Article

Paddy Politics: Is there an Electoral Cycle in India's Agricultural Policy

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Abstract
Political incentives often motivate adjustments to economic policy that coincide with elections, a phenomenon known as the "electoral cycle". My paper studies this in the context of the Minimum Support Price (MSP) policy in Indian agriculture. I estimate a state and time fixed effects model for 28 Indian states from 2010-2023, finding significant rises in the effectiveness of MSP in the lead up to a scheduled election, indicating the presence of an electoral cycle. This finding is robust to different sets of control variables and complemented by an instrument for election timings. My results are consistent with theory on electoral cycles, which predicts more populist uses of economic policy just before elections. Furthermore, my paper adds to literature on electoral cycles in developing countries, a vital area in understanding the intersection between politics and development economics.

Keywords: Electoral Cycle, Minimum Support Price, Fixed Effects Model

1. Introduction

Economic policy is first political, then economic. Garnering voter support is imperative for politicians to remain in power, and therefore can outweigh the pursuit of economic wellbeing. For instance, governments may lower taxes and increase public spending in order to appease the electorate. Such populist expansionary policies are expected to be implemented just before elections, followed by necessary fiscal contractions after elections (Nordhaus, 1975; Lindbeck, 1976; Rogoff & Sibert, 1988; Rogoff, 1990). It is, then, reasonable to expect fluctuations in policy decisions that coincide with election timings, a phenomenon known as the 'electoral cycle' (Tufte, 1978).

Agricultural policy in India, where rural communities comprise 64% of the population (The World Bank, 2023), is an important setting to study in this regard. In February 2024, farmers protested against the Indian government, demanding the guaranteed enforcement of the Minimum Support Price (MSP), a price floor for crops, across all commodities. Not only does the MSP benefit farmers by protecting them against price shocks, but it also tends to favour regions where major lobby groups are present (Raghavan, 2004), indicating that the policy is politically consequential. Given that the farmer protest for guaranteed MSP also took place only a few months before the 2024 Indian general election, it is pertinent to study its electoral implications. Still, little research has thus-far been conducted on how elections influence the 'effectiveness' of MSP implementation. By the definition of price floor, no crop price should fall below MSP as long as it meets government quality standards (Ministry of Agriculture & Farmers Welfare, Government of India , 2024), and if it does MSP implementation is considered 'ineffective'. As such, 'MSP effectiveness' (MSPE) can be defined as the proportion of crop lots sold at prices equal to or above the MSP.

Figure 2 shows trends in MSPE overtime for 6 states around India with highlighted election timings and the years preceding them which can be seen as an area of high 'political volatility'. Interestingly, MSPE rises in the lead up to elections for some states like Uttar Pradesh but falls for others like Tamil Nadu, indicating heterogeneity in MSPE across states. Also, MSPE in Punjab and Delhi is always above 0.9, implying that the policy is implemented exceptionally well in those states/UTs, which is expected considering their political significance. Punjab is a large paddy-growing state and hosts major agricultural lobby groups (Raghavan, 2004), whist Delhi is the capital of the country.[1]

[1] The IEC tracks entire electoral cycles from 4 years before an election, so election data is collected from 2006 (4 years before earliest year, 2010).

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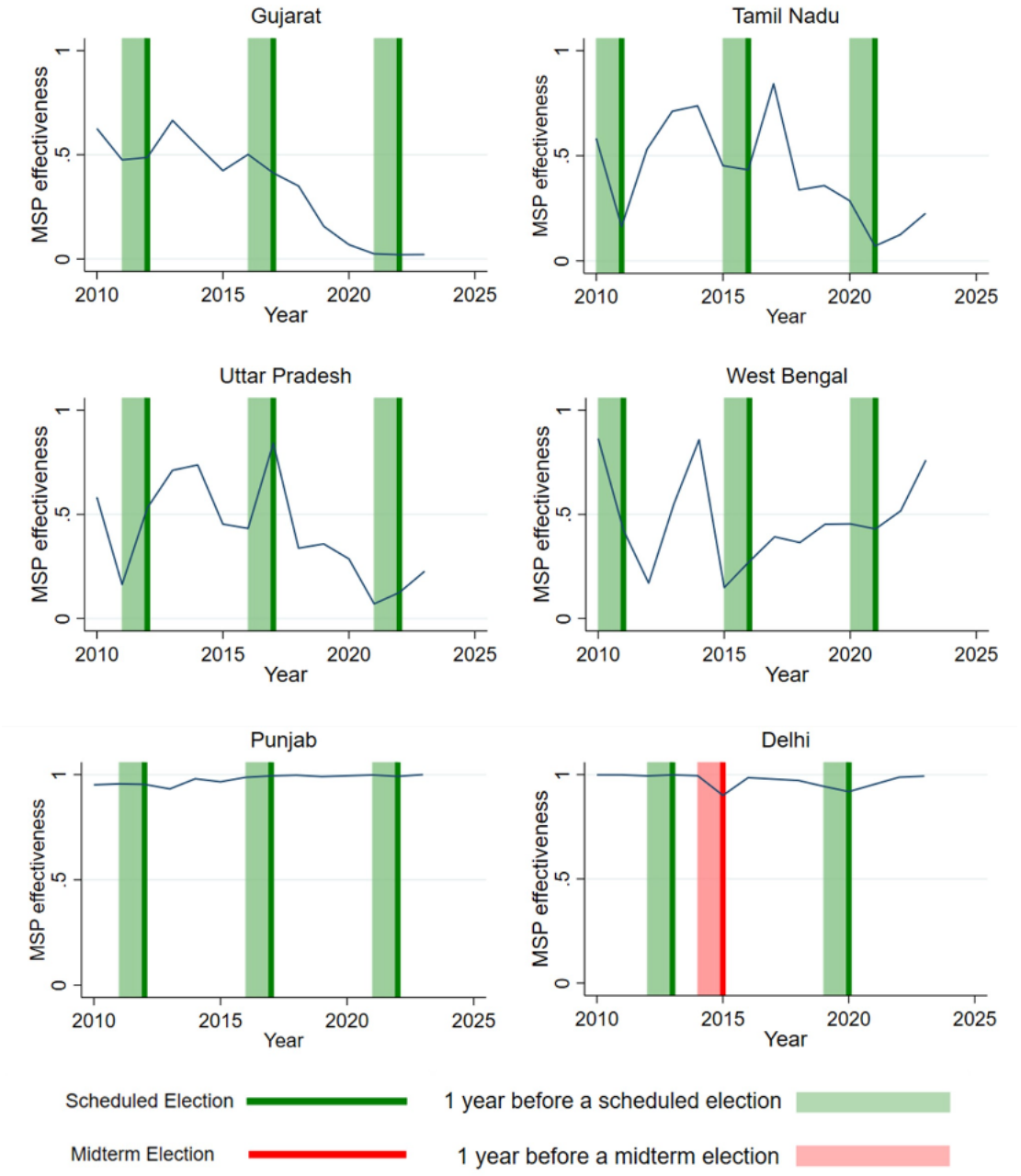

Figure 2: MSP effectiveness overtime and election timings for various Indian states

I study whether MSP implementation in India follows an electoral cycle or not. Previous studies on electoral cycles in developing countries tend to focus on broad fiscal policies (Khemani, 2004; Chauvet & Collier, 2009), and studies that explore electoral cycles in the agricultural sector only do so in OECD countries like the USA where only a minority of the population lives in rural areas (Witzke, 1990). Alternatively, studies on the MSP in India reach a consensus that the enforcement of MSP varies among different groups of farmers Specifically, farmers sowing in larger farms (Basantaray, 2023), selling from surplus-producing states (Ali, et al., 2012), and specialising in staple crops such as paddy (rice) or wheat (Chand, 2003), benefit the most from MSP implementation. My paper unites these two strands of literature by exploring the effect of election

timings on MSP effectiveness. I specifically focus on the market for common paddy because it is the most popular crop in India and, unlike Basmati paddy, it is cultivated across the whole country.

