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Stabilisation Without Transformation: Agrarian Distress and the Political Economy of State Intervention in India

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Abstract

Agrarian distress remains a persistent feature of the Indian economy despite sustained and expanding state intervention in agriculture. While farm incomes have risen in nominal terms over the past decade, high levels of indebtedness, cost escalation, and income vulnerability continue to characterise agricultural livelihoods. This paper examines agrarian distress in India through a political economy lens, focusing on how state-led policy instruments shape farm income outcomes without proportionately alleviating structural vulnerability. Using annual macro-level secondary data for the period 2010–2023, the study empirically analyses the role of price support, institutional agricultural credit, public expenditure, input subsidies, irrigation coverage, and climatic conditions. Employing Ordinary Least Squares regression models, the analysis finds that Minimum Support Price relative to cost of cultivation and institutional agricultural credit exert strong, positive, and statistically significant effects on farm income. Fiscal expenditure and input subsidies also display significant income effects, though their influence appears compensatory rather than transformative.

From a political economy perspective, the findings suggest that India's agrarian policy regime prioritises income stabilisation and political manageability through distributive instruments such as price support, credit expansion, and subsidies. While effective in mitigating short-term

distress, these interventions have not adequately addressed deeper structural constraints related to productivity, cost dynamics, and unequal access to institutional support.

Keywords: Agrarian Distress, State Intervention, Political Economy, Farm Incomes.

1. Introduction

The term *agrarian* refers to the economic, social, and institutional arrangements surrounding agriculture, particularly the relationship between land, labour, production, and the state. Agrarian distress, in this context, denotes a persistent condition of economic vulnerability experienced by agricultural households, manifested through low and volatile incomes, rising indebtedness, cost escalation, and heightened exposure to market and climatic risks (Mishra, 2014; Reddy & Mishra, 2019). In India, agrarian distress has emerged as a structurally embedded phenomenon rather than a transient crisis, despite decades of intensive state intervention. According to recent official estimates, agriculture continues to support nearly 45 per cent of India's workforce while contributing less than 18 per cent to gross value added, reflecting deep income asymmetries within the economy (Government of India, 2023). The average annual income of agricultural households, though rising in nominal terms, remains modest relative to non-agricultural earnings, while more than half of farming households report outstanding debt obligations (NSSO, 2019; RBI, 2022). These patterns situate agrarian distress at the intersection of economic development and political governance, making it a central concern of India's political economy.

From an economic perspective, agrarian distress is often attributed to structural constraints such as declining landholdings, rising input costs, price volatility, and inadequate non-farm absorption of surplus labour (Chand, 2017; Fan et al., 2021). However, political economy scholarship emphasises that these outcomes cannot be understood independently of state policy and institutional design (Bardhan, 1984; Frankel, 2005). In India, agriculture has historically been a politically sensitive sector, shaping electoral outcomes and public policy priorities. As a result, the state has played a dominant role in influencing agrarian outcomes through administered price support, institutional credit expansion, input subsidies, fiscal expenditure, and public investment in infrastructure. These interventions are motivated not only by

efficiency or welfare considerations but also by the political imperative to maintain rural stability and manage agrarian discontent (Varshney, 1999; Harriss, 2006).

In the post-reform period, India's agrarian policy regime has gradually shifted from a production-centric framework towards income stabilisation and risk mitigation. Minimum Support Prices (MSP), expanded procurement, interest subvention on agricultural loans, and rising subsidy outlays have become central instruments of intervention (Gulati & Saini, 2016; Swaminathan, 2018). While these policies have contributed to observable increases in farm income, their distributive reach remains uneven across crops, regions, and farm sizes (Sharma, 2012; Gulati, 2019). Empirical evidence suggests that a relatively small proportion of farmers - primarily those integrated into procurement and formal credit networks - benefit disproportionately from such interventions, raising concerns about equity and inclusiveness (Reddy & Reddy, 2016; Jha & Ramaswami, 2020).

Institutional agricultural credit has emerged as a particularly prominent channel of state intervention. Between 2010 and 2023, agricultural credit disbursement increased several-fold, reflecting a deliberate policy strategy to support farm incomes and investment through financial deepening (RBI, 2021; NABARD, 2022). Economically, access to credit enables farmers to finance inputs, smooth consumption, and manage risk. Politically, credit expansion offers a less fiscally visible and more administratively scalable mechanism of intervention compared to direct income transfers. However, a growing body of literature highlights that rising credit availability has not translated into a commensurate decline in agrarian indebtedness, particularly among small and marginal farmers (Mishra & Nayak, 2015; Bhattacharya & Pillai, 2019). This paradox underscores the limits of credit-led strategies in addressing structural distress.

Fiscal expenditure and input subsidies further illustrate the compensatory logic of India's agrarian policy framework. Public spending on fertiliser, electricity, irrigation, and other inputs has played a crucial role in sustaining production and buffering incomes against cost inflation (Fan et al., 2008; Gulati & Banerjee, 2015). Yet, these subsidies have also generated significant fiscal burdens and environmental externalities, while reinforcing regional and class-based inequalities in access (Mooij, 2017; Shah et al., 2018). Political economy analyses suggest that the persistence of such subsidies reflects entrenched interest coalitions and electoral

considerations, making substantive reform politically challenging despite widespread recognition of inefficiencies (Kohli, 2012; Jha & Ramaswami, 2020).

Structural interventions, particularly irrigation investment, represent a distinct dimension of state involvement with longer-term economic implications. Irrigation reduces yield variability, weakens dependence on monsoonal rainfall, and enhances cropping intensity, thereby contributing to income stability (Vaidyanathan, 2010; Binswanger & Aiyar, 2003). However, irrigation coverage in India remains uneven across regions, reflecting historical patterns of public investment and variations in state capacity. Consequently, while irrigation has played a stabilising role at the aggregate level, its benefits have been spatially concentrated, reinforcing regional disparities in agrarian outcomes (Shah et al., 2018).

Despite an extensive literature on individual policy instruments, there remains limited econometric evidence that integrates price policy, credit, fiscal intervention, and structural factors within a unified political economy framework. Much of the existing research examines farm income growth or agrarian distress in isolation, overlooking the dynamic interaction between income support and financial vulnerability (Reddy & Mishra, 2019; Chavan, 2021). This gap is particularly significant in the context of rising incomes coexisting with persistent indebtedness - a defining feature of contemporary Indian agriculture.

