

Agrarian Structure of Punjab in the Post-green Revolution Era

Household Strategies for Distress Coping

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While Punjab is endowed with population bonus from a macro perspective, the dividend viewed at a household level has placed Punjab farmers in two major difficulties: the shrinkage of farm size and the underutilisation of the dividend. Due to a dearth of decent non-farm job opportunities, Punjab farmers have struggled to pursue distress-coping strategies. This paper focuses on three primary strategies for survival: land leases, overseas migration, and obtaining informal domestic jobs outside the agricultural sector, based on our unique data of 956 landholders and 254 landless households across Punjab.

Agriculture in Punjab has recorded significant growth since the advent of the green revolution in the mid-1960s, earning it the title of “India’s Breadbasket.” In the second half of the 1970s, the green revolution in Punjab extricated India from food shortages. The state’s per capita income surged to the forefront of the major Indian states in the 1980s and 1990s.

The ironic truth is that food self-sufficiency ushered in a new era of the anti-agricultural regime in that the food problem has turned into the agricultural adjustment problem.¹ In the phase of the economic liberalisation initiated in 1991, Punjab’s per capita income fell from the first to the seventh position in 2012, and further to the ninth position in 2017 (*Indian Economic Survey 2018–19*). Being inexorably entwined with the challenges of the anti-agricultural regime, Punjab farmers have struggled to pursue distress-coping strategies.

The agricultural adjustment problem is often discussed in the context of high-performing economies in Asia (Hayami 2007). In line with these discussions, a resolution of the food problem is expected to release the economy from the Ricardian growth trap and realise industrialisation spurts. The subsequent reallocation of labour resources from the agricultural to the industrial sector will alleviate the agricultural adjustment problem. However, this sequence failed to occur in Punjab because of the sluggish growth of employment in the organised sector.

Three primary livelihood options are presented for the distressed Punjab farmers to mitigate these adverse situations: enlarging operational holdings by leasing in farmland, migrating abroad, and obtaining domestic jobs outside the agricultural sector (hereafter, non-farm jobs). Overseas migration and obtaining non-farm jobs often involve leasing out entire holdings (hereafter, farm renouncement). These phenomena have recently gained attention as “depeasantisation.” Depeasantisation in Asian high-performing economies is growth-led, whereas that in Punjab is deemed distress-driven (Singh et al 2009; Singh 2012). Thus, depeasantisation should be examined through the lens of farmers’ distress-coping strategies. Rural households are subject to various restrictions in implementing distress-coping strategies, and that the restrictions are likely inherent to landholding size (hereafter, farm size). For this reason, analysing the farm size is imperative for our study.

The anti-agricultural regime is often cited as a prime culprit that has precipitated the farmers’ distress. While acknowledging

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this, we propose a demographic approach to investigate farmers' decision-making in distress strategies. Amid the demographic transition, rural Punjab is endowed with demographic dividends. Though the dividend is usually discussed as a demographic bonus from a macro perspective, the dividend within a household depicts a different picture. As the dividend implies an increased number of male workers within a household, pursuing an appropriate mix of distress-coping options implies allocating male workers for income-generating activities. This study explores how the number of male workers within a household influences the implementation of distress-coping strategies, utilising survey data of rural households across Punjab.

The study is organised as follows. The first section explains the data sets. The second section provides the demographics of sample households, followed by the presentation of background information on the distress-coping strategies. Further, the land lease markets are overviewed. Subsequent sections introduce our empirical model, followed by the presentation of estimation results on the three distress-coping options. These two sections examine the major research question with respect to the impact of households' demographic traits on the implementation of distress-coping strategies. However, the regression analysis produced several seemingly contradictory results. They are posed as subsequent questions. Finally, the snowballed questions are summarised and addressed to gain a deeper understanding of the household strategies for distress-coping.

Data

This study relies on two unique survey data from rural households (intensive data) and villages (extensive data) across Punjab. Punjab is traditionally divided into three regions: Majha, Doaba, and Malwa. Amritsar district in Doaba and Jalandhar in the Majha regions were selected. From the Malwa region, which comprises 57.9% of rural households, three districts comprising Ludhiana in the north, Sangrur in the south-west, and Bhatinda in the south-east of the region were selected. Following this, based on a multistage random sampling method, we selected a medium-scale village from randomly sampled 48 community development blocks. Extensive surveys were conducted to collect data unavailable from intensive surveys.

We sampled approximately 20 landholders from six size categories of landholding and five landless households per village. In total, 956 landholders and 254 landless households were surveyed using a structured questionnaire (Table 1).

Table 1: Distribution of Households and Area Owned by Farm Size

Size of Ownership Holding (Acre)	Category Name	Average Farm Size (Acre)	Household			Area %
			Obs	%	%	
0	Landless	0.00	254	21.0	—	0.0
0.01–3.00	Marginal	1.86	415	34.3	43.4	13.4
3.01–6.00	Small	4.72	247	20.4	25.8	20.3
6.01–10.00		8.52	159	13.1	16.6	23.9
10.01–15.00	Medium	13.00	69	5.7	7.2	15.6
15.01–20.00		18.50	37	3.1	3.9	11.9
>20.01	Large	29.97	29	2.4	3.0	15.1
		6.01	1,210	100.0	100.0	100.0

Source: Intensive data.

