Impact of International Migration on the Use of Agriculture Land: Evidence from Bangladesh

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Motivation…

- Migration and remittance flow globally and developing countries
  - The number of international migrants worldwide stood at 280.6 million in 2020 (or 3.6% of the world's population), up from 272 million in 2019 (a 3.5% increase)
  - Around $831 billion was received as remittance by the migrants-sending countries in 2022, of which $647 billion was received by the low and middle-income countries

  (IOM World Migration Report (2024)
  - Remittances account for over a quarter of GDP in many Asian countries
  - The share of remittance in GDP is 5.07% in 2023 for Bangladesh

  World Development Indicators (2024)
  - About 7.5 million people from Bangladesh are working worldwide, and the yearly migration rate is about 0.3-0.4 million (IOM, 2020).
  - 10% of Bangladeshi male labor force works abroad (Das et al. 2018).
- Hence, for the developing countries, the number of international migrants is substantial and remittance is one of the important sources of foreign earnings.

Motivation...

- Remittance as a result of migration impacts the development of origin countries
  - ➢ Triples the migrant's own earnings and the remittances double the incomes of the migrants' families in Bangladesh.
  - ➢ Migration loosens the credit constraint, facilitates investment in relatively high-return activities, contributes to increasing local production activities.

(Mobarak et al. (2023), Taylor et al. (2003)

  - ➢ Male migration lowers the schooling attendance and attainment of children; the effect is more intense when the mother migrates.
  - ➢ Maternal migration negatively affects the children's early cognitive development.
  - ➢ Drains labour and crowds out the local production activities.
  - ➢ Migration decreases the entrepreneurial activity of remittance receiving households in Bangladesh.

(Cortes, 2015, McKenzie & Rapoport, 2010', Mobarak et al., 2023; Uddin, 2023)

- Literature misses one important aspect of the impacts of international migration →

Use of Agriculture Land

Link between International migration and agriculture

- International migration creates the lost labour in agriculture. Since agriculture production is labour intensive, the lost labour can depress the crop output.
- Moreover, remittance as a form of non-labour income for the receiving household could make the lost labour effect more adverse by curbing the labour supply of remaining family members.
- This phenomenon is well known as the backwards-bending labour supply curve. Hence remittance receiving households could discourage investment in agriculture and withdraw labour from farm activities (Amuedo-Dorantes & Pozo, 2006).
- However, the lost labour can be compensated by the capital. International migration can increase crop output through the utilization of remittance in adopting new agriculture technologies and hiring wage labour (Taylor et al., 2003).
- Therefore net result of international migration on the agriculture land use depends on which effect dominates over others- **productive investment using remittance or lost labour**.

Literature

The corresponding empirical study has come up with conflicting and contradictory evidence about the impact of international migration on agriculture.

- Migrant households are more likely to employ modern farming technology, thereby higher productivity (Mendola, 2008), increasing agriculture asset accumulation (Böhme, 2015), adopting high-yield seeds (Quinn, 2009; Tshikala et al., 2019) and increases the income from livestock production (Wouterse & Taylor, 2008)
- Migrant households switch agriculture crop production from low-profit crop to high-profit cash crops (Rozelle et al., 1999).
- However, a recent study shows migration decreases the production of both capital- and labor-intensive crops, reflecting a decline in overall farm activity (Ali et al., 2023).
- The lost labour effect decreases the production of labour-intensive crops such as cereals (rice, maize, etc.) and increases the production of cash crops.
- Migrant families appear to have less investment in productivity-enhancing and time-saving farm technologies in crop production (Miluka et al., 2010).
- However, there is **no study and robust evidence** that links international migration and the use of agriculture land.