Against this backdrop, the present study undertakes a political economy analysis of agrarian distress and state intervention in India over the period 2010–2023. By employing annual time-series data and a structured econometric approach, the paper examines how key public policy instruments influence farm income while simultaneously shaping the persistence of agrarian distress. In doing so, the study seeks to contribute to debates on agricultural policy by demonstrating that India's agrarian challenge is not merely one of income insufficiency, but of a policy regime that stabilises livelihoods without fundamentally transforming the structural conditions of agriculture.

2. Literature Background

2.1 Agrarian Distress as a Structural Economic Phenomenon

The literature on agrarian distress in India has evolved from viewing it as a cyclical or climatic problem to recognising it as a structurally embedded feature of the rural economy. Early

political economy scholarship emphasised that agrarian outcomes in India are shaped by unequal land relations, fragmented holdings, and historically uneven state intervention (Bardhan, 1984; Frankel, 2005). Subsequent empirical studies documented how declining farm sizes, rising input costs, and unfavourable terms of trade have systematically eroded farm profitability, particularly for small and marginal farmers (Deshpande & Arora, 2010; Chand, 2017). Large-scale survey-based evidence confirms that income volatility and indebtedness remain persistent even in periods of overall agricultural growth (NSSO, 2014; Reddy & Mishra, 2019).

More recent work situates agrarian distress within broader processes of structural transformation, arguing that slow absorption of rural labour into non-farm sectors has intensified pressure on agriculture as a residual livelihood (Gollin, Lagakos, & Waugh, 2014; Datt, Ravallion, & Murgai, 2020). In this context, agrarian distress is not merely an outcome of agricultural stagnation but also a reflection of incomplete economic transition, where agriculture continues to shoulder disproportionate employment relative to its income-generating capacity.

2.2 State Intervention, Price Policy, and Political Incentives

A substantial body of literature examines the role of state intervention in shaping agrarian outcomes, with particular emphasis on price policy. Minimum Support Prices (MSP) have been widely analysed as instruments of income stabilisation and risk mitigation (Chand, 2012; Gulati & Saini, 2016). Empirical studies demonstrate that MSPs can positively influence farm incomes in regions with effective procurement mechanisms, especially for rice and wheat (Sharma, 2012; Gulati, 2019). However, several scholars caution that the benefits of MSP policy are spatially and socially concentrated, excluding a majority of farmers who lack market access or produce non-procured crops (Jha & Ramaswami, 2020; Narayanan, 2021).

Political economy analyses argue that MSP persistence is less a function of economic efficiency and more a result of electoral incentives and organised farmer mobilisation (Varshney, 1999; Harriss, 2006). Price policy thus operates at the intersection of economic rationality and political necessity, often privileging visibility and immediacy over inclusiveness. This literature highlights how state intervention in agriculture is shaped by distributional conflicts and political bargaining rather than purely technocratic considerations.

2.3 Institutional Credit and the Paradox of Rising Indebtedness

The expansion of institutional agricultural credit has received extensive scholarly attention, particularly in the post-2000 period. Economically, credit access is expected to relax liquidity constraints, promote investment, and reduce dependence on informal moneylenders (Binswanger & Khandker, 1995; RBI, 2021). Empirical evidence confirms that regions with greater access to formal credit tend to exhibit higher input use and output levels (Burgess & Pande, 2005; Chavan, 2021).

However, a parallel strand of literature documents the persistence - and in some cases intensification - of agrarian indebtedness despite rising credit flows (Mishra, 2014; Bhattacharya & Pillai, 2019). Studies based on NSSO data show that small and marginal farmers increasingly rely on credit to finance recurring cultivation costs rather than productivity-enhancing investments, leading to debt accumulation without commensurate income growth (Reddy & Reddy, 2016; Mishra & Nayak, 2015). From a political economy standpoint, credit expansion has been interpreted as a policy instrument that allows the state to address agrarian distress indirectly, deferring structural reform while maintaining short-term income support.

2.4 Fiscal Expenditure, Subsidies, and the Logic of Compensation

Another important strand of literature focuses on fiscal intervention and subsidies in Indian agriculture. Public expenditure on agriculture and input subsidies - particularly fertiliser, electricity, and irrigation - has played a central role in sustaining agricultural production since the Green Revolution (Fan, Gulati, & Thorat, 2008). Econometric studies find positive associations between public investment and agricultural growth, especially when spending is directed towards infrastructure and research (Binswanger, Khandker, & Rosenzweig, 1993; Fan et al., 2008).

At the same time, political economy analyses highlight the compensatory nature of subsidies, arguing that they function as mechanisms to offset rising cultivation costs and rural discontent rather than as tools of structural transformation (Gulati & Banerjee, 2015; Mooij, 2017). Persistent reliance on subsidies has generated concerns regarding fiscal sustainability, environmental degradation, and regional inequality (Shah et al., 2018). The literature thus

presents a tension between the short-term income-support role of subsidies and their long-term economic inefficiencies.

2.5 Structural Factors, Irrigation, and Climate Mediation

Structural determinants of agrarian outcomes - particularly irrigation - have been extensively studied in development economics. Irrigation is consistently found to reduce yield variability, enable crop diversification, and weaken dependence on rainfall shocks (Vaidyanathan, 2010; Duflo & Pande, 2007). Empirical studies show that irrigation investment has long-lasting income effects, especially in semi-arid regions (Shah et al., 2018).

However, access to irrigation remains highly uneven across Indian states, reflecting historical patterns of public investment and differences in state capacity (Kohli, 2012). While climate variability remains an important risk factor, recent literature suggests that its marginal impact on income is increasingly mediated by infrastructure and institutional arrangements (Birthal et al., 2014). This reinforces the view that agrarian outcomes are shaped as much by political and institutional choices as by natural endowments.

