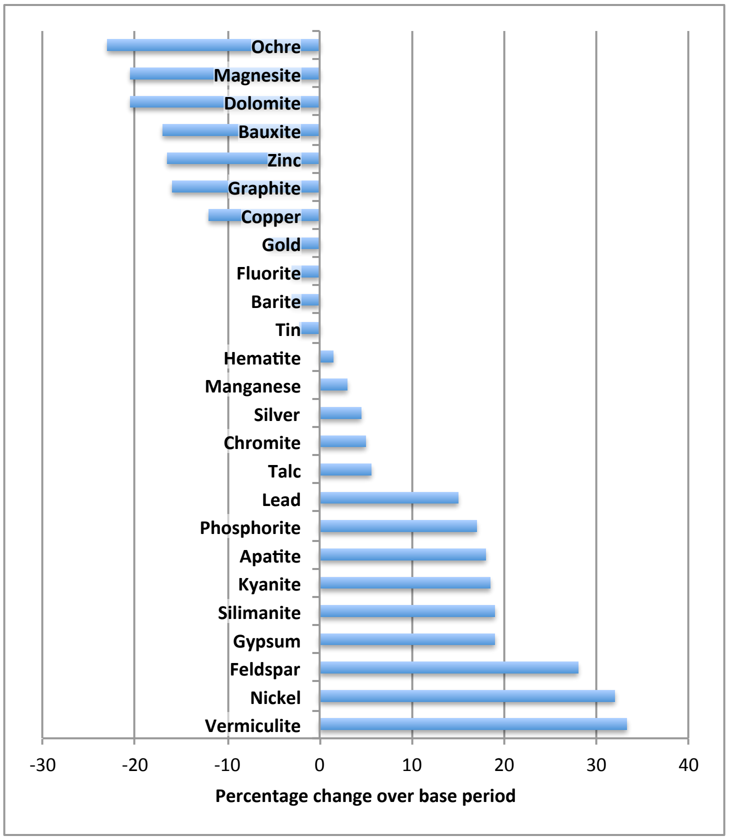
Figure 4
Construction of Sample Size



The figure describes the process for generating the sample of constituencies with valuable mineral deposits. The sample consists of 4090 constituencies as with boundaries held constant between 1971 and 2007. These are matched to 2494 mineral deposits (Geological Survey of India 2005), and to district-level production data (229 districts, Statistics of Mineral Information, Indian Bureau of Mines). 1581 constituencies are within 10km of mineral deposits, and 383 of these are in districts that report production of the same mineral between 1990 and 2014. Candidate affidavit information (data on assets and criminal charges) was obtained for 374 of these constituencies. These constituency boundaries match the sample for elections from 2003-2007. An additional 309 observations come from an identical process applied to post-delimitation boundaries, which are matched to elections from 2008-2013, making up the 683 observations in Column 1 of Table 2.

