Electoral Cycles in Food Prices: Evidence from India

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Abstract

Do prices of essential food commodities vary with the timing of elections? Using weekly retail price data of 16 food items between 1993 and 2012 in 28 cities across India, we find existence of a 'political price cycle' in onions and not in other commodities, confirming a commonly held (but hitherto empirically untested) view that onion prices are an electorally salient issue. There is suggestive evidence that the opportunistic cycles are strongest when: (a) incumbent state governments are aligned with the center, (b) incumbent state governments win with large majorities, and (c) in periods when the market is unregulated. The findings can be explained by the role of informal regulatory strategies such as collusion between incumbent governments and trading cartels, who exercise significant influence in the market supply of onions.

Keywords: Political business cycles; Food prices; Agricultural markets; India

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1 Introduction

In developing countries, people spend a significant share of their income on food. It is, therefore, not surprising that food price inflation consistently emerges as a crucial issue during election campaigns.[1] The case of food prices is unique because they drive a wedge among citizens: net sellers (and traders) prefer higher prices whereas net buyers prefer lower prices. An unresolved question in the literature is how do office-seeking incumbents balance these competing producer/trader and consumer interests. In this paper, we make progress on this broad question by conducting the first systematic empirical investigation of electoral cycles in prices of essential food items.[2] We ask what are the conditions under which incumbents can induce a cycle and what are the strategies they use to do so.

We conduct our study in India which offers an excellent setting to examine this issue because of three reasons. First, the country has a large agricultural dependent population and the average Indian spends nearly half of her income on food.[3] Second, the country is a long standing democracy with a federal setup where elections to state legislatures are held every five years. The staggered timing of elections across states provides exogenous variation to estimate the political cycle. Finally, the Government of India complies rich data on retail and wholesale prices for various essential commodities across the country which allows us to test for mechanisms.

Using data on weekly retail prices for 16 commodities across 28 urban centres between 1993 and 2012, we find that prices of onions are lower prior to elections, confirming a long-held (but hitherto empirically untested) view that onion prices are an electorally salient issue in India. We do

[1] In 2006, just a few months after Felipe Calderón's election as the President of Mexico, there were massive protests against the sharp rise in the price of tortillas and other staple food items. Despite Calderón's swift decisions on social programmes and drug trafficking, food inflation brought thousands of people onto the streets (Malkin 2007; Simmons 2016). Similarly, a large drought in 2017 led to sever food inflation in Kenya which became a prominent electoral issue (Okiror 2017)

[2] Chhibber (1999) tests for electoral cycles in food subsidies in India between 1967 and 1985. He notes that prior to the 1977 elections the central government decided to provide its employees with interest-free loans to buy food and urged state governments to do the same. Just a couple of weeks before the election the government also decided to sell eggs, onions, and potatoes at ration shops to ensure that these items were available to consumers.

[3] Gupta (2012) reports that expenditure on food comprises 54 and 41 percent of the monthly per capita expenditure in rural and urban India respectively.

not find evidence for an election cycle in other commodities because the market structure of those commodities is not conducive for such intervention. The relatively higher concentration of power in the hands of few traders differentiates onions from other commodities (a single market, Lasalgaon in Maharashtra, accounts for a significant share of onion trade and it is the largest onion market in Asia). We believe that the cycle is driven by traders' markup prices because we only find a cycle in retail onion prices and not in wholesale prices (the price at which farmers sell their produce to traders).

These results can be explained by the role of trader-politician ties and informal strategies in oligopolistic agricultural markets. In India, onion traders have ties to political parties and enjoy significant political clout. Incumbents can thus collude with these cartels to keep prices low closer to elections and high at other times. We provide suggestive evidence that cycles are likely to occur when incumbent state governments are aligned with the national governments and when they have a higher ex-ante probability of re-election (i.e. relatively stronger incumbents). These factors provide the necessary conditions for governments to overcome coordination problems and incentives for traders to comply. Interestingly, we also find cycles to be present when the market is (relatively) unregulated which further corroborates our claim.

This paper makes contributions in three key areas. Firstly, we document a political price cycle in retail food prices. The electoral cycle literature has mostly considered public-finance decisions and an expansionary fiscal policy as instruments which can be used by politicians for improving public perception about performance. While there is some work on agriculture, it has focused on either mostly the farmer side and, to the best of our knowledge, no such attempt has been made in the context of retail food prices, especially in the developing world. Secondly, we show that cycles may exist in the absence of formal regulatory measures and when markets are free. Incumbent governments are innovative and will employ informal strategies to fulfill their desired objectives. We also add to the literature on politician-business collusion by highlighting the role of trading cartels controlling the commodity market, which is an understudied issue. The findings of the paper have implications for other contexts where market power is concentrated in the hands of few. (In

Ghana, for example, the tomato and onion cartels are referred to as 'market queens'.) Finally, we also contribute to the literature on the association between political accountability and prices of goods and services provided by the state. Politicians realize that prices of public services and goods influence cost of living and determine the electorate's perception of economic performance. Thus, they make efforts to keep prices under check closer to elections when public perception matters most for them. In this way, our paper also contributes to the literature on retrospective economic voting and performance issues in developing countries (Nooruddin and Chhibber 2008; Nooruddin and Simmons 2016; Jensenius and Suryanaryan 2015).

The rest of the paper is organized as follows: Section 2 outlines a theory for an electoral cycle in prices of food commodities and lists a number of testable hypotheses. Section 3 describes the institutional context of India and provides an overview of the food commodity market in the country. We also provide a detailed note on our data sources and make a case for why a developing country context such as India provides a particularly useful setting for studying electoral cycles in food commodities. In section 4 we discuss the identification strategy to test the hypotheses. Section 5 presents the quantitative results and discusses the mechanism of informal regulatory strategy in detail. We conclude our paper in section 6 and also address the scope conditions for the analysis presented in the paper.

2 Framework

In the past few years, a considerable evidence for electoral cycles has emerged. Scholars have found evidence for an electoral cycle in diverse outcomes like legislative budgetary decisions (Wehner 2013), the exchange rate regime (Clark and Hallerberg 2000; Dreher and Vaubel 2004), the housing market (Ladewig 2008), in electricity supply (Thushyanthan et al. 2015, Englmaier et al 2017), foreign aid (Faye and Niehaus 2012, Dreher and Vaubel 2004), stock markets (Sturm 2013 and Kräussl et al. 2014), household consumption spending (Lami, et al. 2014), public expenditure (Saez and Sinha 2010, Khemani 2004), agricultural producer protection (Thies and Porche 2007), agriculture credit (Cole

2009), and prices paid to farmers for sugarcane (Sukhtankar 2012).[4] However, to the best of our knowledge, no such attempt has been made in the context of food commodities, especially in the developing world.[5]

While some scholars emphasize the existence of opportunistic models, i.e., all incumbents try to intervene to increase their chances of re-election (Nordhaus 1975), others argue that the ideological orientation of the incumbent party determines preference of sectors that warrants intervention and thus emphasize on partisan cycles (Alt 1985, Hibbs 1987, Alesina 1988).[6] We argue that most incumbents, regardless of their party ideology, would prefer to keep prices of essential commodities in check as it is a valence issue, i.e. all voters care about this and prefer low prices. However, as incumbents cannot influence prices of all essential commodities, they tend to strategically select commodities which are likely to bring them highest electoral returns (Spiller and Savedoff 1999).