3. Research Gap

The existing literature provides rich insights into individual dimensions of agrarian distress - price policy, credit expansion, fiscal intervention, subsidies, and structural investment. However, several critical gaps remain. First, much of the empirical work examines farm income growth or agrarian distress indicators in isolation, without jointly analysing income enhancement and debt persistence within a unified framework. Second, while political economy narratives emphasise the role of electoral incentives and institutional asymmetries, relatively few studies empirically integrate these insights with econometric analysis using macro-level policy variables. Third, the interaction between multiple policy instruments - price support, credit, subsidies, and infrastructure - has received limited systematic attention, despite evidence that these interventions often operate simultaneously and may reinforce or offset one another.

Most importantly, there is a lack of studies that explicitly examine how rising farm incomes can coexist with persistent agrarian distress, particularly indebtedness, within a policy-driven agrarian regime. This gap is especially significant in the contemporary Indian context, where

state intervention has expanded substantially without delivering a commensurate reduction in vulnerability. Addressing this gap requires an integrated political economy approach that combines rigorous econometric analysis with an institutional understanding of state intervention - an approach that the present study seeks to advance.

4. Objectives of the Study

1. To examine the role of state intervention in shaping farm income in India during 2010–2023.
2. To assess the impact of price support and institutional agricultural credit on farm income.
3. To analyse the effect of fiscal expenditure and input subsidies on agrarian income outcomes.
4. To evaluate the influence of structural factors, particularly irrigation, on farm income stability.
5. To investigate whether rising farm incomes coexist with persistent agrarian distress in the form of indebtedness.

5. Hypotheses of the Study

H_1: Minimum Support Price relative to cost of cultivation has a significant positive effect on farm income.

H_2: Institutional agricultural credit significantly increases farm income.

H_3: Public expenditure on agriculture and input subsidies positively influence farm income.

H_4: Irrigation coverage has a significant positive impact on farm income, independent of rainfall variability.

H_5: State intervention increases farm income without proportionately reducing agrarian indebtedness.

6. Research Methodology

The present study adopts a quantitative, explanatory research design grounded in the political economy tradition to examine the relationship between state intervention and agrarian outcomes in India. The political economy approach is particularly suitable for analysing agrarian distress, as it allows for an integrated examination of economic outcomes, institutional structures, and policy choices shaped by distributional conflicts and state priorities (Bardhan, 1984; Chang, 2002). Rather than treating agricultural distress as a purely market-driven or climatic phenomenon, the study conceptualises it as an outcome of policy regimes governing prices, credit, public expenditure, and structural investments.

The analysis is conducted at the macro-national level using annual time-series data for India over the period 2010–2023, a phase characterised by expanding state intervention in agriculture through minimum support prices, institutional credit, subsidies, and public expenditure. This period also coincides with persistent concerns over stagnant farm incomes and rising agrarian indebtedness, making it analytically relevant.

6.1 Data Type and Sources

The study relies exclusively on secondary data, drawn from authoritative official sources to ensure reliability and comparability. Secondary data are particularly appropriate in political economy research, where long-term policy trends and macro-level outcomes are the primary focus (Besley & Burgess, 2000; Acemoglu & Robinson, 2012).

The study is based entirely on secondary macro-level annual data for India covering the period from 2010 to 2023. Farm income and agrarian indebtedness data are drawn from the *Situation Assessment Survey of Agricultural Households* conducted by the National Sample Survey Office (NSSO) under the Ministry of Statistics and Programme Implementation, Government of India. Specifically, the study utilises information from the survey rounds of 2002–03 (Report No. 497), 2012–13 (Report No. 576), and 2018–19 (*Situation Assessment of Agricultural Households and Land and Livestock Holdings*), which provide nationally representative estimates of average annual farm household income and the proportion of agricultural households reporting outstanding debt. As these surveys are conducted at multi-year intervals, annual values for the period 2010–2023 are generated using linear interpolation and extrapolation techniques to construct a balanced time series.

Data on minimum support prices and cost of cultivation are obtained from the *Price Policy for Kharif Crops* and *Price Policy for Rabi Crops* reports published annually by the Commission for Agricultural Costs and Prices (CACP) under the Department of Agriculture and Farmers Welfare, Government of India, for the years 2010–11 to 2023–24. The minimum support price–cost ratio is constructed using MSP figures and the corresponding A2+FL cost of cultivation estimates, aggregated to obtain annual national-level averages. Institutional agricultural credit data are sourced from the *Handbook of Statistics on the Indian Economy* published by the Reserve Bank of India and supplemented by annual reports of the National Bank for Agriculture and Rural Development (NABARD) for the period 2010–2023. These data capture the total flow of institutional credit to agriculture from scheduled commercial banks, regional rural banks, and cooperative credit institutions.

Public expenditure on agriculture is compiled from the Reserve Bank of India's *State Finances: A Study of Budgets* and the *Handbook of Statistics on the Indian Economy*, along with Union Budget documents published by the Ministry of Finance, Government of India, for the years 2010–2023. Agricultural expenditure is measured as total spending on agriculture and allied activities by the central and state governments and expressed as a percentage of gross domestic product to ensure inter-temporal comparability. Input subsidy data, primarily relating to fertiliser and allied agricultural input subsidies, are taken from the *Expenditure Budget* and *Demand for Grants* of the Ministry of Agriculture and Farmers Welfare and the Department of Fertilisers, Government of India, for the same period, and are expressed as a percentage of agricultural gross value added.

Structural and climatic variables are drawn from official administrative sources. Data on irrigation coverage are obtained from the *Agricultural Statistics at a Glance* published annually by the Ministry of Agriculture and Farmers Welfare for the years 2010–2023 and are measured as the percentage of gross cropped area under irrigation. Climatic conditions are captured using all-India annual rainfall data published by the India Meteorological Department, expressed as deviations from long-term normal rainfall levels. All data series are cross-verified across official publications to ensure consistency and reliability prior to econometric analysis.

