World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(REVIEW ARTICLE)

Rethinking Farmers' Self-Reliance: A regional exploration of cultivation in India

Ashok Nayak * and Kshamanidhi Adabar

Department of Studies in Economics and Planning (DSEP), Central University of Gujarat, India.

World Journal of Advanced Research and Reviews, 2025, 27(02), 454-460

Publication history: Received on 18 June 2025; revised on 24 July 2025; accepted on 26 July 2025

Article DOI: https://doi.org/10.30574/wjarr.2025.27.2.2785

Abstract

This study analyses the income from cultivation, consumption expenditures, and saving habits of farmers and uses econometric estimation with a Probit regression model to understand the self-reliance of Indian farmers across regions. The study finds significant regional differences in farmers' cultivation income and an alarming trend of negative savings, which implies a heavy reliance on non-farm income for sustenance. The estimated econometric results validate that marginal and small farmers, as well as farmers in Eastern and Northern regions, are significantly less likely to be self-sufficient in cultivation.

Keywords: Self -Reliance of Farmers; Regional Disparity; Income of Cultivate; Probit Regression Model

1. Introduction

There is a large variation in self-sufficiency in Indian agriculture in terms of space, structure, and policy. It is determined by various factors, such as farmers' landholding size, the crops they cultivate, their input usage habits, and their policies concerning agriculture. India's agriculture dynamics are heterogeneous due to its unique topography and agricultural techniques. Marginal and small farmers constitute a large part of the Indian agricultural population and are mostly constrained by their lack of access to institutional credit, farm inputs, technology, and market infrastructure (Deshpande, 2002; Deshpande and Prabhu, 2005; Gill and Singh, 2006; Suri, 2006). These challenges often result in a reliance on traditional practices, which can hinder productivity and sustainability. To address these issues, there is a pressing need for policies that enhance access to resources and promote technological advancements tailored to the specific needs of these farmers. Instead, these farmers are often reliant on external sources, like government subsidies, public distribution systems, and other social safety nets, for their survival (Agarwal and Agrawal, 2017). They have limited control over their own financial independence, and ever-present environmental shocks create greater difficulty for farmers to negotiate their way towards self-reliance. However, limited access to credit, tardy adoption of modern farming technologies, and weak market linkages are impediments to lifting agricultural productivity and income (Jeromi, 2007; Vadivelu and Kiran, 2013). Additionally, environmental uncertainties, such as irregularities caused by climate change, have emerged as major risks to the stability of agriculture; for example, erratic rainfall, extended dry spells, and flash floods are making agriculture unsustainable (Aggarwal, 2008). This further reinforces vulnerabilities and becomes dependent on institutional support. Due to these systemic and context-specific factors, most farmers are unable to earn enough income from farming to cover their minimum consumption expenditure. Especially marginal and small farmers earn little from agriculture, and the earnings are volatile with little scope for savings (Indo-Global, 2017; Singh et al., 2017). Thus, against this backdrop, the current study investigates the degree of self-sufficiency in the cultivation of Indian farmers. The self-reliance on cultivation is determined by the savings from cultivation as the only source of income. If the savings of a farmer after accounting for consumption are equal to or greater than zero, they are self-reliant on cultivation. If the savings are negative, this indicates that agricultural proceeds are insufficient to meet basic needs, and farmers are not self-reliant on cultivation.

* Corresponding author: Ashok Nayak.

Therefore, this study is divided into four sections. Section 1 gives an introduction to the study. Section 2 presents the data sources and the analysis methodology. Section 3 discusses the estimation results and analysis. Lastly, Section 4 concludes and suggests policy measures that would improve Indian farmers' autonomy over finances.