However, there are binding constraints and incumbents cannot induce a political business cycle under all scenarios. Alt and Rose (2007) mention that many earlier studies on electoral cycles lacked strong and systematic evidence on outcomes such as growth, unemployment, or inflation cycles because politicians do not control real economic variables, and even when it comes to fiscal policy, incumbents typically control policy instruments that are imperfectly related to outcomes.[7] This is certainly true for advanced industrialized countries where autonomous regulatory institutions, as well as markets, are much stronger. Incumbents in developing countries such as India, where autonomous institutions and markets are weak, have a greater influence over economic outcomes.

While office seeking incumbents in India and elsewhere would like to minimize uncertainty and

[4]For a more detailed survey of literature on electoral cycles, see Dubois (2016), Klomp and de Haan (2013), Drazen (2000, 2001), Franzese (2000, 2002), Franzese and Long-Jusko (2006) and Shi and Svensson (2003).

[5]Evidence suggest that political business cycles are more pronounced in new democracies as they tend to be characterized by less fiscal transparency than established democracies (Persson and Tabellini 2003, Shi and Svensson 2002, Alt and Lassen 2006).

[6]Scholars have shown that left parties are more likely to pursue policies associated with higher growth and lower unemployment, even at the cost of inflation, than right parties. For example, Krause (2005) in the case of United States finds that income growth is higher under Democratic administrations, but that Republican administrations generate larger pre-election economic expansions.

[7]For example, Beck (1987) finds no cycle in monetary instruments the United States and concludes that while the Federal Reserve Board might accommodate fiscally induced macroeconomic cycles generated by the president and Congress, it does not generate cycles itself.

maximize their re-election prospects, their ability to induce a price cycle depends upon a variety of factors. Alt and Rose (2007) argue that such cycles are "context conditional" as incumbents need not only have the incentives, but also the ability to intervene in a manner that induces such political cycles. For them, inducing an electoral cycle is not merely a question of desirability, but also of feasibility. Thus, they have to choose between the range of employable options available to them after weighing the cost-benefit matrix of each option. We argue that incumbents are likely to be strategic in selection as it is virtually impossible to induce cycles in all food commodities. They would like to maximize their return on efforts made for intervention (Brail and Post 2015, Spiller and Savedoff 1999). Thus, incumbents' preference depends on two factors: (a) a large section of the electorate puts a premium on the commodity,[8] and (b) commodity's market structure is favourable for intervention. In other words, incumbents do not need to intervene for commodities that are available for purchase at the state-subsidized outlets (Public Distribution System shops in case of India. It is more feasible for them to intervene for commodities that are usually purchased from the open market, but the supply chain of the commodity is controlled by few traders, i.e., a cartel. Further, an oligopolistic market structure is a fertile ground for finding trader-politician collusion as the latter need to ensure cooperation from relatively fewer individuals. In some countries, the commodity market is highly regulated, and incumbents have near-total control over the supply and pricing. In such a scenario, they can easily influence the prices of food commodities closer to elections using a variety of formal regulatory strategies. However, as we explain later in this section, formal instruments are not always feasible, and even if they are, they may not always yield the desired results. Thus, incumbents would prefer strategies which lie outside the purview of formal measures (Bril and Post 2015).

Under what conditions can incumbents induce such a cycle? The scholarship has found mixed results suggesting that the magnitude of the cycle depends on the "institutional, structural, and strategic contexts in which elected, partisan incumbents make policy" (Franzese 2002). The incumbent's ability to intervene in the commodity market increases when there is a credible threat for traders controlling the supply chain of food commodities to comply. This threat is greater under two con-

[8]Commodities which are used by a majority of the electorate, regularly used, perishable (which means it cannot be purchased in bulk and stored for long), and cannot not be easily substituted with another

ditions. First, even though there is always an uncertainty around getting re-elected in competitive electoral democracies, trading cartel controlling the supply chain would be more willing to comply if incumbents provide a clear signal of high ex-ante re-election probability (Schultz 1995; Carlsen 1997). Second, in a federal setup, the threat of punishment in case of non-compliance is higher, when the same party is in power at the national and state level (Jones et al 2000, Dillinger and Webb 1999, Wibbels and Rodden 2002, and Khemani 2004). In such cases, incumbents have greater resources and instruments at their command for directing actions of those controlling the supply chain.[9]

We argue that formal instruments are often not feasible for keeping prices of such essential commodities under check.[10] Moreover, sometimes using formal policy instruments may end up hurting the interest of the incumbent. This becomes extremely important if the commodity has an oligopolistic market. In highly competitive democracies where contesting elections is a costly business, economic actors like commodity market traders are also a source of campaign finance (Kapur and Vaishnav 2018). Use of formal instruments like a crackdown on hoarding would hurt traders and in turn decrease campaign finance support for the incumbents. Thus, the best strategy for an incumbent would be to collude with these trading cartel and make arrangements so they bear the cost of incumbents' re-election in lieu of unhinged cartel rents in the post-election period. We suggest that our argument about informal strategy of inducing electoral cycle is different from the logic of political connectedness prevalent in the existing literature. In the latter case, while the incumbents bestow favouritism in choosing the economic agent (firms, individuals etc.), they use formal regulatory strategies such as a licensing system to enter into quid-pro-quo arrangements.[11]

Under what conditions would trading cartels comply? There has to be a credible threat that non-

[9] As Khemani (2004) has observed in the case of India, whenever a state government is controlled by the same political party that controls the national government, that specific state government tends to have higher spending and an above average fiscal deficit.

[10] For example, an incumbent may influence prices by changing the trade policy. This is not feasible in a federal system such as India. The national and the state governments have separate areas of jurisdictions. While agriculture lies in the domain of state governments, the trade policy is decided by the national government. Similarly, incumbents may try increasing production through supply-side incentives like raising the minimum floor prices for farmers. In election years, governments may avoid increasing floor prices as it could generate inflationary pressures.

[11] For example, Bertrand et al (2007) find that firms in France with politically connected CEOs are less likely to conduct job reductions in election years. Englmaier and Stowasser (2013) show that banks in Germany with county-level politicians as governing board members expand their lending activities closer to elections.

compliance could be costly. Scholars have suggested that the incumbent's ability increases when there is vertical alignment, i.e., same party is in power at the state as well as at the national level (Khemani 2004, Saez and Sinha 2010, Chhibber 1999). Vertical alignment not only expands an incumbent party's access to formal instruments for controlling prices but also increases the effectiveness of informal regulatory strategies. Similarly, many scholars have also emphasized that the context of an election determines an incumbent's desire to induce an electoral cycle. If there is a favourable perception of the incumbent's performance and it has no credible threat from the opposition, there is no need to influence the prices of essential commodities. The results are inconclusive as some scholars have found a significant impact of electoral competitiveness (Aidt et al. 2011; Benito et al. 2013b), while others have found no effect (Chaudhuri and Dasgupta 2005; Schneider 2010). In contrast to traditional electoral cycle models, in which larger the margin, the lower the incentive to intervene to secure reelection, there is a growing literature on leviathan behaviour (Brennan and Buchanan 1980), in which politicians are viewed as power-maximizing agents. Studies have found that a higher margin is associated with the greater government capacity for increasing expenditures and taxes (Dubois et al. 2007; Solé-Ollé 2003, 2006). We suggest that trading cartels would be more willing to comply when the incumbents are in power with large majorities. There is some evidence that unless there are exceptional circumstances, incumbents with large majorities are more likely to get re-elected.

3 Context and Data

Food inflation is a critical issue in Indian politics. The Indian National Election Studies have consistently shown that inflation is the most important issue for voters. In the 2014 Lok Sabha election, almost one-fifth of the voters said that price rise was the most important issue while voting (Cherian 2015). Some observers have argued that the Congress-led coalition government lost the 2014 national elections due to high inflation. The then Finance minister in an interview candidly admitted, "I think high inflation was a big red in the UPA-2 report card."