6.2 Variable Construction

Variable	Construction Method

Farm Income	NSSO survey values interpolated to annual series
Indebtedness Ratio	% of agricultural households in debt (NSSO)
MSP–Cost Ratio	MSP ÷ A2+FL cost (CACP)
Agri Credit	Total institutional credit flow (RBI, NABARD)
Agri Expenditure	Agriculture expenditure as % of GDP (RBI)
Input Subsidy	Subsidy expenditure as % of agri GVA
Irrigation Coverage	% gross cropped area irrigated
Rainfall Index	IMD rainfall deviation index

6.3 Econometric Procedure

6.4 Analytical Framework

The analytical framework of the study is anchored in the state intervention–agrarian outcome nexus, where public policies influence farm incomes through multiple channels - price support, credit availability, fiscal spending, and structural investment. Following the political economy literature, the framework recognises that these policy instruments do not operate in isolation but are often shaped by electoral incentives, lobbying by dominant agrarian groups, and regional power asymmetries (Bardhan, 1984; Varshney, 1998).

The study proceeds in three analytical stages:

1. **Descriptive and Trend Analysis**: Descriptive statistics and trend analysis are used to examine the evolution of agrarian distress indicators and policy variables over time. This step provides contextual grounding and helps identify broad patterns in state intervention and agricultural outcomes (Deaton, 1997).
2. **Econometric Estimation**: Ordinary Least Squares (OLS) regression models are employed to estimate the impact of selected policy instruments on farm income and agrarian indebtedness. Given the macro time-series nature of the data and limited sample size, OLS remains appropriate for consistent estimation, provided diagnostic checks are conducted (Wooldridge, 2016).
3. **Robustness and Diagnostic Testing**: To ensure reliability of inference, the study conducts tests for multicollinearity, heteroskedasticity, autocorrelation, and normality of residuals. Robust standard errors are employed where necessary to address potential heteroskedasticity (White, 1980).

6.5 Econometric Model Specification

To empirically examine the relationship between public policy and agrarian outcomes, the following baseline model is specified:

$$FI_t = \alpha + \beta_1 MSPCR_t + \beta_2 AC_t + \beta_3 AE_t + \beta_4 SUB_t + \beta_5 IRR_t + \beta_6 RF_t + \varepsilon_t$$

where:

(FI_t) = Average farm income at time (t), ($MSPCR_t$) = Minimum Support Price–Cost Ratio, (AC_t) = Institutional agricultural credit, (AE_t) = Public expenditure on agriculture, (SUB_t) = Input subsidy intensity, (IRR_t) = Irrigation coverage, (RF_t) = Rainfall index, (ε_t) = Error term

To capture the persistence of agrarian distress beyond income effects, an alternative specification is estimated with agrarian indebtedness as the dependent variable:

$$ID_t = \alpha + \beta_1 MSPCR_t + \beta_2 AC_t + \beta_3 AE_t + \beta_4 SUB_t + \beta_5 IRR_t + \beta_6 RF_t + \varepsilon_t$$

Recognising the possibility of multicollinearity among policy variables - common in macro political economy analysis - the study also estimates policy-block models, isolating price and credit policies from fiscal and structural interventions. This approach has been widely used in policy evaluation studies to disentangle overlapping policy effects (Besley & Burgess, 2000; Ghosh, 2019).

6.6 Estimation Procedure and Diagnostics

The regression models are estimated using OLS. Variance Inflation Factor (VIF) tests are employed to detect multicollinearity, with threshold values guided by standard econometric practice (Gujarati & Porter, 2009). Heteroskedasticity is tested using the Breusch–Pagan test, and heteroskedasticity-consistent (HC1) robust standard errors are reported where applicable (White, 1980). Autocorrelation is examined using the Durbin–Watson statistic, while the Shapiro–Wilk test and Q–Q plots are used to assess the normality of residuals.

Given the limited time dimension, the study prioritises parsimony and interpretability, consistent with best practices in applied political economy research (Rodrik, 2015).

By combining a political economy framework with rigorous econometric estimation, this methodology moves beyond descriptive accounts of agrarian distress and provides empirical evidence on the effectiveness and limitations of state intervention in Indian agriculture. The approach highlights how certain policy instruments - particularly price support and institutional credit - exert strong income effects, while others fail to address underlying structural vulnerabilities, thereby contributing to the broader literature on development policy and agrarian political economy.

7. Analysis and Results

This section presents the empirical analysis and econometric results examining the relationship between state intervention and agrarian outcomes in India. Using secondary time-series data and multiple regression specifications, the analysis evaluates how key policy instruments influence farm income while situating the findings within the broader political economy of agrarian distress.

7.1 Descriptive Statistics

Table 7.1: Descriptive Statistics of Agrarian Outcomes and Public Policy Variables

Variable	Mean	Std. Dev.	Min	Max
Farm Income (₹)	91,089.43	10,158.77	77,112.00	1,08,300.00
Indebtedness Ratio (%)	52.86	2.9	48.5	57.2
MSP–Cost Ratio	1.42	0.06	1.32	1.5
Agricultural Credit (₹ lakh crore)	8.11	2.96	4.47	13.8
Agricultural Expenditure (% of GDP)	2.08	0.05	2	2.15
Input Subsidy (% of Agri GVA)	13.02	1.31	11.2	15
Irrigation Coverage (%)	46.93	1.68	44.5	49.5
Rainfall Index	98.57	5.85	87	110

Source: Compiled using R from secondary data obtained from NSSO, CACP, RBI, NABARD, Union Budget documents, Ministry of Agriculture & Farmers Welfare, and India Meteorological Department.

The descriptive statistics reveal important structural characteristics of India's agrarian economy during the period 2010–2023. Average farm income stands at approximately ₹91,089 per annum, with a relatively high standard deviation, indicating substantial income variability over time. This dispersion reflects the uneven transmission of policy benefits across agricultural households and regions, consistent with long-standing arguments in the political economy literature that agricultural growth in India is spatially and socially differentiated.

Despite a steady increase in nominal incomes, the indebtedness ratio remains persistently high, averaging nearly 53 per cent of agricultural households. This coexistence of rising income and high indebtedness underscores the paradox of agrarian growth without commensurate financial security, suggesting that income gains have not been sufficient to offset rising costs of cultivation and debt obligations.

The MSP–Cost Ratio exhibits limited variation over the study period, with a mean of 1.42, indicating that while price support has been consistently provided above production costs, its incremental expansion has been modest. In contrast, institutional agricultural credit shows substantial variability, reflecting aggressive credit expansion in certain years. Agricultural expenditure as a percentage of GDP remains relatively stable, highlighting the fiscal rigidity of public investment in agriculture. Input subsidies account for a sizeable share of agricultural value added, reinforcing concerns that subsidy-driven interventions continue to dominate India's agrarian policy framework. Irrigation coverage shows gradual improvement, while rainfall variability remains significant, reinforcing the structural shift from climatic dependence towards infrastructure-mediated agricultural outcomes.