Research question

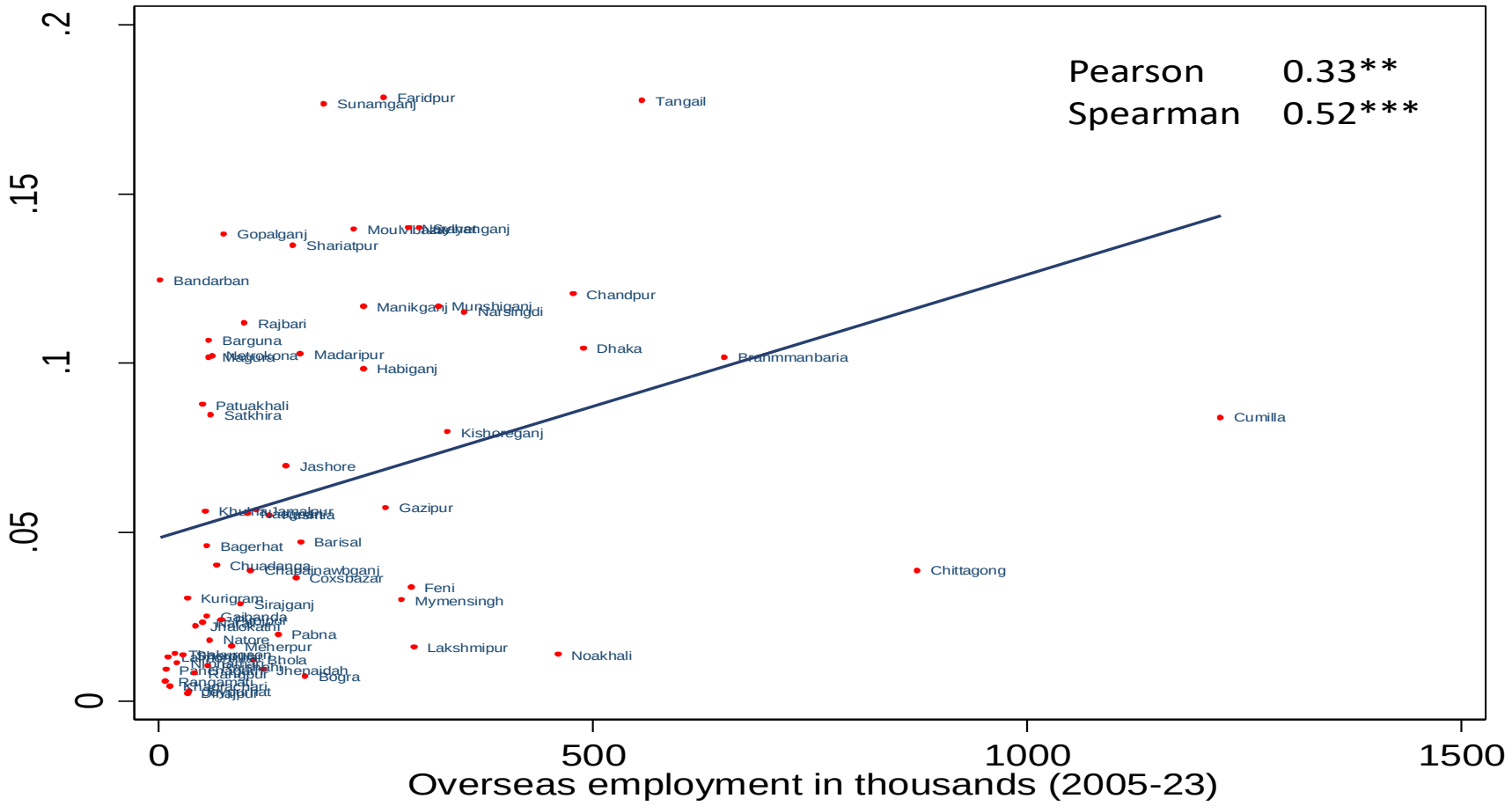
Does international migration and remittance impact the use of agriculture land (fallow land and cropping intensity)?

Why important

- **Food security:** Abandoning land or keeping it uncultivated makes the food insecurity problem more noxious in Bangladesh, the most densely populated country in the world, with a population of over 170 million.