Onions hold special significance for the Indian voter; there is a widespread belief that incumbents in India have lost power due to soaring onion prices. For instance, Indira Gandhi swept back into power in 1980 by turning the price of onions into a populist rallying cry. Wallace (1980) termed it the *pyaaz* (onion) elections as onion prices were an overwhelming concern for voters. The Congress party took out front page newspaper ads blaming the incumbent Charan Singh government for failing to keep onion prices under check. Indira Gandhi waved garlands of onions in political rallies while famously attacking the government for its failure to control prices. Auerbach (1980) reported that even before Indira Gandhi took the oath of office after her party's landslide victory, onion prices dropped by around 20 percent. This was attributed to traders reducing their premium to avoid strict controls by Indira Gandhi's new government.

Similarly, it is argued that the incumbent Bharatiya Janata Party (BJP) lost power in 1998 Delhi assembly elections partly due to a spike in vegetable prices, especially onions. In March 1998, the Bharatiya Janata Party (BJP) had won all seven parliamentary seats with 51.7 percent votes in the national capital, Delhi. However, in the state assembly election held later that year a few months after the party's historic decision to test the nuclear bomb and well within its "honeymoon" period, the party's vote share declined sharply in Delhi to just 34 percent. Most accounts of the election attribute BJP's defeat to the sharp spike in onion prices prior to the elections. As the price of an item used daily in most households doubled over a few months, voters decided to punish the incumbent at the time of voting (Dugger 1998). Why have onions acquired such political significance? Yogendra Yadav, then a political scientist and now a politician, aptly responded to a question after the 1998 onion-crisis, "Onions are a metaphor for the world turned upside down. They become a symbol of what is happening to the basic things of life."[12]

Political system: India has a federal polity where the powers between national and state governments have been clearly delineated under Article 293 of the Constitution. India is a parliamentary democracy with regular elections for the national parliament and state legislatures. Elections are

[12]Onions are a part of the basic diet across the country. In rural India, even in the absence of other food, people often eat *Rotis* (flatbreads) with raw onions and green chillies. India is the world's second largest producer of onions and accounts for around one-fifth of the global production (Chengappa et al. 2012). This makes India a net exporter of onions and imports usually occur only when there is a sharp fall in domestic supply due to natural shocks.

held every five years but their timing is staggered. There is a robust multi-party competition at the national level and in many states. The party/coalition with a majority in the legislature forms the government in each state. State governments are headed by the Chief Minister who is supported by a council of ministers selected from the legislators.

Food markets: Most lower income households in Indian cities buy staple grains (rice, wheat and pulses) at subsidized rates from fair price shops operated by the governments, vegetables (potato and onions) from local vendors, and other commodities (edible oil, tea, salt etc.) from local shops but these are manufactured by branded companies. For long the Indian state has remained concerned with the smooth supply of essential commodities; especially food items. The Essential Commodities Act, 1955 was enacted to protect consumer interest from traders. The Act provides for the regulation and control of production, distribution and pricing of commodities which are declared as essential for maintaining or increasing supplies or for securing their equitable distribution and availability at fair prices [13] While the national government has the power to include or exclude an item from this list, the state governments are responsible for enforcing the provision in their jurisdiction. Interestingly after the onion-crisis of 1998, the central government brought onions within the purview of the essential commodities act. In October 2004, a few months after a new government was sworn in, they were removed from the act. They were again added to the list when the BJP came to power in 2014.[14]

Agriculture markets: Agriculture markets in India are highly regulated by state governments through special laws and legal provisions. For instance, primary transactions (from producers to large wholesale traders) in many states are restricted to designated markets (locally referred to as *Mandi*). Many states in India have enacted the Agricultural Produce Marketing Committee (APMC) Act which has led to the establishment of committees in each agricultural market and increased state regulation of agricultural marketing (Chengappa et al. 2012). These committees are often controlled

[13]The Prevention of Black Marketing and Maintenance of Supplies of Essential Commodities Act, 1980 (PBM Act) is implemented through state governments for prevention of illegal and unethical trade practices like black marketing of commodities. It covers all the essential commodities including the ones targeted under PDS.

[14]Remya Nair and Neha Sethi, Govt brings onions, potatoes under the Essential Commodities Act, The Livemint, July 3, 2014.

by influential traders or local politicians who are able to direct market activity/transactions in their favour. For instance, the committees approve licenses required for trading in the market and this often allows them to control the entry of new players in the market. Politicians across party lines have deep connections with the influential traders and APMC committees (Jain 2014; Kumar 2017; Suryawanshi 2017). In states where the managing committee of APMCs are elected, parties play an active role in the elections. For instance, in Maharashtra, the NCP and Congress held control of most APMCs. The voting rights for local government functionaries allowed them to extend their electoral dominance to the agriculture sector and get their representative elected to the committees (Ghadyalpatil 2017). Similarly, in Gujarat, the BJP held control of more than 90 percent APMCs across the state (Uttam 2017).

Prices data: We use a panel data set of weekly wholesale and retail prices for 16 food commodities from 1993 to 2012. This data is available for twenty-eight urban centres spread across eighteen states of India.[15] These prices have been collected by the Price Monitoring Cell (PMC) of the department of Consumer Affairs, Government of India. The cell collects this information from the Civil Supplies Department of all states to assist central policymakers in actively monitoring prices of daily use commodities. For most commodities, we have data for the entire period under study for all centres. This enables us to compare results for various commodities and also ensures that results cannot be attributed to missing data for a specific period. This dataset allows us to analyze changes in prices encountered by many consumers in retail markets rather than figures from headline inflation rates. There may be some concerns regarding this data as one could argue that governments deliberately misreport prices around elections (while actual prices encountered by consumers are much higher) to avoid a public uproar. We validated the PMC data by comparing prices reported in news reports in the Times of India. Figure A1 presents a scatter plot with the fitted line based on 37 instances of matched newspaper prices. The high correlation, reaffirms the validity of the our data.

[15]These include both state capitals and tier two cities. There are nine centres from North India – Amritsar, Delhi, Hisar, Kanpur, Karnal, Lucknow, Ludhiana, Mandi and Shimla; nine centres from Western and Central India – Ahmedabad, Bhopal, Indore, Jaipur, Jodhpur, Mumbai, Nagpur, Panjim and Rajkot; five centres from East India – Bhubaneshwar, Cuttack, Guwahati, Kolkata and Patna; and five centres from South India – Ernakulam Bangalore, Chennai, Hyderabad and Vijayawada.

4 Empirical Strategy

The variation in the timing of state elections across the country allows us to identify electoral cycles in food prices. We use fixed effects model to identify electoral cycles and the empirical analysis is primarily based on equation 1.

$$y_{c,t} = \beta\tau + \gamma\tau^2 + u_c + v_t + w_{r,t} + e_{c,t} \tag{1}$$

The analysis is conducted at the city-week level. Here, $y_{c,t}$ represents the average weekly retail price of the food item at city c in week t (winsorized at the 5^{th} and 95^{th} percentiles). The main variables of interest are τ and τ^2, as these represent the linear and quadratic terms for weeks to the next state assembly election ($\tau \in \{0, 1, 2, ..., 260\}$). The city-fixed effects u_c control for all time-invariant observable and unobservable differences across cities which may influence food prices. The week fixed effects v_t control for all time-variant confounding variables which are common to all cities. $w_{r,t}$ represents region-time varying flexible controls which could refer to region $\times$ year FE or region $\times$ month FE. These allow us to non-parametrically control for any regional level temporal variation that might bias the estimates. The idiosyncratic errors e_{ct} are clustered at state level. The coefficients β and γ, indicate the change in the average weekly price of the food item as elections approach. We expect these to be positive and negative respectively. This would indicate an inverted U-shaped relationship between food prices and weeks to election i.e. prices tend to rise after an election and decline as the next election approaches.