Figure 5

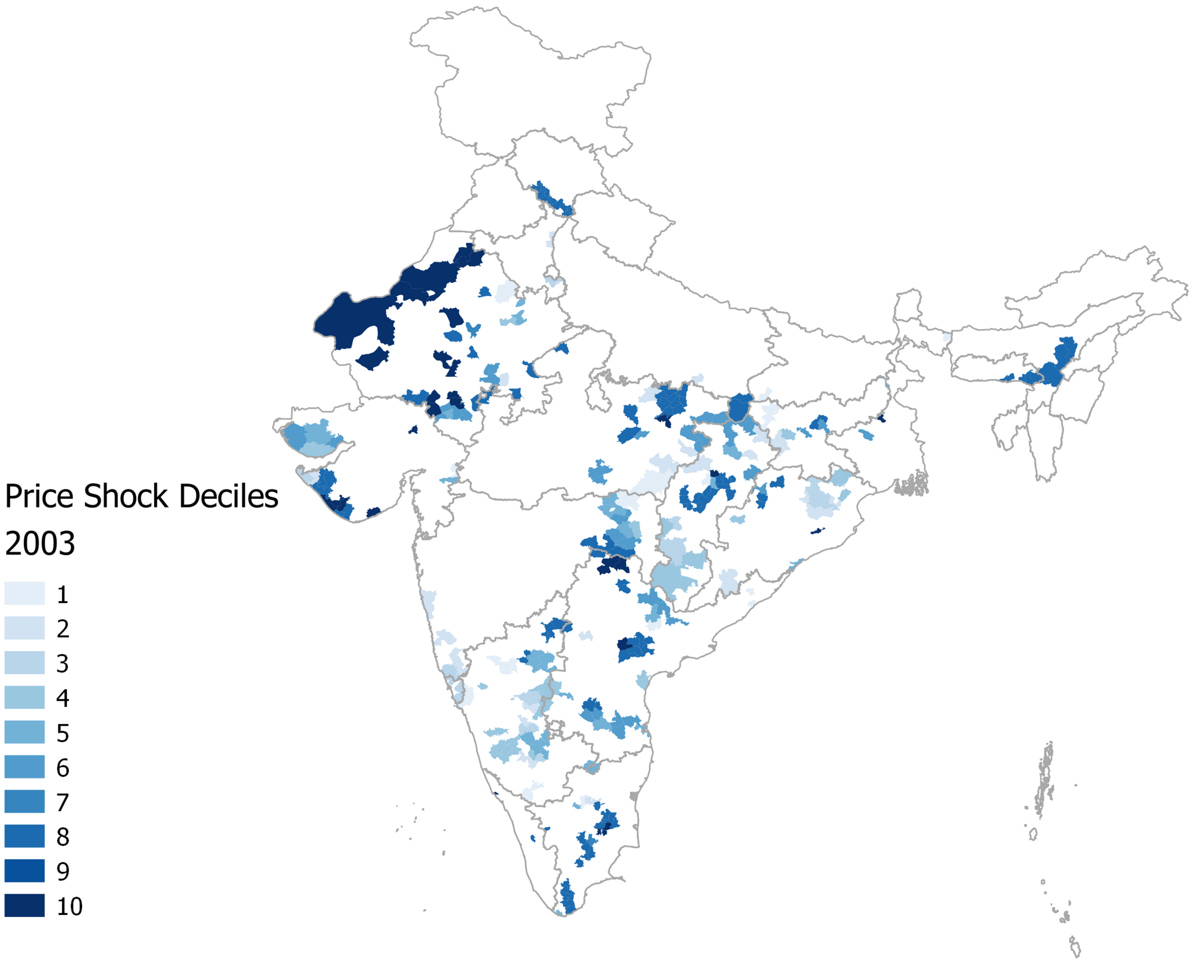
Mineral price shocks 1998-2003



The figure shows mineral-specific price shocks calculated from 1998-2003. Source: United States Geological Survey.

Figure 6

Map of mineral price shocks (1998-2003)



The map shows constituencies (1976-2007 delimitation) with productive mineral deposits, shaded according to the magnitude of the price shock in the period 1998-2003 (the first shock used in the analysis of crime data). Price shocks are defined as the production-weighted change in global prices of actively mined minerals in a given constituency (see 5 for more information). The darkest constituencies experienced the largest positive price shock. Unmarked constituencies are those excluded from our sample, because they had no productive mineral deposits that we were able to identify. Sources: United States Geological Survey (prices); Statistics of Mineral Information, Indian Bureau of Mines (production quantities); MLInfoMap (Constituency boundaries).

A Appendix For Online Publication: Additional figures and tables

Table C1

Effect of Price Shocks on Winning Candidate Criminality (Robustness)

	(1)	(2)	(3)
Price shock$_{-6,-1}$	0.279	0.312	0.278
	(0.073)***	(0.080)***	(0.073)***
Log Base Mineral Output	-0.010	-0.011	0.005
	(0.013)	(0.014)	(0.011)
State-Year F.E.	Yes	Yes	Yes
N	629	503	684
r2	0.13	0.15	0.14

$^{*}p < 0.10,^{**} p < 0.05,^{***} p < 0.01$

This table estimates the impact of a local mineral price shock on criminality of the local elected leader, alternate specifications to Table 2. The dependent variable is an indicator that takes the value 1 if the local election winner is facing criminal charges. Column 1 weights mineral deposits based on average district-level mineral output from 1981-2014. Column 2 weights based on all years before ADR data are available (1981-2003). Column 3 defines the price shock from the year 5 years before the election date to the present date (as opposed to Table 2 which uses 6 years before to 1 year before). All regressions include state-year fixed effects, and constituency controls for the number of deposits within 10km of a constituency, log constituency population, the share of the population living in rural areas, the share of villages with electricity and the per capita number of primary schools, all from the 2001 population census. Standard errors are robust and clustered at the state-year level.

Table C2

Effect of Price Shocks on Winning Candidate Criminality (Fixed Candidate Location)

	(1)	(2)	(3)
Price shock$_{-6,-1}$	0.381	0.425	0.420
	(0.120)***	(0.143)***	(0.150)***
Log Baseline Mineral Output	0.017	0.024	0.032
	(0.024)	(0.025)	(0.026)
State-Year F.E.	Yes	Yes	Yes
N	177	153	133
r2	0.20	0.31	0.26

$^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.01$

This table estimates the impact of a local mineral price shock on criminality of the local elected leader (as in Table 2), but limits the sample to candidates who have not changed constituencies from one electoral period to the next. We define candidates who have not moved as those for whom the constituency centroid is less than 20km or less than 10km from that in the previous election. A 0km threshold would reject nearly all constituencies due to redelimitation in 2007-08. The mean constituency diameter is approximately 45km. The dependent variable is an indicator that takes the value 1 if the local election winner is facing criminal charges. Column 1 includes the full sample of candidates that we are able to observe in the previous electoral term. Column 2 limits to candidates who have moved less than 20km since the previous electoral term. Column 3 limits to candidates who have moved less than 10km. All regressions include state-year fixed effects, and constituency controls for the number of deposits within 10km of a constituency, log constituency population, the share of the population living in rural areas, the share of villages with electricity and the per capita number of primary schools, all from the 2001 population census. Standard errors are robust and clustered at the state-year level.