My paper expands upon existing literature concerning the MSP in India. The unwillingness of the Indian government to enforce the MSP has been acknowledged (Meenakshi & Banerji, 2005), but research measuring the 'effectiveness' of MSP is limited. Conventionally, MSP effectiveness is quantified by calculating the deviations of market price from MSP, with negative deviations implying that the MSP is ineffective (Ali, et al, 2012; Basantaray, 2023). However, studies tend to compare these deviations across states, rather than leveraging them to test for significant determinants of MSP effectiveness in a statistical model. Furthermore, this approach disregards the fact that MSP implementation depends on crop quality, limiting its ability in accurately identifying what causes variation in MSP effectiveness. In my research, MSP effectiveness is quantified as a continuous variable using the aforementioned rule, but in order to address the drawbacks of past studies, I take advantage of panel data. This allows me to adjust for paddy quality through the inclusion of state and time fixed effects, as will be discussed in section 4.

Moreover, my paper contributes to development economists' understanding of political incentives in the developing world. Theoretical research on electoral cycles in economic policy predate the rational expectations revolution (Nordhaus, 1975), though Khemani (2004) was the first to specifically focus on developing countries. Since developing countries tend to have less stable democratic systems and therefore sporadic election timings, testing for an electoral cycle in their economic policy is challenging. Nevertheless, Khemani (2004) circumvents this by using an instrumental variable for the electoral cycle which measures the time left until a scheduled election, as will be explained in section 3. On the other hand, agricultural sectors in developing countries, despite their political significance, are left understudied in the context of electoral cycles. In order to address this, I implement Khemani's (2004) instrument in my methodology to examine the plausibility of an electoral cycle in MSP effectiveness. Furthermore, I also discuss how certain features of Indian agriculture, such as seasonal harvests and predetermined selling periods, distinguish its electoral cycle from other sectors.

I find that MSP effectiveness tends to increase as elections approach and it is highest 1 before a scheduled election, which indicates the presence a potential electoral cycle. In particular, the model with a full set of controls predicts that a scheduled election being 1 year away has the largest positive impact on MSP effectiveness of 0.0676 points. However, this is only a slight rise above a scheduled election being 2 years away with an effect of 0.0666 points, implying that the rise in MSP effectiveness is damped just before the election. I suggest possible reasons for this, including the cost constraints of campaigning and the prioritisation of other electoral strategies such as identity politics.

The remainder of this paper is structure as follows: Section 2 reviews pertinent literature. Section 3 explains the construction of the dependent variable and instrument, in addition to presenting and discussing the data used for this research. Section 4 elaborates on the state and time-fixed effects model and discusses conditions for identification of causal effects. Section 5 presents and discusses the findings of the state and time fixed effects model. Section 6 discusses the results and section 7 concludes.

2. From Barns to Ballots: A Literature Review

2.1 Elections and Economics

Elections, given their periodic occurrence, lend themselves well to economic analysis. Research on changes in economic policy during elections emerged in the 1970s (Nordhaus, 1975; Lindbeck, 1976) with Nordhaus (1975) introducing the concept of an electoral cycle (also known as 'The Political Business Cycle'), which attributes fluctuations in macroeconomic policy to the incumbent's motivation for re-election. In particular, incumbents were expected to raise spending and cut taxes (resulting in a budget deficit) just before elections in order to appease voters, followed by a post-election contraction (Nordhaus, 1975; Lindbeck, 1976).

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This prediction, however, is grounded in the assumptions of myopic voting behaviour, which suggests that policy fluctuations arise due to the short-sightedness of voters. Contrastingly, later models developed a rational expectations framework which derives electoral cycles as an equilibrium where there are persistent shocks to the incumbents' ability, and therefore their popularity amongst the electorate (Rogoff & Sibert, 1988; Rogoff, 1990). Despite this difference in assumptions, both of the rational expectations and myopic voter models of electoral cycles predict that economic policy is manipulated near election timings in order to favour the majority of the electorate, thereby increasing the chance of re-election. Even with this intuitive result, early research on electoral cycles is limited to OECD democracies.

Khemani (2004) addresses this limitation of the initial literature by empirically testing the presence of an electoral cycle in fiscal policy and state road construction in India. Specifically, she uses a state and time fixed effects model that estimates the effect of election timings on taxation, spending and road construction. This also involves an instrumental variable which anticipates scheduled elections, thereby avoiding the endogeneity of midterm elections, as will be explained in section 3. In harmony with the theoretical studies, she finds that fiscal policy loosens near elections, but management of road construction improves more significantly. The latter here suggests a moral hazard situation where politicians avoid shirking and exert greater effort in public service delivery due to rising career concerns near elections (Khemani, 2004).

Chauvet and Collier (2009) extend this empirical study of electoral effects to 80 developing countries, using the Country Policy and Institutional Assessment of the World Bank (CPIA) and the International Country Risk Guide (ICRG) as a measure of policy effectiveness. In contrast to Khemani (2004), they use an ordered probit model to estimate the effect of election timings on a discrete rendition of the CPIA, as well as a logit model which considers whether election timings lead to a positive or negative change in CPIA, before using ICRG as a robustness check. Despite the larger sample, Chauvet and Collier (2009) don't employ an instrument for the electoral cycle like Khemani (2004), diminishing the validity of the results. Furthermore, CPIA and ICRG are broad measures of policy effectiveness compared to Khemani's (2004) outcome of road construction. Given that smaller scale interventions tend to exhibit more pronounced electoral cycles compared to macroeconomic tools or measures of governance (Khemani, 2004), it is pertinent for literature on electoral cycles to explore more niche, perhaps sector-specific policies.

2.2 The Minimum Support Price

One such sector-specific policy is the agricultural Minimum Support Price (MSP), which is a price floor for crops. Widely implemented in both developed and developing countries, the MSP is invaluable in protecting farmers against volatility in commodity prices and ensuring adequate production of different crops. Therefore, assessing the effectiveness of its implementation is critical in understanding how it can attract rural voters.

Given the size and diversity of its agricultural sector, India is an interesting context to study in this regard. MSP in Indian agriculture is mostly storage-based, whereby the government purchases any crop of acceptable quality (Ministry of Agriculture & Farmers Welfare, Government of India , 2024) when its market price falls below a pre-determined MSP level. Specifically, crops are sold in an open ascending auction in a physical market place known as a *mandi*. A government worker will attend this and bid the MSP value, ensuring that the winning price doesn't fall below it.

Studies tend to measure the effectiveness of MSP by calculating the deviations of market price from the MSP for a given crop, attributing negative deviations to ineffective implementation (Ali, et al., 2012; Basantaray, 2023). In regard to the paddy market, MSP is effective in surplus producing states like Punjab, but ineffective in deficit states like West Bengal (Ali, et al., 2012). Furthermore, the Indian government is more likely to purchase rice from larger farmers who, as a result, benefit from the MSP more than smaller farmers (Basantaray, 2023). Such an approach, however, seems naïve since it disregards the fact that MSP is only enforced for crops that meet government quality standards. A lack of MSP enforcement for paddy with inadequate quality is expected and does not constitute ineffective implementation. Contrastingly,

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Meenakshi and Banerji (2005) also collect data on characteristics of paddy quality, such as moisture content and uniformity in grain size, allowing them to identify failures in MSP implementation more rigorously. They found that half the paddy in Panipat market sold at prices below the MSP despite meeting the government standard for quality, insinuating an unwillingness on the government's behalf to enforce the MSP, which is expected given the fiscal strain in purchasing large amounts of crops.

