A Appendix For Online Publication: Additional figures and tables

Table A1

Criminal Charges Against Politicians Contesting Election:
Summary Statistics

Variable	**Mean**	**(Std. Dev.)**	**N**
Number of open charges listed on affidavit	1.606	(5.181)	9685
Any Charge	0.32	(0.466)	9685
Corruption	0.103	(0.304)	9563
Violent Crime	0.113	(0.317)	9563
Property Crime	0.075	(0.263)	9563
Civil Disorder	0.134	(0.341)	9563
White Collar Crime	0.028	(0.166)	9563
Libel	0.051	(0.221)	9563

The table shows the distribution of charges faced by politicians seeking election in India. The sample period is 2003–2017. 2003 is the first year that candidates were required to file affidavits showing criminal charges. Corruption is defined as theft from a government office, illegally attempting to influence a public servant or an election-related crime. Violent crime includes actual or attempted assault, armed robbery, homicide, kidnapping or sexual assault.

Table A2

Robustness of main results to constituency fixed effects

Panel A: Effect of Price Shocks on Winning Candidate Characteristics

	BJP	INC	High School	Age	Log Net Assets
	(1)	(2)	(3)	(4)	(5)
Price shock$_{-6,-1}$	0.032	-0.049	0.061*	-2.178**	-0.213
	(0.045)	(0.048)	(0.036)	(1.067)	(0.321)
N	1905	1905	682	710	710
r2	0.58	0.52	0.73	0.70	0.64

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

Panel B: Effect of Price Shock on Criminality by Type of Crime

	Violent	Non-violent	Corruption	Not Corruption
	(1)	(2)	(3)	(4)
Price shock$_{-6,-1}$	0.135**	-0.023	0.069	0.043
	(0.067)	(0.069)	(0.058)	(0.080)
N	711	711	711	711
r2	0.58	0.61	0.58	0.60

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

Panel C: Effect of Price Shock on Election Competitiveness

	Incumbent	Turnout	ENOP
	(1)	(2)	(3)
Price shock$_{-6,-1}$	-0.021	0.005	0.155***
	(0.053)	(0.008)	(0.054)
N	1409	1536	1414
r2	0.47	0.89	0.68

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

These three panels shows the robustness of Tables 3, 4, and 5 in the body of the paper to the inclusion of constituency fixed effects. All rows and columns are identical to those tables in the body of the paper, but include constituency fixed effects.

Table A3

Effect of mineral price shocks on non-winner criminality

	(1)	(2)	(3)	(4)	(5)	(6)
Price shock$_{-6,-1}$	0.010	0.007	-0.002	0.005	-0.015	-0.035
	(0.015)	(0.017)	(0.022)	(0.041)	(0.045)	(0.070)
State-Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
District F.E.	No	Yes	No	No	Yes	No
Constituency F.E.	No	No	Yes	No	No	Yes
Mean Dep. Var.	0.19	0.19	0.18	0.28	0.28	0.30
N	987	985	807	855	848	631
r2	0.22	0.39	0.66	0.18	0.34	0.63

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

The table estimates the impact of a local mineral price shock on the criminality of candidates who contested election but did not win. Criminality is a candidate-level indicator that takes the value one if the candidate is facing criminal charges. The dependent variable in Columns 1–3 is the mean of this indicator across all candidates contesting election in each constituency-year. The dependent variable in Columns 4–6 is the criminality of the second-place candidate in each constituency-year. The price shock is the change in global mineral prices, weighted by constituency pre-sample production values of each mineral, calculated over the five years preceding the given election. Columns 1 and 4 estimate Equation 2 on the full sample with state*year fixed effects. Columns 2 and 5 add district fixed effects and Columns 3 and 6 add constituency fixed effects. All regressions include state-year fixed effects and constituency controls for the number of deposits within 10km of a constituency, a constituency-level mineral dispersion index, and baseline (2001) values of log constituency population, share of the population living in rural areas, share of villages with electricity and the per capita number of primary schools. Standard errors are robust and clustered at the district level.

Table A4

Effect of mineral price shocks on candidate asset growth and criminal activity
Robustness to lagged price shocks

	Change in Assets		Change in Crime	
	(1)	(2)	(3)	(4)
Price shock$_{+1,+5}$	0.267***	-0.045	0.216***	-0.045
	(0.101)	(0.165)	(0.062)	(0.087)
Price shock$_{+1,+5}$ * Winner		0.302*		0.244**
		(0.168)		(0.100)
Winner		-0.142		-0.420**
		(0.297)		(0.201)
Price shock$_{-5,-1}$ (lagged)	0.095	0.191**	0.023	-0.010
	(0.103)	(0.092)	(0.058)	(0.070)
Price shock$_{-5,-1}$ (lagged) * Winner		-0.073		0.021
		(0.119)		(0.081)
State-Year F.E.	Yes	Yes	Yes	Yes
Mean Dep. Var.	1.02	0.98	0.18	0.20
N	448	696	364	629
r2	0.40	0.33	0.23	0.18

