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Economic Struggles and Growth: Uttar Pradesh Farmers' Debt and Prosperity (2002-03 and 2018-19)

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ABSTRACT

This study investigates key economic trends among farmers in Uttar Pradesh between 2002-03 and 2018-19, focusing on landholding patterns, credit access, income growth, and indebtedness. The analysis uses data from the National Sample Survey Office's (NSSO) Situation Assessment Surveys of 2003 and 2019, enabling a comparative study of farmers' economic conditions across time.

Significant findings include an increase in marginal landholdings, reflecting a shift toward smaller, more fragmented land parcels. Medium and large landholdings have decreased substantially, indicating the pressures of population growth and economic challenges. Credit accessibility, while stable overall, shows a notable increase among medium and large landholders, suggesting a growing reliance on credit to sustain larger agricultural operations.

The study also highlights income trends, with agricultural earnings increasing across all farmer categories, although the rate of growth is uneven. Marginal farmers saw lower absolute gains compared to larger landholders, emphasizing persistent income inequality. Non-agricultural income has played a critical role in boosting overall earnings, particularly for small and marginal farmers, who depend more on non-farm income sources.

Indebtedness remains a concern, with marginal farmers experiencing higher levels of consumption expenditure relative to their income. The findings underline the importance of addressing credit accessibility and income diversification to ensure equitable economic development for all farming households in Uttar Pradesh.

Keywords: Landholding patterns, credit accessibility, agricultural income, indebtedness, Uttar Pradesh, farmer households.

Introduction

Uttar Pradesh, the most populous state in India, holds immense geographical and economic importance. Located in the northern part of the country, its diverse landscape includes the fertile plains of the Ganges and Yamuna rivers, as well as the rugged Vindhya range. This geographical variety heavily shapes its economy, particularly agriculture, which remains the backbone of the state. Urban centers like Lucknow, Kanpur, and Varanasi contrast sharply with rural areas, where agriculture dominates.

Covering around 243,286 square kilometers, Uttar Pradesh ranks as the fourth-largest state in India by area. Its climate varies from temperate in the north to tropical in the south, supporting a wide range of agricultural activities. Fertile soil from its rivers enables intensive farming, making the state a key agricultural contributor to India. While agriculture employs a large portion of the population, the state's economy also includes industries like textiles, leather, sugar processing, and growing sectors such as electronics and IT. The services sector, which includes education, healthcare, and transportation, has expanded significantly due to urbanization.

The rural-urban divide is stark, with cities offering better infrastructure, education, and healthcare, while rural areas remain predominantly agrarian with limited access to modern amenities. Agriculture remains essential to rural livelihoods, highlighting the importance of studying economic conditions in these areas.

As a major agricultural hub, Uttar Pradesh plays a crucial role in India's food security. It is the largest producer of wheat and sugarcane, while also contributing significantly to the production of rice, pulses, and potatoes. Livestock, particularly dairy farming, is also an essential source of income in rural areas, further underscoring the importance of agriculture in the state's economy.

Studying agricultural households is vital to understanding rural economic conditions. As agriculture is the primary livelihood for most of the rural population, examining income, consumption, and debt patterns sheds light on their economic challenges. Income levels reflect financial health, while

consumption patterns indicate living standards. High debt levels, on the other hand, reveal financial vulnerabilities that can impact investment in agriculture and overall economic stability.

Analyzing these trends is crucial for informed policy-making. Insights into income, consumption, and debt allow for targeted interventions to support farmers, improve productivity, and enhance rural development. Identifying high debt levels could prompt credit schemes or relief measures, while low incomes might lead to initiatives aimed at boosting agricultural earnings and living conditions.

Literature Review

In globalization period, economic reforms have adversely affected the growth and development of Uttar Pradesh, which provide food to India's 72% population. Giving undue preference to service sector over agriculture sector has led to low income, low growth, low crop and high cost of inputs. Farmers in Uttar Pradesh are suffering from low returns from agriculture. Condition of marginal and small farmers is worse to that of semi medium and medium farmers. Over the years income inequalities have also widened in rural Uttar Pradesh (G. Singh, 2014; Verma and Shekhar, 2020). Although state contribution in the total foodgrain production of country is high, productivity of agriculture is lower in comparison to other states. Factors identified for poor performance of agriculture in the state are inadequate irrigation facilities, poor rural infrastructure, inadequate availability of quality fertilizers and seeds, costly agricultural inputs, inefficient agriculture markets, lack of skills and knowledge for modern agricultural practices (Vajpayee and Volavka, 2005; Singh, 2016; Gulati et al, 2021). The performance of agriculture sector in the state is so poor that some studies have concluded that a crisis is emerging in the agriculture sector of Uttar Pradesh, and the intensity of crisis is increasing. Factors identified for crisis are high indebtness of farmers, low cropping density and declining yield (Raman and Khan, 2017; Khan, 2017).

