When Does Emigration Reduce Domestic Economic Activities? Evidence on the Loss of Management Capacity from a Visa Lottery*

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Abstract

Economic development is often conceived as structural transformation and migration out of rural agriculture (Lewis, 1954; Fei & Ranis, 1964). Understanding development therefore requires us to identify how rural economies transform in response to emigration. We study how international migration reshapes domestic economic activity in origin households using a randomized visa lottery that gave Bangladeshi men job opportunities in Malaysia. Winning the lottery raises total household income through remittances, but income earned in Bangladesh declines due to contractions in nonfarm business activity. In contrast, crop income remains stable despite large reductions in agricultural input expenditures, because farming gets delegated through land rental markets. We identify a "supervision constraint" that explains why households divest from nonfarm business activity. The key input that is lost through male migration is not land, labor, or physical capital, but "management capacity".

JEL: F22; F24; O15; Q12

Keywords: migration, remittance, rural economy, management, supervision, Bangladesh

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1 Introduction

International migration increases remittance inflows to origin households while simultaneously reducing productive inputs available for domestic activities. This raises a fundamental question: how do origin households adjust production after losing a migrant member? Understanding this adjustment process has been central to the study of economic development ever since Lewis (1954) made the simplifying assumption that rural economies can supply unlimited labor perfectly elastically as workers emigrate to cities. Modern theories explore both urban pull and rural push factors underlying structural transformation, and aggregate effects depend on workers' comparative advantage in rural versus urban sectors (Herrendorf, Rogerson & Valentinyi, 2014; Alvarez-Cuadrado, Amodio & Poschke, 2026). We use a large-scale visa experiment in Bangladesh paired with detailed individual-level, sector-specific data on domestic economic activities to develop a more comprehensive account of the effects of emigration on origin economies.

Rural households that lose an emigrant worker can adjust agricultural activities in multiple ways. They could substitute capital for the lost labor and mechanize production, as documented for the United States in the 19th and early 20th centuries (Hornbeck & Naidu, 2014; Clemens et al., 2018; Manuelli & Seshadri, 2014). They could use remittances as a source of capital or to insure investments and expand or modernize agricultural production, as documented for China, Bangladesh, and Uganda (Kinnan et al., 2018; Mendola, 2008; Veljanoska, 2022). Or they could divest from farming activities and rent out their land to non-migrant families, as documented for India (Madhok et al., 2025). And when it comes to the *non-agricultural sector*, the literature largely finds negative effects of emigration in the short-run (Anelli et al., 2023; Clemens & Tiongson, 2017; Gibson et al., 2013), and some positive effects in the long-run through capital accumulation (Khanna et al., 2026; Dinkelman et al., 2024).

This paper studies domestic production adjustments in both agricultural and non-agricultural sectors in response to a randomized visa lottery that gave one male member access to a lucrative international migration opportunity. Comparing across sectors, we develop a new insight: whether households maintain production in-house, or whether they downsize and use markets to delegate activities to others, depends on the ability of individuals remaining behind to internally manage production and coordinate new inputs – which we call their *supervision* or *management capacity*. We first establish that the loss in management capacity – **not** the loss of other inputs like land, labor, or capital – is the key limiting factor that drives the contraction in some types of domestic economic activities. Then we show that when there is a readily available rental market for inputs such as land that does not require the newly labor-scarce migrant household to constantly

supervise production activities, they divest from in-house agricultural production and rent out land to continue earning agricultural (rental) income. But such rental markets are not as prevalent for the nonfarm business and entrepreneurial sectors, and so the migrant's absence translates into a reduction in nonfarm income.

We examine these margins of adjustment using experimental variation generated by a work visa lottery in which the Malaysian government offered two-year contracts to up to 35,000 male agricultural workers from Bangladesh. 1.43 million Bangladeshis applied to the program, which led the Bangladesh government to randomize access via lottery in 2013. South Asians working in richer Asian nations on temporary work contracts are by far the most numerous form of international migration, so we present this evidence for an important global migration corridor. Our analysis uses household- and individual-level data from a random sample of 1,127 lottery winners and 1,247 lottery losers. By 2018, 76 percent of lottery winners and 19 percent of control applicants had migrated abroad. Mobarak et al. (2023) report the overall program evaluation effects of this lottery on household welfare, and in this study we delve into the details of domestic economic activities to understand the adjustment process.

The decline in domestic activity could have been driven by capital constraints after the migrant pays visa intermediation fees, but in this setting, where direct government facilitation greatly lowers the cost of migration, we show that treatment households are not as credit constrained and don't need to sell land. In fact, they borrow less and invest in more land and real estate than lottery losers. Using individual-level employment and income data, we also show that the reduced domestic activities do not reflect reduced effort by non-applicant members, whose labor supply and incomes remain stable. Furthermore, origin households do not replace lost labor with hired labor. Hired labor expenditures fall relative to the control group in both crop farming and business activities for lottery winners. The relevant constraint is also not the availability of labor per se, but the household's capacity to supervise it.