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

The table shows estimates of the impact of mineral wealth shocks on asset growth of elected leaders and on new criminal charges against them. Results are analogous to those in Table 6, but with the inclusion of lagged price shocks. The dependent variable in columns 1–2 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, defined as the change in the global prices of the basket of mineral in each constituency, measured from the first year after the politician is elected to the end of the electoral term. Column 1 estimates the regression on elected officials only. In Column 2, the sample includes winners and runners up from the first election, and the price shock is interacted with a dummy variable indicating the election winner. Columns 3 and 4 run specifications comparable to Columns 1 and 2, 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. All regressions include state-year fixed effects and constituency controls for the number of deposits within 10km of a constituency, a constituency-level mineral dispersion index, and baseline (2001) values of log constituency population, share of the population living in rural areas, share of villages with electricity and the per capita number of primary schools. Standard errors are robust and clustered at the district level.

Table A5

Effect of employment shocks on candidate selection and behavior

Panel A: Constituency-Level Non-Farm Employment Growth

	Crim Winner	Change in Assets		Change in Crime	
	(1)	(2)	(3)	(4)	(5)
Pre-Election Growth	-0.003				
	(0.016)				
Growth in Electoral Term		0.108	0.077	-0.045	0.224***
		(0.211)	(0.136)	(0.046)	(0.071)
Winner			0.190		0.031
			(0.128)		(0.056)
Winner * Growth in Electoral Term			0.029		-0.245***
			(0.207)		(0.072)
Constant	0.339***	1.178***	1.011***	0.224***	0.198***
	(0.009)	(0.085)	(0.104)	(0.030)	(0.047)
State-Year F.E.	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var.	0.34	1.21	1.17	0.21	0.25
N	4427	213	335	219	349
r2	0.10	0.12	0.09	0.13	0.14

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

Panel B: Bartik-Predicted Constituency-Level Non-Farm Employment Growth

	Crim Winner	Change in Assets		Change in Crime	
	(1)	(2)	(3)	(4)	(5)
Bartik Predicted Pre-Election Growth	0.078				
	(0.103)				
Predicted Growth in Electoral Term		-1.309	-2.442	-0.287	0.142
		(0.950)	(1.584)	(0.316)	(0.668)
Winner			-0.289		0.068
			(0.714)		(0.301)
Winner * Predicted Growth in Electoral Term			1.158		-0.313
			(1.694)		(0.700)
Constant	0.308***	1.757***	2.056***	0.329**	0.227
	(0.039)	(0.397)	(0.656)	(0.138)	(0.281)
State-Year F.E.	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var.	0.34	1.21	1.17	0.21	0.25
N	4427	213	335	219	349
r2	0.10	0.13	0.10	0.13	0.12

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

The table replicates the main results of the paper using shocks to non-farm sector employment instead of mineral wealth shocks. The independent variable in Panel A is constituency-level non-farm employment growth; in Panel B, it is *predicted* non-farm employment growth from a Bartik specification. Column 1 shows a regression of a criminal winner indicator on employment growth in the period before the election. Columns 2 and 3 show regressions of the change in candidate assets on employment growth during the candidate's term in office. Columns 4 and 5 show regressions of an indicator that takes the value one if a candidate has accumulated additional criminal charges during the electoral term, on employment growth during the candidate's term in office. Columns 2 and 4 are restricted to sitting MLAs (i.e. election winners) only; Columns 3 and 5 include runners-up in the last election as a control group. All regressions include state-year fixed effects and the standard set of constituency controls. Standard errors are robust and clustered at the district level.

Table A6

Effect of rainfall shocks on candidate selection and behavior

	Criminal Winner		Change in Assets		Change in Crime	
	(1)	(2)	(3)	(4)	(5)	(6)
Precip. Year Before Election	0.001					
	(0.009)					
Precip. 5 Years Before Election		-0.017				
		(0.019)				
Precip. During Electoral Term			0.159	0.190	-0.014	0.108
			(0.223)	(0.205)	(0.099)	(0.109)
Winner				0.194**		-0.052
				(0.084)		(0.041)
Precip. During Term * Winner				0.150		-0.023
				(0.161)		(0.081)
Constant	0.306***	0.307***	1.098***	0.949***	0.181***	0.247***
	(0.006)	(0.005)	(0.058)	(0.064)	(0.026)	(0.036)
State-Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var.	0.31	0.31	1.08	1.03	0.18	0.20
N	9274	9274	356	596	361	612
r2	0.13	0.13	0.19	0.15	0.17	0.13

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

The table replicates the main results of the paper using precipitation shocks instead of mineral wealth shocks. Column 1 shows a regression of a criminal winner indicator on rainfall in the year before the election. Column 2 uses average rainfall in the five years before the election. Columns 3 and 4 show regressions of the change in candidate assets on average rainfall during the candidate's term in office. Columns 5 and 6 show regressions of an indicator that takes the value one if a candidate has accumulated additional criminal charges during the electoral term, on average rainfall during the candidate's term in office. Columns 3 and 5 are restricted to sitting MLAs (i.e. election winners) only; Columns 4 and 6 include runners-up in the last election as a control group. Rainfall in each year is measured as total rainfall in the month of monsoon arrival. All regressions include state-year fixed effects and the standard set of constituency controls. Standard errors are robust and clustered at the district level.