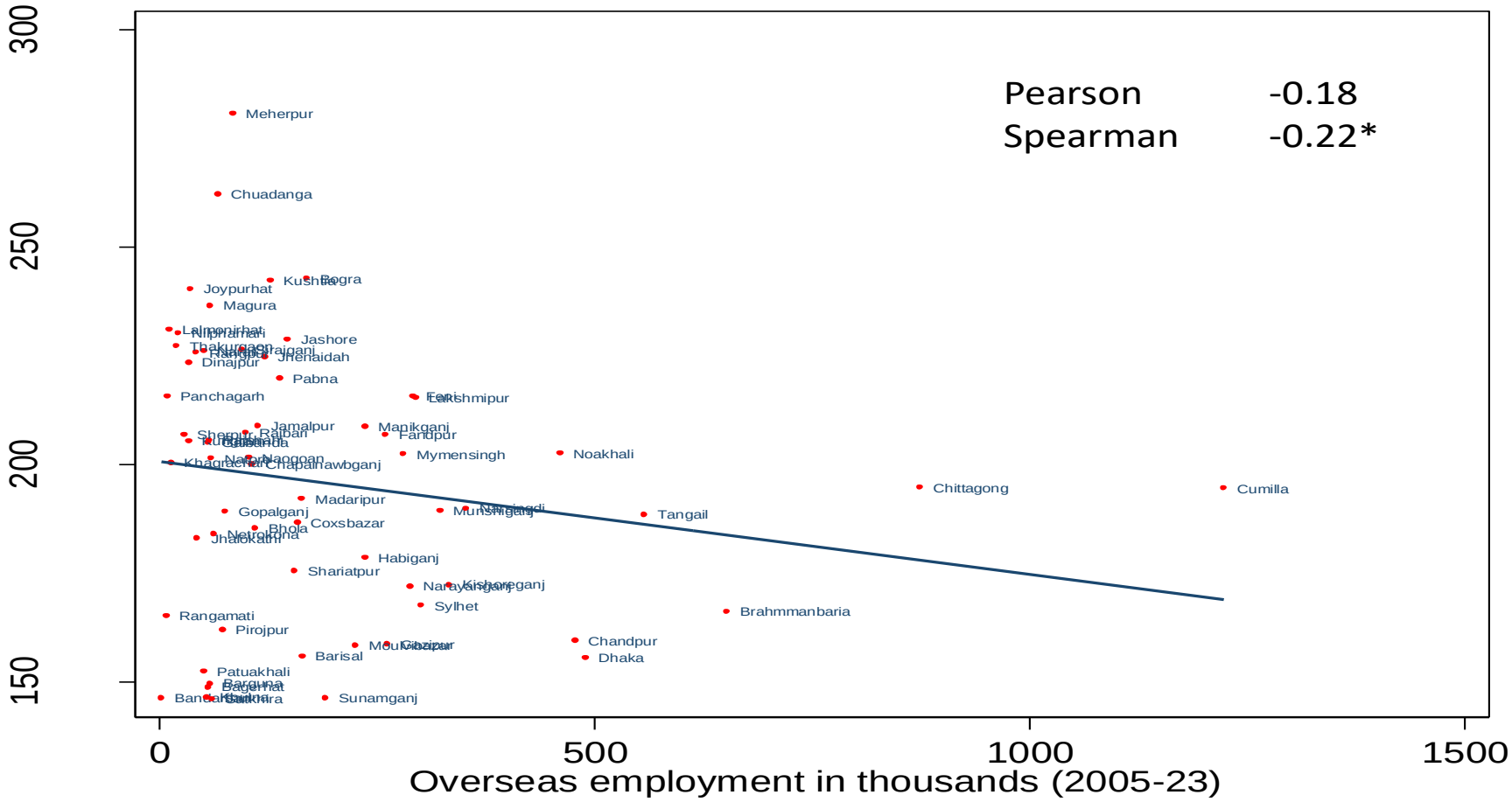
- **Rural agriculture development:** Rural households are not investing migrants' resources or their time in crop production, which indicates that agriculture continues to give little prospect for growth and individual betterment.

Migration and Agriculture in Bangladesh



Source: Yearbook of Agricultural Statistics & Bureau of Manpower, Employment and Training (BMET)
Notes: 'The number of overseas employments for the years 2020 and 2021 is missing in the source
*** p<0.01, ** p<0.05, * p<0.1

Migration and Agriculture in Bangladesh



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Data and Sample

- Three rounds of the Bangladesh Integrated Household Survey (BIHS)
- BIHS is a rural representative panel survey of households, i.e., the same rural households were followed in all three rounds (Ahmed, 2016; Ahmed & Tauseef, 2022).