The model allows us to control for numerous potential biases in the estimates. First, prices can depend on various city-specific factors like local preferences and tastes of residents, geographical conduciveness for production etc. The city fixed effects allow us to control for such factors and identify 'within-city' variation in prices. Second, the week fixed effects control for variations due to time-variant factors which are not specific to any city. Such factors can range from seasonal patterns in prices of certain commodities or price incentives or market interventions by the national

government. They also help in accounting for some city invariant improvements in the data collection process. Third, prices in the retail market depend on supply and domestic production of the commodity which may, in turn, be affected by acts of nature like nonseasonal rain or drought. We try to control for such factors by using region $\times$ year and region $\times$ month fixed effects. These allow us to control for factors which are specific to a state in a particular year or month. As such events rarely occur in a single city and usually affect an entire state, we are able to control them through region $\times$ year FEs.

5 Findings

We first examine the existence of electoral cycles in all 16 commodities. We then conduct some robustness checks to test the validity of our main results. Finally, we check for heterogeneous effects that inform our theoretical prediction. Table 1 provides summary statistics for variables used in the study.

We estimated the model represented by equation 1 for all sixteen commodities in our data set. Figure 1 provides coefficient estimates for all sixteen commodities. We find electoral cycles only in the case of onions. Table 2 and figure 2 present results for onions from various specifications. The first column, i.e., model 1 reports a limited version of equation 1 with only city and week fixed effects. Models 2 and 3 include zone-year and zone-month fixed effects respectively in addition to the base model. The coefficients of interest (β and γ) are statistically significant in all three specifications. The coefficients indicate the retail prices of onions tend to drop as elections approach and rise during the initial part of an incumbent's tenure. In terms of magnitude, the coefficient is highest in Model 1, with only a marginal decline as we include additional fixed effects. Further, figure 2 provides a visual representation of Model 3.

[TABLE 2 HERE]

In order to test for robustness we take the model with the most aggressive fixed effect structure (model 3) and conduct further sensitivity checks. In Table A2, we first control for time-varying factors like weather conditions, access to market supply and political competition. We use average monthly temperature and rainfall as indicators for weather conditions (col 1-2). We consider access to the largest wholesale market for onions (Lasalgaon, Maharashtra) as a proxy for market access in col 3. We add distance-year fixed effects to allow for time-varying improvements in accessibility due to reduction in transportation costs. We account for competition by controlling for margin of victory (in terms of vote share) and turnout in the previous state election in col 4. We find that the main coefficients of interest remain statistically significant despite adding these additional variables. In fact, the magnitude of the coefficients is marginally higher.

Our results are also robust to alternative transformations of the dependent variable and changes in the estimating sample. Table A3, Panel A implies that the findings cannot be attributed to winsorizing of commodity prices. The results remain similar even when we use all observed values of retail onion prices in the data set (including the endogenous early elections) in Panel B . There is wide variation in the population of cities covered in our sample. The results presented above give equal weights to all cities in the estimating sample. We re-estimated the main result for onions after weighing by the city's population from the 2001 Indian census. Again, the results remain qualitatively unchanged.

5.1 Heterogeneous effects

We find evidence for the conditional occurrence of political price cycles in onion prices. We test for differences in the strength of cycles based on centre-state alignment, the ex-ante probability of the incumbent's re-election and nature of market regulation. Centre-state alignment indicates whether the state incumbent is also in the ruling coalition at the national level. We categorized incumbent strength on the basis of the proportion of seats held in the legislative assembly. Incumbents holding a special majority i.e. more than two-third seats were considered as strong incumbents while those

with a simple majority were classified as weak incumbents. Onions were added to the list of items covered by the Essential Commodities Act, 1955 in June 1999 and removed in October 2004. This period is considered as a period of high regulation as governments were entrusted with greater powers to regulate traders and introduce stock controls. Table 3 presents results from these split sample regressions. The split-sample regressions test for heterogeneity by centre-state alignment, incumbent strength in columns and inclusion of onions in the Essential Commodities Act, 1955 have been presented in table 3. There is suggestive evidence that political price cycles in onions occur when there is centre-state alignment, a higher ex-ante probability of incumbent's re-election, and the market is relatively less regulated.

[TABLE 3 HERE]

5.2 Mechanism

Given that we observe both retail prices (prices consumers receive) and wholesale prices (prices paid to the farmer at the agricultural market) in the data, we can test whether there is a cycle in the traders' markup prices (difference between retail and wholesale prices). Since wholesale prices are not available for the full period, we re-estimate equation 1 for only comparable data. Table 4, Panel A suggests that there is weak evidence for cycles in onion prices but a cycle in the retail prices of onions persists, indicating that trading cartels take a hit prior to the election to reap benefits in the post-election period.

[TABLE 4 HERE]

How do incumbents manage to induce this cycle? Incumbents have various formal and informal regulatory strategies available to them to influence prices. In section 2, we provided a rationale for why formal instruments are unlikely to work. We suggest that incumbents collude with large traders who control the supply chain of onion market. This collusion begins with implicit understanding

that if these traders can keep a check on prices prior to election period, they may reap benefits in the post-election period. The incumbents can signal credible threat due to vertical alignment and a strong majority. Hoarding is extremely common in the onion sector in India and has been identified as an important factor behind instances of skyrocketing prices despite adequate production; some of the months with high stock arrivals often witness higher prices. Trading cartels hold on to large volumes of onions bought from the farmers immediately after harvest at low prices and release the supply in a way to influence prices. If these traders do not comply, incumbents can crackdown and act against hoarders. Such an action would hurt traders, but may also lead to a decline in campaign finance support that comes from trading communities. Thus, collusion is a better strategy for both players.

A detailed investigation by journalists and Competition Commission of India (CCI) provides us with some insights into how onion cartels operate and how political collusion works. After several instances of public outrage over soaring onion prices, the CCI asked a team of agricultural economists to look into the matter. The reports find onion as a case of dysfunctional agricultural markets in India, dominated by trader cartels under political patronage. Similarly, another study on onion markets by the National Council of Applied Economic Research, which, like the CCI report, identified collusion as a key limitation of wholesale markets, pointed out that 8-10 traders dominate trade in all *mandis*. These reports along with journalistic investigations point that all big traders are also commission agents but it is a common practice to acquire separate licenses in the name of their relatives. One of the reasons why cartels thrive is the proximity between traders and those meant to protect farmers, the Agricultural Produce Management Committee, or APMC, which hands out trading licenses. Under APMC law, out of the Committee's 21 members, 18 have to be farmers, voted for by farmers. Traders have only one representative. In reality, the APMC elections are like mini-political contests. The remaining committee members are all from political parties, who, many say, use the patronage and money from the *mandi* to further their political career.

The lead economist on the CCI report in an interview said, "The entire range of intermediaries comprising the commission agent, wholesaler, transporter, storage chain owner, and even the railway

agent, usually belong to the same family." It is such a closed and monopolistic nexus that across major onion markets in India, a network of a few families controls the supply chain. This is compounded by the fact that approximately, one-third of Onion produce in India come from Maharashtra and another 15-20 percent from neighbouring Karnataka. Even within these states, there are specific areas where onions are grown.