Table A7

Effect of mineral price shocks on winning candidate criminality

Alternate deposit definitions

	Exact Deposit Locations			Deposits Only		
	(1)	(2)	(3)	(4)	(5)	(6)
Price shock$_{-6,-1}$	0.131***	0.107**	0.118**	0.040**	0.038**	0.051*
	(0.039)	(0.041)	(0.056)	(0.016)	(0.016)	(0.028)
State-Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
District F.E.	No	Yes	No	No	Yes	No
Constituency F.E.	No	No	Yes	No	No	Yes
Mean Dep. Var.	0.33	0.33	0.32	0.30	0.30	0.30
N	628	625	484	3280	3270	1905
r2	0.18	0.39	0.69	0.13	0.25	0.66

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

This table estimates the impact of a local mineral price shock on the criminality of the local elected leader, with specifications parallel to those in Table 2. The price shock variable is a weighted sum of global price shocks to the minerals present in a constituency. The dependent variable is an indicator that takes the value one if the local election winner is facing criminal charges. Columns 1 through 3 define price shocks using mineral deposits strictly within constituency boundaries, under different fixed effect specifications. In contrast, Table 2 weights price shocks using proximity to deposits that are close to constituencies. Columns 4 through 6 weight price shocks with the number of mineral deposits in a constituency, irrespective of whether production is reported in that constituency, under different fixed effect specifications. In contrast, Table 2 uses pre-sample mineral output values as weights. Sample size is lower than Table 2 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, a constituency-level mineral dispersion index, and baseline (2001) values of log constituency population, share of the population living in rural areas, share of villages with electricity and the per capita number of primary schools. Standard errors are robust and clustered at the district level.

Table A8

Effect of price shocks on winning candidate criminality
Alternate price shock definitions

	Baseline 1990-2003	$\text{Shock}_{-5,0}$	Prod above 0	Prod above USD 50k	Prod above USD 200k	State Clusters	Placebo Fixed Effects
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Price Shock	0.136***	0.134**	0.087***	0.086**	0.120**	0.097**	0.029
	(0.046)	(0.054)	(0.032)	(0.041)	(0.048)	(0.037)	(0.043)
State-Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District-Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var.	0.35	0.33	0.32	0.34	0.34	0.33	0.25
N	720	948	1726	1063	780	946	679
r2	0.34	0.34	0.26	0.33	0.36	0.35	0.44

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

This table estimates the impact of a local mineral price shock on the criminality of the local elected leader, under alternate price shock definitions. The price shock is the change in global mineral prices, weighted by constituency pre-sample production values of each mineral, calculated over the five years preceding the given election. The dependent variable is an indicator that takes the value one if the local election winner is facing criminal charges. Column 1 weights mineral deposits based on baseline district-level mineral output measured from 1990–2003, instead of 1990–2013. Column 2 defines the price shock from 5 years before the election date to the present date (as opposed to Table 2 which uses 6 years before to 1 year before). Column 3, 4 and 5 define mineral constituencies as those with production of at least (3) $1 in any one year; $50,000 in one year; or (5) $200,000 in any year. In Table 2, the threshold is $100,000. Column 6 presents the main specification from Table 2, with standard errors clustered at the state level. Column 7 shows estimates from a placebo specification, where the treatment variable is the change in value of mineral deposits in constituencies that report zero production, i.e. constituencies with unproductive mineral deposits. All regressions include state-year fixed effects and constituency controls for the number of deposits within 10km of a constituency, a constituency-level mineral dispersion index, and baseline (2001) values of log constituency population, share of the population living in rural areas, share of villages with electricity and the per capita number of primary schools. Standard errors are robust and clustered at the district level.

Table A9

Effect of mineral price shocks on candidate asset growth and criminal activity
Alternate price shock definitions

	Assets	Crime	Assets	Crime	Assets	Crime	Assets	Crime
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Price shock$_{+1,+5}$	0.279***	0.190**	0.331***	0.141**	0.256**	0.220***	0.222**	0.212***
	(0.105)	(0.078)	(0.118)	(0.067)	(0.117)	(0.070)	(0.100)	(0.063)
State-Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	301	248	291	240	362	290	477	370
r2	0.43	0.29	0.43	0.24	0.41	0.24	0.37	0.24