2. Data and Methodology

This study is based on secondary data from the National Sample Survey Office's (NSSO) Situation Assessment Survey of Agricultural Households, performed during the 70th round. The sample size is 34,054 farm households from various parts of the country. All Indian states have been divided into six main regions based on their administrative areas: north, east, west, south, northeast, and center. The purpose of this study is to determine if a farmer is self-sufficient in agriculture, which is stated in equation 1 below. The self-reliance indicator is denoted by Φ, whereas λ represents total yearly income from cultivation and μ indicates total annual consumption expenditure. If $\phi > 0$, the farmer is self-sufficient in cultivation, but if $\phi < 0$, the farmer is not. A dummy variable Y is constructed based on the farmer's savings status; for example, Y=1. If the farmer is self-sufficient in cultivation, then Y=0; otherwise, it is not. Because the dependent variable is qualitative and binary in form, the Probit regression model is used to assess the significance of factors influencing a farmer's self-reliance in agriculture. Assuming that a farmer is completely dependent on agriculture and ignores other sources of income that may impact consumer spending, equation 2 provides a symbolic depiction of the idea of self-sufficiency in farming.

$$\phi = \lambda - \mu \text{ ---------- (1)}$$

$$P(Y=1 \mid X) = G(\beta 0 + \beta 1\, x1 + \beta 2\, x2 + \beta 3\, x3 + \beta 4\, x4 + \beta 5\, x5 + \beta 6\, x6 + \beta 7\, x7 + \beta 8\, x8 + \beta 9\, x9) \text{ ------- (2)}$$

In equation 2, G(.) represents the cumulative distribution function (CDF) of a conventional normal distribution, whereas X denotes a vector of independent variables reflecting various farmer types and geographical factors. The model's goal is to investigate the impact of landholding size and geographic location on farmers' chances of being self-sufficient in farming. The explanatory variables are specified as follows: x1 = marginal farmer, x2 = small farmer, x3 = semi-medium farmer, x4 = medium farmer, x5 = Northern, x6 = Central, x7 = Eastern, x8 = Western, and x9 = Southern region.

3. Analysis

This study's analysis is organised into three main sections, focusing on the assessment of farmers' financial independence across various geographical regions of India. Section 3.1 addresses the percentage distribution of farmers' savings status across various regions. Section 3.2 analyses average annual income from cultivation, consumption expenditure, and saving patterns across various regions. Section 3.3 of the study presents the results of the Probit regression model, identifying the factors that promote self-reliance in farmer cultivation. This structured approach facilitates a systematic assessment of the economic issues and factors affecting Indian farmers.

3.1 Percentage distribution of farmers' saving across different regions

The farmers' savings in various parts of the country reveal (Table 1) some unexpected differences, even within regions. In the Northern Region, Punjab leads with 25% of farmers reporting positive savings (the most in the region), while Jammu & Kashmir lags at 7% (the lowest), suggesting an 18 percentage point regional difference, while the overall positive savings gap is 13%. The situation in the Northeastern Region shows significant variation, with Meghalaya having a high of 28% of farmers reporting positive savings and Sikkim having a low of 3%, resulting in a 25-point difference; the regional average is 19%, which is much higher than the national average. In the Central Region, both the states of Chhattisgarh and Madhya Pradesh exhibit a similar situation, with positive savers accounting for 23% of all farmers in the state, whereas Uttar Pradesh's ratio is 10%. The intra-regional variance is substantial, although the regional average is only about 14% (Table 1). How do we know that the Eastern region is the poorest-performing area in the country? India has a national average of 29% positive saving rate, with the Western Region performing best with around 37% and the Eastern Region performing worst with around 4% average positive savings. The Western Region of Maharashtra (18%) outperforms Gujarat (11%) by 7 percentage points, with the regional average at 16%. The Southern Region has the most intra-region variability, with Telangana leading both the area and the country at 31% of farmers reporting positive savings, while Kerala lags the lowest in the region at 8%, resulting in a remarkable 23 percentage point disparity and a regional average of 17%. According to the all-India average, just 13% of farmers have surplus funds, while 87% are in deficit on a national basis. On the state level, Telangana has the largest share of positive savers (31%), while West Bengal has the lowest (2%), resulting in a national differential of 29 percentage points. These findings illustrate the regional and state-level variation in India's farmer financial situation, with some regions demonstrating resilience and others trapped in a cycle of widespread negative saving.