Household type	Sample size		
	Round 1 (2011-12)	Round 2 (2015)	Round 3 (2019)
Never split	5503	5098	4691 [a]
Split only in round 2	-	349[b]	309 [b]
Split only in round 3	-	-	563 [c,d]
Split in round 2, then again in round 3	-	-	42 [e]
Total sample size	5503	5447	5605
Total sample size*	5503	5260	5133
Attrition rate (%)*	-	4.42	7.03
nos. of PSUs	275	275	275

- BIHS consists of 5503, 5447, and 5605 households in the first to third round, respectively.
- [a] There are 87 households which were not in round 2
- [b] These are originally 162 households in round 1
- [c] There are 10 split households (originally 5 as per round 1) which were not in round 2
- [d] These are originally 265 households in round 1
- [e] These are originally 20 households in round 1
- * With respect to round 1
- Ahmed and Tauseef (2022) found little evidence of attrition being non-random

Study Sample

Round-wise presence	Nos. of households
(1) round 1-3	5020
(2) round 1-2/2-3*/1 & 3	1469
(3) round 1/2*/3*	546
Study sample: (1)+(2)	6489

* non-head split households

- We chose households that were present in at least two rounds to capture the intrahousehold variation of our interest variables over time.
- We considered the first household of the split-off households as the original household, as it contained the original household head (Ahmed, 2016).
- We arrive at a study sample of 6489 households (including both of non-split and split types), which are present in at least two rounds of BIHS.

Defining variables

Variables	Round 1 (2011-12)	Round 2 (2015)	Round 3 (2019)
Migration	Stock (1)	Flow (2)	Flow (3)
Stock migration	Stock (1)	Stock (2)= Stock (1)+Flow (2)	Stock (3)= Stock (2)+Flow (3)
Returnee adjusted stock	Stock (1)	Returnee-adjusted stock (2)=Stock (2)-return (2)	Returnee-adjusted stock (3)= Returnee adjusted stock (2)+Flow (3)-Return (3)
Share of fallow land (%)	Total amount of fallow land is divided by total amount of cultivable land		
Cropping intensity	Number of times the land is cultivated in a crop year in Bangladesh		

Parenthesis indicates round

- We first calculate the total number of migrants for each household and thereby define migration variable as migration dummy (at least one international migrant in the household vs no migrants) for both stock and return-adjusted stock.
- It is not possible to exact match the migration with return. Therefore, we define the migration variable in two extreme cases.

Descriptive Statistics

International Migration and Agriculture in Rural Bangladesh (pooled BIHS)

Variables	Mean (SD)			
	Full sample (18,544)	**HHs with at least one international migrant (1,783)**	**HHs with no migrants (16,761)**	**P-value of difference**
	(1)	(2)	(3)	(2)-(3)
Total amount of cultivable land (decimal)	112.26 (136.54)	117.60 (136.26)	111.62 (136.56)	0.17
Share of fallow land in total cultivable land	2.14 (12.56)	4.99 (0.57)	1.80 (0.11)	0.00
Share of own land in total cultivable land	63.90 (33.11)	61.56 (33.22)	64.12 (33.11)	0.09
Share of rented-in land in total cultivable land	31.54 (42.31)	21.11 (36.92)	32.79 (42.74)	0.00
Share of rented-out land in total cultivable land	15.06 (33.18)	27.86 (41.97)	13.53 (31.62)	0.00
Share of land used for rice cultivation	75.60 (32.68)	75.64 (33.57)	75.60 (32.59)	0.97
Share of land used for other cereal cultivation (wheat & maize)	2.69 (10.76)	1.69 (9.42)	2.78 (10.86)	0.01
Share of land used for cash cultivation	21.59 (30.81)	22.55 (32.06)	21.51 (30.69)	0.38
Cropping intensity	163.32 (56.47)	152.93 (56.37)	164.27 (56.39)	0.00
Cropping intensity of own-land	171.45 (59.43)	155.50 (57.38)	173.09 (59.40)	0.00
Cropping intensity of rented-in land	156.22 (57.43)	151.04 (57.97)	156.62 (57.37)	0.05

Note: standard deviation in parentheses

- The share of fallow and rented-out land for international migrant households is significantly higher while the share of own land and rented-in land is lower.
- Migrant households significantly cultivate less wheat & maize.
- Cropping intensity is significantly lower for migrant households.