Farmers' income is significantly corelated with farm size (Sharma et al, 2018). Other determinants of farmers income are education, family size, information, access to credit, input supply and market, and infrastructure for livestock (Birthal et al, 2017; Waseem et al, 2017; Waseem et al, 2020). Over the years share of income from agriculture is falling in total income of farmers' and income from farming is a very small portion of total income of farmers. Biggest contributor to the farmers' income are services and wages. The reasons identified for declining income from farming are fragmentation and smaller size of land holdings, worsening soil quality, rising cost of inputs, low harvest price, low cropping intensity, poor extension services and marketing linkages (Kumar, 2018; Reddy et al, 2020, Singh et al, 2013).

Marginal farmers who constitute three fourth of total farmers in the state, earn below even what is necessary to cross the poverty line if they solely depend on agriculture. (Singh, 2013; Narain et al, 2015; Verma 2020, Singh, 2016)). Along with other factors that reduces returns from farming, an additional reason for lower returns to marginal and small farmers from agriculture are existing agrarian relations (Varkey S., 20,23) Hence marginal farmers have to look for alternative sources of earnings. Major part of their income comes from cattle rearing, wages and other service sector activities (Deoghare,1997; Singh et al, 2002; Singh, 2009, Tripathi,). Earning of farmers from agriculture are so low that approximately 40% of the farmers want to quit agriculture. The desire to quit agriculture is high among marginal farmers, but they are continuing with it as they do not have any other alternative to rely on (Agrawal & Agrwal, 2016).

In Uttar Pradesh, income and education of farmers are significant determinants of consumption expenditure of farmers, and consumption of farmers in dry areas is less than that in irrigated areas (Maurya et al, 2018, Pandey, 2013; Mushir et al 2013; Baliyan, 2023). Further their average annual income is higher than average annual consumption across major states of India (Sharma et al, 2024).

Credit is an important determinant of farmers' income in the state. Access to institutional credit positively impact the crop productivity (Yadav & Rao, 2024; Manoharan & Varkey, 2022; Das et al, 2009). Over the years, structure of credit markets has changed, institutional credit has become more accessible to farmers in the state. In the total institutional credit for farmers, the share of short-term credit is increasing, while that of long-term credit has been decreasing in Uttar Pradesh, **reflecting the fact that availability of institutional credit for productive purposes is decreasing.** Access to institutional credit is determined by factors such as education, caste, gender and ownership of assets. Hence institutional credit is available mostly to rich and resourceful farmers. Marginal farmers still largely rely on informal sources of credit. That is why share of informal credit in total credit to farmers in the state has remained intact (Kumar & Saroj, 2019; Singh and Upadhyay, 2017; Kumar et al, 2021; Khan et al, 2007; Kumar and Afroz, 2022). Further there are interdistrict disparities in the disbursement of institutional credit in the state, with agriculturally advanced districts receiving more (Kumar 2021).

Increasing marginalization of agricultural holding is leading to resource crunch in farming sector. This is also an important reason behind rising indebt ness in farmers in the state. Poor farmers have to rely on borrowings even to meet their consumption requirements. They borrow mainly from informal sources at exorbitant interest rates, resulting in indebt ness (Singh, 2022; Kumar and Nomita, 2020; Reddy et al, 2020). Rising dependence of farmers on loan to meet the rising cost of cultivation and Inefficiency in agricultural marketing channels are additional reasons for rising indebtness of farmers in the state. High level of indebt ness has forced marginal farmers to diversify their sources of income specially in informal sector (Kishore, 2012; Varkey, 2022).

Since 47% of population in the state is directly dependent on agriculture, assessing financial health of farmers of the state is important. As good financial condition of farmers is necessary not only for ensuring food security of the country, but also for providing financially viable occupation to approximately half of the state population. However, evaluating overall health of farmers is an understudied subject with various studies focusing on either one or two aspects of it. Given this background this paper is a modest attempt to present the overall picture of financial health of farmers of Uttar Pradesh.

Objective of The study

1. **Analyze Changes in Landholding Patterns and Credit Accessibility Among Farmers in Uttar Pradesh from 2002-03 to 2018-19.**
2. **Investigate the Trends in Agricultural and Overall Income for Farmers in Uttar Pradesh**
3. **Examine Indebtedness among Farmers of different Landholding Size in Uttar Pradesh**

Research Methodology of the Study

This study relies on data from two key surveys conducted by the National Sample Survey Office (NSSO) of India: the Situation Assessment Survey (SAS) of Farmer Households in 2003 and the SAS of Agricultural Households in 2019. These surveys provide crucial insights into the economic well-being and indebtedness of farmers in Uttar Pradesh over time.

The **SAS 2003 (59th Round)** was conducted to assess the living standards of farmer households across rural India. Using a stratified multi-stage sampling design, the survey covered 6,748 farmer households in Uttar Pradesh, representing a population of 42,772 individuals. It collected detailed data on consumer expenditure, income, assets, indebtedness, farming practices, and access to agricultural technologies.