Table C3

Effect of Price Shocks on Winning Candidate Criminality (Interactions with State Corruption)

	Corruption (TI)		Corruption (Enterprise)		Share Criminal MLA	
	High	Low	High	Low	High	Low
Price $\text{shock}_{-6,-1}$	0.242	0.204	0.215	0.188	0.217	0.161
	(0.138)*	(0.076)***	(0.090)**	(0.116)	(0.068)***	(0.172)
Log Baseline Mineral Output	0.019	0.007	0.002	0.010	0.024	-0.016
	(0.019)	(0.015)	(0.017)	(0.017)	(0.015)	(0.017)
Difference (p-value)		.711		.994		.657
State-Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
N	280	346	223	306	426	257
r2	0.20	0.10	0.07	0.21	0.11	0.17

$^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.01$

The table shows estimates of the impact of mineral wealth shocks on politician asset growth and changes in politician criminality (as in Table 4), separately for states coded as high or low corruption. The dependent variable is the change in a candidate's log net assets over a single electoral term. The price shock is the unanticipated change in mineral wealth in that electoral term. The sample is limited to politicians elected to state legislative assemblies. For each indicator, results are shown for, respectively, the set of states classified as low corruption and high corruption. Columns 1 and 2 measure corruption using the state-level Perception of Corruption Index from Transparency International (2005). Columns 3 and 4 use state-level estimates of bribe-giving from the Global Enterprise Survey (India, 2014). Columns 5 and 6 divide the sample into states with, respectively, above-median and below-median share of MLAs facing criminal charges. We display p-values for the difference in estimates between the high and low corruption states for each indicator. All regressions include state-year fixed effects, and constituency controls for the number of deposits within 10km of a constituency, log constituency population, the share of the population living in rural areas, the share of villages with electricity and the per capita number of primary schools, all from the 2001 population census. Standard errors are robust and clustered at the state-year level.

Table C4

Effect of Price Shocks on Winning Candidate Assets (Interactions with State Corruption)

	Corruption (TI)		Corruption (Enterprise)		Share Criminal MLA	
	High	Low	High	Low	High	Low
Price shock$_{-6,-1}$	0.422	0.446	0.481	0.528	0.500	0.366
	(0.268)	(0.159)***	(0.187)**	(0.262)**	(0.168)***	(0.200)*
Log Baseline Mineral Output	-0.013	-0.012	-0.031	-0.017	-0.004	-0.003
	(0.033)	(0.039)	(0.043)	(0.045)	(0.030)	(0.040)
Baseline Log Net Assets	-0.256	-0.210	-0.213	-0.190	-0.250	-0.213
	(0.059)***	(0.039)***	(0.051)***	(0.051)***	(0.034)***	(0.057)***
Difference (p-value)		.880		.917		.562
State-Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
N	133	133	118	102	159	127
r2	0.37	0.32	0.31	0.32	0.44	0.27

$^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.01$

This table estimates the impact of a local mineral price shock on criminality of the local elected leader (as in Table 2), separately for regions coded as high or low corruption. The dependent variable is an indicator that takes the value 1 if the local election winner is facing criminal charges. Columns 1 and 2 estimate the regression separately for states with respectively, above-median and below-median corruption, as measured by Transparency International (2005). Columns 3 and 4 cut the sample using state-level estimates from the Global Enterprise Survey (India, 2014). Columns 5 and 6 divide the sample into states with, respectively, above-median and below-median share of MLAs facing criminal charges. We display p-values for the difference in estimates between the high and low corruption states for each indicator. All regressions include state-year fixed effects, and constituency controls for the number of deposits within 10km of a constituency, log constituency population, the share of the population living in rural areas, the share of villages with electricity and the per capita number of primary schools, all from the 2001 population census. Standard errors are robust and clustered at the state-year level.