Descriptive Statistics

International Migration (stock)) **and Agriculture in Rural Bangladesh (round-wise BIHS)**

Variables	2018–19				2015–16				2011–12			
	Full sample (5605)	HHs with at least one international migrant (726)	HHs with no migrants (4,879)	P-value of difference	Full sample (5,447)	HHs with at least one international migrant (541)	HHs with no migrants (4,906)	P-value of difference	Full sample (5,503)	HHs with at least one international migrant (449)	HHs with no migrants (5,054)	P-value of difference
	(1)	(2)	(3)	(2)-(3)	(4)	(5)	(6)	(5)-(6)	(7)	(8)	(9)	(8)-(9)
Share of fallow land in cultivable land (%)	2.91 (14.35)	6.33 (20.95)	2.38 (12.94)	0.00	2.76 (14.67)	6.23 (22.11)	2.37 (13.52)	0.00	0.67 (6.64)	1.10 (8.84)	0.63 (6.40)	0.25
Cropping intensity (%)	161.31 (56.09)	150.27 (58.63)	162.63 (55.64)	0.00	164.84 (56.95)	155.34 (58.15)	165.63 (56.79)	0.01	164.57 (56.73)	154.73 (49.97)	164.57 (56.73)	0.02
Cropping intensity in own land (%)	166.54 (59.05)	148.16 (57.63)	169.13 (58.80)	0.00	172.38 (58.26)	159.35 (59.51)	173.60 (58.01)	0.01	175.39 (60.58)	163.56 (53.33)	176.31 (61.02)	0.02
Cropping intensity in rented-in land (%)	157.20 (56.68)	151.59 (61.07)	157.75 (56.21)	0.16	159.12 (59.03)	152.77 (60.19)	159.58 (58.93)	0.21	151.59 (61.07)	157.75 (56.21)	170.01 (64.07)	0.16

Note: standard deviation in parentheses

Empirical Strategy

The model is specified as fallow

$$Agriculture\ land\ use_{it} = \alpha_i + \lambda_t + \ \beta_1 Migration\ dummy_{it} + \beta_2 Total\ land\ holding_{it} + \beta_3 Household\ size + + u_{it}$$

- We use two dependable variables (1) share of fallow land in total cultivable land and (2) cropping intensity.
- Cropping intensity is also divided into two ways: (i) cropping intensity in own land and (ii) cropping intensity in rented in land.
- The indices i and t denote households and years respectively. α_i is a time-invariant household unobserved factor or household-level fixed effect and λ_t captures the time/survey round effect.
- Migration dummy is equal 1 if household at least one international migrant and 0 otherwise
- Using a households and round fixed effect allows controlling the non-observable time-invariant household level characteristics

Empirical Strategy

Controlling time variant factor s

- Relatively affluent households can afford international migration and might be less involved with farm activity. **Total land holding** of the household as a proxy of their relative affluence.

- Agriculture is labour-intensive and households with more adult males might be more likely to have international migrants. As a result, **household size** could affect migration and agriculture land use.
- As the data is Upazilas (region) level cluster, we think that error are correlated within upazilla but not across upazilla. Therefore, in order to capture these within region correlated errors we cluster the errors around region to get unbiased estimates of standard errors.
- BIHS data uses the frequency weight, we have used the frequency weight in our model.

Regression results: Fallow land

Independent variables	Dependent variable: Share of fallow land in total cultivable land	
	(1)	(2)
Migration dummy (stock)	2.031**	
	(1.028)	
Migration dummy (returnee adjusted stock)		1.545
		(1.135)
Total land holding	-0.003**	-0.003**
	(0.001)	(0.001)
Household size	-0.041	-0.050
	(0.162)	(0.159)
Observations	4,161	4,161
R-squared	0.014	0.014
Survey year FE	Yes	Yes

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

- ✓ Household with at least one international migration is associated with 2.03 percentage points higher share of fallow land than households with no international migrants.