The **SAS 2019 (77th Round)** integrated the Land and Livestock Holdings Survey with the Situation Assessment Survey. It focused on agricultural households, collecting data on landholdings, income, assets, indebtedness, and farming practices from 6,074 agricultural households in Uttar Pradesh, representing 35,973 individuals. The survey covered the agricultural year from July 2018 to June 2019.

When comparing the two surveys, it is essential to note differences in definitions and methodologies. The 2003 survey defined a "farmer household" as one engaged in agricultural activities, while the 2019 survey broadened the definition to include households with significant agricultural income. Despite these changes, both surveys offer robust data for comparison. However, researchers should be mindful of these methodological differences when interpreting results, as they may affect direct comparability.

In this study, "farmer household" and "agricultural household" are used interchangeably to align with NSSO definitions. To ensure accuracy when comparing incomes across the two periods, inflation adjustments were made using the 2016-17 base year. The **Consumer Price Index (CPI)** data, sourced from the Reserve Bank of India, was converted from the original 1986-87 base year to the 2016-17 base year. For instance, the CPI for 2002-03 was 319, and for 2018-19, it was 907, with the base year value being 870. After adjustment, the CPI values were approximately 36.67 for 2002-03 and 104.25 for 2018-19.

These adjusted CPI values allowed the conversion of nominal incomes, consumption, and debt figures into real terms, providing a clearer picture of economic changes over time. This method ensures that the analysis is grounded in reliable data, facilitating a comprehensive understanding of trends in Uttar Pradesh's agricultural sector during the study period.

Analysis of the Study

Landholding Patterns and Credit Accessibility Among Farmers

Table 1: Uttar Pradesh Farmers' Landholdings and Loan Accessibility Trends (2002-03 and 2018-19)

Year	Farmer Category	Farmer Households	%age Family	Avg Land (Acre)	%age Loanee
2002-03	Marginal(< 1 Acre)	8,136,404	47.4	0.4	41.1
	Small (1-1.99 Acre)	3,970,443	23.1	1.4	37.7
	Medium (2-4.99 Acre)	3,644,627	21.2	3.1	41.1
	Large (5 Acre & more)	1,406,048	8.2	11.2	46.6
	Overall	17,157,522	100.0	2.1	40.8
2018-19	Marginal(< 1 Acre)	10,532,926	59.3	0.4	37.0
	Small (1-1.99 Acre)	4,132,786	23.3	1.4	43.2
	Medium (2-4.99 Acre)	2,373,180	13.4	3.1	53.3
	Large (5 Acre & more)	719,390	4.1	8.0	69.4
	Overall	17,758,283	100.0	1.3	41.9

The results are estimated by the authors from SAS 2002-03 and SAS 2018-19.

As per the data presented in Table 1, significant shifts in landholding patterns and credit accessibility among farmers in Uttar Pradesh are evident over the period from 2002-03 to 2018-19. This analysis aims to highlight these changes, offering socio-economic interpretations to understand the underlying factors.

Landholding Patterns: From 2002-03 to 2018-19, there has been a notable increase in the proportion of marginal landholders, with the percentage of households owning less than 1 acre rising from 47.4% to 59.3%. This shift suggests a fragmentation of landholdings, potentially driven by population growth, inheritance practices, and the division of agricultural land among family members. Concurrently, the proportion of small landholders (1-1.99 acres) has remained relatively stable, increasing slightly from 23.1% to 23.3%.

The most substantial changes are observed among medium and large landholders. The percentage of medium landholders (2-4.99 acres) decreased significantly from 21.2% to 13.4%, while the proportion of large landholders (5 acres and more) dropped sharply from 8.2% to 4.1%. These trends indicate a consolidation of smaller landholdings and a reduction in larger agricultural estates, which could be attributed to economic pressures, land reforms, and the shift towards more intensive farming practices on smaller plots.

Average Landholding: The overall average landholding size among agricultural families has decreased from 2.1 acres in 2002-03 to 1.3 acres in 2018-19. This decline reflects the increasing number of marginal landholders and the reduction in medium and large holdings. The average land size for marginal and small landholders has remained constant at 0.4 and 1.4 acres, respectively. However, the average land size for large landholders has decreased from 11.2 acres to 8.0 acres, further indicating a trend towards smaller, more fragmented land parcels.

Credit Access: Credit accessibility among farmers shows varied trends across different landholding categories. The overall percentage of loanee families has remained relatively stable, increasing slightly from 40.8% in 2002-03 to 41.9% in 2018-19. However, a closer examination of specific categories reveals more nuanced changes.

For marginal landholders, the percentage of loanee families decreased from 41.1% to 37.0%. This decline might be due to the increasing financial insecurity among these farmers, making them less eligible for credit. Conversely, the percentage of loanee families among small landholders increased from 37.7% to 43.2%, reflecting a possible improvement in credit access for this group, perhaps due to targeted financial inclusion policies.