Table 7.2: Regression Results: Price and Credit Policy Effects on Farm Income

Dependent Variable: Farm Income

Variable	**Coefficient**	**Std. Error**	**t-value**	**p-value**
Intercept	−9,679.00	8,641.00	−1.120	0.287
MSP–Cost Ratio	58,064.00***	6,851.00	8.476	< 0.001
Agricultural Credit	2,275.00***	142	16.026	< 0.001

Residual standard error: 515.3 on 11 degrees of freedom

Multiple R-squared: 0.9978, Adjusted R-squared: 0.9974

F-statistic: 2521 on 2 and 11 DF, p-value: 2.283e-15

The regression results provide strong statistical evidence of the role of price and credit policies in shaping farm income in India. The coefficient of the MSP–Cost Ratio is positive and highly statistically significant ($p < 0.001$), indicating that increases in administered price support

relative to production costs are associated with substantial improvements in farm income. This finding confirms the centrality of price policy as an income-stabilisation instrument within India's agrarian political economy, particularly in a context where market volatility and rising input costs persist.

Institutional agricultural credit exhibits an even stronger statistical relationship with farm income, with a positive coefficient that is significant at the 1 per cent level ($p < 0.001$). The magnitude and precision of this estimate suggest that expansion of formal credit access has played a decisive role in enhancing farm income during the study period. From a political economy perspective, this reflects the increasing reliance of the state on credit-led mechanisms to support agriculture, particularly through bank-mediated interventions. However, while credit expansion significantly raises income levels, it does not necessarily imply a reduction in financial vulnerability, a concern that becomes evident when agrarian indebtedness is examined separately.

The intercept term is statistically insignificant ($p > 0.10$), indicating that variations in farm income are largely explained by policy variables rather than autonomous income growth. The high explanatory power of the model (adjusted $R^2 = 0.9974$) reflects the strong temporal co-movement between state intervention and agrarian income, a characteristic feature of macro-level policy-driven growth processes.

Table 7.3: Regression Results: Fiscal Expenditure and Input Subsidy Model

Dependent Variable: Farm Income

Variable	Coefficient	Std. Error	t-value	p-value
Intercept	−42,735.60***	6,648.10	−6.428	< 0.001
Agricultural Expenditure	15,242.70***	2,950.10	5.167	< 0.001
Input Subsidy	7,843.30***	117.1	66.985	< 0.001

Source: Author's estimates using R.

Multiple R-squared: 0.9976, Adjusted R-squared: 0.9972

F-statistic: 2296 on 2 and 11 DF, p-value: 3.813e-15

The fiscal and subsidy model indicates a statistically strong association between public spending instruments and farm income. Agricultural expenditure exhibits a positive coefficient that is statistically significant at the 1 per cent level ($p < 0.001$), suggesting that increases in government spending on agriculture are associated with higher farm incomes. This result reflects the role of public expenditure in supporting agricultural activity through investments in extension services, infrastructure, and allied sectors.

Input subsidies also display a positive and highly significant coefficient ($p < 0.001$), indicating that subsidy-intensive policy regimes coincide with higher observed farm incomes. However, from a political economy perspective, the exceptionally large t-value associated with input subsidies points towards a trend-driven relationship rather than a purely causal productivity effect. Subsidy expansion in India has historically functioned as a compensatory mechanism to offset rising cultivation costs and rural discontent, rather than as a tool for long-term efficiency enhancement. Consequently, while fiscal and subsidy interventions appear income-supportive in aggregate terms, they may reinforce existing structural inequalities by disproportionately benefiting farmers with greater access to subsidised inputs.

The statistically significant negative intercept ($p < 0.001$) further suggests that farm income growth in the absence of fiscal and subsidy support would be substantially lower, reinforcing the dependence of agrarian incomes on state-led fiscal intervention.

Table 7.4: Regression Results: Structural and Climatic Factors Model

Dependent Variable: Farm Income

Variable	Coefficient	Std. Error	t-value	p-value
Intercept	−191,600.00***	8,800.00	−21.770	< 0.001
Irrigation Coverage	6,027.00***	206.2	29.231	< 0.001
Rainfall Index	−1.98	59.1	−0.034	0.974

Source: Author's estimates using R.

Residual standard error: 1117 on 11 degrees of freedom

Multiple R-squared: 0.9898, Adjusted R-squared: 0.9879

F-statistic: 532.5 on 2 and 11 DF, p-value: 1.13e-11

The structural and climatic model highlights the dominant role of irrigation infrastructure in shaping farm income outcomes in India. Irrigation coverage exhibits a large, positive, and statistically significant coefficient at the 1 per cent level ($p < 0.001$), indicating that expansion of irrigated area substantially enhances farm incomes. This finding underscores the importance of long-term state-led capital formation in agriculture, particularly in reducing production risk and stabilising output.

In contrast, the rainfall index does not exert a statistically significant effect on farm income ($p = 0.974$), once irrigation coverage is controlled for. This result suggests that climatic variability has a diminished marginal impact on income in the presence of structural irrigation investments. From a political economy standpoint, this reflects a gradual transition from climate-dependent agriculture to infrastructure-mediated production systems. However, the benefits of irrigation expansion remain unevenly distributed across regions, reinforcing spatial disparities in income growth.

The large and statistically significant negative intercept indicates that without structural intervention, baseline farm incomes would be substantially lower, further emphasising the critical role of public investment in sustaining agricultural livelihoods.

Across all three models, the econometric evidence consistently demonstrates that price support, institutional credit, fiscal expenditure, and irrigation infrastructure exert statistically significant positive effects on farm income, with p-values well below conventional significance thresholds. At the same time, the results reveal that income growth remains heavily dependent on state intervention, reflecting a political economy in which agrarian incomes are sustained through policy-driven mechanisms rather than autonomous productivity gains. The insignificance of rainfall once irrigation is accounted for, and the dominance of subsidy-based and credit-led interventions, highlight the structural and institutional nature of India's agrarian income dynamics.