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

The table shows estimates of the impact of mineral wealth shocks on asset growth of elected leaders, and on new criminal charges against them. Results are analogous to those in Table 6, but with alternate definitions of price shocks. The dependent variable in columns 1, 3, 5 and 7 is the change in a candidate's log net assets over a single electoral term. The dependent variable in columns 2, 4, 6 and 8 is an indicator for whether the politician is facing more criminal charges at the end of the electoral term than at the beginning The price shock is the unanticipated change in mineral wealth in that electoral term, defined as the change in the global prices of the basket of mineral in each constituency, measured from the first year after the politician is elected to the end of the electoral term. Columns 1 and 2 show results based strictly on mineral deposits, ignoring production data. Columns 3 and 4 define production using all years of data. Columns 5 and 6 define mineral constituencies at the lower production threshold, and Columns 7 and 8 do so at the higher production threshold. All regressions include state-year fixed effects, district fixed effects and constituency controls for the number of deposits within 10km of a constituency, a constituency-level mineral dispersion index, and baseline (2001) values of log constituency population, share of the population living in rural areas, share of villages with electricity and the per capita number of primary schools. Standard errors are robust and clustered at the district level.

Table A10

Effect of mineral price shocks on winning candidate criminality
Spatial Spillovers

	(1)	(2)	(3)	(4)
Price Shock	0.163***	0.194***	0.202***	0.118*
	(0.053)	(0.059)	(0.071)	(0.070)
Price Shock to Neighbors	-0.044	-0.052	-0.050	-0.035
	(0.045)	(0.044)	(0.051)	(0.058)
State-Year F.E.	Yes	Yes	Yes	Yes
District F.E.	No	Yes	Yes	No
Constituency F.E.	No	No	Yes	No
Mean Dep. Var.	0.33	0.33	0.33	0.33
N	865	862	650	786
r2	0.37	0.57	0.75	

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

The table estimates the impact of local mineral price shocks on the criminality elected politicians in neighboring constituencies. The dependent variable is the share of neighboring constituencies in which the election winner faces criminal charges. The price shock is the average price shock in the neighboring constituencies. The row marked "Price Shock to Neighbors" is the price shock in the reference constituency. In both cases, the price shock is a change in global mineral prices, weighted by constituency pre-sample production values of each mineral, calculated over the five years preceding the given election. Column 1 estimates Equation 2 on the full sample with state*year fixed effects, with the additional neighboring price shock variable. Columns 2 and 3 respectively add district and constituency fixed effects. Column 4 shows the marginal effect from a probit estimation of a similar specification to that in Column 1. All regressions include state-year fixed effects and constituency controls for the number of deposits within 10km of a constituency, a constituency-level mineral dispersion index, and baseline (2001) values of log constituency population, share of the population living in rural areas, share of villages with electricity and the per capita number of primary schools. Standard errors are robust and clustered at the district level.

Table A11

Adverse selection and moral hazard tests
Alternate crime definitions

	Adverse Selection		Moral Hazard (Differences)	
	Num Crime	Log Num Crime	Num Crime	Log Num Crime
	(1)	(2)	(3)	(4)
Price shock$_{-6,-1}$	0.646***	0.201***		
	(0.172)	(0.055)		
Price shock$_{+1,+5}$			1.082**	0.209**
			(0.517)	(0.091)
State-Year F.E.	Yes	Yes	Yes	Yes
Mean Dep. Var.	1.33	0.43	-0.55	-0.05
N	948	948	364	364
r2	0.20	0.22	0.56	0.55

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

This table tests the robustness of results in Tables 2 and 6 to alternate definitions of the criminality of the winner. Columns 1 and 2 estimate the impact of local pre-election mineral price shocks on the criminality of the local elected politician. The dependent variable in Column 1 is the number of criminal charges faced by the winner; in Column 2 it is the log of the number of criminal charges plus one. Columns 3 and 4 estimate the impact of post-election mineral price shocks on the number of charges faced by the elected leader in a constituency. These columns again show the effect on the number of charges and the log number of charges. All columns include state and year fixed effects. Columns 1 and 2 include district fixed effects. All regressions include state-year fixed effects and constituency controls for the number of deposits within 10km of a constituency, a constituency-level mineral dispersion index, and baseline (2001) values of log constituency population, share of the population living in rural areas, share of villages with electricity and the per capita number of primary schools. Standard errors are robust and clustered at the district level.

Table A12

Effect of price shocks on winning candidate criminality

Iron, coal, conflict exclusions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Price shock$_{-6,-1}$	0.100**	0.142***	0.128***	0.118***	0.171***	0.178***	0.129**	0.163***
	(0.040)	(0.043)	(0.040)	(0.045)	(0.054)	(0.055)	(0.057)	(0.047)
Price Shock	No coal	No iron	No coal/iron	No coal	No iron	No coal/iron	All	All
Constituency Sample	All	All	All	No coal	No iron	No coal/iron	No Naxalite States	No Naxalite Districts
State-Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Var.	0.33	0.33	0.33	0.32	0.33	0.32	0.32	0.32
N	863	891	800	766	738	572	633	660
r2	0.13	0.14	0.14	0.12	0.16	0.16	0.15	0.16

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

This table estimates the impact of a local mineral price shock on the criminality of the local elected leader, excluding certain effects in coal- and iron-producing regions. The price shock is the change in global mineral prices, weighted by constituency pre-sample production values of each mineral, calculated over the five years preceding the given election. The dependent variable is an indicator that takes the value one 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. Column 7 excludes the four states with the greatest Naxalite presence (Orissa, Andhra Pradesh, Jharkhand and Chhattisgarh). Column 8 excludes districts with at least Naxalite conflict-related death between 2005–2010. All regressions include state-year fixed effects, district fixed effects and constituency controls for the number of deposits within 10km of a constituency, a constituency-level mineral dispersion index, and baseline (2001) values of log constituency population, share of the population living in rural areas, share of villages with electricity and the per capita number of primary schools. Standard errors are robust and clustered at the district level.