Meenakshi and Banerji (2001) were also the first to analyse the auction trading mechanism in the context of the Panipat paddy market in Haryana, India. They found evidence of collusion amongst rice millers, the main bidders in *mandis*, to drive down crop prices, indicating a lack of farmer bargaining power and therefore the importance of MSP enforcement in ensuring rural welfare. However, one drawback of Meenakshi and Banerji's approach is the classic independent private values (IPV) assumption of auction theory, which is likely violated in grain markets.

2.3 Inefficiencies and Politics

Inadequate MSP enforcement can also exacerbate the very issues it aims to alleviate. For example, MSP implementation in India favours wheat and rice over other crops like pulses or oilseeds (Chand, 2003), resulting in a lack of good quality land for the disadvantaged crops, as well as excessive procurement of wheat and rice. The latter here is particularly problematic, because it can lead to the government urgently selling their stock to avoid food wastage, thereby depressing crop prices and counteracting the intended benefits of the MSP.

An alternative to the storage-based MSP that avoids the problem of excess stocks is the credit-based MSP, a system where the government subsidises the farmer if market price falls below MSP instead of purchasing the crop. Chintapalli and Tang (2021) find that this approach is particularly useful when budget availability is low or moderate. Even with this practicality, the credit-based MSP is scarcely employed in India compared to its storage-based counterpart. A noteworthy example of such a scheme in India was implemented by the state government of Madhya Pradesh, but it only applied to eight crops including soyabean and groundnut (Kutty, 2021). Given that rice and wheat are India's staple crops, procurement is much higher for them than it is for those covered by the credit-based MSP. Hence, in spite of the potential credit-based MSPs possess for alleviating excess procurement, storage-based MSPs still dominate the markets for the crops where this problem is most abundant.

Regarding the paddy market, levy rice was another alternative to the MSP before its abolition in 2015. This policy requires millers to sell a fixed proportion of their rice to the government at a pre-determined "levy price", which is higher than the MSP (Gupta, 2022). Despite the Indian government's claim that abolishing levy rice has led to improved MSP delivery (Department of Food and Public Distribution, 2015), Gupta (2022) concluded that levy provided sufficient price support to farmers through resultant market prices being close to the MSP. Moreover, levy is far cheaper to implement than MSP (Gupta, 2022) and it's also a better tool for reducing excess government procurement (Meenakshi & Banerji, 2005).

There is a clear dissonance between the perceptions of the Indian government and economic literature, but it is plausible that these inefficiencies are politically driven. Given that the storage-based MSP is widely implemented in India, any shift away from this policy may viewed unfavourably by farmers, resulting in backlash and a loss of major voter support.

The politics of agriculture has been explored by past literature. Regarding the USA, Witzke (1990) examines trends in wheat support prices around election times and finds that support prices decrease during presidential elections; an execution of policy that is a clearly opportunistic in its attempt to draw votes. Agricultural policies are also prone to the interference of lobbyists, as Bates (1981) suggests in the context of Africa. In particular, protectionist measures taken by African governments tend to prioritise the prices of manufactured goods over crops and therefore farmer income, as well as only concentrate their agricultural subsidies amongst a privileged few. Comparably, in India, local political groups are known for their lobbying

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power, which can encourage the central government to enforce MSP in certain regions more than others. For example, North Indian states like Punjab and Haryana are known for their major farm lobby and union power (Raghavan, 2004). As a result, East and South Indian states produce over 50% of the country's rice output, yet only account for 10% of the total government procurement (Raghavan, 2004). Given the political nature of MSP, it is surprising that these electoral incentives remain under-researched, particularly in the realm of econometrics and empirical economics.

2.4 Indian Agriculture and The Farmer Identity

It must be emphasised that the MSP is not just important because of its maintains farmer income, but also because it forms a crucial part of the agricultural traditions in India, including mandis which widely facilitate crop exchange and arthis (intermediaries or "commission agents") who represent farmers in auctions (Haq, et al., 2013). In 2020, the Bhartiya Janata Party (BJP) government, the current incumbent in India, passed 3 laws which would open up the agricultural market by allowing farmers to sell directly to buyers. However, farmers perceived this as an undermining of their lasting agricultural traditions, and therefore went on to form the "Dilli Challo" ("Let's go to Delhi") demonstration, now recognised as the world's largest protest. The recent protests advocating for guaranteed MSP can be seen as an extension of this.

Overall, it is evident that Indian agriculture, given its recent sociopolitical unrest and established traditions, is an area of great interest in regard to electoral cycles, despite being overlooked by the pertinent literature. My paper fills this gap by finding evidence of an electoral cycle in the Indian MSP, suggesting that it is used to politically manipulate rural voters.

3. Variable Construction and Data

3.1 Quantifying MSP effectiveness

Panel data on state-wise modal paddy prices i.e. The most commonly observed price for lots sold daily was collected from the Indian government's portal on agricultural marketing, Agmarknet (Government of India, n.d.) for 2009-2023.[2] These are at market-level granularity, which is the most precise followed by district and state-level. MSP values for annual harvest periods were collected from the Reserve Bank of India (RBI) and the Ministry of Agriculture & Farmers Welfare (Reserve Bank of India, n.d.; Ministry of Agriculture & Farmers Welfare, 2023) (see A.1 in section 9).

As discussed before, past literature on MSP effectiveness, with the exception of Meenakshi and Banerji (2005), tends to overlook the importance of paddy quality meeting government standards and simply deems the policy ineffective if market price falls below MSP (Ali, et al., 2012; Basantaray, 2023). Though data on paddy quality is unavailable for this research, the methodology exploits state fixed effects which contain time-invariant determinants of paddy quality, such the typical climate of a state and the variety of paddy it specialises in. Such factors are no longer endogenous when controlled within state fixed effects, as will be discussed in section 5.

Accordingly, MSP effectiveness is defined as the proportion of paddy lots for which the modal market price is equal to or above the MSP. To assign scores for MSP effectiveness, I use the following rule:

$$MSPE_{it} = \frac{\sum_{k=1}^{K_{it}} \mathbf{1}(p_{itk} \geq MSP_{itk})}{K_{it}}$$

Equation 1

[2]Paddy price data is collected from 1 year before time period of interest so a 1-year lag can be created in section 5

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where $MSPE_{it}$ is the MSP effectiveness (henceforth, MSPE) score in state i in year t ranging from 0 to 1 (0 being entirely ineffective and 1 being entirely effective); K_{it} is the total number of paddy lots sold in state i in year t; p_{itk} is the modal market price for lot k sold in state i in year t, and MSP_{itk} is the MSP value that should be enforced for lot k sold in state i in year t. It is important to note that even though MSP values for paddy are the same for all lots across the country, they vary across state-specific lots in the rule above because they change every harvest period instead of every year. In particular, the Indian government announces a new MSP for paddy at the start of each harvest period for Kharif crops, also known as monsoon crops or autumn crops (Ministry of Agriculture and Farmers Welfare, Government of India , n.d.). This is typically in June, but in my analysis each year t spans from January to December since this is more appropriate for election timings. To account for this misalignment, I assign MSP values to lots depending on the harvest period their date of purchase comes under, and then use these to calculate $MSPE_{it}$ by year instead of harvest period.

3.2 Instrumenting the Electoral Cycle

The main caveat with estimating the effect of elections is their endogeneity with respect to MSPE. In particular, even though elections are constitutionally scheduled for every 5 years, some may occur unexpectedly in the middle of this 5-year cycle. These midterm elections may be called by incumbents when economic conditions are favourable in order to raise votes and remain in power for another term. High MSPE would be expected in such a situation as an attempt to sway rural voters in favour of the incumbent. Alternatively, situations with low MSPE may incite political backlash from rural communities, leading to incumbents resigning and therefore necessitating a midterm election. In both cases, MSPE dictates the timing of midterm elections, resulting in a reverse causality issue (see figure 1).