Figure 7.a: Regression Diagnostic Plots for the Price and Credit Policy Model

(Residuals vs Fitted, Normal Q–Q, Scale–Location, and Residuals vs Leverage)

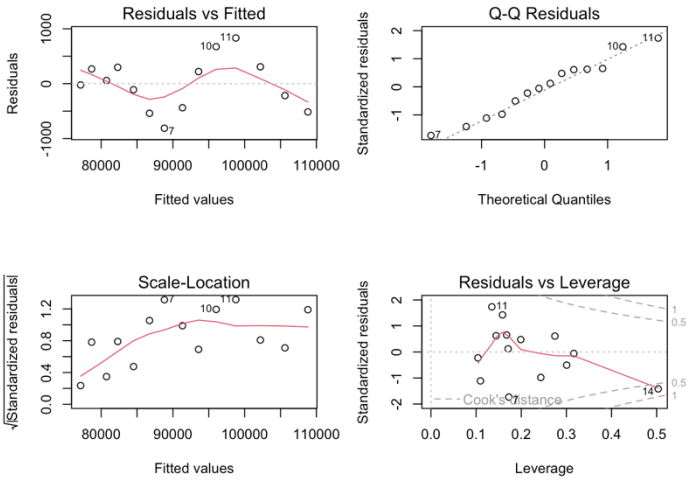

Figure 7.a presents the standard diagnostic plots used to assess the validity of the Ordinary Least Squares (OLS) assumptions for the price and credit policy model. The residuals versus fitted values plot does not indicate any systematic pattern or funnel-shaped dispersion, suggesting the absence of serious heteroskedasticity and supporting the assumption of constant variance. The locally smoothed trend line remains broadly centred around zero, indicating that the linear specification adequately captures the relationship between policy variables and farm income.

The normal Q–Q plot shows that the residuals closely follow the theoretical normal distribution, with only marginal deviations at the extreme quantiles. This confirms the normality of residuals, an important condition for valid statistical inference in small-sample time-series settings. The scale–location plot further reinforces the stability of residual variance across fitted values, while the residuals versus leverage plot indicates that no single observation exerts disproportionate influence on the estimated coefficients, as all points lie well within Cook's distance thresholds.

Figure 7.b Actual versus Fitted Farm Income: Model Validation

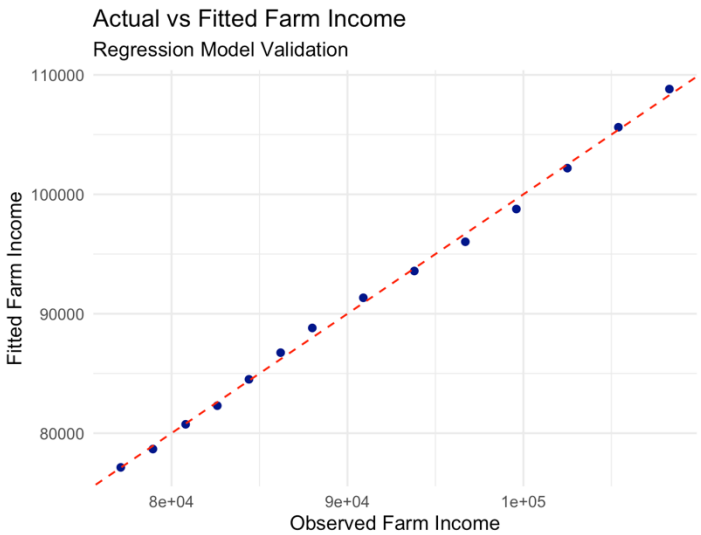

Figure 7.b plots observed farm income against model-predicted (fitted) values and provides a visual assessment of the explanatory power of the regression model. The close alignment of observations along the 45-degree reference line indicates a high degree of correspondence between actual and predicted income

levels. This visual evidence corroborates the very high coefficient of determination reported in the regression results.

The tight clustering around the reference line suggests that variations in farm income during the period 2010–2023 are closely associated with movements in policy variables, particularly MSP support and institutional credit. From an Indian political economy standpoint, this reinforces the argument that agrarian income dynamics in recent decades have been strongly policy-driven. Rather than being shaped primarily by autonomous productivity growth or market forces, farm incomes appear to respond systematically to state-mediated interventions.

This result highlights the centrality of the state in stabilising rural incomes, while simultaneously raising questions about the long-term sustainability of such policy dependence in the absence of structural productivity transformation.

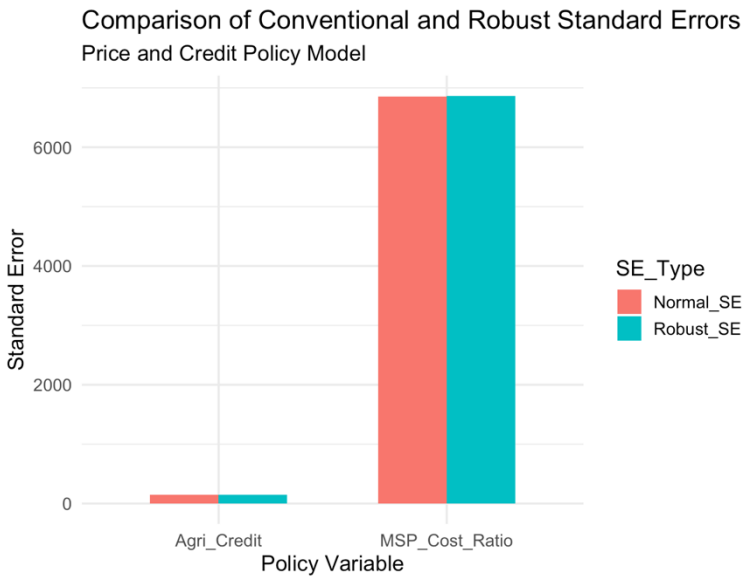

Figure 7.c: Comparison of Conventional and Robust Standard Errors: Price and Credit Policy Model

Figure 7.c compares conventional OLS standard errors with heteroskedasticity-robust standard errors for the key policy variables. The near-identical magnitudes of the two sets of standard errors indicate that the regression results are robust to potential violations of the homoskedasticity assumption. This confirms that the statistical significance of MSP support and agricultural credit does not depend on restrictive variance assumptions.