Table 1 The distribution of farmers' savings status as a percentage across regions

		Status of saving		
		Negative	Positive	Total
Northern Region	Jammu and Kashmir	93.00	7.00	100
	Himachal Pradesh	92.00	8.00	100
	Punjab	75.00	25.00	100
	Haryana	80.00	20.00	100
	Rajasthan	89.00	11.00	100
	Total	87.00	13.00	100
Northeastern Region	Sikkim	97.00	3.00	100
	Arunachal Pradesh	76.00	24.00	100
	Nagaland	86.00	14.00	100
	Manipur	90.00	10.00	100
	Mizoram	88.00	12.00	100
	Tripura	94.00	6.00	100
	Meghalaya	72.00	28.00	100
	Assam	79.00	21.00	100
	Total	81.00	19.00	100
Central Region	Uttar Pradesh	90.00	10.00	100
	Chhattisgarh	78.00	23.00	100
	Madhya Pradesh	77.00	23.00	100
	Total	86.00	14.00	100
Eastern Region	Bihar	95.00	5.00	100
	West Bengal	98.00	2.00	100
	Jharkhand	93.00	7.00	100
	Orissa	95.00	6.00	100
	Total	96.00	4.00	100
Western Region	Gujarat	89.00	11.00	100
	Maharashtra	82.00	18.00	100
	Total	84.00	16.00	100
Southern Region	Andhra Pradesh	89.00	11.00	100
	Karnataka	79.00	21.00	100
	Kerala	92.00	8.00	100
	Tamil Nadu	90.00	10.00	100
	Telangana	69.00	31.00	100
	Total	83.00	17.00	100
All India		87.00	13.00	100

Source: Author's calculation from NSSO Unit level Data, 70th round, schedule 33, 2013

3.1 Analyses average annual income from cultivation, consumption expenditure, and saving patterns across various regions

The statistics on average annual cultivation income, consumption expenditure, and total savings among farmers (Table 2) reveal a similar pattern of negative savings across all regions, although there is large inter- and intra-regional variability. Punjab has the highest income (₹130,331) and lowest negative saving (₹-29,428 in the Northern Region), while Jammu and Kashmir has the lowest income (₹36,715) and the highest negative saving (₹-71,405) in the region and country. The regional average income is ₹56,219, with consumption of ₹104,859 and a savings difference of ₹-48,639. Arunachal Pradesh (₹-5,308) and Meghalaya (₹-5,580) have the lowest negative savings in the Northeastern Region, indicating a close match between spending and income. Tripura (₹-49,806) and Nagaland (₹-48,872) have significant negative savings. The region's average income (₹50,753) and spending (₹73,063) contribute to a modest deficit of ₹-22,310, making it the best-performing region in terms of pecuniary net balance. In the Central Region, Madhya Pradesh (₹-12,241) and Chhattisgarh (₹-13,666) have lesser deficits than Uttar Pradesh (₹-40,645), resulting in a regional average negative saving (₹-31,597) (Table 8b). In fact, the Eastern Region continues to be the lowest in terms of income (only ₹11,754 in West Bengal) and the highest deficit state (₹-58,895), together with two other so-called impoverished states. The region has the lowest mean income (₹16,560), high spending (₹63,122), and a significant negative saving value (₹-46,562). Maharashtra has a lesser deficit (₹-22,905) despite a middling revenue (₹46,297) compared to Gujarat, which has a significantly bigger deficit (₹-56,827). The national average is ₹42,232 income, ₹77,212 consumption, and −₹34,979 deficit, whereas the regional average is ₹42,232 income, ₹77,212 consumption, and −₹34,979. Kerala has the highest individual deficit in the country, with individuals earning ₹42,536 and spending ₹131,666 while saving ₹-89,129. Telangana (₹-9,842) and Karnataka (₹-11,550) have the lowest deficits in absolute terms compared to others. It is also the lowest in the region, with a saving of ₹-34,523.Nationally, the average income in India is ₹36,965, whereas the average spending is ₹74,574, resulting in an average negative saving of ₹-37,609. Kerala and Arunachal Pradesh had deficits of ₹-89,129 and ₹-5,308, respectively, resulting in an ₹83,821 disparity. Similarly, the Northeastern Region has the lowest average deficit, while the Eastern Region has the greatest, highlighting the huge disparities in financial sustainability among Indian farmers across states and regions. This research shows that farmers with continually negative savings are not totally self-sufficient in terms of agricultural sustainability. Agriculture income offers insufficient purchasing power for consumption, and many households require nonfarm income streams, borrowings, subsidies, or remittances to provide a sustainable living. The income-to-expenditure mismatch indicates structural instability in the agricultural economy and has an impact on the long-term viability of farming as a source of income, which is especially concerning for small and marginal farmers.