5.3 Alternate explanations

conventional theories of political competition imply that we should see cycles when the race is close as only then will incumbents have the incentive to induce a cycle. These theories do not fit well with the key mechanism we have in mind (collusion requires strong governments) but we nevertheless test for these hypothesis in Table 5. We examine heterogeneity by three commonly used measures of political competition (electoral volatility, the margin of victory, and turnout in the previous state assembly election) and cannot reject that there is no cycle. Electoral volatility in columns (1) and (2) has been categorized based on data in Nooruddin and Chhibber (2008). We test for the expected closeness of the election through the margin of victory, measured in terms of the vote share i.e. the difference in the vote share of the winning party/coalition and the runner's up. The binary categorization is based on below and above median margin of victory. We consider turnout in the preceding election as a proxy for "turnout buying" in the subsequent election (Nichter 2008). Observations for which turnout in the previous state assembly election was lower than the median (66.9 percent) are categorized as low turnout; rest are categorized as high turnout. Unlike the heterogeneous effects, these factors do not explain political price cycles for onions in India. In Table 5, none of the coefficients except γ in column (4) are statistically significant.

[TABLE 5 HERE]

6 Discussion

In this paper, we provide evidence on how incumbent politicians can manipulate prices of essential commodities in the run-up to elections to improve public perception of their economic performance. We provide evidence for an electoral cycle to onion prices in India. The market structure for onions is controlled by few large traders, and primary transactions (from producers to large wholesale traders) can only take place in designated markets (locally referred to as *mandis*) and thus very feasible for politician-trader collusion to affect prices.

The findings of the paper raises two further questions. First, do incumbents always benefit from inducing an electoral cycle? The evidence on this front is also mixed.[16] In Table A4 we compare the results of cycles in cases of constitutionally scheduled elections (col 1) with those in cases of early elections (col 2). We find that the cycles are stronger in the latter case and the difference between the two columns is statistically significant. These findings should be interpreted cautiously since early elections are endogenous. A future direction of research should explore the strategic timing of elections and the consequences of such cycles.

Second, while the results statistically significant, there could be concerns about the actual effect size. In our view, voters encounter changes in the price of food commodities on daily basis. So even when the increase in prices is small, for a majority of Indian voters who live on one dollar a day, this is a significant difference to form their opinion about inflation. This makes incumbents wary of public sentiment on prices of essential commodities. Moreover, our main argument in this paper is about incumbent-trading cartel nexus. And even with small changes in actual price, the volume of onion sold every season determines the profit and loss. For example, Srinivasan Jain in his report on the economics of onion *mandis* does a simple math to show the unhealthy synergy between traders and the *mandi* bosses-cum-politicians: "Traders say they are not reckless profiteers, and that they only get a 4-10 per cent commission from the farmer. But last year, about 4 million tonnes were

[16] Brender and Drazen's (2008) find no impact of the pre-election budget deficit on reelection probability, while others (Aidt et al. 2011) find that greater expenditures in the election year lead to greater vote differences between the incumbent and the main opponent.

traded by Maharashtra's *mandis*. Multiply that by the average price of the trade - Rs. 25 per kilo - and the total amount of onions sold comes to Rs. 10,000 crores. 4 per cent of that is Rs. 400 crores of profit, a huge amount divided between a very small pool of traders. Those margins can shoot up even higher if there is a shortage, genuine or perceived. But as we found in Delhi's Azadpur *mandi*, commission agents say they receive consignments directly from Nashik traders, on whose behalf they sell onions to wholesalers. The profits go directly back to Nashik. The agent's 6 per cent commission comes from his buyers. As with the Nashik *mandis*, Azadpur too operates as a tightly controlled cartel, making it difficult to ascertain how pricing works."

To sum up, in this paper, we show the existence of an electoral cycle in retail (but not wholesale) onion prices in India. The odds of manipulating onion prices are higher because of its oligopolistic market structure. The electoral cycles cannot be explained by conventional theories of political competition and the logic of turnout buying. There is suggestive evidence that cycle occurs when market is (relatively) less regulated, when there is a vertical alignment between incumbents and when incumbents have a large majority in the house. We believe that the underlying mechanism is collusion between the incumbents and trading cartels. We argue that so far the literature on electoral cycles and welfare spending on public utilities has overlooked the role of informal regulatory strategies such as trader-politician collusion and this is an important avenue for future research.

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8 Tables

Table 1: Summary Statistics

	Mean	S.D.	Min	Max
Retail onion price (per kg)	8.75	5.43	1.50	65.00
Retail onion price, winsorized (per kg)	8.52	4.32	3.50	20.00
Wholesale onion price (per 100 kg)	736.94	449.04	75.00	5850.00
Wholesale onion price, winsorized (per 100 kg)	720.70	363.30	300.00	1700.00
Centre-state alignment (in percent)	0.44	0.50	0.00	1.00
Strong incumbent (in percent)	0.63	0.48	0.00	1.00
Regulation (in percent)	0.31	0.46	0.00	1.00
High electoral volatility	0.43	0.5	0.00	1
Margin of victory (t) (in percent)	0.08	0.06	-0.01	.23
Close election	0.49	0.50	0.00	1.00
Turnout (t-1) (in percent)	0.65	0.11	0.24	1.00
High turnout (t-1) (in percent)	0.49	0.50	0.00	1.00
Congress incumbent (in percent)	0.36	0.48	0.00	1.00
BJP incubment (in percent)	0.23	0.42	0.00	1.00
Mid-term/early election (in percent)	0.19	0.39	0.00	1.00
Monthly rainfall (in mm.)	8.55	12.61	0.00	91.23
Monthly temperature (in °c)	25.68	5.56	7.60	36.90
Market access (in kms.)	1149.31	507.20	225.00	2546.00
N	24,135	24,135	24,135	24,135

Note: Centre-state alignment indicates whether the state incumbent was also in the ruling coalition at the centre. Strong incumbents held more than than two-third seats in the state legislative assembly. Onions were included in the list of items covered by the Essential Commodities Act, 1955 in June 1999. This is the period of high regulation. High production states are identified on the basis of annual onion production. The top nine onion producing states have been classified as high production states (Andhra Pradesh, Bihar, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, and Uttar Pradesh). City-week observations during which turnout in the preceding state assembly election was higher than the median - 66.9 percent, are categorized as high turnout. Elections which were held before the constitutionally mandated date have been classified as mid-term/early elections. This includes cases of dissolution of assembly due to inability to form the government, no party/alliance with a majority or early elections by the incumbent party. The largest market for onions in India is Lasalgaon, Maharashtra. The estimating sample includes 28 cities across 4 regions in India.

Table 2: Electoral Cycles in Retail Prices of Onions

	(1)	(2)	(3)
Weeks to election (τ)	0.006661**	0.005670**	0.005668**
	(0.002644)	(0.002430)	(0.002764)
τ^2	-0.000023**	-0.000019**	-0.000019*
	(0.000010)	(0.000009)	(0.000011)
N	19,516	19,516	19,516
City FE	Yes	Yes	Yes
Week FE	Yes	Yes	Yes
Additional FE	None	Region $\times$ year	Region $\times$ month

Note: Table 2 shows that onion prices vary with the timing of election. The estimates represent β and γ from the following equation: $y_{c,t} = \beta\tau + \gamma\tau^2 + u_c + v_t + w_{r,t} + e_{c,t}$ where $y_{c,t}$ represents the average weekly retail price of onions at city c in week t (winsorized at the 5^{th} and 95^{th} percentiles); τ represents weeks to the next constitutionally scheduled state assembly election ($\tau \in \{0, 1, 2, ..., 260\}$), u_c represents city-fixed effects, v_t represents week fixed effects, $w_{r,t}$ represents region-time varying flexible controls which could refer to region $\times$ year FE or region $\times$ months FE, and e_{ct} are idiosyncratic errors clustered at state level. The estimating sample includes 60 elections in 28 cities across 4 regions in India. The sample excludes midterm and early elections. Standard errors in parentheses. * p $<$ 0.1, **p $<$ 0.05, *** p $<$ 0.01