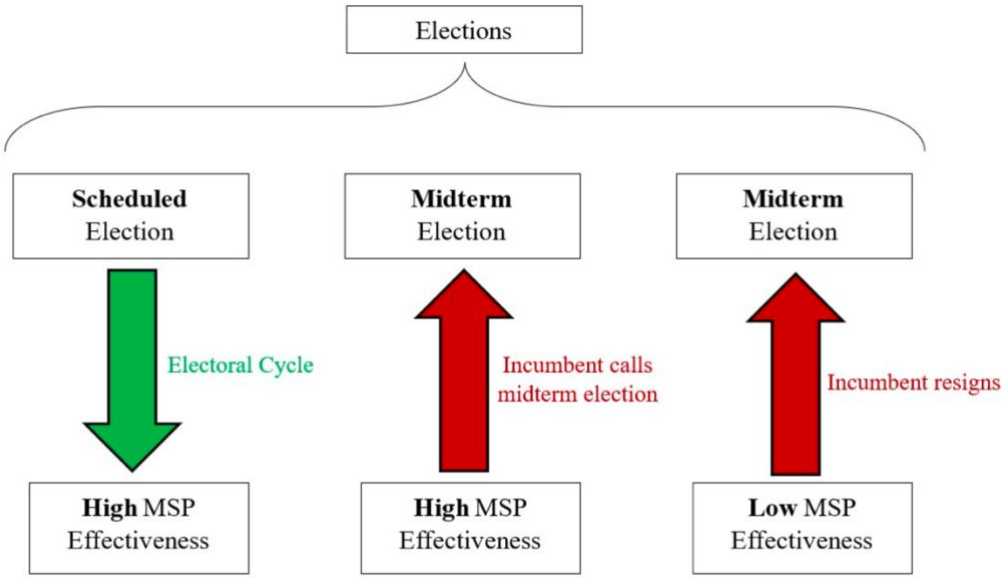

Figure 1: The Reverse Causality of Elections

In order to circumvent this, I use Khemani's (2004) instrument for election timings called the instrumental electoral cycle (IEC). This is a 5-year cycle which ends every scheduled election and restarts every midterm election, as illustrated by figure 1. As such, the IEC "counts down" from each election to the next scheduled one, making "Years until next Scheduled election" the new explanatory variable of interest.

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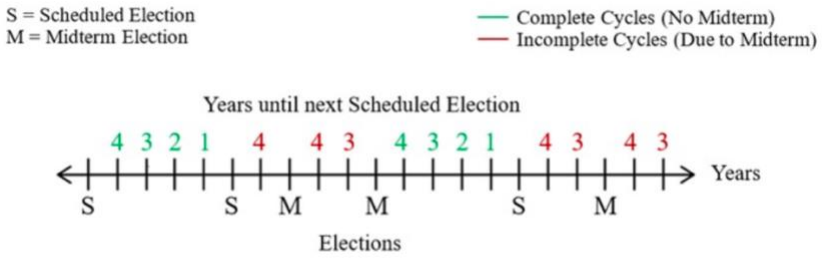

Figure 2: The Instrumental Electoral Cycle

Since the IEC is solely concerned with the next *expected* election, midterm elections are now negligeable as the anticipation of the next scheduled election takes precedence over the preceding election. Equivalently, this forward-looking nature of the IEC avoids the reverse effects prevalent in midterm electons, thereby ensuring exogeneity.

3.3 Political Data

Panel data on state-wise legislative assembly elections was collected from IndiaVotes (IndiaVotes, n.d.) from 2006-2023.[3] I use this to create an election indicator variable which equals 1 if a state election takes place in state i in year t, and 0 otherwise, as well as separate indicators for scheduled elections and midterm elections. Additionally, I create indicators for each year of the electoral term which therefore illustrates the IEC. These are 4 variables which equal 1 if a certain state is 4, 3, 2 or 1 year away from its next scheduled election respectively.

3.4 Controls

Panel data on control variables was collected from the RBI (Reserve Bank of India, n.d.) from 2009-2022.[4] All of these are state-wise agricultural characteristics likely to be correlated with both MSPE and election timings: gross sown area, gross irrigated area, storage capacity of foodgrains, gross value added by agriculture (base year 2011-2012), and estimated rice yield.

Gross sown area, rice production, and gross value added by agriculture relate to the sowing behaviour of the farmer. Farmers may anticipate greater MSPE closer to election years and therefore increase these variables in tandem in order to sell more lots at a higher guaranteed price. Furthermore, since MSP is known to discriminatorily favour paddy over other crops (Chand, 2003), farmers may prioritise sowing paddy resulting in higher rice production. Estimated rice yield is also largely dependent on sowing behaviour. However, since yield is an indication of farmer productivity and therefore ability, including it as an explanatory variable will to some extent control for paddy quality. This is because more able farmers likely have greater experience in optimising their paddy quality.

On the other hand, gross irrigated land and storage capacity of foodgrains relate to government decision-making. Regarding the former, irrigation benefits farmers by improving their soil quality and crop growth, so state governments may try to win over rural voters by intensifying irrigation practices closer to elections. Moreover, paddy farming is particularly water-intensive so it requires greater irrigation in comparison to

[3] The IEC tracks entire electoral cycles from 4 years before an election, so election data is collected from 2006 (4 years before earliest year, 2010).

[4] Controls are lagged by 1 year in section 4 so 2023 data on them is not useful for this research.