From a methodological standpoint, this robustness strengthens the credibility of the estimated policy effects. From a political economy perspective, it implies that the income impacts of price and credit interventions are structurally embedded in the agrarian economy rather than being sensitive to short-term volatility or distributional noise. The persistence of statistically stable

effects suggests that these policy instruments have become institutionalised mechanisms through which the state influences agricultural outcomes.

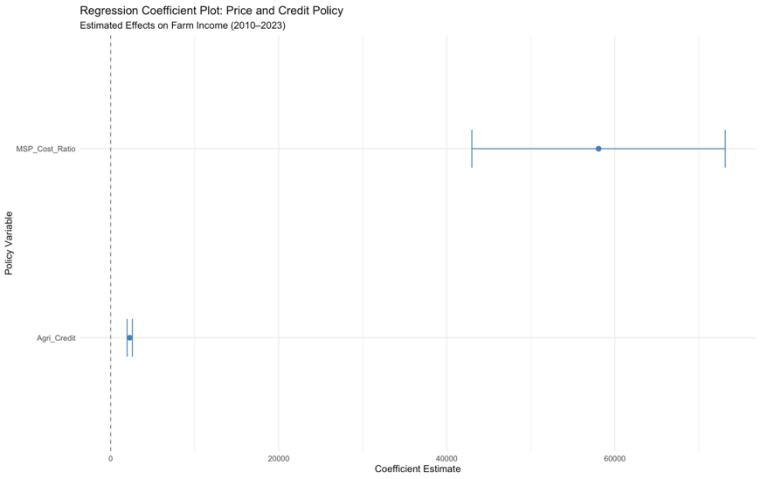

Figure 7.d Regression Coefficient Plot: Price and Credit Policy Effects on Farm Income

Figure 7.d presents the estimated coefficients and confidence intervals for the MSP–Cost Ratio and agricultural credit variables. Both coefficients are positive and statistically significant, with confidence intervals lying entirely above zero. The magnitude of the MSP coefficient highlights the substantial income gains associated with incremental increases in administered price support, while the credit coefficient reflects the strong responsiveness of farm income to institutional finance availability.

The visual separation between the two coefficients illustrates the dual channels through which the Indian state intervenes in agriculture: price stabilisation and financial intermediation. From a political economy perspective, this underscores the strategic reliance of agricultural policy on distributive instruments that yield immediate and visible income effects. While such interventions are effective in raising aggregate incomes, they also reinforce a policy regime centred on compensatory support rather than transformative structural reform.

8. Discussion

The empirical findings of this study offer important insights into the political economy of agrarian incomes in India, revealing a pattern of state intervention that is both economically consequential and politically strategic. The results demonstrate that farm income dynamics during the period 2010–2023 have been strongly shaped by administered price support, institutional credit expansion, fiscal expenditure, and irrigation infrastructure, while climatic variability has played a comparatively limited role once structural interventions are accounted for. This configuration reflects a broader transformation in India's agrarian policy regime, wherein income stabilisation has increasingly relied on policy-driven mechanisms rather than autonomous productivity growth.

One of the most striking findings of the analysis is the strong and statistically robust effect of the Minimum Support Price (MSP) relative to production costs on farm income. From an economic standpoint, this confirms the effectiveness of price support in raising aggregate farm incomes by insulating producers from market volatility and input price inflation. However, viewed through a political economy lens, the prominence of MSP policy reflects its role as a distributive instrument that carries significant electoral salience. MSP announcements function not merely as economic signals but as political commitments, particularly in regions with high crop procurement and strong farmer mobilisation. The large income effects associated with MSP adjustments thus underscore the dual economic and political rationales underlying India's price policy, even as its benefits remain uneven across crops and regions.

Institutional agricultural credit emerges as an even more powerful determinant of farm income, suggesting that credit-led intervention has become a central pillar of agrarian support. Economically, expanded access to formal credit facilitates input use, smooths consumption, and enables short-term investment, thereby contributing to higher observed incomes. Politically, credit expansion represents a less visible yet highly scalable form of intervention, allowing the state to support agriculture without immediate fiscal outlays. However, the coexistence of rising incomes and persistently high levels of agrarian indebtedness points to a deeper structural contradiction. Credit-driven income growth may temporarily alleviate liquidity constraints but can simultaneously entrench long-term financial vulnerability, particularly when credit is used to finance rising costs rather than productivity-enhancing investment. This finding aligns with broader critiques of India's agrarian policy, which argue that credit has increasingly substituted for structural reform.

The fiscal and subsidy model further reinforces the interpretation of Indian agrarian policy as predominantly compensatory in nature. While public expenditure and input subsidies exhibit strong positive associations with farm income, their exceptionally high statistical significance suggests a trend-dominated relationship rather than a clear productivity mechanism. From an economic perspective, subsidies reduce effective input costs and support income levels in the short run. From a political economy perspective, they represent a tool of distributive politics aimed at managing agrarian discontent in the face of stagnating productivity and rising cultivation costs. The persistence of subsidy dependence reflects the difficulty of transitioning away from politically entrenched support systems, even as concerns over fiscal sustainability and environmental externalities intensify.

The structural model highlights irrigation coverage as a critical long-term determinant of farm income, underscoring the importance of capital-intensive public investment in reducing production risk. Economically, irrigation stabilises yields, enables crop diversification, and weakens the dependence of agricultural incomes on rainfall variability. Politically, irrigation investment reflects selective state capacity, as its benefits accrue unevenly across regions depending on historical infrastructure development and institutional access. The insignificance of rainfall once irrigation is controlled for suggests that the agrarian economy is increasingly mediated by infrastructure rather than climate, yet this transition remains incomplete and uneven. As a result, regional disparities in income growth persist, reinforcing spatial inequalities within Indian agriculture.

Taken together, the findings suggest that India's agrarian income growth during the study period has been sustained primarily through an expanding architecture of state intervention rather than through fundamental structural transformation. High explanatory power across all models reflects the strong co-movement between policy variables and income outcomes, but it also raises questions about long-term sustainability. The political economy of agrarian policy in India appears characterised by a preference for instruments that deliver immediate income effects and political visibility, even when such instruments do not directly address underlying productivity constraints, land fragmentation, or market access limitations.