The most significant increases in credit access are seen among medium and large landholders. The percentage of loanee families in the medium category rose from 41.1% to 53.3%, while in the large category, it surged from 46.6% to 69.4%. These trends suggest that larger landholders have become more reliant on credit, potentially to invest in advanced agricultural technologies, enhance productivity, and manage larger operational costs.

The observed trends in landholding patterns and credit accessibility indicate a complex interplay of socio-economic factors in Uttar Pradesh's agricultural sector. The fragmentation of landholdings and the rise in the number of marginal landholders suggest increasing pressure on agricultural land, driven by population growth and inheritance practices. The reduction in average landholding size points to a potential decline in agricultural productivity and income, especially for smaller farmers.

The varied trends in credit accessibility highlight the challenges and opportunities faced by different farmer categories. While larger landholders have greater access to credit, likely due to better collateral and financial stability, marginal farmers face increased difficulties in securing loans. This disparity underscores the need for targeted financial inclusion policies and support mechanisms to ensure equitable access to credit for all farmer categories.

In conclusion, the data from SAS 2002-03 and SAS 2018-19 reveal significant changes in landholding patterns and credit accessibility among farmers in Uttar Pradesh. These trends reflect broader socio-economic dynamics and highlight the need for policies that address the challenges faced by marginal and small farmers while promoting sustainable agricultural development.

Farmer's Earning and Consumption Expenditure Pattern in Uttar Pradesh

Trends in Farmer Income and Cosumption Expenditure in Uttar Pradesh

Table 2:Farmer's Annual Earning from Agricultural Activites in Uttar Pradesh

Farmer_Category	2002-03	2018-19	Relative % Change
Marginal(< 1 Acre)	9,018	17,994	99.5
Small (1-1.99 Acre)	26,308	44,012	67.3
Medium (2-4.99 Acre)	51,349	85,760	67.0
Large (5 Acre & more)	118,330	206,006	74.1
Overall	30,969	40,721	31.5

Data are in rupees (Rs.) at constant prices of 2016-17. Estimated from SAS 2002-03 and SAS 2018-19.

The data from Table 2 indicates the changes in annual earnings from agricultural activities among different farmer categories in Uttar Pradesh between 2002-03 and 2018-19. The trends reflect significant growth across all farmer categories, albeit with varying magnitudes.

For marginal farmers, who possess less than 1 acre of land, the annual agricultural earnings nearly doubled, rising from Rs. 9,018 to Rs. 17,994, representing a relative percentage increase of 99.5%. This substantial growth, however, starts from a very low base, highlighting the persistent economic vulnerability of this group despite the increase in income.

Small farmers, with landholdings between 1 and 1.99 acres, experienced a significant increase in their agricultural income, which rose from Rs. 26,308 to Rs. 44,012, reflecting a relative percentage change of 67.3%. Medium farmers, holding 2 to 4.99 acres, saw their earnings increase from Rs. 51,349 to Rs. 85,760, indicating a similar relative percentage change of 67.0%.

Large farmers, with landholdings of 5 acres and more, witnessed their agricultural income increase from Rs. 118,330 to Rs. 206,006, translating to a relative percentage change of 74.1%. This group consistently earned the highest agricultural income among all categories, reflecting the advantage of larger scale production and potentially better access to resources and markets.

Overall, the average annual agricultural earnings across all categories rose from Rs. 30,969 to Rs. 40,721, marking a relative percentage change of 31.5%. This overall growth, while positive, suggests that the increase in income is not evenly distributed among all farmers, though marginal farmers seeing higher relative growth percentages but from a much lower base income.

Farmer Agricultural and Gross Earning Trends in Uttar Pradesh

Table 3:Farmer Household Annual Earning Level in Uttar Pradesh

Farmer_Category	2002-03	2018-19	Relative % Change
Marginal(< 1 Acre)	37,295	60,389	61.9
Small (1-1.99 Acre)	44,459	84,584	90.3
Medium (2-4.99 Acre)	70,949	139,091	96.0
Large (5 Acre & more)	143,466	284,413	98.2
Overall	54,802	85,613	56.2

Data are in rupees (Rs.) at constant prices of 2016-17. Estimated from SAS 2002-03 and SAS 2018-19.

Table 3 highlights the total annual earnings of farmer households, which includes both agricultural and non-agricultural income. The data shows substantial increases across all categories of farmers from 2002-03 to 2018-19.

Marginal farmers' total annual earnings grew from Rs. 37,295 to Rs. 60,389 representing a relative percentage increase of 61.9%. This increase reflects both the rise in agricultural income and the additional earnings from non-agricultural activities such as wage labour, private jobs, and non-farm businesses.

For small farmers, the total annual earnings increased from Rs. 44,459 to Rs. 84,584, a significant relative percentage change of 90.3%. Medium farmers saw their earnings nearly double, from Rs. 70,949 to Rs. 139,091, indicating a relative percentage change of 96.0%.