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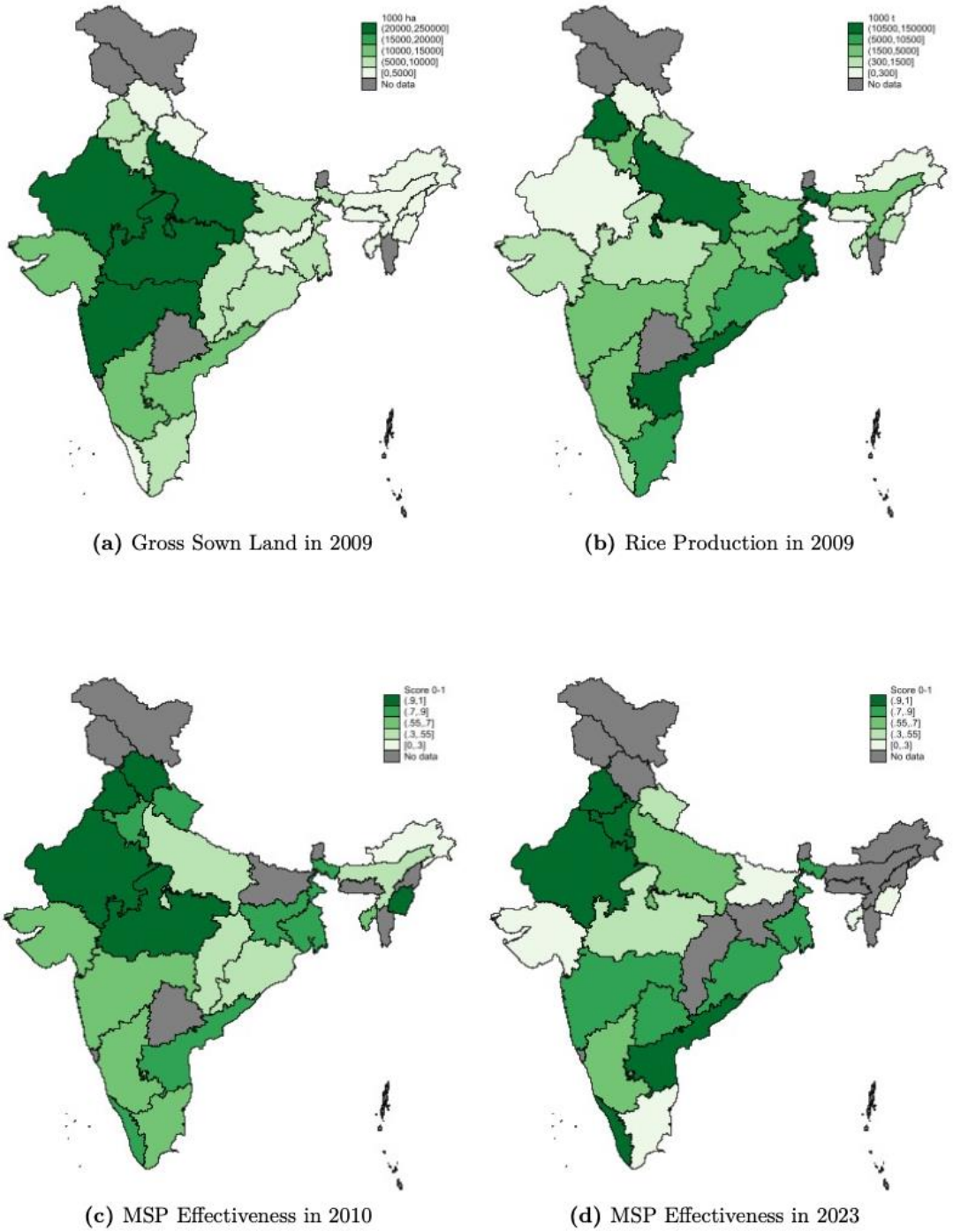
other crops (Mallareddy, et al., 2023). Hence, major paddy-producing states (such as Punjab and Haryana) which already have favourable MSP implementation are also likely to have higher gross irrigated land.

More importantly, storage capacity of foodgrains is directly correlated with MSPE given that MSP in India is storage-based rather than credit-based. The government enforces this by purchasing paddy at MSP, so a



(a) Gross Sown Land in 2009

(b) Rice Production in 2009

(c) MSP Effectiveness in 2010

(d) MSP Effectiveness in 2023

Figure 4: Agricultural Activity and MSP Effectiveness across India

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higher storage capacity allows MSP to be enforced more frequently. Governments may thus raise storage capacity as elections approach in preparation for greater MSP implementation as a voting incentive.
Table 1 presents summary statistics for MSPE, election variables and control variables. Figures 3 and 4 exhibit the spatial variation of two controls, gross sown area and rice production, in 2009, whilst figures 5 and 6 show the same for MSPE in 2010 and 2023 (the start and end of the time period of interest) across different states on maps of India. Though farming is prevalent across several Indian states, as shown by the ubiquitous gross sown area, only northern, eastern and southern states specialise in paddy. The most major agricultural state is Punjab where MSPE in 2010 and rice production in 2009 is over 1 standard deviation higher than the respective means for those variables across all states and years. This finding is consistent with Ali, et al (2012), who also finds that MSPE is highest in Punjab and other paddy-surplus states.

Furthermore, out of these major paddy-producing regions, northern states consistently maintain a higher MSPE than eastern and southern states. In 2010, northern states, namely Punjab, Haryana and Uttar Pradesh, averaged an MSPE score of 0.775 On the other hand, southern states like Andhra Pradesh and Tamil Nadu averaged 0.7078275, whilst eastern states like West Bengal and Odisha only averaged 0.6067285. This is consistent with Raghavan's (2004) assertation that the northern states have greater lobby power and are therefore more politically significant, which results in agricultural policy being implemented better in those regions.

Variable	Obs.*	Mean	Std. Dev.	Min	Max
MSPE	303	0.6339689	0.304021	0	1
Election ind.	73				
Scheduled election indicator	71				
Midterm election indicator	2				
4 years until a scheduled election indicator	73				
3 years until a scheduled election indicator	75				
2 years until a scheduled election indicator	76				
1 years until a scheduled election indicator	80				
Gross sown area (1000 ha)	320	7457.628	8271.446	25	29903
Gross irrigated area (1000 ha)	320	3693.803	4760.444	21	22994
Rice production (1000 t)	367	4167.67	4451.91	16.8	16728.699
Storage capacity of foodgrains (1000 t)	268	27.805	48.482	0	252.56
Gross value added by agriculture (100, 000 rupees)	315	4082774.5	3974340.1	19025	18054604
Estimate rice yield (kg per ha)	360	2490.589	720.715	872	5795

*For indicator variables, observations only count the instances when the indicator = 1
Table 1: Summary statistics across all states and years

3.5 Limitations of Data

Despite its applicability to the research question, there are some disadvantages of the dataset. First, compared to Khemani (2004) who studied the time period 1960-1994, the time period of interest for this paper, 2010-2023, is small because data on paddy prices is scarce before then. As a result, each state only observes 2 or 3 elections, making the political data less representative. Furthermore, the sample size falls as more controls are added (see table 2 in section 6), because the controls have different available time periods (see A.3 in section 9). The small time period also means that out of the total 73 elections only 2 are midterms, which occur in 2015 in Delhi and 2018 in Telangana. Since this number of endogenous observations is very small, using the IEC may seem superfluous. However, there is no loss in applying the

IEC to scheduled elections because it simply treats them as a complete cycle, so it is still favourable to use it.

Second, a state-wise analysis overlooks heterogeneity within states. For example, western districts of Uttar Pradesh were some of the first to adopt green revolution strategies such as chemical fertilisers and irrigation facilities, whilst eastern districts often experience floods and waterlogging (Gulati, et al., 2021). Consequently, western districts are more suitable for paddy farming, so they may drive up MSPE near elections even if eastern districts are performing poorly.

Third, despite the data being chiefly sourced from established institutions, there are several observations that are omitted since they have no MSPE observations (see A.2 in section 9). Notably, 9 states/UTs are omitted and some of these (Mizoram and Sikkim) are in North East India where rice production is low (see figure 4). Hence, it is plausible that these values are omitted systematically instead of randomly, which may bias estimates. All of these limitations should be kept in mind when reviewing the results of this paper.

4. Methodology

4.1 State and Time Fixed Effects Model

I use a state and time-fixed effects model to estimate the effect of election timings on MSPE. I describe the approach in this section, present the results in section 6 and discuss them in section 7.

Witzke (1990) uses an autoregressive model to estimate the effect of elections on agricultural support prices but, given that data is available across multiple states and years here, it is more appropriate to use a panel data model. The main advantage of a state and time fixed effects model is that it controls for state and time-invariant factors respectively which would otherwise be endogenous. However, in order to identify an electoral cycle using this, the model must track the impact on MSPE throughout the electoral term and not just during election years. Witzke (1990) and Chauvet & Collier (2009) use election indicators as their main variable of interest, which helps to identify electoral trends but doesn't clearly depict an electoral cycle. Alternatively, explicitly including the IEC in a reduced form equation like Khemani (2004) better depicts how the impact on MSPE changes in the lead-up to a scheduled election. I thus estimate an IV reduced form equation rather than the conventional 2SLS equation:

$$MSPE_{it} = \sum_{T=1}^{4} E_{it}^{T}\beta_T + \boldsymbol{X_{it}}\lambda + \alpha_i + \delta_t + u_{it}$$

Equation 2

where $MSPE_{it}$ is the state-year MSPE as usual; E_{it}^{T} for $T = 1,\ldots 4$ are a set of indicator variables illustrating the IEC: $E_{it}^{1} = 1$ if t is 1 year before a scheduled election year in state i, E_{it}^{2} = 2 if t is 2 years before a scheduled election year in state i, and so on; X_{it} is a vector of the control variables lagged by 1 year; α_i are the state-fixed effects; δ_t are the time-fixed effects included as indicator variables for each year, $\delta_{2010}\ldots\delta_{2023}$; u_{it} is the error term, containing unobserved determinants of $MSPE_{it}$, such as the proficiency of government employees involved in paddy procurement.