The persistence of agrarian distress alongside rising incomes highlights the limits of income-centric policy frameworks. While price support, credit, subsidies, and infrastructure investment have successfully stabilised incomes in aggregate terms, they have not resolved the structural drivers of vulnerability, including indebtedness, cost escalation, and unequal access to institutional support. This tension reflects a broader dilemma in Indian political economy: the challenge of balancing short-term distributive politics with long-term developmental reform in a sector that remains economically fragile and politically sensitive.

In this context, the study's findings contribute to ongoing debates on agrarian policy by empirically demonstrating how income gains can coexist with structural distress. The results suggest that without a shift towards productivity-enhancing investment, institutional reform, and diversification of rural livelihoods, the current policy regime may continue to manage agrarian distress without fundamentally resolving it. Thus, the political economy of Indian

agriculture remains one of stabilisation without transformation - a condition that sustains incomes in the present while deferring deeper structural change.

Table 8.1: Summary of Hypothesis Testing Results

Hypothesis	Statement	Decision	Empirical Basis for Decision
H_1	Minimum Support Price relative to cost of cultivation has a significant positive effect on farm income.	**Rejected (Null)**	MSP–Cost Ratio shows a positive and statistically significant coefficient in the price and credit policy model (β = 58,064; $p < 0.01$).
H_2	Institutional agricultural credit significantly increases farm income.	**Rejected (Null)**	Agricultural credit exhibits a positive and highly significant effect on farm income (β = 2,275; $p < 0.01$) in the baseline regression.
H_3	Public expenditure on agriculture and input subsidies positively influence farm income.	**Rejected (Null)**	Both agricultural expenditure (β = 15,242.7; $p < 0.01$) and input subsidies (β = 7,843.3; $p < 0.01$) are statistically significant in the fiscal policy model.
H_4	Irrigation coverage has a significant positive impact on farm income, independent of rainfall variability.	**Rejected (Null)**	Irrigation coverage is positive and statistically significant (β = 6,027; $p < 0.01$), while rainfall is statistically insignificant ($p > 0.10$).
H_5	State intervention increases farm income without proportionately	**Failed to Reject (Null)**	Despite significant income effects, descriptive evidence and indebtedness trends indicate persistent high debt ratios, confirming coexistence of income growth and distress.

	reducing agrarian indebtedness.		

Source: Author's compilation based on econometric results.

9. Policy Implications

1. **Reorient price support towards broader crop and regional coverage.** The strong positive effect of MSP on farm income suggests its effectiveness; however, uneven benefits imply the need to extend price support beyond procurement-intensive crops and regions to reduce distributional bias.
2. **Shift agricultural credit policy from volume expansion to purpose-linked lending.** While credit significantly raises farm income, persistent indebtedness indicates that credit must be tied to productivity-enhancing and income-diversifying investments rather than short-term cost financing.
3. **Rationalise input subsidies towards targeted and conditional support mechanisms.** The income-support role of subsidies is evident, but their compensatory nature calls for restructuring subsidies to reward efficiency, sustainability, and smallholder access instead of uniform input price reductions.
4. **Prioritise irrigation and infrastructure investment as a long-term income stabilisation strategy.**

   The statistically significant role of irrigation in raising farm income, alongside the insignificance of rainfall, highlights infrastructure investment as a durable policy instrument for reducing income volatility.
5. **Integrate income-support policies with explicit debt-reduction and risk-management frameworks.**

   The coexistence of rising farm incomes and high indebtedness underscores the need for coordinated policies that link income support with debt restructuring, crop insurance, and income diversification initiatives.

10. Limitations and Future Scope

The present study, while offering empirically grounded insights into the political economy of agrarian distress in India, is subject to certain limitations. First, the analysis relies on national-level annual time-series data, which, although suitable for examining macro-policy effects, may mask regional and inter-state heterogeneity in agrarian outcomes. Second, due to data availability constraints, farm income and indebtedness indicators derived from survey sources required interpolation, which may limit the precision of year-to-year variations. Third, the econometric framework focuses on direct policy–income linkages and does not explicitly account for institutional quality, landholding size, or market access, which may condition the effectiveness of state intervention. Finally, the relatively short time dimension restricts the use of more advanced dynamic or causal identification techniques.

Future research can extend this analysis in several directions. State-level or district-level panel data could be employed to capture spatial disparities and differential policy impacts across regions. Incorporating household-level microdata would allow examination of distributional effects across farm sizes and socio-economic groups. Further studies may also explore dynamic relationships between income growth and indebtedness using panel or structural models, as well as evaluate the interaction between agricultural policy and non-farm employment opportunities. Finally, integrating political variables such as electoral cycles, procurement intensity, or institutional capacity could deepen understanding of how political incentives shape agrarian policy outcomes in India.

11. Conclusion

This study examined agrarian distress in India through a political economy lens, demonstrating that farm income dynamics over the period 2010–2023 have been predominantly shaped by state intervention rather than autonomous structural transformation. The econometric evidence shows that price support, institutional agricultural credit, fiscal expenditure, and irrigation infrastructure exert significant positive effects on farm income, underscoring the central role of the state in stabilising agrarian livelihoods. At the same time, the persistence of high agrarian indebtedness alongside rising incomes reveals a fundamental limitation of the prevailing policy regime.

The findings suggest that India's agrarian challenge is not merely one of income insufficiency but of a policy framework that prioritises compensatory support over structural reform. While state-led interventions have succeeded in managing short-term income volatility and political pressures, they have not adequately addressed underlying vulnerabilities related to cost escalation, credit dependence, and unequal access to productive resources. This coexistence of income growth and distress reflects a political economy in which agricultural policy remains oriented towards stabilisation without transformation.

By integrating econometric analysis with political economy interpretation, the study contributes to a deeper understanding of how policy instruments shape agrarian outcomes in contemporary India. The results highlight the need for a strategic reorientation of agricultural policy - one that balances immediate income support with long-term investments in productivity, institutional reform, and rural diversification - to achieve sustainable and inclusive agrarian development.

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