Table 3: Electoral Cycles in Retail Prices of Onions: Heterogeneous Effects

	Centre-state alignment		Incumbent strength		Formal regulation	
	(1)	(2)	(3)	(4)	(5)	(6)
Weeks to election (τ)	0.002889	0.012232*	0.000880	0.006937***	0.008040**	0.000910
	(0.003056)	(0.006327)	(0.004775)	(0.002679)	(0.004053)	(0.001502)
τ^2	-0.000017	-0.000053**	0.000008	-0.000025**	-0.000026*	-0.000004
	(0.000012)	(0.000025)	(0.000019)	(0.000011)	(0.000015)	(0.000006)
N	11,563	7,875	6,936	12,553	13,744	5,772
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes	Yes	Yes
Region $\times$ month FE	Yes	Yes	Yes	Yes	Yes	Yes
Sample Restriction	Not Aligned	Aligned	Weak	Strong	Low	High

Note: Table 3 shows that the electoral price cycles are strongest when center and state governments are aligned, when incumbent governments are strong and when markets are relatively unregulated. The estimates represent β and γ from the following equation: $y_{c,t} = \beta\tau + \gamma\tau^2 + u_c + v_t + w_{r,t} + e_{ct}$ where $y_{c,t}$ represents the average weekly retail price of onions at city c in week t (winsorized at the 5^{th} and 95^{th} percentiles); τ represents weeks to the next constitutionally scheduled state assembly election ($\tau \in \{0, 1, 2, ..., 260\}$), u_c represents city-fixed effects, v_t represents week fixed effects, $w_{r,t}$ represents region-month FE, and $e_{c,t}$ are idiosyncratic errors clustered at state level. The split-sample regressions test for heterogenity by centre-state alignment in columns (1) and (2), incumbent strength in columns (3) and (4) and inclusion of onions in the Essential Commodities Act, 1955 in columns (5) and (6). Centre-state alignment indicates whether the state incumbent was also in the ruling coalition at the centre. Incumbents with less than two-third seats in the legislative assembly are weak incumbents while those with more than two-third seats are strong incumbents. Onions were included in the list of items covered by the Essential Commodities Act, 1955 in June 1999 and excluded from the list in October 2004. This is the period of high regulation. A SUR test of equality between impact of elections on retail onion prices in all the split sample regressions was statistically significant at conventionally used levels of significance. The estimating sample includes 60 elections in 28 cities across 4 regions in India. The sample excludes mid-term and early elections. Standard errors in parentheses. * $p < 0.1$, **$p < 0.05$, *** $p < 0.01$

Table 4: Electoral Cycles in Onion Traders' Markup Prices

	(1)	(2)	(3)
Panel A: Wholesale prices			
Weeks to election (τ)	0.568800**	0.374969	0.266241
	(0.249539)	(0.307820)	(0.349716)
τ^2	-0.001913**	-0.001051	-0.000726
	(0.000906)	(0.001019)	(0.001177)
N	13323	13323	13323
Panel B: Retail prices			
Weeks to election (τ)	0.006373**	0.007648**	0.007485**
	(0.002763)	(0.003312)	(0.003758)
τ^2	-0.000020*	-0.000026**	-0.000027**
	(0.000010)	(0.000011)	(0.000013)
N	13,315	13,315	13,315
City FE	Yes	Yes	Yes
Week FE	Yes	Yes	Yes
Additional FE	None	Region $\times$ year	Region $\times$ month

Note: Table 4 shows that there is weak evidence for cycles in wholesale prices. The estimates represent β and γ from the following equation: $y_{c,t} = \alpha + \beta\tau + \gamma\tau^2 + u_c + v_t + w_{r,t} + e_{c,t}$ where $y_{c,t}$ represents the average weekly wholesale price of onions at city c in week t (winsorized at the 5^{th} and 95^{th} percentiles); τ represents weeks to the next constitutionally scheduled state assembly election ($\tau \in \{0, 1, 2, ..., 260\}$), u_c represents city-fixed effects, v_t represents week fixed effects, $w_{r,t}$ represents region-month fixed effects, and $e_{c,t}$ are idiosyncratic errors clustered at state level. The estimating sample includes 60 elections in 28 cities across 4 regions in India. The sample excludes mid-term and early elections. Standard errors in parentheses. * p $<$ 0.1, **p $<$ 0.05, *** p $<$ 0.01

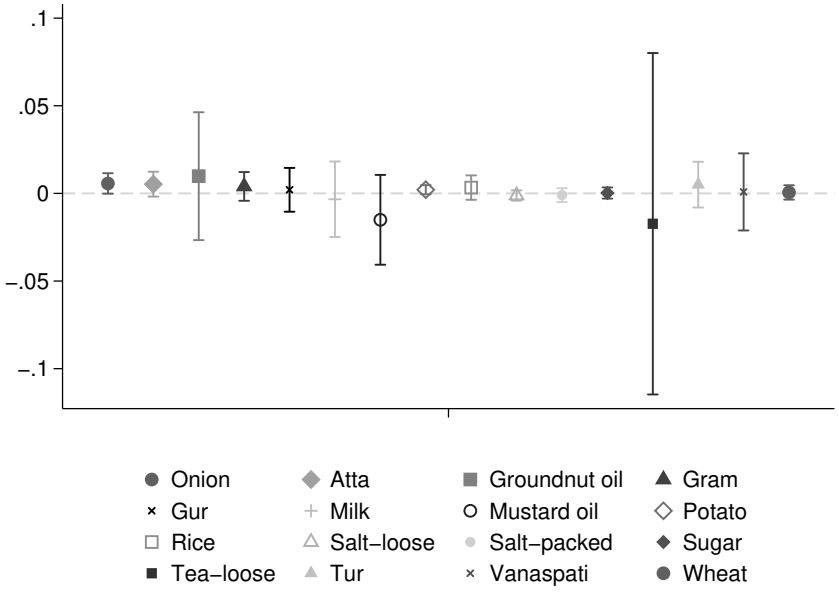
Table 5: Alternate explanations for Electoral Cycles in Retail Prices of Onions

	Electoral volatility		Margin of victory (t)		Turnout (t-1)	
	(1)	(2)	(3)	(4)	(5)	(6)
Weeks to election (τ)	0.006504	0.000092	0.004411	0.007437	0.001076	0.006119
	(0.006084)	(0.006825)	(0.004830)	(0.004537)	(0.005555)	(0.005640)
τ^2	-0.000024	-0.000001	-0.000015	-0.000032*	-0.000024	-0.000019
	(0.000022)	(0.000003)	(0.000019)	(0.000017)	(0.000022)	(0.000023)
N	12,235	6,796	9,668	9,834	10,401	9,097
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes	Yes	Yes
Region $\times$ month FE	Yes	Yes	Yes	Yes	Yes	Yes
Sample Restriction	Low	High	Low	High	Low	High