Tables 2a and 2b present summary statistics of major variables from the two data sets. Extensive data indicate the proportion of households that adopted different distress-coping options: those households with at least one migrant (hereafter, migrant households) stand at 31.4%, households that lease out entire holdings (hereafter, renouncers) constitute 12.1%, exodus families constitute 6.1%, and households having at least one male worker engaging in non-farm jobs constitute 10.7%.

Table 2a: Descriptive Statistics on Landholders (acre)

	Observations	Average Size (Acre)	SD
Landholdings	956	6.01	6.22
Operational holdings >0	852	10.54	11.50
HHS that leased in land	372	10.84	10.84
HHS that leased out land	142	4.46	6.28

HH denotes household.

Source: Intensive data.

Table 2b: Descriptive Statistics from Extensive Data

	Average	SD
Owned land (acre)	6.3	2.9
Tenancy rate (%) ¹	29.7	18.8
Net profit per acre (₹) ²	56,338.9	10,200.7
Land rent per acre (₹)	48,875.0	10,706.2
Proportion of HHS with migrants among landholders (%)	31.4	29.0
Proportion of NRI HHS (%)	6.1	10.4
Proportion of renouncers to total landholders (%)	12.1	13.8
Proportion of HHS with at least one non-farm worker (%)	10.7	19.2

¹ Tenancy rate: The proportion of leased land to the total operated land in the villages.

² Net profit per acre was calculated based on crop-wise cost and benefit (farmgate price) structures, considering the proportion of areas sown by each crop to the total cropped area.

The costs of family labour, land rent, and interest in capital are not included.

HH denotes household.

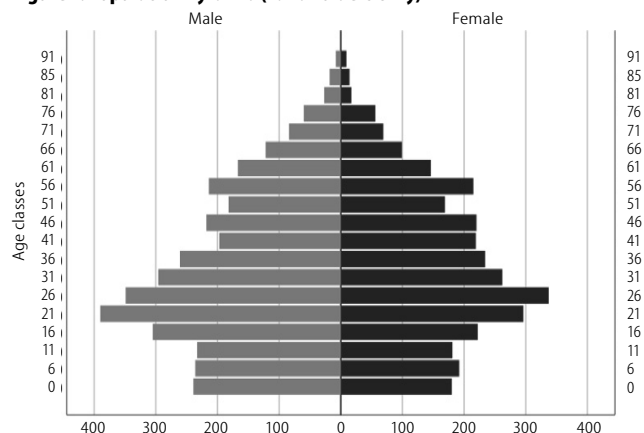
Source: Extensive data.

Demographic Factors

Punjab is a state at the forefront of the demographic transition. Punjab's total fertility rate declined from 3.1 in 1991 to 2.4 in 2000 and to 1.7 in 2016, falling below the replacement level of 2.1 (Government of India 2018).

Figure 1 presents the population pyramid of household members (landholders only) by five age groups. With a decline in the total fertility rate, the pyramid becomes constrictive, where the proportion of the working-age population (15 to 60 year olds) to the total population is as high as 68.1%.

Figure 1: Population Pyramid (Landholders Only)



N = 4,665 (male = 2,865 and female = 2,300). Migrants are included.

Source: Intensive data.

This population event enables two concerns to be identified: an increased number of male workers per household and a rapid decrease in farm size due to patrimonial customs on inherited land divided equally among male heirs. These demographically-related factors are assumed to influence households' distress-coping strategies.

A household perspective interprets the constrictive population pyramid differently from a macro-perspective claim. Table 3 presents the number of male workers, overseas male migrants, and family members by farm size. The number of male workers increases with farm size. In addition, the headcount of male workers per household varies considerably for every class of landholders, as the standard deviations of male workers indicate.

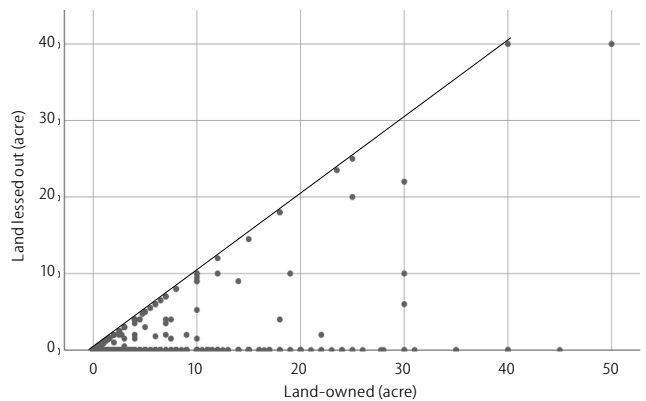
Indian agriculture is known to be highly dependent on agricultural labourers. However, hired labour is not perfectly substitutable for family labour, especially with regard to agricultural operations at a specific time, the supervision of hired labourers, and mechanised operations. Accordingly, the number of male workers per household is assumed to influence agriculture-related behaviours.