Table 2 Average annual cultivation income, consumption expenditure and saving of all farmer ⟨₹⟩

		Income, Consumption Expenditure and Savings		
		Income from Cultivation	**Consumption Expenditure**	**Total Saving**
Northern Region	Jammu and Kashmir	36,715	108,119	-71,405
	Himachal Pradesh	34,989	85,739	-50,750
	Punjab	130,331	159,759	-29,428
	Haryana	94,494	127,677	-33,183
	Rajasthan	36,628	89,036	-52,408
	Total	56,219	104,859	-48,639
Northeastern Region	Sikkim	20,350	68,045	-47,695
	Arunachal Pradesh	80,227	85,535	-5,308
	Nagaland	38,545	87,417	-48,872
	Manipur	35,075	77,874	-42,799
	Mizoram	54,736	95,219	-40,483
	Tripura	33,257	83,063	-49,806
	Meghalaya	77,662	83,242	-5,580
	Assam	50,546	69,165	-18,619

	Total	50,753	73,063	-22,310
Central Region	Uttar Pradesh	34,266	74,911	-40,645
	Chhattisgarh	40,303	53,969	-13,666
	Madhya Pradesh	48,065	60,306	-12,241
	Total	37,977	69,574	-31,597
Eastern Region	Bihar	20,401	65,814	-45,413
	West Bengal	11,754	70,648	-58,895
	Jharkhand	17,389	56,181	-38,792
	Orissa	16,893	51,657	-34,764
	Total	16,560	63,122	-46,562
Western Region	Gujarat	34,877	91,703	-56,827
	Maharashtra	46,297	69,202	-22,905
	Total	42,232	77,212	-34,979
Southern Region	Andhra Pradesh	24,146	71,112	-46,966
	Karnataka	59,000	70,550	-11,550
	Kerala	42,536	131,666	-89,129
	Tamil Nadu	23,079	69,557	-46,478
	Telengana	50,994	60,837	-9,842
	Total	39,976	74,499	-34,523
All India		36,965	74,574	-37,609

Source: Author's calculation from NSSO Unit level Data, 70th round, schedule 33, 2013