Large farmers experienced the most substantial increase in total earnings, which rose from Rs. 143,466 to Rs. 284,413, translating to a relative percentage change of 98.2%. This significant growth reflects their greater capacity to diversify income sources and leverage larger landholdings for higher agricultural and non-agricultural earnings.

Overall, the average annual earnings for all farmer households increased from Rs. 54,802 to Rs. 85,613 representing a relative percentage change of 56.2%. This overall increase underscores the combined impact of higher agricultural earnings and increased non-agricultural income, highlighting the importance of income diversification for rural households in Uttar Pradesh.

This needs to be underlined that percentage change in the income of marginal farmers is least in comparison to other categories of farmers. For other categories of farmers the increase is as large as 90% (for large farmers it is 98%), while for the marginal farmers it is just 60%. Thus it seems that there is not much change in total income of marginal farmers. Researches have shown that after stagnating for long, there was substantial increase in real rural sector wages during 2007 to 2014. This is being attributed to implementation of MGNREGA, growth of construction sector and revision of minimum wages etc. However, real rural wages for unskilled workers almost stagnated again over the period of 2014-15 to 2018-19 (Dreze,2023a;Das and Yosifumi Usami,2023). This stagnation in wages 2014 onwards might have had a significant negative impact on the total earnings of marginal farmers, as wages form a significant component of their income.

According to NABARD Financial Inclusion Survey (2018), farmers income in the state is lowest among all states of India. Average monthly income per agricultural household is 25% lower than all India average. This could be attributed to low productivity of agriculture, and poor marketing and extension facilities in the state.

Annual Consumption Expenditure Trends in Uttar Pradesh

Table 4:Farmer Household Annual Consumption Expenditure Trend Uttar Pradesh

Farmer_Category	2002-03	2018-19	Relative % Change
Marginal(< 1 Acre)	32,360	67,859	109.7
Small (1-1.99 Acre)	29,024	80,646	177.9
Medium (2-4.99 Acre)	31,695	93,046	193.6
Large (5 Acre & more)	38,834	113,162	191.4
Overall	31,977	76,036	137.8

The consumption expenditure are in rupees (Rs.) at constant prices of 2016-17.It is only out of pocket expenditure during the year. It is Estimated from SAS 2002-03 and SAS 2018-19.

Table 4 presents the trends in annual consumption expenditure among farmer households, indicating a significant rise in out-of-pocket spending on non-durable consumption goods across all farmer categories from 2002-03 to 2018-19.

Marginal farmers' annual consumption expenditure more than doubled, increasing from Rs. 32,360 to Rs. 67,859, representing a relative percentage change of 109.7%. This dramatic increase suggests improved living standards and greater spending capacity, likely fueled by the rise in total income.

Small farmers saw their annual consumption expenditure grow from Rs. 29,024 to Rs. 80,646 a substantial relative percentage change of 177.9%. Medium farmers experienced an even higher increase, with their spending rising from Rs. 31,695 to Rs. 93,046 reflecting a relative percentage change of 193.6%.

Large farmers' consumption expenditure grew from Rs. 38,834 to Rs. 113,162 indicating a relative percentage change of 191.4%. This significant rise underscores the improved economic well-being and enhanced consumption capacity of larger landholders.

Further it should be noted that percentage increase in consumption expenditure for marginal farmers over the study period is least. For them it is just 109%, while for other categories of farmers consumption expenditure has increased by 177% or more. For large farmers the increase is as high as 191%. In addition, in the year 2018-19 their consumption expenditure is more by Rs.7500 than their income. As data reveals that in 2018-19 the annual gross income of marginal farmer is Rs.60,389 while their consumption expenditure is Rs. 67,859. This indicates marginal farmers' income is insufficient to cover their consumption needs. This also underlines the fact that most of their loans are for consumption purposes.

Overall, the average annual consumption expenditure for all farmer households increased from Rs. 31,977 to Rs. 76,036 representing a relative percentage change of 137.8%. This substantial growth in spending highlights the improved economic conditions and increased disposable income among farmer households in Uttar Pradesh.

Income Growth: The data from Tables 2 and 3 illustrate that while agricultural income has increased across all farmer categories, the total household earnings have grown even more significantly due to the contribution of non-agricultural income sources. This diversification of income is crucial for rural households, particularly for marginal and small farmers, who rely heavily on non-agricultural activities to supplement their agricultural earnings.

Marginal farmers, despite seeing the highest relative growth in agricultural income, continue to have the lowest base earnings. This suggests that while their situation has improved, they remain economically vulnerable and heavily dependent on non-agricultural income for their livelihoods. The significant growth in total household earnings for small, medium, and large farmers reflects their better capacity to diversify income sources and enhance their overall economic stability.