Basic Findings on Land Leasing and Overseas Migration

This section contextualises our data pertaining to the three distress-coping options. In addition, we consider the leasing out of land as it is intertwined with these options.

Land lease markets: Figure 2 depicts the association between farm size and area leased out among landholders (N=956). Landholders on the horizontal axis are non-lessors (N=814), whereas those on the 45-degree line (N=104) are renouncers

Figure 2: Landownership and Area Leased Out (N=956)



Source: Intensive data.

that account for 10.9% of landholders. Landholders that partially lease out land (N=38) are located between the two lines. They use retained land mainly for self-consumption of food. In this sense, partial leasing out is de facto renouncing (lessors=142 and non-lessors=814).

Singh et al (2009) regarded renouncers as distress-rentiers since they are predominantly marginal farmers. However, our data reveal that the proportion of renouncers is high for both marginal and large farmers (Column 7 of Table 4). In contrast, medium-scale farmers lease in land actively (Column 3 of Table 4). Oft-noted reverse tenancy is virtually non-existent (Singh 1989). Marginal and large farmers appear to lose their zest for farming in that they do not lease in land much, but renounce farming more than medium-scale farmers. The following question is posed here. What explains the u-shaped farm renouncement or inverted u-shaped commitment to farming along with farm size?

Note that the land leased in and leased out do not represent two sides of the same coin, in that the area leased in is far larger than that leased out.² This discrepancy may be partly because intensive surveys could not cover the area leased out by non-resident Indians, as lessors tend to conceal their leasing out. Hence, the two behaviours need to be decoupled when examining the land lease markets.

Non-farm employment and overseas migration: Table 5 (p 59) presents the proportion of households that adopted options

Table 3: Male Workers per Household

Size Class	Workers	Overseas Migrants	Workers at Home	Average Family Size
Landless	2.32 (0.98)	0.07	2.25	5.20
0.01–3.00	2.35 (0.99)	0.12	2.23	5.12
3.01–6.00	2.47 (1.02)	0.15	2.32	5.55
6.01–10.00	2.70 (1.23)	0.18	2.52	6.12
10.01–15.00	2.96 (1.14)	0.12	2.84	7.12
15.01–20.0	3.05 (1.43)	0.38	2.67	6.70
>20.01	3.03 (1.97)	0.48	2.55	7.44
Average	2.49 [2.53]	0.14 [0.16]	2.35 [2.39]	5.58 [5.67]

Figures in parentheses denote standard deviation and those in square brackets denote male workers per landholder.

Source: Intensive data.

Table 4: Land Leasing by Farm Size

Farm Size Category	Average Size of Holdings (Acre)	Proportion of HHs		Average Leased Area of Lessor and Lessee (Acre)		Tenancy Rate (%)	Prop of Renouncers (%)
		Lessor (%)	Lessee (%)	Leasing Out (N=142)	Leasing In (N=382)		
Column	1	2	3	4	5	6	7
Landless	NA	NA	3.9	NA	10.0	100.0	NA
0.01–3.0	1.9	19.5	32.8	1.5	5.9	55.3	17.3
3.01–6.0	4.7	9.3	42.5	4.1	11.6	53.1	6.3
6.01–10.00	8.5	13.2	42.7	6.3	11.5	39.1	6.3
10.01–15.00	13.0	5.8	49.3	11.4	15.1	37.6	1.4
15.01–20.0	18.5	10.8	51.4	12.5	18.9	36.1	5.4
>20.01	30.0	31.0	34.5	20.9	11.4	14.3	10.3
Average	6.0	11.7 (14.9)	31.6 (37.9)	4.5	10.2 (14.0)	43.0	10.9

(1) The tenancy rate is the ratio of leased land to operational holdings.

(2) Figures in parenthesis denote an average for landholders.

Source: Intensive data.

equivalent to agricultural labourers. As it is mainly landless households (mostly Dalits) that take up such low-paid informal jobs, landholders are likely reluctant to engage in such

Table 5: Migration and Non-farm Job by Land Class

Landholding (Acre)	Observations	Proportion of Households					
		Migrant HHs		Gulf Countries as Destinations		Informal Job	Formal Job
		Obs	%	Obs	%	%	%
0	254	21	8.3	10	47.6	78.7 (1.27)	3.5 (0.04)
0.01–3.0	415	55	13.3	23	41.8	25.1 (0.35)	4.3 (0.04)
3.01–6.0	247	36	14.6	7	19.4	7.3 (0.11)	4.9 (0.05)
6.01–10.00	159	25	15.7	3	12.0	9.4 (0.11)	5.7 (0.09)
10.01–15.00	69	10	14.5	0	0.0	7.3 (0.13)	4.4 (0.05)
15.01–20.00	37	10	27.0	1	10.0	5.4 (0.08)	0.0 (0.00)
> 20.01	29	11	37.9	0	0.0	3.5 (0.03)	4.5 (0.13)
Total/average	1,210	168	13.9	44	3.6	28.5 (0.43)	4.5 (0.05)
Landholders	956		15.4		3.6	15.2 (0.21)	4.7 (0.06)

(1) Figures in parentheses are the number of male workers per household.