Note that $\boldsymbol{X_{it}}$ is also transformed using a $log(x+1)$ function, where x is a control variable. This reduces the skewness of the controls, whilst accounting for the zero values present in the storage capacity of foodgrains. Additionally, $\boldsymbol{X_{it}}$ also includes a 1-year lag of MSPE to account for any persistence in the model which is further justified in section 6. The key parameters of interest are β_Ts, which should contain the effect of the election timings on MSPE and therefore plausible evidence of an electoral cycle.

Based on the predictions of the theoretical literature on electoral cycles (Nordhaus, 1975; Lindbeck, 1976; Rogoff & Sibert, 1988; Rogoff, 1990), I expect the impact on MSPE to rise as we move through the electoral

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term (the closer we get to a scheduled election). Equivalently, I expect the estimates of β_T to rise as T goes from 1 to 4, so $\widehat{\beta_4} <\ldots< \widehat{\beta_1}$.

4.2 Identification

Identification in models using instrumental variable relies on two key assumptions: relevance and exclusion. Here, relevance requires that the IEC is indeed correlated with election timings so it can generate variation in them and allow the model to identify their impact. This can be summarised as follows:

$$Cov(E_{it}|E_{it}^1, E_{it}^2, E_{it}^3, E_{it}^4) \neq 0$$

Equation 3

where E_{it} is the election indicator. Though this paper solely focuses on the results from the reduced form equation, and the correlation between the IEC and election timings is intuitively apparent, it is important to estimate the first stage regression of the election indicator on the IEC in order to formally test relevance. For this, I the estimate the following linear probability model as a first stage regression via OLS:

$$Pr(E_{it} = 1) = \sum_{T=1}^{4} E_{it}^T \pi_T + \boldsymbol{X_{i,t-1}}\theta + \alpha_i + \delta_t + u_{it}$$

Equation 4

where π_T for $T = 1,\ldots 4$ indicates the relationship between the IEC and election timings. Results for this are reported in A.5 in section 9, which confirms that the IEC is significantly correlated with election timings. The estimated first stage coefficients, $\widehat{\pi_T}$, are all negative because if, in year t, a scheduled election is 4,3,2 or 1 years away, then there are no elections in year t.

Exclusion, on the other hand, requires that this variation in election timings generated by the IEC is exogenous, which equates to the IEC being uncorrelated with the error term in the model, u_{it}:

$$Cov(u_{it}|E_{it}^1, E_{it}^2, E_{it}^3, E_{it}^4) = 0$$

Equation 5

This implies the zero-conditional mean assumption for equation 2, which is required to ensure the unbiasedness of the β_T estimates:

$$E(u_{it}|E_{it}^1, E_{it}^2, E_{it}^3, E_{it}^4) = 0$$

Equation 6

The avoidance of reverse causality issues caused by midterm elections is the biggest contribution of the IEC in regard to exogeneity. Nonetheless, there may be certain idiosyncratic factors, such as farmer awareness of MSP, that correlate with the IEC (see section 7). However, as mentioned in section 3, the main advantage of the state and time fixed effects model is that it controls for state and time-invariant endogenous factors present in α_i and δ_t respectively.

Apart from the time-invariant components of paddy quality mentioned in section 3, α_i also contains endogenous measures of political significance for each state. For example, the number of seats held by a state in the Lok Sabha (the lower parliamentary house in India) likely correlates with MSPE and the IEC. In order to maximise their chances of attaining central authority, political parties will try to win elections in states with the most seats, possibly by enforcing MSP there more effectively. Fortunately, this is also constitutionally frozen from 2002 to 2026 (Jaitley, 2000), making it time-invariant in our analysis. Similarly, δ_t contains country-wide shocks to MSPE, most popularly any adjustments to the level of MSP which is the same for all states. Other state-invariant factors include one-off national policy shocks such as demonetisation in 2016. Controlling for these by including year indicators in equation 2 distinguishes the effect of elections from other shocks in the same year.

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Finally, lagging the controls by 1 year has two purposes: to allow controls enough time to impact MSPE, and to aid the identification of β_T by alleviating price-quantity simultaneity. By equation 1, MSPE depends directly on paddy market price, and since controls such as gross sown land and rice production closely relate to paddy quantity, they are likely determined simultaneously with MSPE in a supply and demand equilibrium for the paddy market. Lagging the controls ensures that the causal effect only goes from the controls to MSPE (see figure 5), thereby lessening the associated endogeneity. This issue, however, is already less pervasive in agricultural markets where crop quantity is determined before harvesting and price, after.

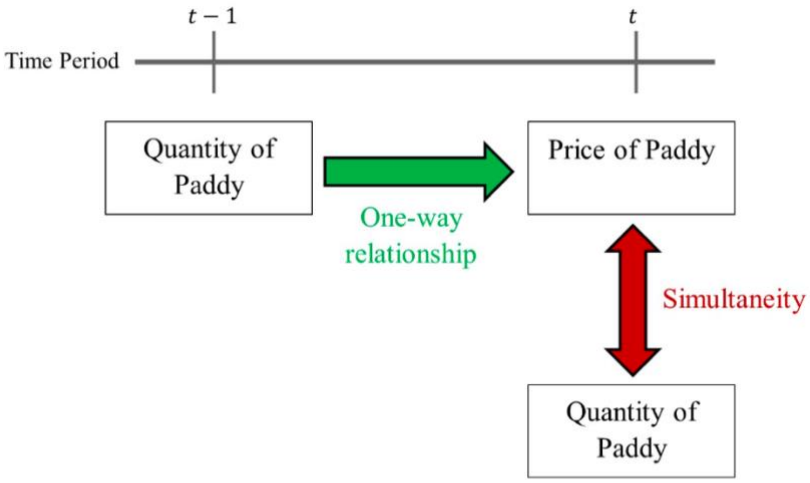

Figure 5: Lags to Solve the Simultaneity of Price and Quantity

Nonetheless, given the limited sample size and possible threats to identification, particularly those that may compromise exogeneity, the results of this paper should be interpreted with caution.

5. Results

The results from the OLS estimation of equation 2 are reported in table 2. Column 1 reports this without any controls, and columns 2 to 8 consecutively include controls as a robustness check. The estimated coefficients on the E_{it}^{T} indicators, $\widehat{\beta_T}s$, tend to increase as T goes from 1 to 4 (as we approach a scheduled election) as expected. Throughout all regressions, $\widehat{\beta_4}$ has the smallest and least significant impact on MSPE, whilst $\widehat{\beta_1}$ has the largest and most significant except in column 8, where $\widehat{\beta_2}$ rises suddenly in both magnitude and significance after the inclusion of $MSPE_{i,t-1}$. Still, adding $MSPE_{i,t-1}$ gives the highest adjusted R-squared value of 0.397, indicating that the regression in column 8 best fits the data. Furthermore, it also leads to a distribution of residuals that appear closer to the normal distribution (see A.4 in section 9), indicating that column 8 is more likely to satisfy the OLS normality assumption than column 7 and therefore have more valid statistical inference.