3.3 Factor influencing farmers' self-reliance on cultivation

The descriptive statistics of the independent variables employed in the Probit model demonstrate that farmers vary in terms of structure and geography. The majority of the split sample is made up of marginal farmers (69.5%), followed by small farmers (16.9%), semi-medium farmers (9.3%), and medium farmers (3.6%). The signals are projected to be negative for marginal, small, and semi-medium farmers, supporting the idea that lower classes' landholdings would be excessive if they achieved acceptable levels of savings or economic self-sufficiency. On the other hand, the positive expected coefficient for medium farms suggests that bigger landowners are more likely to acquire financial capacity through economies of scale. Geographically, the sample is mostly composed of Central (29.7%) and Eastern (22.8%) regions (both with negative predicted signs), indicating that farmers in these areas experience structural disadvantages. The Southern (16.9%), Northern (12.7%), and Western (12.3%) areas also show negative expected signs, indicating that farmers in these regions may be limited, although to varying degrees. The columnar distribution of the variables appears to indicate that the Probit model was designed to investigate the effect of farm size and region on the likelihood that a farmer will be financially sustainable, with the majority of the indicators pointing to structural vulnerability, ranging from being smallholders to being situated in economically weaker regions (Table 3).

Table 3 Descriptive statistics of independent variable and their expected sign of Probit Model

Description of variable	Min	Max	Mean	Std. Dev	Std. Err	Exp. Sign
Economic factor						
Marginal farmer (D.V)	0	1	0.695	0.460	0.000049	-
Small farmer (D.V)	0	1	0.169	0.375	0.0000399	-
Semi-medium farmer (D.V)	0	1	0.093	0.291	0.000031	-

Medium farmer (D.V)	0	1	0.036	0.188	0.0000201	+
Geographical factor						
Northern (D.V)	0	1	0.127	0.333	0.0000355	-
Central (D.V)	0	1	0.297	0.457	0.0000487	-
Eastern (D.V)	0	1	0.228	0.419	0.0000447	-
Western (D.V)	0	1	0.123	0.329	0.000035	-
Southern (D.V)	0	1	0.169	0.374	0.0000399	-

Source: Author's calculation from NSSO Unit level Data, 70th round, schedule 33, 2013; Note- [D.V- Dummy variable]

Table 4 Regression results of Probit model

Results						
Nature of Variable	**Description of variable**	**Coef.**	**dy/dx=Marginal Effect**	**Delta-method Std. Err.**	**z**	**P>|z|**
Dependent (Y)	Farmer is Self-reliant on Cultivation (Y=1)					
Independent (Xi)	Economic variable					
	Marginal farmer (D.V)	-1.868*	-0.30769	0.0003	-885.9	0.000
	Small farmer (D.V)	-0.881*	-0.14516	0.0003	-414.05	0.000
	Semi-medium farmer (D.V)	-0.485*	-0.07998	0.0003	-226.12	0.000
	Medium farmer (D.V)	-0.024*	-0.00402	0.0003	-11.03	0.000
	Geographical variable					
	Northern (D.V)	-0.545*	-0.08976	0.0001	-602.54	0.000
	Central (D.V)	-0.221*	-0.03652	0.0001	-281.59	0.000
	Eastern (D.V)	-0.694*	-0.1143	0.0001	-775.11	0.000
	Western (D.V)	-0.504*	-0.08304	0.0001	-570.09	0.000
	Southern (D.V)	-0.279*	-0.04603	0.0001	-336.61	0.000

Source: Author's calculation from NSSO Unit level Data, 70th round, schedule 33, 2013; Number of obs = 34907, Pseudo R2 = 0.2107, Prob > chi2 =0.000; Note-[D.V- Dummy variable, *1% level of significance]

With 34,907 data and a pseudo-R^2 of 0.2107, the model is statistically significant and offers helpful information regarding the roots of farmers' self-reliance on farming in India. The Probit regression results reveal that economic and geographical factors are equally important. As an economic determinant, landholding size is again adversely related with the self-reliance effect, with marginal farmers having the lowest chance of being self-sufficient (effect: -0.3077), followed by small (effect: -0.1452), semi-medium (effect: -0.0800), and medium farmers (effect: -0.0040). Simply said, the larger the farm, the more likely one is to be self-sufficient. There is also a geographical element; each regional dummy (Northern, Central, Eastern, Western, and Southern) has considerably negative coefficients. Farmers in the Eastern (-0.1143) and Northern (-0.0898) areas are particularly hard hit in comparison to other groups (Table.4). Overall, the research demonstrates that small and marginal landholdings and other regional features are substantial impediments to farmers generating a living purely from agriculture, and it implies that measures must be targeted to farmers' best interests to close these structural gaps.