(2) Twelve households have workers in both sectors.

Source: Intensive data.

Table 6: Tenancy Rate (OLS)

Specification	1	2	3
Constant	-0.04 (-0.18)	-0.07 (-0.31)	0.02 (0.10)
Average farm size (acre)	-0.02 (-2.55) *	-0.02 (-2.33) *	-0.01 (-2.78) **
Profit per acre (₹ lakh)	0.14 (0.77)	0.21 (1.01)	0.07 (0.40)
Prop of migrant HHs	0.10 (1.09)	0.31 (3.99) **	
Prop of renouncers among landholders	0.69 (4.92) **	0.77 (5.09) **	0.08 (4.85) **
Prop of exodus HHs	0.79 (3.24) **	0.97 (5.37) **	
Tractors per acre	0.57 (1.65)	0.47 (1.23)	0.51 (1.50)
Agricultural wage (₹)	0.01 (1.14)	0.01 (0.95)	0.01 (1.31)
Prop of HHs with at least one non-farm worker	-0.06 (-0.60)	-0.13 (-1.20)	-0.05 (-0.52)
R-squared	0.69	0.60	0.68
F-value	10.74 **	8.72 **	12.05 **

(1) t-values are in parentheses. ** p<1.0%, * p<5.0%.

(2) HH denotes household.

Source: Extensive data.

Table 7: Land Rent (OLS)

Specification	1	2	3
Constant	60,016.86 (4.64) **	51,382.72 (3.81)	60,586.70 (4.69) **
Average farm size (acre)	-1,670.34 (-4.50) **	-1,418.99 (-3.20) **	-1,697.97 (-4.02) **
Profit per acre (₹ lakh)	0.10 (0.82)	0.22 (1.80)	0.09 (0.72) *
Prop of migrant HHs	-16,718.35 (-2.70) *		-20,908.26 (-4.59) **
Prop of exodus HHs	-15,853.33 (-1.00)	-44,739.93 (3.57) **	
Tractors per acre	21,587.64 (0.96)	30,482.49 (1.27)	24,255.22 (1.09)
Agricultural wage (₹)	-4.87 (-0.18)	-17.22 (-0.60)	-4.12 (-0.15)
Prop of HHs with at least one non-farm worker	-4,883.53 (-0.74)	-6,404.09 (-0.91)	-3,201.02 (0.50)
R-squared	0.57	0.50	0.56
F-value	7.66 **	6.69 **	8.77 **

(1) t-values are in parentheses. ** p<1.0%, * p<5.0%.

(2) HH denotes household.

Source: Extensive data.

jobs, except for poverty-ridden marginal farmers. In contrast, only a few are employed in the organised sector, mostly as military personnel, police officers, and schoolteachers. As such, there is a dearth of decent non-farm job opportunities for landholders. This drives rural households to seek employment abroad.

India is the leading country of origin for overseas migrants (International Organization for Migration 2020). Although the predominant destinations for Indian migrants are Gulf countries (Jain and Oommen 2016), Punjab's migration presents a distinct picture due to a long-standing migration history, especially in connection with the migrants recruited to the British Army. Consequently, a considerable proportion of overseas migrants from Punjab, mostly the landowning caste of Jatt Sikhs, migrate to developed countries (Taylor and Singh 2013).

Intensive data reveal that 15.4% of landholders have at least one overseas migrant.³ Note that farm size is positively related to the proportion of migrant households, although migration from rural societies is often deemed distress-driven. Migration destinations can be dichotomised into Gulf countries and developed countries. More than 40% of the landless and marginal farmers go to Gulf countries, whereas medium-scale and large landholders send family members to developed countries. The following question is posed on overseas migration. Though overseas migration is deemed distress-driven, why do large farmers have a higher propensity for migration than marginal farmers? In addition, why is migration to developed countries towards larger farmers, while that to Gulf countries, towards marginal farmers and the landless?

As Tables 4 and 5 indicate, the implementation of distress-coping options is highly associated with farm size, a farm-size approach is indispensable in exploring farmers' behaviours.

The next section provides an overview of the land lease markets, focusing on the tenancy rate (the ratio of the leased in area to the total cultivated area) and land rent. As they are simultaneously determined in the land lease markets, a similar set of independent variables representing the demand for and supply of farmland are considered.

Tenancy Rate and Land Rent

The demand for land is represented by the reciprocal of the average farm size. On the supply side, the proportion of renouncers, migrant households, and exodus households to total village landholders is considered. As the proportion of migrant households is highly correlated with that of exodus households, we present three models to avoid multicollinearity.

Table 6 reports the results of three specifications. A good fit of the models measured by R-squared is equally high. As expected, the average farm size has a significantly negative effect, and the three variables associated with the supply of land in the lease markets have a significantly positive effect on the tenancy rate. High population pressure on farmland and a high incidence of depeasantisation boost the tenancy rate. However, as confirmed before in Table 4, marginal farmers actively lease out land.