Looking at these coefficients in column 8, being 4 or 3 years away from a scheduled election (1 or 2 years into an electoral term) doesn't change MSPE significantly. However, being 2 years away from a scheduled election (the penultimate year of the term) raises MSPE by 0.0666 points and being 1 year away (the final year of the term) raises by MSPE by 0.0676 points. Interestingly, though MSPE rises drastically just 2 years from an election, the subsequent increase 1 year away is dampened. Figure 7 illustrates this by plotting the estimated coefficients for this regression against the number of years left until a scheduled election.

Though results show evidence of an electoral cycle in the MSP, the dampening of the MSPE rise in the final year of the electoral term is unexpected. I discuss potential reasons for this in section 7 and how some of these are specific to agriculture.

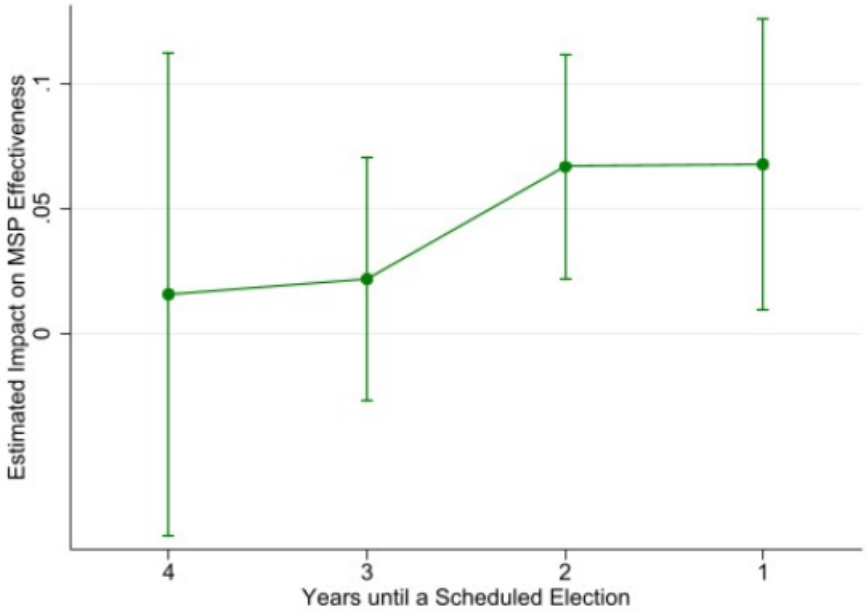

Figure 6: The Electoral Cycle of the MSP

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Explanatory Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
E_{it}^4	-0.0218	0.00241	0.00328	-0.00123	0.00651	0.00562	0.00471	0.0158
	(0.0332)	(0.0435)	(0.0431)	(0.0416)	(0.0373)	(0.0381)	(0.0405)	(0.0467)
E_{it}^3	0.0616	0.0662	0.0699	0.0615	0.0137	0.0135	0.0161	0.0218
	(0.0406)	(0.0469)	(0.0462)	(0.0456)	(0.0214)	(0.0217)	(0.0234)	(0.0234)
E_{it}^2	0.0575**	0.0582**	0.0610**	0.0588**	0.0324	0.0327	0.0345	0.0666***
	(0.0246)	(0.0278)	(0.0274)	(0.0270)	(0.0313)	(0.0310)	(0.0310)	(0.0217)
E_{it}^1	0.0876**	0.0923**	0.0851**	0.0846**	0.0641**	0.0645**	0.0622**	0.0676**
	(0.0338)	(0.0351)	(0.0366)	(0.0362)	(0.0249)	(0.0251)	(0.0279)	(0.0280)
Gross sown area		0.0477	0.185	0.181	0.618*	0.609*	0.514*	0.430
		(0.106)	(0.140)	(0.134)	(0.319)	(0.320)	(0.287)	(0.297)
Gross irrigated area			-0.144	-0.0841	-0.478*	-0.472*	-0.576**	-0.436
			(0.106)	(0.0972)	(0.253)	(0.253)	(0.243)	(0.261)
Rice production				-0.107	-0.0331	-0.0249	0.246	0.186
				(0.0667)	(0.151)	(0.159)	(0.192)	(0.188)
Storage Capacity of Foodgrains					0.0252	0.0247	0.0167	0.00187
					(0.0534)	(0.0532)	(0.0486)	(0.0384)
Gross Value Added by Agriculture						-0.0208	-0.00731	-0.0186
						(0.0596)	(0.0553)	(0.0531)
Estimated Rice Yield							-0.402	-0.236
							(0.243)	(0.241)
$MSPE_{i,t-1}$								0.201**
								(0.0922)
Obs.	303	263	263	263	170	170	170	164
Adjusted R-squared	0.173	0.153	0.156	0.160	0.269	0.265	0.275	0.397

Robust standard errors in parentheses
* p < 0.1, ** p < 0.05, *** p < 0.01

Table 2: OLS Estimates of Reduced Form Equation for State and Time Fixed Effects Model

6. Discussion

6.1 Myopic Voter or Moral Hazard?

Despite the limitations of data and methodology discussed in sections 4 and 5 respectively, the results illustrate a clear electoral cycle where MSPE rises in the lead up to a scheduled election. It is important, however, to consider theoretical explanations of this phenomenon. Both myopic voter (Nordhaus, 1975; Lindbeck, 1976) and rational expectations (Rogoff & Sibert, 1988; Rogoff 1990) models predict this outcome, but it is unclear which fits the context of MSP better. Rural communities in developing countries may have lower education, making their voters myopic. However, farmers are familiar with the timing of regular harvests and elections. Considering that the vast majority of elections in the data are scheduled, rural voters may learn to anticipate paddy harvests and elections, likewise, possibly making them more rational.

More importantly, though politician behaviour in regard to electoral cycles is typically explained by the motivation for re-election by appeasing voters, it is more likely that variation in MSPE emerges from a moral hazard situation. As Khemani (2004) suggests, that incumbents shirk less and improve policy implementation closer to elections due to “career concerns”, the fear they may be voted out of office if they don’t deliver ‘effective’ policy. Contrastingly, incumbents may wish to intentionally raise MSP levels near elections as an attempt at wooing myopic voters. However, since MSP values are fixed annually and this paper focuses on its ‘effectiveness’ as opposed to its ‘level’, the reported higher MSPE near elections more likely suggests less shirking on behalf of politicians rather than some intentional political manipulation.

6.2 Campaign Costs and Incumbent Behaviour

In regard to the dampening of the rise in MSPE in the final year of the electoral term, there is an arity of reasons as to why politicians may improve MSP implementation here by less than expected. First, given the size of India’s electorate, preparations for elections is often expensive and requires extensive campaigning. MSP implementation already puts much strain on incumbent’s funds since it requires the state to purchase and store large amounts of paddy. As such, incumbents may need to reduce MSPE before just before elections in order to free up some money for campaigns.

6.3 Within-year Heterogeneity

A notable aspect excluded in this paper’s methodology is that MSPE likely varies across months of the year, particularly with respect to paddy quality and farmer size. The Kharif harvest for paddy tends to span from June, when the MSP is announced, till the end of the year (USDA Foreign Agricultural Service, 2015). Then paddy auctions take place during the selling period later in that year or into the first half of the next year, followed by the MSP being updated in June for the next harvest. Any lots sold after the selling period during the next year’s harvest may be leftovers initially rejected for their lower quality. Likewise, smaller farmers, for whom MSP is enforced less effectively (Basantaray, 2023), may find it difficult to compete with larger farmers during the selling period so they get ‘left behind’ until later in the year (see figure 7). In both cases, MSPE is likely to be higher in the former half of a given year compared to the latter. Regarding election timings, within-year heterogeneity is less of an issue here since this paper only considers the years before an election. Hence, regardless of the timing of an election within a year, trends in MSP enforcement should remain consistent in the preceding years. However, considering the timing of the Kharif harvest is nonetheless beneficial for better understanding Indian agricultural practices. In order to incorporate this in an empirical model, future research should consider a more granular time measurement like months.