Consumption Patterns: The sharp rise in consumption expenditure, particularly among small, medium, and large farmers, indicates improved living standards and increased purchasing power. The growth in spending on non-durable goods reflects greater access to consumer goods and services, enhancing the quality of life for rural households.

For marginal farmers, the doubling of consumption expenditure suggests a positive change in their economic well-being, though their overall spending capacity remains lower compared to other categories. The substantial increase in consumption expenditure among small and medium farmers highlights their improved economic conditions, enabling them to spend more on essential and non-essential goods.

The highest growth in consumption expenditure among large farmers underscores their significant economic advantage, allowing for higher discretionary spending and investment in better living conditions. This trend also suggests that larger landholders are better positioned to benefit from economic opportunities, further widening the gap between different farmer categories.

Credit Accessibility: The analysis of income and consumption trends also points to the importance of credit accessibility in influencing economic outcomes for farmers. The data suggests that access to credit has improved for small and medium farmers, enabling them to invest in agricultural and non-agricultural activities, thereby enhancing their income and consumption capacity.

For large farmers, the substantial increase in credit access highlights their ability to leverage financial resources for higher productivity and better economic returns. However, the relatively lower increase in credit access for marginal farmers indicates persistent challenges in accessing formal financial services, which may limit their economic growth potential.

In summary, the analysis of farmer income and consumption patterns in Uttar Pradesh from 2002-03 to 2018-19 reveals significant improvements in economic well-being across all farmer categories. The diversification of income sources and the substantial rise in consumption expenditure reflect enhanced living standards and greater economic stability for rural households.

However, the data also highlights ongoing disparities between different farmer categories, with marginal farmers remaining economically vulnerable despite improvements in their income and consumption capacity. The trends underscore the need for targeted policies and interventions to ensure equitable access to financial services, support income diversification, and promote sustainable agricultural development for all farmers in Uttar Pradesh.

Trends of Indebtedness and its burden on Farmer in Uttar Pradesh

Farmer Indebtness Trends in Uttar Pradesh

Table 5: Debt Burden on Indebted Farmer in Uttar Pradesh

Farmer_Category	2002-03	2018-19	Relative % Change
Marginal(< 1 Acre)	30,642	70,687	130.7
Small (1-1.99 Acre)	39,686	113,390	185.7
Medium (2-4.99 Acre)	63,534	179,539	182.6
Large (5 Acre & more)	138,076	331,084	139.8
Overall	49,683	116,866	135.2

Data are in rupees (Rs.) at constant prices of 2016-17. Estimated from SAS 2002-03 and SAS 2018-19.

The data in Table 5 shows a significant increase in the debt burden across all categories of indebted farmers in Uttar Pradesh between 2002-03 and 2018-19.

For marginal farmers, the average debt burden more than doubled, rising from Rs. 30,642 in 2002-03 to Rs. 70,687 in 2018-19, reflecting a relative percentage increase of 130.7%. This dramatic rise indicates the growing reliance of marginal farmers on borrowed funds As previously discussed in the year 2018-19 their consumption expenditure is more by Rs.7500 than their income. This indicates marginal farmers' income is insufficient to cover their consumption needs and most of their loans are for meeting household needs. Other reasons for borrowings could be increased input costs, a greater need for investment in agriculture**.**

Small farmers saw an even more substantial increase in their debt burden, with average debt levels rising from Rs. 39,686 to Rs. 113,390, a relative percentage change of 185.7%. This significant rise could be attributed to increased investments in agricultural technology, rising costs of production, or expanding their operations to improve productivity.

Medium farmers experienced a similar trend, with their average debt burden increasing from Rs. 63,534 to Rs. 179,539, reflecting a relative percentage change of 182.6%. This indicates that medium farmers are increasingly using borrowed capital to scale their farming operations, invest in better technologies, or cover higher operational costs.

For large farmers, the average debt burden rose from Rs. 138,076 to Rs. 331,084, marking a relative percentage increase of 139.8%. Despite having larger landholdings and potentially higher incomes, the significant increase in debt among large farmers suggests that they are also heavily investing in modern agricultural practices, expanding their operations, or dealing with high production costs.

Overall, the average debt burden across all indebted farmers increased from Rs. 49,683 to Rs. 116,866, representing a relative percentage change of 135.2%. This substantial rise in debt levels highlights the growing financial pressures on farmers, irrespective of their landholding size, and underscores the critical role of affordable credit in sustaining agricultural activities.

As far as source of credit for farmers are concerned, 39.4% of households have taken loan from formal sources, while 55.7% have taken loan from informal sources and 4.9% have taken loan from both. This shows that still framers heavily rely on informal sources of credit (NABARD All India Rural Financial Inclusion Survey, 2016-17). Studies have shown that in Uttar Pradesh large farmers belonging to general social groups, with higher education and greater access to information technology have greater access to formal sources of credit. While marginal and small farmers have to fall back upon informal sources for to meet their credit needs (Motunrayo Bedruand, 2022; Jatav S. S. & Nayak, 2022).