The average rent of the 48 villages surveyed (extensive data) is ₹48,875 per acre (Table 2b). This implies that leasing out 2 to 2.5 acres of land yields land revenue almost equal to the annual earnings from informal jobs. Conversely, high rent makes tenants' margin meagre, as land rent reaches approximately 70% to 80% of the net profit per unit of land.

Table 7 (p 59) reports the estimation results on land rent. Similar results are obtained with tenancy rate functions. The average farm size representing the demand for land is negatively associated with rent. Overseas migration and family exodus reduce rent by increasing the supply of land.⁴

Land Leasing Option

This and the next section extend our analysis to identify the determinants of the three distress-coping options and a land leasing out option. As the core of all the questions in this paper lies in households' decision-making, the dependent variables in question are binary. To estimate the choice outcomes of households, we use the following equation:

$$Y_{ij}^d = \alpha + \beta H_{ij} + \gamma V_{ij} + \epsilon_{ij}$$

where Y_{ij}^d is the outcome variable of option d ($d=1, 2, 3, 4$) coded as a binary variable (if a household adopted an option $d=1$, otherwise=0) in household i at village j ($j=1, 2, 3, \dots, 48$). In performing a regression of one option, the other options are treated as independent dummy variables.

Overseas migration is classified as migration to developed countries (migration West dummy: a household having at least one migrant to a developed country=1, otherwise=0) and that to Gulf countries (migration Gulf dummy: at least one migrant to a Gulf country=1, otherwise=0). Non-farm employment is

Table 8: Land Leasing In and Out (Probit)

Specification	Leasing In	Leasing Out
Own land (acre)	0.02 (1.16)	-0.04 (3.95) *
Own land squared	-0.01 (2.11)	0.01 (6.23) *
Male works staying at home	0.13 (10.27) **	-0.31 (28.61) **
Migration Gulf dummy (migrant to Gulf countries=1)	0.05 (0.04)	-0.35 (1.35)
Migration West dummy (migrant to developed countries=1)	0.41 (7.63) *	0.41 (6.80) **
Informal job dummy (informal job=1)	-0.67 (19.90) **	0.87 (41.89) **
Formal job dummy (formal job=1)	-0.07 (0.10)	0.43 (3.88) *
Profit per acre (₹ lakh) [E]	0.82 (3.13) +	-0.75 (1.89)
Rent per acre (₹ lakh) [E]	-1.62 (10.64) **	0.14 (0.05)
Agricultural wage [E]	0.01 (0.05)	0.01 (0.33)
Observations	852	956
Quasi-squared (Cox and Snell)	0.06	0.10
Log-likelihood	-1,084.00	-681.51
Chi-squared	153.87**	102.72**

(1) [E] denotes village characteristics from extensive data.
 (2) Wald statistics are in parentheses. ** p<1.0%, * p<5.0%, + p<10.0%.
 (3) HH denotes household.
 Source: Intensive data.

classified as an informal job dummy (a household with at least one worker obtaining an informal job=1, otherwise=0), and the formal job dummy (at least one worker obtaining a formal job=1, otherwise=0).

H_i is the variable of interest in household i , such as the size of landholdings, the number of male workers, and the four option dummies. V_j is village characteristics obtained from extensive data: land rent per acre, daily agricultural wage rate, and the proportion of households with at least one non-farm worker. Tractor ownership is a critical determinant of distress-coping strategies. However, we do not consider it to avoid multicollinearity as the proportion of tractor ownership is highly associated with farm size. As our concern is the decision-making of actual cultivators (N=852: lessees=372 and non-lessees=480), renouncers are not considered for estimating a leasing in option.

Estimation results of land leasing in and out are shown in Table 8. As leasing in land is prevalent across size classes, farm size has an insignificant effect on a leasing in option. Conversely, farm size has an inverted U-shaped relationship with a leasing out option as was confirmed in Table 4.

The number of male workers staying at home, as expected, facilitates leasing in land and decreases leasing out land. As its corollary, the informal job dummy and the migration dummy are assumed to negatively affect the leasing in of land, and positively affect the leasing out of land. The informal job dummy has expected signs. Findings contrary to expectation are that migration to developed countries intensifies leasing in land, and that the migration Gulf dummy does not influence leasing behaviours. These seemingly contradictory results drive us to the following question.

Why is overseas migration to developed countries positively related to the leasing in of land, whereas the migration Gulf dummy has an insignificant impact on land-leasing behaviours?

Overseas Migration Option

Overseas migration is a vital strategy for distressed farmers in Punjab. We focus on the migration of a family member (hereafter, individual migration) rather than family exodus as the former precedes the latter as far as migration to developed countries is concerned.

Individual migration: Table 9 presents the estimation results for the proportion of migrant landholders to the total landholders, relying on extensive data. As the average farm size shows a negative coefficient, overseas migration emerges from highly populated villages. As higher land rent increases the difficulty of leasing in land (Table 8), high rent is assumed to push distressed

Table 9: Proportion of Migrant Households (OLS)

Constant	1.54 (4.08) **
Average farm size (acre)	-0.04 (-2.44) **
Profit per acre (₹ lakh)	-0.57 (-1.72) +
Rent (₹ lakh)	-1.62 (-4.59) **
Agricultural wage (₹)	-0.619 (-0.99)
Prop of HHs with a non-farm worker	.001 (0.98)
Tractor per acre	-1.64 (-0.94)
R-squared	0.54
F-value	F=7.92**

(1) t-values are in parentheses.
 ** p<1.0%, * p<5.0%, + p<10.0%.
 (2) HH denotes household.
 Source: Extensive data.

farmers to a migration option. However, the land rent has a negative coefficient. We discuss this later after presenting a migration function using intensive data.