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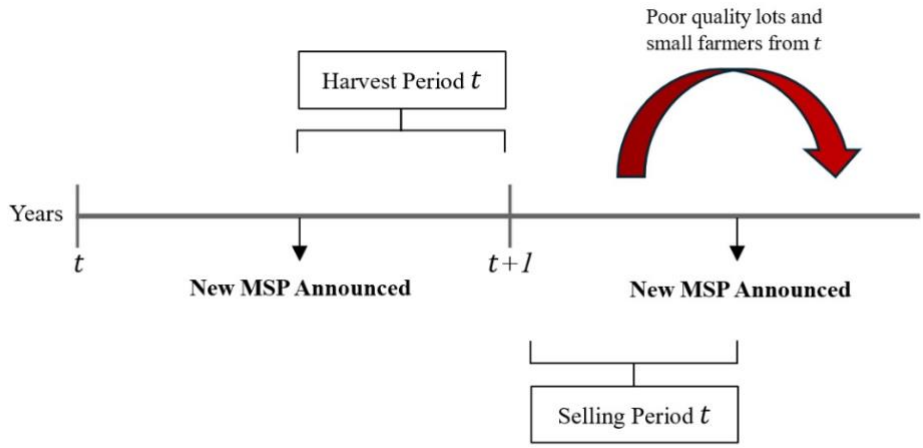

Figure 7: Leftover Lots and Left Behind Farmers - A Harvest Timeline

7. Conclusion

Perhaps the most intriguing result of this paper is the dampened MSPE rise in the final year of an otherwise expected electoral cycle. Campaign costs and moral hazard are merely hypothetical explanations for this, but nonetheless fascinating avenues for further investigation. What is clear, however, is that politicians understand the pivotal nature of farmer votes and will enforce MSP to safeguard their electoral support. This politicisation of economic policy, while not extraordinary, has profound implications for Indian agriculture. As agricultural policy becomes an instrument for electoral gain, the *kisan* (farmer) identity is exposed to the same political exploitation as other cultural subgroups, namely religion and caste. Still, after the recent farmer protests, political conventions in the country's agricultural sector and its associated politics have been permanently disrupted. Looking ahead, it will be interesting to see whether MSP enforcement remains contingent on elections or improves ubiquitously independent of them.

At present, the results to the state and time-fixed effects model indicate, through a significant rise in MSPE in the lead up to scheduled elections, the presence of an electoral cycle in the Indian MSP regime. This finding is consistent with the predictions of theoretical literature on electoral cycles (Nordhaus, 1975; Lindbeck, 1976; Rogoff & Sibert, 1988; Rogoff, 1990), and it improves researchers' understanding of MSP enforcement. Despite the respective shortcomings of the data and model, this paper sheds light on the political nature of agricultural policy. Future research should focus on more intricately understanding decisions around MSPs, and how they interact with other campaigning strategies near elections. In particular, game theory provides frameworks for modelling interactions between incumbents and oppositions, thereby forming a better understanding of electoral incentives. As such, I hope my paper encourages deeper study of the intersection between elections and economics, as well as the political manipulation of economic policy in developing countries.

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Appendix A. (Appendix Title if Given)

A.1. MSP values for ‘Paddy Common’

Harvest Period	MSP Value (rupees)
2009-2010	1050
2010-2011	1000
2011-2012	1080
2012-2013	1250
2013-2014	1310
2014-2015	1360
2015-2016	1410
2016-2017	1470
2017-2018	1550
2018-2019	1750
2019-2020	1815
2020-2021	1868
2021-2022	1940
2022-2023	2040
2023-2024	2183

A.2. List of Indian States/UTs Used and Omitted

State/Union Territory (UT)	No. of MSPE Observations
Andhra Pradesh	14
Arunachal Pradesh	1
Assam	10
Bihar	7
Chhattisgarh	2
Delhi (UT)	12
Gujarat	14
Haryana	14
Himachal Pradesh	2
Jharkhand	12
Karnataka	14
Kerala	14
Madhya Pradesh	14
Maharashtra	14
Manipur	12
Meghalaya	8
Nagaland	11
Odisha	14
Pondicherry	14
Punjab	14
Rajasthan	14
Tamil Nadu	14
Telangana	10*
Tripura	14
Uttar Pradesh	14
Uttarakhand	14
West Bengal	14
Andaman and Nicobar Islands	0 (omitted)
Chandigarh (UT)	0 (omitted)

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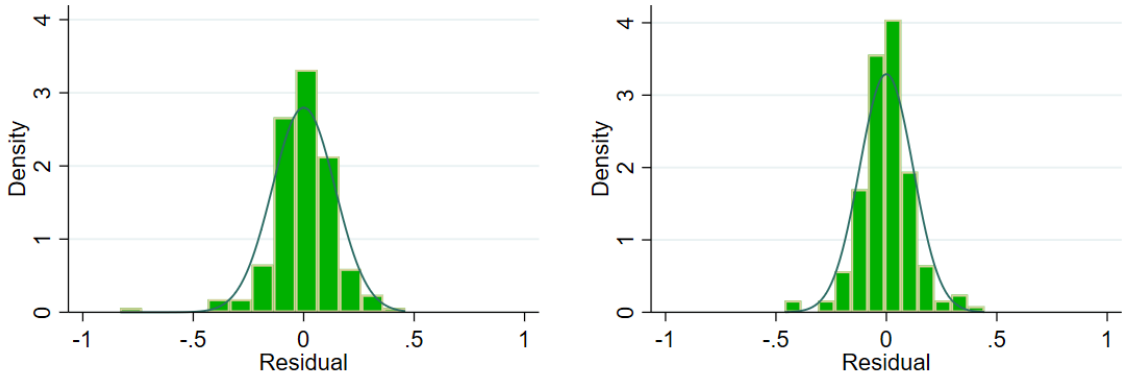
Dadra and Nagar Haveli (UT)	0 (omitted)
Daman and Diu (UT)	0 (omitted)
Goa	0 (omitted)
Jammu and Kashmir	0 (omitted)
Lakshadweep	0 (omitted)
Mizoram	0 (omitted)
Sikkim	0 (omitted)

*Telangana's values for 2010-2013 are omitted since the state did not exist at the time

A.3. Available Time Periods for Controls

Control Variable	Available Time Period
Gross sown area (1000 ha)	2010-2020
Gross irrigated area (1000 ha)	2010-2020
Rice production (1000 t)	2010-2023
Storage capacity of foodgrains (1000 t)	2014-2023
Gross value added by agriculture (100,000 rupees)	2012-2023
Estimated rice yield (kg per ha)	2010-2023

A.4. Residual Plots for Models with and without MSPE lag



A.5. OLS Estimates for First Stage LPM

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Explanatory Variable	(1)
E_{it}^4	-0.968***
	(0.0401)
E_{it}^3	-0.929***
	(0.0758)
E_{it}^2	-0.934***
	(0.0646)
E_{it}^1	-0.921***
	(0.0541)
Gross sown area	-0.331**
	(0.145)
Gross irrigated area	0.121
	(0.115)
Rice production	0.180
	(0.132)
Storage capacity of foodgrains	-0.0282
	(0.0319)
Gross value added by agriculture	-0.0337
	(0.0453)
Estimated rice yield	-0.171
	(0.152)
$MSPE_{i,t-1}$	-0.0262
	(0.0332)
Obs.	175
F-statistic	5855.1

Robust standard errors in parentheses
* p<0.1, ** p<0.05, *** p<0.01

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