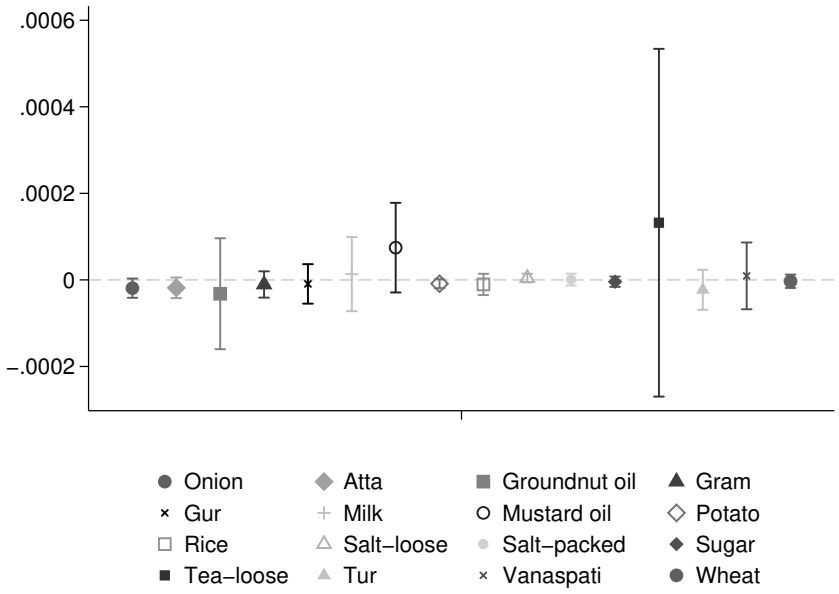
Note: Table 5 shows that the electoral price cycles cannot be explained by conventional measures of political competition. The estimates represent β and γ from the following equation: $y_{c,t} = \beta\tau + \gamma\tau^2 + u_c + v_t + w_{r,t} + e_{ct}$ where $y_{c,t}$ represents the average weekly retail price of onions at city c in week t (winsorized at the 5^{th} and 95^{th} percentiles); τ represents weeks to the next constitutionally scheduled state assembly election ($\tau \in \{0, 1, 2, ..., 260\}$), u_c represents city-fixed effects, v_t represents week fixed effects, $w_{r,t}$ represents region-month fixed effects, and $e_{c,t}$ are idiosyncratic errors clustered at state level. The split-sample regressions test for heterogeneity by electoral volatility in columns (1) and (2), margin of victory in columns (3) and (4) and turnout in previous election in columns (5) and (6). Electoral volatility is categorized based on data in Nooruddin and Chhibber (2008), Figure 2. Margin of victory is calculated using Bhavnani (2014). City-week observations for which turnout in the previous state assembly election was lower than median (66.9 percent) are categorized as low turnout; rest are categorized as high turnout. The estimating sample includes 60 elections in 28 cities across 4 regions in India. The sample excludes mid-term and early elections. Standard errors in parentheses. * p $<$ 0.1, **p $<$ 0.05, *** p $<$ 0.01

9 Figures

Figure 1: No electoral cycles in essential food commodities (except onions)



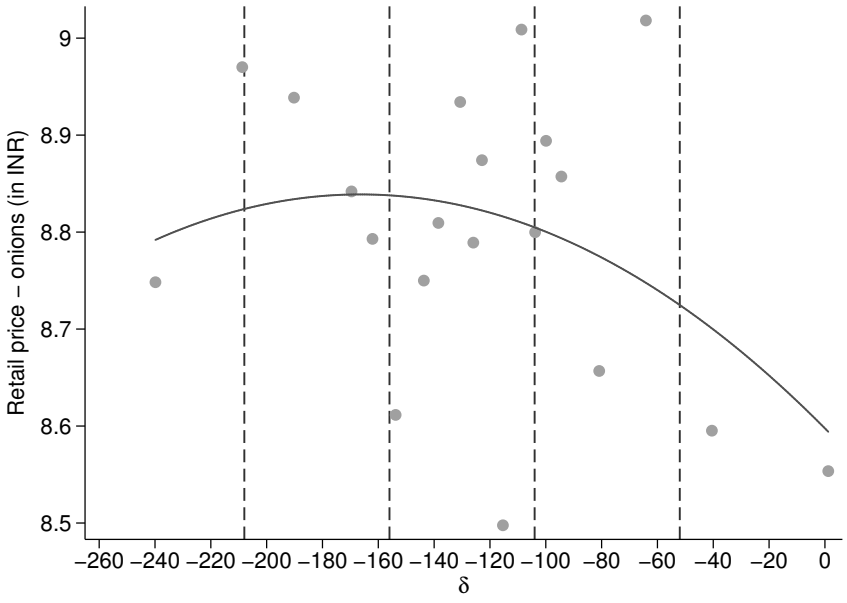
(a) Coefficient on τ



(b) Coefficient on τ^2

Note: Figure 1 shows that election cycles are only found in onion prices and not in other commodities. It plots β^j and γ^j from the following equation: $y^j_{c,t} = \alpha^j + \beta^j\tau + \gamma^j\tau^2 + u^j_c + v^j_t + w^j_{r,t} + e^j_{c,t}$ where $y^j_{c,t}$ represents the average weekly retail price of essential commodity $j \in$ {Atta, Groundnut oil, Gram, Gur, Milk, Mustard oil, Potato, Rice, Salt, Sugar, Tea, Tur, Vanaspati, Wheat} at city c in week t (winsorized at the 5^{th} and 95^{th} percentiles); τ represents weeks to the next constitutionally scheduled state assembly election ($\tau \in \{0, 1, 2, ..., 260\}$), u_c represents city-fixed effects, v_t represents week fixed effects, $w_{r,t}$ represents region-month fixed effects, and $e_{c,t}$ are idiosyncratic errors clustered at state level. The estimating sample includes 60 elections in 28 cities across 11 regions in India. The sample excludes mid-term and early elections. The error bars denote 95 percent confidence intervals.

Figure 2: Electoral cycles onion prices



Note: Figure 2 shows that the prices of onions are lowest closest to elections. It depicts the non-parametric relationship between the average retail price of onions and the timing of election ($\delta \in \{-260, ... -1, -2, 0\}$, where $\delta = -1 \times \tau$). The above binned scatter plot accounts for city FE, week FE and region $\times$ month FE. Each bin corresponds to nearly 1,000 observations. The dotted lines mark the end of the 1st, 2nd, 3rd and 4th term of the government. The estimating sample includes 28 cities across 4 regions in India and is restricted to only constitutionally scheduled elections.