Turning to intensive data, a probit model is applied to a household decision on migration. The dependent variable is binary (migrant household is coded 1, otherwise 0).

The estimation results are shown in Table 10. Farm size shows a significantly positive effect on migration, contrary to the result of extensive data. Though poverty-ridden marginal farmers are supposed to be more inclined to migrate overseas, intensive data indicate that they neither send family members abroad (Table 8) nor lease in land actively (Table 7) compared to their medium- and large-scale counterparts.

Table 10: Individual Migration Option (Probit for Landholders Only)

	Migration among Landholders	Migration to Developed Countries
Own land (acre)	0.02 (8.22) **	0.03 (15.32) **
Renouncement dummy (renouncer=1)	0.60 (13.28) **	0.77 (19.02) **
Leasing in dummy (leasing in=1)	0.14 (1.44)	0.22 (3.11) +
Male workers staying at home	0.13 (8.36) **	0.14 (8.10) **
Informal dummy (informal=1)	-0.02 (0.01)	-0.18 (1.06)
Formal dummy (formal=1)	-0.09 (0.03)	-0.03 (0.01)
Profit per acre (₹)	-0.09 (0.03)	0.24 (0.16)
Rent per acre (₹ lakh) [E]	-3.36 (32.60) **	-3.14 (24.41) **
Agricultural wage (₹) [E]	-0.01 (1.70)	0.01 (0.13)
Observations	954 (147 migrants)	954 (112 migrants)
Quasi R-squared (Cox and Snell)	0.06	0.07
Log-likelihood	-807.40	-610.25
Chi-squared	63.65 **	70.69 **

(1) Migration household is coded 1, otherwise 0.

(2) [E] denotes village characteristics from extensive data.

(3) Migration to Gulf countries is not considered as only 34 households sent members there.

(4) Wald statistics are in parentheses. ** $p < 1.0\%$, + $p < 10.0\%$.

Source: Intensive data.

Farm renouncement facilitates overseas migration, indicating the reallocation of male workers from farming to overseas migration. Accordingly, leasing in land is assumed to drive down overseas migration. However, leasing in land has an insignificant effect on migration or has a moderately positive effect on migration to developed countries. This indicates that leasing in land is not an alternative livelihood option to overseas migration. Furthermore, obtaining non-farm jobs does not affect migration, even though it reduces labour resources for migration. These results imply that households can simultaneously pursue three distress-coping options: leasing in land, overseas migration, and obtaining non-farm jobs. Here, the following question is posed. What enables households to implement plural strategies simultaneously? The coefficient of land rent is of interest in understanding farmers' behaviours. It is likely to assume that higher rent discourages farmers from leasing in land and renders them migrate abroad.

However, land rent has a significantly negative impact on overseas migration. The most plausible explanation is that high land rent dissuades farmers from migration, as it assures farmers' livelihood as rentiers. This causality is taken up later.

Choice of migration destinations: Migration destinations differ along with farm size (Table 5). Migrants to developed countries intend to settle in as these countries offer an opportunity for permanent residency. Conversely, migrants to Gulf countries work on short-term contracts, typically lasting two to five years.

According to intensive data, households with migrants to Gulf countries receive a remittance of ₹54,000 ($N=43$) per year on average, while those with migrants to developed countries ₹33,487 ($N=123$) despite higher earnings in the latter. In terms of farm size, annual remittances are the smallest for large farmers and the largest for marginal farmers (Table 11). As migrants to developed countries tend to settle down in their adopted country, they are unlikely to be able to afford the expense of remittances.

Years spent in school do not differ between the migrants to Gulf countries (9.2 years) and those to developed countries (9.7 years). The correlation between farm size and years spent in school among migrants ($r=0.14$) is not significant.

Nonetheless, education is an important determinant of migration destinations. English-speaking developed countries offer a work visa or even citizenship if migrants have competent English, generally an International English Language Testing System (IELTS) score of six or above. Affluent households have better access to quality education, such as urban schools that charge high fees (Kaur 2017). Furthermore, the acquisition of English qualifications requires further education in language schools. One can see an advertisement for a language school across villages in Punjab. Being deprived of qualified education, poor youth face a hurdle to migration to developed countries.

Another hurdle for marginal farmers is travelling costs to developed countries, which are much higher than those to Gulf countries. The poor need to take a loan from moneylenders who charge a higher interest rate (Nanda and Véron 2015).

Table 11: Annual Remittance by Farm Category

Farm Category	Average of Migrants	Observations
Landless	43,619.1	21
Marginal	48,272.7	55
Small	43,428.8	35
Medium scale	33,823.5	34
Large	9,523.8	21
Average	38,801.2	166

Source: Intensive data.