Table A13

Effect of price shocks on winning candidate criminality
Fixed candidate location

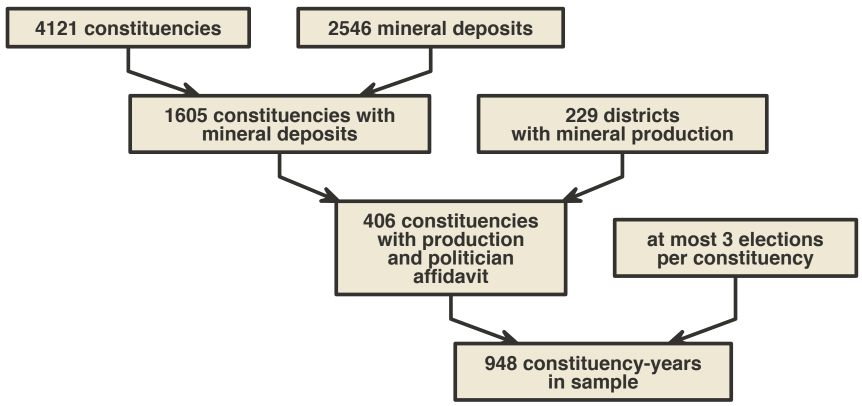
	All	Moved < 20km	Moved < 10km	Moved < 5km
	(1)	(2)	(3)	(4)
Price shock$_{-6,-1}$	0.197**	0.177**	0.149*	0.164*
	(0.079)	(0.076)	(0.077)	(0.091)
State-Year F.E.	Yes	Yes	Yes	Yes
Mean Dep. Var.	0.43	0.43	0.43	0.43
N	294	275	266	254
r2	0.19	0.27	0.25	0.27

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

This table estimates the impact of a local mineral price shock on the 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 a given distance from that in the previous election. The mean constituency diameter is approximately 45km. The price shock is the change in global mineral prices, weighted by constituency pre-sample production values of each mineral, calculated over the five years preceding the given election. The dependent variable is an indicator that takes the value one 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, and Column 4 to 5km. All regressions include state-year fixed effects and constituency controls for the number of deposits within 10km of a constituency, a constituency-level mineral dispersion index, and baseline (2001) values of log constituency population, share of the population living in rural areas, share of villages with electricity and the per capita number of primary schools. Standard errors are robust and clustered at the district level.

Figure A1

Sample construction

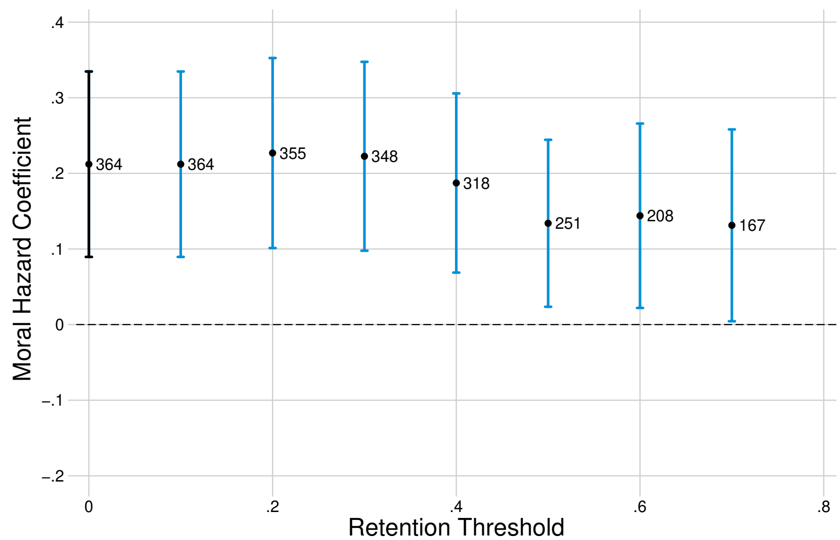


The figure describes the process for generating the sample of constituencies with valuable mineral deposits, based on predelimitation constituencies. The sample consists of 4121 predelimitation constituencies. These are matched to 2546 mineral deposits (Geological Survey of India 2005), and to district-level production data (229 districts, Statistics of Mineral Information, Indian Bureau of Mines). 1605 constituencies are within 10km of mineral deposits, and 406 of these are in districts that report production of the same mineral between 1990 and 2013. Each constituency has either two or three elections in the sample period, leading to a main sample size in Table 2 of 948 constituency-years.