A For online publication

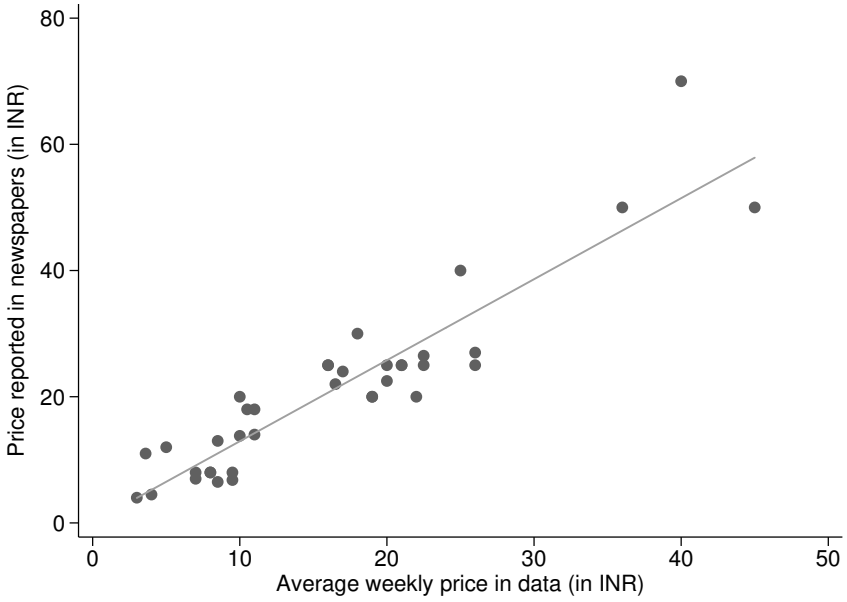
A.1 Data appendix

Table A1: Elections included in the analysis

			Year of election	
Region	State	City	Constitutionally scheduled	Unscheduled/early
South	Andhra Pradesh	Hyderabad	1994, 2004, 2009	1999
East	Assam	Guwahati	1996, 2001, 2006, 2011	-
North	Bihar	Patna	1995, 2000, 2005 (Feb), 2010	2005 (Oct)
North	Delhi	Delhi	1993, 1998, 2003, 2008	-
West	Goa	Panaji	1995, 2007, 2012	1999, 2002
West	Gujarat	Ahmedabad, Rajkot	1995, 2007, 2012	2000, 2002
North	Haryana	Karnal, Hisar	1996, 2005	2000, 2009
North	Himachal Pradesh	Mandi, Shimla	1998, 2003, 2007, 2012	1993
South	Karnataka	Bengaluru	1995, 2004	1999, 2008
South	Kerala	Ernakulam	1996, 2001, 2006, 2011	-
North	Madhya Pradesh	Bhopal, Indore	1998, 2003, 2008	1993
West	Maharashtra	Mumbai	1995, 2004, 2009	1999
East	Odisha	Bhubaneshwar, Cuttack	1995, 2000, 2009	2004
North	Punjab	Amritsar, Ludhiana	1997, 2002, 2007, 2012	-
North	Rajasthan	Jaipur, Jodhpur	1998, 2003, 2008	1993
South	Tamil Nadu	Chennai	1996, 2001, 2006, 2011	-
North	Uttar Pradesh	Kanpur, Lucknow	2002, 2007, 2012	1993, 1996
East	West Bengal	Kolkata	1996, 2001, 2006, 2011	-

Note: Unscheduled elections refer to midterm or early election (or in the case of Bihar, a re-election due to a 'hung assembly')

Figure A1: Validation of onion price data



Note: Figure A1 shows the correlation between retail onion prices reported in the data and those in news reports for matched weeks is high. The correlation coefficient is 0.92 (N=37). The onion 'newspaper' price was extracted from 139 articles related to onion prices published in the Times of India, Mumbai edition between 1993 and 2012.

A.2 Supplementary Information

Table A2: Robustness to controlling for time-varying factors

	(1)	(2)	(3)	(4)
Weeks to election (τ)	0.006098**	0.006205**	0.007343**	0.007232**
	(0.002930)	(0.002990)	(0.003545)	(0.003668)
τ^2	-0.000023**	-0.000023**	-0.000029**	-0.000028**
	(0.000011)	(0.000011)	(0.000013)	(0.000013)
N	17,582	17,582	17,582	17,558
City FE	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes
Region $\times$ month FE	Yes	Yes	Yes	Yes
Weather controls	Only rainfall	Rainfall and temperature	Rainfall and temperature	Rainfall and temperature
Market access $\times$ year FE	No	No	Yes	Yes
Political controls	No	No	No	Yes

Note: Table A2 shows that the findings are robust to controlling for potentially confounding factors such as weather and market access. The estimates represent β and γ from the following equation: $y_{c,t} = \alpha + \beta\tau + \gamma\tau^2 + \delta C_{i,t} + u_c + v_t + w_{r,t} + e_{c,t}$ where $y_{c,t}$ represents the average weekly wholesale price of onions at city c in week t (winsorized at the 5^{th} and 95^{th} percentiles); τ represents weeks to the next constitutionally scheduled state assembly election ($\tau \in \{0, 1, 2, ..., 260\}$), u_c represents city-fixed effects, v_t represents week fixed effects, $w_{r,t}$ represents region-month fixed effects, and $e_{c,t}$ are idiosyncratic errors clustered at state level. Col 1 and 2 control for weather conditions $(C_{i,t})$ like average monthly rainfall (in mm.) and average monthly temperature (in °c) in the city. Col 3 additionally controls for access to the largest market for onions - Lasalgaon. This is estimated by including an interaction between distance to Lasalgaon $\times$ year. The estimating sample includes 50 elections in 25 cities across 4 regions in India (data for rainfall and temperature could not be extracted for Ernakulam, Mumbai, and Panaji). The political controls include margin of victory in the election (t) and turnout in the previous election (t-1). The sample excludes mid-term and early elections. Standard errors in parentheses. * p $<$ 0.1, **p $<$ 0.05, *** p $<$ 0.01

Table A3: Robustness to alternative transformations and estimating samples

	(1)	(2)	(3)
Panel A: Unwinsorized prices			
Weeks to election (τ)	0.006052*	0.006872**	0.006441**
	(0.003634)	(0.003129)	(0.003040)
τ^2	-0.000021	-0.000024*	-0.000022*
	(0.000013)	(0.000012)	(0.000012)
N	19,516	19,516	19,516
Panel B: Population weights			
Weeks to election (τ)	0.006586**	0.007629**	0.008423**
	(0.002873)	(0.003383)	(0.003700)
τ^2	-0.000023**	-0.000025*	-0.000027*
	(0.000011)	(0.000013)	(0.000015)
N	19,516	19,516	19,516
Panel C: Including early elections			
Weeks to election (τ)	0.005821**	0.004307**	0.003482*
	(0.002157)	(0.001802)	(0.001895)
τ^2	-0.000021**	-0.000017**	-0.000014*
	(0.000009)	(0.000007)	(0.000007)
N	24,135	24,135	24,135
City FE	Yes	Yes	Yes
Week FE	Yes	Yes	Yes
Additional FE	None	Region $\times$ year	Region $\times$ month

Note: Table A3 shows that the findings in Table 2 are robust to not winsorizing prices, weighing the regression by city's population and not just restricting the sample to only constitutionally scheduled election. Note: The estimates represent β and γ from the following equation: $y_{c,t} = \alpha + \beta\tau + \gamma\tau^2 + u_c + v_t + w_{r,t} + e_{c,t}$ where $y_{c,t}$ represents the average weekly retail price of onions at city c in week t; τ represents weeks to the next state assembly election ($\tau \in \{0, 1, 2, ..., 260\}$), u_c represents city-fixed effects, v_t represents week fixed effects, $w_{r,t}$ represents region-month fixed effects, and e_{ct} are idiosyncratic errors clustered at state level. The estimating sample includes 77 elections in 28 cities across 4 regions in India. Standard errors in parentheses. * p < 0.1, **p < 0.05, *** p < 0.01

Table A4: Strategic timing of midterm/early elections

	(1)	(2)
Weeks to election (τ)	0.005668**	0.007562***
	(0.002764)	(0.002357)
τ^2	-0.000019*	-0.000034***
	(0.000011)	(0.000008)
N	19,516	4,573
City FE	Yes	Yes
Week FE	Yes	Yes
Region $\times$ month FE	Yes	Yes
Sample Restriction	Regular	Midterm/early

Note: The estimates represent β and γ from the following equation: $y_{c,t} = \alpha + \beta\tau + \gamma\tau^2 + u_c + v_t + w_{r,t} + e_{c,t}$ where $y_{c,t}$ represents the average weekly retail price of onions at city c in week t; τ represents weeks to the next constitutionally scheduled state assembly election ($\tau \in \{0, 1, 2, ..., 260\}$), u_c represents city-fixed effects, v_t represents week fixed effects, $w_{r,t}$ represents region-month fixed effects, and e_{ct} are idiosyncratic errors clustered at state level. The table compares regular elections and mid-term/early elections. The estimating sample includes 77 elections in 28 cities across 4 regions in India. Standard errors in parentheses. * p $<$ 0.1, **p $<$ 0.05, *** p $<$ 0.01