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Therefore, they must seek migration to Gulf countries or non-farm jobs.

Informal job option: Obtaining informal jobs is an almost exclusive option for marginal farmers and the landless (Table 5). Table 12 presents the regression results for informal jobs for marginal farmers (N=416).

Even within the class of marginal farmers, farm size is negatively associated with obtaining informal jobs. The renouncement and leasing in dummies show the expected signs. The number of male workers facilitates the allocation of workers to non-farm employment. However, strangely enough, the migration Gulf dummy has a positive coefficient.

Table 12: Informal Jobs for Marginal Farmers (Probit)

Own land (acre)	-0.30 (11.85) **
Renouncement dummy (renouncer=1)	0.66 (11.64) **
Leasing in dummy (leasing in=1)	-0.61 (11.39) **
Male workers staying at home	0.31 (17.57) **
Migration Gulf dummy (migration to Gulf countries=1)	0.58 (3.60) +
Migration West dummy (migration to developed countries=1)	-0.39 (1.41)
Formal dummy (formal=1)	-0.04 (0.01)
Profit per acre (₹)	-0.07 (0.01)
Rent per acre (₹ lakh) [E]	1.38 (2.22)
Agricultural wage (₹) [E]	-0.01 (4.76) *
Observations	416 (informal job HHs=104)
Quasi R-squared (Cox and Snell)	0.16
Log-likelihood	-458.16
Chi-squared	71.44 **

Wald statistics are in parentheses. ** p<1.0%, * <5.0%, + <10.0%.
Source: Intensive data.

Distress-coping from a Farm-size Perspective

Our findings on household decision-making are summarised from a farm-size perspective as follows. For ease of discussion, we highlight marginal, medium-scale, and large farmers. Small and semi-large farmers properly intermediate between the adjoining farm size categories.

Starting with medium-scale farmers as a reference group, they struggle for survival by enhancing their commitment to farming, in that they lease in land actively but do not lease out much, that they do not seek non-farm jobs, and that they send male workers abroad more than marginal farmers but less than large farmers. Thus, medium-scale farmers show a lower proportion of renouncers than their marginal and large-scale counterparts. It can be said that the process of standardisation for medium-scale farmers is underway.

Large farmers pursue an overseas migration option, lowering their commitment to farming. The proportion of migrant households is the highest for large farmers (37.9%), while it is

only 13.3% for marginal farmers (Table 5). In addition, while approximately 40% of migrants from marginal farmers travel to Gulf countries, the majority of large farmers send family members to developed countries. Furthermore, large farmers show the second highest proportion of renouncers, following marginal farmers (Table 4). Considering the leased area, large farmers impose a greater impact on land supply in the land lease markets than marginal farmers do. Obtaining non-farm jobs is the least adopted option partly because informal job wages seem below the reservation wages for large farmers and partly because landholders have a biased view of such occupations that the landless takes on.

Finally, marginal farmers are assumed to desire distress-coping options as a matter of necessity. However, they neither actively lease in land nor migrate abroad. The lowest proportion of tractor ownership for marginal farmers (27.2%) explains their inactivity in leasing in land.

We observed that farm size is associated with a mix of distress-coping options. Thus, households' strategies would profoundly transform the agrarian structure of Punjab. Our analysis revealed that the number of male workers is significantly related to distress-coping strategies. The number of male workers at home facilitates leasing in land (Table 8) and overseas migration (Table 10), while it decreases leasing out land (Table 8). In examining the determinants of distress-coping options, four subsequent questions were posed. As some questions overlap, sorting out questions into two issues provides a starting point.

The first issue concerns the simultaneous implementation of coping options. Migration to developed countries induces the leasing out of land as expected, but it facilitates the leasing in of land contrary to expectation. Conversely, migration to Gulf countries does not affect the leasing behaviour. Thus, the issue is, what makes it possible for landholders to simultaneously pursue migration to developed countries and the leasing in of land?

The second issue is why not only land-abundant large farmers but land-scarce marginal farmers lease out land to be renouncers. This concerns the question of an inverted u-shaped commitment to farming along with farm size.

Discussion

If choosing one option requires the reallocation of labour resources from other options for profit maximisation, the simultaneous adoption of coping strategies would not take place prevalently. The most likely explanation is that ample male workers at home, that is, surplus labour within a household, enable or *ex post facto* force households to allocate surplus labour for plural strategies concurrently. Hence, a positive relationship between overseas migration and leasing in land is deemed spurious. The same may hold true for a positive relationship between migration Gulf dummy and obtaining informal jobs (Table 12).

Note that large farmers primarily prioritise a migration option, neglecting a leasing in option. There are two reasons why large farmers have a lower commitment to farming. First, large farmers are highly distressed over the loss of commercial

gains under the anti-agricultural regime, as they have a more marketable surplus of agricultural products than their small- and medium-scale counterparts. This makes large farmers reluctant to expand their operational holdings by leasing in land. Another reason is a large number of brothers per household (Table 3). This produces a negative prospect of land shrinkage due to patrimonial inheritance customs, making large farmers less committed to farming.