Regression Results: Cropping intensity

Independent variables	Dependent variable: Cropping intensity	
	(1)	(2)
Migration dummy (stock)	-6.811	
	(5.768)	
Migration dummy (returnee adjusted stock)		-5.179
		(5.324)
Total land holding	-0.002	-0.002
	(0.010)	(0.010)
Household size	0.618	0.606
	(0.695)	(0.701)
Observations	2,740	2,740
R-squared	0.001	0.001
Survey year FE	Yes	Yes

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

- ✓ Migration has no effect on the cropping intensity.

Regression results: Cropping intensity (own land)

Independent variables	Dependent variable: Cropping intensity (own land)	
	(1)	(2)
Migration dummy (stock)	-12.456**	
	(5.819)	
Migration dummy (returnee adjusted stock)		-9.976*
		(5.350)
Total land holding	-0.009	-0.009
	(0.008)	(0.008)
Household size	0.233	0.202
	(0.884)	(0.891)
Observations	1,592	1,592
R-squared	0.006	0.006
Survey year FE	Yes	Yes

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

- ✓ Both stock migration and returnee adjusted migration are negatively associated with the cropping intensity (own land) .

Regression results: Cropping intensity (rented-in land)

Independent variables	Dependent variable: Cropping intensity (rented-in land)	
	(1)	(2)
Migration dummy (stock)	0.256	
	(8.824)	
Migration dummy (returnee adjusted stock)		0.151
		(8.779)
Total land holding	0.010	0.010
	(0.009)	(0.009)
Household size	-0.498	-0.505
	(0.921)	(0.921)
Observations	1,790	1,790
R-squared	0.004	0.004
Survey year FE	Yes	Yes

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

- ✓ Migration has no effect on the cropping intensity in rented-in land.

Impact heterogeneity

Independent variables	**Dependent variable:**				**Dependent variable:**			
	Share of fallow land in total cultivable land	Cropping intensity	Cropping intensity (own land)	Cropping intensity (rented-in land)	Share of fallow land in total cultivable land	Cropping intensity	Cropping intensity (own land)	Cropping intensity (rented-in land)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Above mean cultivable land holdings (large farm HHs)					**Panel B: Below mean cultivable land holdings (small farm HHs)**			
Migration dummy (stock)	0.847	-10.873	-7.697	-7.264	3.965**	0.514	-23.687***	14.895
	(0.736)	(8.034)	(7.225)	(17.881)	(1.876)	(8.079)	(8.471)	(11.975)
Migration dummy (returnee adjusted stock)	0.691	-11.241	-7.740	-10.817	2.862	3.479	-13.440*	13.669
	(0.809)	(7.218)	(6.403)	(18.778)	(1.943)	(7.202)	(8.042)	(11.419)
Observations	1,036	867	630	531	2,266	1,740	875	1,104
Panel E: HHs with amounts of remittance received in the last 12 months								
log (remittance amount)	2.179***	-4.805	-2.485	-5.755				
	(0.824)	(2.944)	(3.735)	(5.745)				
Observations	439	277	198	181				

Regression results: Summary

➢ Baseline results

- Households with at least one international migrant have a 2.03 percentage point higher share of fallow land compared to households with no international migrants.
- Migrant households' cropping intensity of their own land is 12.46 percentage points lower than that of non-migrant households.
- Within the remittance-receiving households, remittance is positively associated with fallow land (a 1% increase in remittance increases the fallow land by 2.17%).

➢ Heterogeneity of impact

- The impact has also been found to be more pronounced for the households with small farmer.

Conclusion

➞ **Headline results**

❖International migration tends to increase the fallow land and decrease cropping intensity in own land in rural Bangladesh.

➞ **Policy implication**

❑**Commercialization**: In the region of Bangladesh where international migration is a large amount, agricultural land is needed to prioritize contract farming and renting out land.

❑**Disincentivize**: Measure such as monetary penalty to discourage keeping land in fallow or uncultivated.

Thank You!