Farmers Annual cost of Loan Trends in Uttar Pradesh

Table 6:Annual Interest Paid by Farmers of Uttar Pradesh

Farmer_Category	2002-03	2018-19	Relative % Change
Marginal(< 1 Acre)	7,978	10,831	35.8
Small (1-1.99 Acre)	8,220	13,637	65.9
Medium (2-4.99 Acre)	10,982	15,673	42.7
Large (5 Acre & more)	21,398	29,432	37.5
Overall	9,930	13,573	36.7

Data are in rupees (Rs.) at constant prices of 2016-17. Estimated from SAS 2002-03 and SAS 2018-19.

Table 6 provides data on the annual interest paid by farmers, showing an overall increase in the interest burden across all categories from 2002-03 to 2018-19.

Marginal farmers saw their annual interest payments rise from Rs. 7,978 to Rs. 10,831, reflecting a relative percentage increase of 35.8%. This increase, while significant, is lower compared to the rise in their debt levels, suggesting that the terms of borrowing may have improved slightly for this group, or that they have become more reliant on formal credit sources with lower interest rates.

Small farmers experienced a substantial increase in annual interest payments, rising from Rs. 8,220 to Rs. 13,637, representing a relative percentage change of 65.9%. This significant rise indicates a higher cost of borrowing, which could be due to larger loan amounts or higher interest rates on borrowed funds.

Medium farmers' annual interest payments increased from Rs. 10,982 to Rs. 15,673, reflecting a relative percentage change of 42.7%. The rise in interest payments for medium farmers aligns with their increased debt burden, indicating that they are taking larger loans to support their agricultural activities.

Large farmers saw their annual interest payments increase from Rs. 21,398 to Rs. 29,432, marking a relative percentage change of 37.5%. Despite having higher overall debt levels, the relative increase in interest payments for large farmers is lower than that for small farmers, suggesting better access to cheaper credit or more favorable loan terms.

Overall, the average annual interest paid by farmers increased from Rs. 9,930 to Rs. 13,573, representing a relative percentage change of 36.7%. This increase in interest payments underscores the importance of affordable credit for farmers, as higher interest costs can significantly impact their net income and overall financial stability.

Interest Rate Trends in Uttar Pradesh

Table 7:Trends in The Interest Rate on Loan for Farmer in Uttar Pradesh

Farmer_Category	2002-03	2018-19	Relative % Change
Marginal(< 1 Acre)	26.0	15.3	-41.2
Small (1-1.99 Acre)	20.7	12.0	-42.0
Medium (2-4.99 Acre)	17.3	8.7	-49.7
Large (5 Acre & more)	15.5	8.9	-42.6
Overall	20.0	11.6	-42.0

The data is estimated by the authors from SAS 2002-03 and SAS 2018-19.

Table 7 reveals a significant decline in the interest rates on loans for all categories of farmers from 2002-03 to 2018-19.

Marginal farmers saw their average interest rate decrease from 26.0% to 15.3%, reflecting a relative percentage change of -41.2%. This substantial reduction suggests improved access to formal credit sources, which typically offer lower interest rates compared to informal lenders. However, it should be noted that the rate of interest being paid by marginal farmers is highest among all farmers categories. At the same time cost of borrowing is decreasing with increase in size of land holding of farmers. This points to the fact that while other categories of farmers have got more access to formal sources of finance, but small and marginal farmers still heavily rely on informal sources of credit.

Small farmers experienced an even more significant decline in interest rates, from 20.7% to 12.0%, representing a relative percentage change of -42.0%. This reduction indicates that small farmers are benefiting from better credit terms, possibly due to increased financial inclusion and access to institutional credit.

Medium farmers saw their interest rates drop from 17.3% to 8.7%, marking a relative percentage change of -49.7%. This significant decline in interest rates suggests that medium farmers have greater access to affordable credit, which can help reduce their overall cost of borrowing.

Large farmers also benefited from a decline in interest rates, with average rates falling from 15.5% to 8.9%, reflecting a relative percentage change of -42.6%. This reduction indicates that large farmers have better access to formal credit sources, allowing them to secure loans at more favorable terms.

Overall, the average interest rate on loans for all farmers decreased from 20.0% to 11.6%, representing a relative percentage change of -42.0%. This significant decline in interest rates highlights the positive impact of financial reforms and increased access to formal credit on reducing the cost of borrowing for farmers.

Policy Implication of the Study

Assessment of farmers' income, consumption and debt over 20 years shows that, there have been positive changes on income, consumption front, however the debt has increased substantially across all categories of farmers. Increase in the debt reflect the fact that famers earnings are lower than what is sufficient to meet their consumption and farming requirements. Hence the financial condition of farmers in Uttar Pradesh is fragile.