Table C5

Effect of Price Shocks on Winning Candidate Criminality (Iron/Coal Exclusions)

	(1)	(2)	(3)	(4)	(5)	(6)
Price shock$_{-6,-1}$	0.232	0.251	0.262	0.221	0.290	0.308
	(0.068)***	(0.075)***	(0.073)***	(0.071)***	(0.083)***	(0.083)***
Log Base Mineral Output	0.006	-0.006	-0.006	0.017	0.000	0.022
	(0.012)	(0.012)	(0.013)	(0.014)	(0.014)	(0.019)
State-Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
N	662	634	609	617	520	460
r2	0.13	0.14	0.14	0.12	0.16	0.16

$^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.01$

This table estimates the impact of a local mineral price shock on criminality of the local elected leader, alternate specifications to Table 2. The dependent variable is an indicator that takes the value 1 if the local election winner is facing criminal charges. Column 1 calculates price shocks with coal deposits excluded; Column 2 excludes iron deposits from the price shock, and Column 3 excludes both. Columns 4-6 drop constituencies entirely if they have, (4) a coal deposit, (5) an iron deposit, or (6) either a coal or iron deposit. All regressions include state-year fixed effects, and constituency controls for the number of deposits within 10km of a constituency, log constituency population, the share of the population living in rural areas, the share of villages with electricity and the per capita number of primary schools, all from the 2001 population census. Standard errors are robust and clustered at the state-year level.

Table C6

Effects of price shocks on candidate criminal behavior (Alternate Specifications)

	(1)	(2)	(3)	(4)	(5)	(6)
Price shock$_{+1,+5}$	0.223		0.255		0.175	
	(0.094)**		(0.088)***		(0.086)**	
Price shock$_{+1,+5}$ * Winner		0.235		0.228		0.183
		(0.088)***		(0.082)***		(0.083)**
Price shock$_{+1,+5}$ * Loser		0.013		-0.019		-0.017
		(0.093)		(0.129)		(0.113)
Winner		-0.351		-0.377		-0.302
		(0.154)**		(0.203)*		(0.189)
Log Baseline Mineral Output	0.028	0.024	0.034	0.031	0.015	0.010
	(0.022)	(0.015)	(0.022)	(0.017)*	(0.022)	(0.016)
*Shock * Winner - Shock * Loser*		0.221		0.246		0.199
		(0.101)**		(0.132)*		(0.125)
State-Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
N	236	333	236	333	236	333
r2	0.35	0.29	0.66	0.60	0.33	0.29

$^{*}p < 0.10,^{**}p < 0.05,^{***}p < 0.01$

The table shows estimates of the impact of mineral wealth shocks on changes in politician criminal behavior, as proxied by open criminal cases. The specification is analagous to Table 4, but with alternate dependent variables. In each case, the price shock is the unanticipated change in mineral wealth during the current electoral term, and the dependent variable is a measure of the change in a given candidate's number or existence of open criminal cases. As with Table 4, Columns 1, 3 and 5 limit the sample to elected incumbents; Columns 2, 4 and 6 separately test for effects of price shocks on incumbents and runners-up. In Columns 1 and 2, the dependent variable is the log of one plus the number of open criminal cases at the beginning of the candidate's second observed political race. In Columns 3 and 4, the dependent variable is the *increase* in log criminal cases observed, with decreases winsorized at zero. In Columns 5 and 6, the dependent variable is an indicator that takes the value 1 if the incumbent is facing any criminal charges when contesting his or her second election. The row below the estimates shows the p value for the difference in estimate of the impact of price shocks between winning and runner-up candidates. All regressions include state-year fixed effects, and constituency controls for the number of deposits within 10km of a constituency, log constituency population, the share of the population living in rural areas, the share of villages with electricity and the per capita number of primary schools, all from the 2001 population census. Standard errors are robust and clustered at the state-year level.

Table C7

Effect of mineral price shocks on winning candidate criminality

	Production > USD 50k		Production > USD 200k	
	(1)	(2)	(3)	(4)
Price $\text{shock}_{-6,-1}$	0.299	0.204		
	(0.074)***	(0.069)***		
Price $\text{shock}_{+1,+5}$			0.437	0.350
			(0.155)***	(0.106)***
Log Base Mineral Output	-0.003	-0.001	-0.006	-0.003
	(0.014)	(0.011)	(0.032)	(0.020)
N	553	780	232	333
r2	0.15	0.13	0.34	0.32

$^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.01$

The table shows the robustness of the main estimates to different sample inclusion criteria. Columns 1 and 3 include all constituencies with mineral output of at least USD 200,000 in any year; Columns 2 and 4 include constituencies with mineral output above 50,000. Columns 1 and 2 are analagous to Table 2 and show the impact of a local mineral price shock on the criminality of the locally elected politician. Columns 3 and 4 are analagous to Table 4 and show the impact of mineral wealth shocks during a leader's term in office on his or her asset growth and increase in criminality. All regressions include state-year fixed effects, and constituency controls for the number of deposits within 10km of a constituency, log constituency population, the share of the population living in rural areas, the share of villages with electricity and the per capita number of primary schools, all from the 2001 population census. Standard errors are robust and clustered at the state-year level.