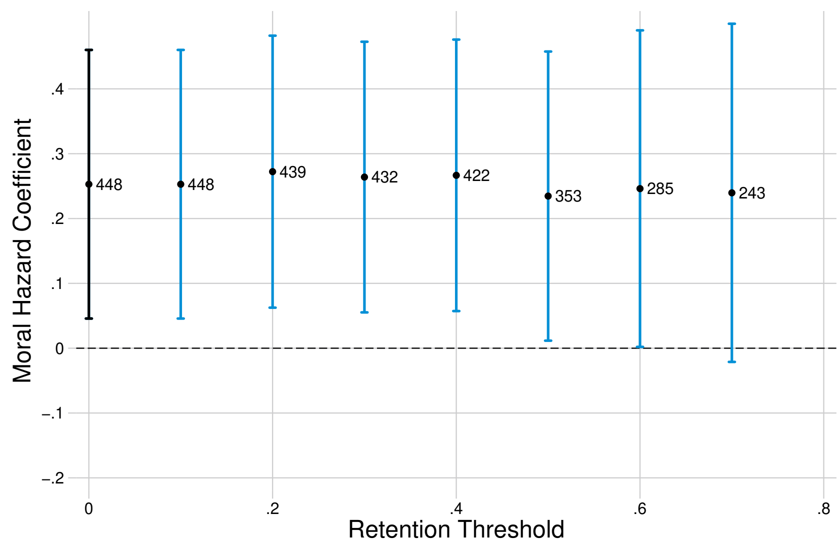
Figure A2

Moral Hazard Estimates: Robustness to Attrition

Panel A: Log Asset Growth



Panel B: Criminal Charge Growth



The figure shows alternate estimations of the moral hazard effects in Columns 1 and 4 of Table 6. The retention threshold on the X axis is a state-election-level variable defined as the minimum share of constituencies in that election for which we were able to observe the winner again in the following election. The estimate at X=0 is the estimate in the paper. The remaining estimates increasingly shrink the sample to a set of elections where candidate attrition is less of a concern. The aim is to show the sensitivity of the estimates to potential attrition. The outcome variable is candidate change in assets in Panel A and change in criminal charges in Panel B. The regression estimate shows the effect of a change in local mineral wealth that occurs after an election on the change in assets or crime of the political representative serving that constituency. The points show the point estimate of each estimation along with the sample size.

B Appendix For Online Publication: A Model of Collusion Between Firms and Politicians

In this section, we present a political agency model to elucidate the channels by which resource extraction operations influence the behavior of politicians. The model is in the spirit of the career concerns model of Persson and Tabellini (2000), which Brollo et al. (2013) extend to allow endogenous entry of politicians. Our model is oriented toward understanding rent-seeking through illegal collusion between politicians and firms.

We focus on collusion between politicians and firms because that relationship is suggested by the other literature on mining firms in India and indeed in many other places around the world. Models of politicians and firms have more commonly focused on the case where politicians extract rents from firms to the detriment of those firms (Shleifer and Vishny, 1994). A model in that spirit would generate similar predictions to those that we describe below, but it fits less well with the qualitative evidence from India. Further, the facilitation of black markets is widely associated in the literature with the presence of violent actors (Tilly, 1985; Gambetta, 1996; Bandiera, 2003; Chimeli and Soares, 2017; Skarbek, 2011).

We focus on two features of the resource extraction sector. First, the mining sector generates rents, which can be expropriated by politicians through their control over the regulatory inputs required by mining firms. Second, mining is rife with illegality, both in India and in other developing countries. This increases the dependence of firms on local authorities, and raises the relative returns to both politicians and firms willing to engage in illegal activity.

Consider a single mining firm that operates in a constituency represented by a single politician. The mining operation has a high fixed cost and a low marginal cost; the price of output is such that the firm is profitable. Politicians have a type that is characterized by returns to illegal behavior $\theta \in (0,1)$. A high θ could represent a low risk aversion, indicating a willingness to risk being caught and punished for crime. It could also represent a set of skills that increase returns from criminal activities, such as a propensity toward violence, or connections to criminal networks and other corrupt officials.[37] Politicians who are caught in illegal activities pay a formal legal punishment and

[37] We do not take a stand in the model on the relationship between θ and the politician's ability to provide services to constituents. Brollo et al. (2013) assume that corrupt politicians provide worse services to citizens; Vaishnav

may face worse odds of re-election.[38]

We intentionally treat θ as a generally propensity toward crime that is not specific to any type of crime, as this appears to fit the context. Qualitative evidence suggests that a willingness to commit crimes for one's party organization or local bosses is used as an intentional signaling strategy. Such politicians may wish it to be known that they are effective at acting outside of the law (Witsoe, 2009; Berenschot, 2011b; Vaishnav, 2017).