Accordingly, a commitment to farming turns inverted u-shaped along with farm size. In addition, the ratchet effect that intends to sustain present livelihoods may induce permanent migration of family members. As large farmers have access to quality education and afford travelling costs for overseas migration, they can send male members to developed countries relatively easily.

Turning to marginal farmers, we need to notice their inability to implement a migration option due to the poor conditions for English education and credit constraints for financing migration.

Thus, approximately 40% of migrants from marginal farmers are obliged to migrate to Gulf countries.

As land rent has been marginally elevated, leasing out 2 acres to 2.5 acres of land yields land revenue almost equivalent to the annual earnings from informal jobs. On the flip side of the same coin, leasing in more than 10 acres of land finally generates similar levels of annual earnings from informal jobs. As only 27% of marginal farmers are tractor owners, expanding operational holdings by leasing in more than 10 acres of land is an unlikely option for them. Obtaining non-farm informal jobs is an almost exclusive option for marginal farmers among landholders. They can increase earnings by allocating workers to informal non-farm jobs and leasing out their land. In addition, as the number of male workers is the smallest among land size classes (Table 5), implementing plural distress-coping options is less possible for them. Hence, obtaining informal jobs leads to the leasing out of land (Table 12). This makes marginal farmers renouncers.

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As we observed, extensive data captured population pressure as a driving force of overseas migration, but intensive data clearly articulated the inability of marginal farmers to migrate overseas. Our discussions so far explained the inconsistent results of extensive and intensive data on the association between farm size and overseas migration. As we discussed, distress has different shades of meaning depending on the context. Marginal farmers are distressed, being closer to the edge of survival. Conversely, large farmers' distress is caused by the loss of commercial gains under the anti-agricultural regime and the further shrinkage of farmland due to the inheritance among male heirs.

Village-wise data show that population pressure is a driving force of overseas migration. However, marginal farmers are in disadvantageous positions in sending family members to developed countries due to educational and financial constraints, even though they urgently need to implement a migration option. Thus, marginal farmers tend to pursue an option of informal jobs. Conversely, as large-scale farmers are relatively free of these constraints, they opt for permanent migration to developed countries, leading to the family exodus in future years. Thus, an intensive survey showed a positive association between farm size and migration.

Conclusions

The agricultural adjustment problem in India manifests itself differently from that in high-performing Asian economies. Agreeing that the anti-agricultural regime has contributed to the downfall of India's breadbasket, we propose another perspective of the demographic transition.

The demographic transition is a long-lasting change in the population structure. In the coming decades, farmland will be inherited among male heirs, leading to the further shrinkage of farmland. Thus, the implementation of distress-coping strategies will become more indispensable for landholders.

This paper explored how landholders allocate their increased male workers to distress-coping options. Larger farmers are

more likely to implement an overseas migration option that eventuates in rural exodus, whereas marginal farmers struggle to obtain informal jobs. Marginal farmers lease out their meagre land to earn land rent. As such, both large and marginal farmers get less committed to farming. On the other hand, it is medium-scale farmers that maintain a higher commitment to farming, facilitating standardisation into medium-scale farmers.

Note that migration to developed countries does not assure decent jobs for migrants. Generally, migrants from rural areas of developing countries are permitted to take up only menial jobs that are not desired by local inhabitants. Punjabi migrants in developed countries mostly take up low-paying jobs, such as drivers, shop assistants, and restaurant employees. Rural households invest in education to develop the linguistic talents of migration candidates to get a visa but cannot handle vocational training. Supplying vocational skills training will help migrants take high-income jobs.

Obtaining informal non-farm jobs is an almost exclusive option for marginal farmers and the landless. Marginal farmers tend to take informal jobs by leasing out their meagre land to earn land rent and, in turn, engage in informal non-farm jobs. On the other hand, large farmers who suffer from the paucity of male family workers renounce farming to become rentiers. Due to the insufficient supply of decent formal jobs in the organised sector, overseas migration is a vital option for larger-scale landholders. Depeasantisation between marginal and large farmers should be clearly demarcated in formulating policies.

As depeasantisation from large-scale farmers increases land supply in the land lease markets significantly, rising land rent is expected to fall back eventually. This will contribute to the welfare of lessees, mostly medium-scale farmers. However, it should be noted that the slippage of land rent would lead to a strategic dead end for marginal farmers who turned rentiers and engaged in informal jobs. Providing job opportunities outside the agricultural sector is a challenging task for improving the welfare of marginal farmers and the landless.

NOTES

- 1 See Hayami (1988) for a full account of the agricultural adjustment problem.
- 2 NSSO (2015) reports that in Punjab, area leased in was 10.66 million ha, whereas area leased out was 3.92 million ha.
- 3 Nanda and Véron (2015) reported that 13% of the rural households in Punjab had at least one current overseas migrant.
- 4 As farm renouncement is assumed to increase land supply in the land lease markets, renouncement will decrease land rent. However, when the proportion of renouncers is considered in the rent function, it significantly increases rent. This is because a higher rent facilitates landholders to become rentiers. Due to this mutual dependence relationship, the proportion of renouncers is excluded in estimating land rent.

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