However, among all categories of farmers marginal farmers' financial condition is the worst. As increase in the marginal farmers income over the study period is least (just 60%), in comparison to that of other categories of farmers (90% or more). Similarly, their gross earnings are less than even their consumption requirements indicating that they have to borrow even to meet their consumption requirements. Further, cost of borrowing for the marginal farmers is very high in comparison to other categories of farmers, further adding to their woes. This also shows that while other categories of have got increased access to formal sources of credit, marginal farmers still have to rely on informal sources. Given the fact that marginal farmers comprise a big portion (78%) of total framing households, all these results indicate that financially, farming community of Uttar Pradesh is on very weak footing. These results are in line with the findings of Kumar and Nomita P. (2020) and Agrawal and Agrwal (2016).

Fertility of agriculture sector is also falling over the period due to excessive application of chemical fertilizers, pesticides and overexploitation of ground water (Chaudhary & Aneja, 1991; Srivastva et al, 2009; Singh & Kumar, 2012; Y.V. Singh et al, 2017; Gautam et al, 2023). All this points to the fact that farming community is in deep distress in the state and financial. Other studies have also pointed prevalence of crisis in agriculture sector of Uttar Pradesh (Raman & Khan, 2017).

Fragile financial condition of farming community is pointing towards deep malaise in the Uttar Pradesh. This has adverse implications not only for well-being of a big portion of the state population, but also for food security and productivity of agriculture. Hence there is a need for special focus for bringing policy changes that can lead to increase in the farmers income commensurate with their labour, generate alternative sources of employment and can reverse the trend of decrease in soil fertility. Special focus of policy makers should be marginal farmers as they are the most vulnerable. Major policy recommendations from this study are as follows:

First, in the state there is strong need for diversifying the crops for encouraging more production of pulses and oilseeds. Over the years, area under pulses have registered a decline (Gulathi et al ,2021), probably due to some in increases in area under irrigation. As pulses and oilseeds are less water and fertilizer intensive crops. Shifting to more pulse production also help in raising water level and improving quality of soil. Thus, enhancing sustainability of agriculture sector in the long run.

Second, due to varied agro-climatic zones, state can produce wide variety of fruits and vegetables. State government must focus on diversification of agriculture, encouraging and supporting small and marginal framers for the production of these high value crops. This can significantly raise farmers' income and decreasing their loan requirements. In this regard building a value chain for fruits and vegetables similar to that of Amul model will not only boost farmers income will but also encourage diversification of agricultural crops. State government can also promote social entrepreneurship model for horticulture on the lines of Maharashtra and Andhra Pradesh.

Third, since marginal farmers earn just 30% of their income from agriculture, effective implementation of MGNREGA is necessary for providing them at least 100 days of employment. Further in the implementation process along with employment generation, aspect of rural asset creation should be equally emphasized. It is necessary for building of good quality works like chakroads, renovation, rejuvenation of water bodies, compost making, tree plantation etc. All these works can help farmers in reducing out of pocket expenditure on various inputs, thereby benefitting all categories of framers. Further, renovation of water bodies can make water available for cattle and other domestic use in rural areas. All these MGNREGA works also have potential for raising the water level and fertility of soil in the long run. Labour under MGNREGA can also be used to help farmers in naturally protecting farmers crops from pests and insects, thereby reducing their expenditure on pesticides.

Fourth, over the years, contribution of milk in the farmers income in the state is continuously rising. It has a great potential for further raising the levels of income. Livestock has become an important asset in rural areas of Uttar Pradesh. Development of value chain for milk collection and processing, can be of great help in diversification of agriculture and generation additional employment opportunities in rural areas.

Fifth, government should make targeted policy intervention for enhancing marginal and small farmers' access to formal sources of credit. This can be a very important step for raising productivity of agriculture and income of farmers in the state. As small and marginal farmers have large share in total operational holdings in the state. Their credit worthiness can be enhanced by enabling them to have a market- oriented production pattern. Access to cheap formal sources of credit will also enhance their resilience given uncertainties of agricultural production due to vagaries of weather.

Sixth, one of major problem of farmers of Uttar Pradesh is their inability to get proper prices for their produce. In case of wheat and rice there are wide variations in procurement every year. As far as procurement of pulses and oilseeds is concerned, under Price Support Scheme and Price Stabilization Fund, NAFED, SFAC and FCI have started procuring pulses and oilseeds at MSP from many states, but Uttar Pradesh farmers have failed in taking advantage of that also, due to inactiveness of Uttar Pradesh procurement agencies. Therefor major marketing reforms are also strongly needed in the state so that farmers are enabled to take adequate price for their produce.

Lastly, Manufacturing of paper bags, cloth bags, earthen wares, eco-friendly leaves dishes can be done in minimum skill and capital, with very low investment. All these items can be produced in mini household level production units in rural areas. All this can generate lot of employment in rural areas, specially for marginal and small farmers. reducing disguised employment in agriculture. Generation of such items will also contribute in making overall growth process sustainable

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