The model has two periods. In the first period, each candidate chooses an election campaign effort level e, with a convex cost $f(e)$. This could be a time cost or a financial cost. Election outcomes cannot be predicted with certainty and the probability of getting elected is a concave function of effort, which we denote $\pi(e)$. The candidate's utility function is:

$$U = \pi(e)g(\cdot) - f(e), \tag{4}$$

where $g(\cdot)$ is the utility gain from getting elected, and includes the continuation value of future elections.

In the second period, in exchange for payment, the elected politician can take an illegal action that increases the firm's output, such as granting an environmental clearance or land use permit that would have been rejected by the formal process.[39] The action raises the firm's output by an increasing concave function $q(a)$; more serious crimes (with higher a) have bigger effects on output.[40] The action increases the firm's profit by $\mu q(a)$, where μ is the mineral markup, or the difference between the price and extraction cost of the mineral. If the politician takes the illegal action, the rents are shared according to the Nash Bargaining solution. We assume equal discount rates for simplicity but the model results do not depend on this assumption, as long as the difference in

(2017) argues they are better at providing services, in part because the formal state does such a poor job.

[38]While we view it as unlikely that voters would reward a politician for being convicted, the model only requires that the punishment from being caught outweighs any electoral benefit.

[39]While the action itself may be legal or illegal, the exchange of the action for payment is illegal. Other actions could be expediting a permit that would have been granted anyway (a less serious crime), or arranging for police to arrest or intimidate local activists (a more serious crime).

[40]Any crimes for which the marginal profit is not increasing in the severity of the crime would be dominated choices, and thus not considered. We could model criminal competency by assuming that $q()$ is a positive function of θ; this strengthens the predictions below because the politician trades off the increase in $q()$ against the cost of crime, which is decreasing in θ.

discount rates is not extreme. The utility cost of illegal action is $\frac{c(a)}{\theta}$, where $c()$ is a convex increasing function of the severity of the action a. The cost function encapsulates the probability of being caught, the punishment conditional upon being caught, and any future electoral consequences. High θ politicians pay a lower utility cost for committing a given crime.

Equation 5 summarizes the politician's net utility from the illegal action:

$$g(a,\mu,\theta)=\frac{1}{2}\big(\mu q(a)-\frac{c(a)}{\theta}\big). \tag{5}$$

We solve the model by backward induction. In the second period, the politician chooses a to maximize rents, trading off profit against the risk and cost of getting caught. The first order condition is:

$$\mu q'(a^*)=\frac{c'(a^*)}{\theta}. \tag{6}$$

Under Inada conditions, any politician with θ strictly greater than zero will choose $a^*>0$ and commit at least some illegal action.[41]

If the price of mineral output, and thus the mineral markup μ rises, then crime severity a^* must rise according to Equation 6.[42] Since μ and a^* are rising, the politician's rents in Equation 5 must rise as well. This gives us the moral hazard result: when mineral rents are high, politicians provide more illegal services to firms and both firms and politicians earn greater rents from mining operations.

We now consider how politician type affects the effort exerted to obtain office. Each candidate chooses an effort level such that the marginal gain in terms of rents in office is equal to the marginal cost of effort required to win:

$$f'(e^*)=\frac{1}{2}\pi'(e^*)\big(\mu q(a^*)-\frac{c(a^*)}{\theta}\big). \tag{7}$$

[41] In the words of a four-time Chief Minister of Uttar Pradesh, "Even an honest MLA [politician] gets a [10%] kickback on discretionary spending" (Vaishnav, 2017).

[42] Specifically, $\frac{\partial a^*}{\partial \mu}=\frac{q'(a^*)}{\frac{c''(a^*)}{\theta}-\mu q''(a^*)}$.

The change in effort in response to an increase in the mineral markup is given by:

$$\frac{\partial e^*}{\partial \mu} = \frac{1}{2} \frac{\pi'(e^*) \cdot q(\mu,\theta)}{f''(e^*) - \pi''(e^*) \cdot g(\mu,\theta)}. \tag{8}$$

The expression is positive. Politicians earn greater rents from office when mineral rents are high, and therefore all candidates try harder to win elections when mineral prices are high. This has the biggest effect on effort when $q(\cdot)$ is large, and thus when θ is large—that is, on the candidates with the highest propensity toward illegal activity. High mineral values will increase the probability that a criminally inclined candidate gets elected, unless the mineral shock also decreases voters' preferences for criminal candidates. This is the adverse selection effect.[43] Both the adverse selection and moral hazard effects lead to increased illegal behavior by politicians in office when mineral rents are high. These effects are likely not only additive, but reinforcing: the moral hazard effect is worse for candidates who are more criminally inclined.

The model makes three key predictions, which we test in this paper. First, positive mineral wealth shocks in the first period (i.e. before elections take place) will lead criminal politicians to win more elections. Second, positive mineral wealth shocks in the second period (i.e. after candidates have been selected into office) will cause politicians in office to gain wealth and commit more crimes. By focusing on shocks that occur after candidates win elections, we can thus isolate the moral hazard effect. Third, the wealth and crime gains may occur for all types of politicians, but should be strongest for the most criminal types.