4. Conclusion

Economic and geographical vulnerabilities differentiate the discrepancies, revealing deep structural inequities in the self-reliance of Indian farmers in cultivation. For the great majority of regions, gross agriculture income is insufficient to meet consumption requirements, resulting in negative savings and economic distress. This tendency is much worse for marginal and small farmers, who have been found to have significantly reduced self-sufficiency, as examined by a Probit regression that reveals broadly negative marginal effects. The other cause is geographical disadvantages, which are mostly concentrated in eastern and northern India, exacerbating the problem and indicating spatial inequities in agricultural expansion and income creation. The current research concludes with two essential policy proposals to improve farmers' financial capability and autonomy. First and foremost, marginal and small farmers require targeted assistance in obtaining institutional financing, interest subsidy schemes, and adequate crop insurance coverage. They can reduce reliance on informal loans, lower the risk of income shocks, and provide a financial buffer in the event of below-average agricultural harvests. Second, prioritising region-specific agricultural development methods is critical. Targeted infrastructure and technology expenditures are required in the Eastern and Northern areas, which have self-reliance levels significantly lower than national averages.

Compliance with ethical standards

Disclosure of Conflict of interest

No Conflict of interest to be disclosed.

References

[1] Adminstrative Division of India, (n.d.). Retrieved from THE CIVIL INDIA,Awarness, Structure, Infrastructure, Developemnt: https://www.thecivilindia.com/administration/administrative-divisions-of-india/

[2] Agarwal, B., and Agrawal, A. (2017, Feb 8). Do farmers really like farming? Indian farmers in transition. Oxford Development Studies.

[3] AGGARWAL, P. (2008, Nov). Global climate change and Indian agriculture: impacts, adaptation and mitigation. Indian Journal ofAgricultural Sciences, 11-19.

[4] Deshpande, R. S. (2002, Jun 29). Agrarian Distress and Possible Alleviatory Steps Suicide by Farmers in Karnataka. Economic and Political Weekly, Vol.37, No.26.

[5] Despande, R., and Prabhu, N. (2005, Nov 4). Farmers' Distress Proof Beyond Question. Economic and Political Weekly, pp.4663-4665.

[6] Gill, A., and Singh, L. (2006, Jun-Jul 30-7). Farmers' Suicides and Response of Punjab Policy: Evidence, Diagnosis and Alternatives from Punjab. Economic and Political Weekly ,

[7] I.-G. S. (2017). Why farmers quit? A study on farmers' suicides in Odisha. Indo-Global Social Service Society. New Delhi-110003: Indo-Global Social Service Society.

[8] Jeromi, P. D. (2007, Aug 4-10). Farmers' Indebtedness and Suicides: Impact of Agricultural Trade Liberalisation in Kerala. Economic and Political Weekly, Vol. 42, No. 31, pp. 3241-3247.

[9] NSSO. (2016). Income, Expenditure, Productive Assets and Indebtedness of Agricultural Households in India. NSSO, Government of India Ministry of Statistics and Programme Implementation. New Delhi: NSSO.

[10] Singh, G., Anupama, Kaur, G., and Kaur, R. (2017, Feb 11). Indebtedness among Farmers and Agricultural Labourers in Rural Punjab. Economic and Political Weekly, vol liI no 6, pp. 51-57.

[11] Suri, K. C. (2006, Apr 22-28). Political Economy of Agrarian Distress. Economic and Political Weekly, Vol.41, No.16, pp. 1523-1529.

[12] Vadivelu, A., and Kiran, B. (2013, August). PROBLEMS AND PROSPECTS OF AGRICULTURAL MARKETING IN INDIA: AN OVERVIEW. International Journal of Agricultural and Food Science.