B.A Modeling Electoral Fraud

This subsection extends the model by considering the possibility that politicians can use criminal activities or violence to win elections.

The structure is as before, but we assume that crime with the purpose of winning elections,

[43]For simplicity, we have assumed that mineral wealth does not affect voter preferences over candidate type. Voter preferences could shift in either direction. They may dislike criminal candidates, and pay closer attention to elections when rents are high, thus mitigating the adverse selection effect. Alternately, they may prefer criminal candidates if they are perceived to facilitate mining operations. In the empirical part of this paper, we observe a joint outcome of voter preferences and candidate effort. The empirical test of the selection effect is thus jointly testing for the sum of the increase in candidate effort and any voter shift *toward* the more criminal candidate.

denoted by a_e, is distinctly chosen from crime to increase mining output, which we call illegal mining and denote by a_m. Both are punished with the same convex increasing cost function $\frac{c(a)}{\theta}$. As above, we use backward induction. We first solve for second period rents and criminal behavior conditional on winning an election. Then, we solve for electoral effort and electoral crime in the first period.

The elected politician earns the following rent, which is unchanged from the model above:

$$g(a_m,\mu,\theta)=\frac{1}{2}\big(\mu q(a_m)-\frac{c(a_m)}{\theta}\big). \tag{9}$$

The first order condition for the extent of illegal mining is unchanged:

$$\mu q'(a_m^*)=\frac{c'(a_m^*)}{\theta}. \tag{10}$$

The politician's utility function is as follows. We add a choice over electoral crime, and a cost function for electoral crime.

$$U=\pi(e,a_e)\frac{1}{2}\big(\mu q(a_m)-\frac{c(a_m)}{\theta}\big)-f(e)-\frac{c(a_e)}{\theta}. \tag{11}$$

As in the primary model, e represents effort to win elections, a_m is the extent of illegal mining, μ is the mineral markup, $q()$ is the output from illegal mining activities, θ is a measurement of propensity toward crime, and $f(e)$ is the convex cost of electoral effort. We have added additional terms a_e, which denotes the extent of electoral fraud, and $c(a_e)$, the convex cost of electoral fraud, which incorporates both the probability of getting caught and the utility punishment. The probability of winning an election $\pi e,a_e$ now depends positively on effort and electoral crime. This function is concave in both e and a_e, and we assume for simplicity that the cross-partial π_{ea_e} is zero.[44]

Candidates now jointly choose electoral effort and electoral crime. The first order conditions are

[44] If the cross-partial is not zero, it is most likely positive, as investment in the capacity to commit one kind of crime (e.g. by hiring thugs or bribing police officers) likely lowers the cost of committing other crimes. A positive cross-partial derivative would further increase the adverse selection effect because it raises the return to electoral crime for politicians already involved in illegal mining.

similar for these two choices, but the amount of electoral crime depends directly on politician type:

$$\frac{\partial f}{\partial e^*} = \frac{1}{2}\frac{\partial \pi}{\partial e^*}\big(\mu q(a_m^*) - \frac{c(a_m^*)}{\theta}\big) \tag{12}$$

$$\frac{1}{\theta}\frac{\partial c}{\partial a_e^*} = \frac{1}{2}\frac{\partial \pi}{\partial a_e^*}\big(\mu q(a_m^*) - \frac{c(a_m^*)}{\theta}\big) \tag{13}$$

The moral hazard effect remains unchanged, because the decision about how much illegal mining to facilitate happens only conditional upon having been elected:

$$\frac{\partial a_m^*}{\partial \mu} = \frac{q'(a_m^*)}{\frac{c''(a_m^*)}{\theta} - \mu q''(a_m^*)} \tag{14}$$

There are now two adverse selection comparative statics. When the mineral markup μ rises, candidates can change their effort levels, and they can change their willingness to engage in electoral crime. The expressions for these comparative statics are calculated from the election effort and crime first order conditions:

$$\frac{\partial e^*}{\partial \mu} = \frac{1}{2}\frac{\frac{\partial \pi}{\partial e^*} q(a_m^*)}{f''(e^*) - \frac{\partial^2 \pi}{\partial e^{*2}} g(a_m^*, \mu, \theta)} \tag{15}$$

$$\frac{\partial a_e^*}{\partial \mu} = \frac{1}{2}\frac{\frac{\partial \pi}{\partial a_e^*} q(a_m^*)}{\frac{1}{\theta}\frac{\partial^2 c}{\partial a_e^{*2}} - \frac{\partial^2 \pi}{\partial a_e^{*2}} g(a_m^*, \mu, \theta)} \tag{16}$$

The first expression is unchanged. The second expression demonstrates a second form of adverse selection: mineral rents increase the return to electoral crime, and do so especially for high θ politicians. This occurs because these politicians facilitate more illegal mining $q(a_m^*)$ and thus have greater marginal returns to crime when prices are high.

In conclusion, extending the model to give politicians the opportunity to commit crimes to win elections strengthens the predictions on the adverse selection effect.