We test whether a supervision friction drives the contraction in domestic activities using variation in whether another working-age male (other than the lottery applicant) is present in the household even after the lottery winner migrates away. When the applicant is the only working-age male in a household, monitoring hired labor and coordinating business decisions becomes difficult. Indeed, we find that income losses are larger in households without a resident adult male non-applicant. Domestic income falls by 70 percent when no adult male remains after the lottery winner receives the migration opportunity, which is statistically significantly larger than the 22 percent decline where one remains. The gender of the remaining working-age members also matters, since women

cannot easily assume the managerial roles in rural Bangladesh that men disproportionately occupy. Restrictions on women's economic activities therefore make the migration opportunity less lucrative and less effective in maintaining the country's economic vitality. In contrast, crop farming gets delegated through a land rental market that does not require continued household oversight. Winning the visa lottery increases land rented out by 45 percent relative to the control group. Nonfarm informal businesses have no comparable delegation option in rural Bangladesh, and nonfarm income sharply contracts in treatment households.

Literature Contributions The visa lottery combined with detailed data on income sources, occupational choices, and production expenditures allows us to provide the first experimental evidence on how international migration reshapes the full household income portfolio and input use across activities. Experimental studies on international migration focus on income and consumption effects and find mixed results (Gibson et al., 2011, 2018; Mergo, 2016). We add crucial details by tracing income back to its source activities and the input decisions behind it. An experimental literature on internal migration has studied the effects on origin rural economies (Bryan et al., 2014; Meghir et al., 2022; Akram et al., 2025; Mobarak et al., 2026), but not the reorganization of household production.

Existing non-experimental literature on the effects of migration on domestic economic activities emphasizes either remittance-induced investment or household labor loss (Yang, 2008; Clemens & Tiongson, 2017; Khanna et al., 2026; Anelli et al., 2023; Dinkelman et al., 2024). We show that the binding constraint is neither labor nor capital but *managerial capacity* that remaining members – often women in South Asian households – cannot fully replace (Jayachandran, 2021; Field et al., 2010). Our analysis thus suggests that giving South Asian women more economic agency would make migration – an engine of growth for many countries – even more productive.

Our analysis identifies the importance of land rental markets to partially insulate migrant households' crop production from losses due to this "supervision constraint". In non-experimental work, Madhok et al. (2025) also find that land rental markets are important for maintaining food production in rural India following emigration shocks. Lottery-winners in Bangladesh rent out 45 percent more land, effectively transferring supervisory responsibility to tenants while retaining rental income. This "delegation" mechanism explains the asymmetric effects on crop versus nonfarm business outcomes, and sheds light on why the literature often finds negative short-run effects of emigration on the nonfarm sector.

2 Context

Over 33 million South Asians live in Asian countries outside their country of birth (UN-DESA, 2024). These flows rank among the largest migration systems in the world, accounting for more than a tenth of the 304 million international migrants in 2024. Temporary labor migration dominates this flow: low- and semi-skilled South Asian workers travel alone on fixed-term contracts that offer no path to residence in the richer destination countries in East and West Asia. The same arrangement governs much of the global economic migration system, which is what makes evidence from this corridor informative well beyond it.

About 2.9 million Bangladeshis are currently working abroad, primarily in Gulf countries, Malaysia, and Singapore (United Nations, 2024). Between July 2024 and May 2025, these workers sent home roughly US$ 27.5 billion, equivalent to 5 percent of the country's GDP (Bangladesh Bank, 2025). A large literature shows that migration and remittances increase income, raise household consumption, and reduce poverty in Bangladesh (Hatemi-J & Uddin, 2014; Romano & Traverso, 2019; Ahmed et al., 2021; Wadood & Hossain, 2017; Mobarak et al., 2023).

2.1 Government-to-Government (G2G) work-visa program

The governments of Bangladesh and Malaysia launched a G2G program in 2013 to expedite placements of Bangladeshi workers in Malaysia, circumventing private middlemen and their high fees. This is similar to other notable global migration programs, such as Korea's Employment Permit System (EPS). Malaysia offered about 30,000 temporary visas for semi-skilled male labor, mainly for palm-oil plantations. The Bangladesh Bureau of Manpower, Employment and Training (BMET) issued an open call nationwide. About 1.43 million Bangladeshi men applied during a two-week registration window through roughly 4,500 rural service centers (Wickramasekara, 2016). Applicants paid a nominal fee (US$0.66–1.30) and had to meet basic demographic requirements: male, 18–45 years old, at least 5 feet tall, 50 kg or more in weight, and able to lift 20 kg.

To allocate the visas fairly, BMET, in collaboration with the Bangladesh University of Engineering and Technology, ran a lottery in February 2013. The first draw selected 36,038 winners; a second draw split them into Phase 1 (11,758), Phase 2 (11,704), and Phase 3 (12,576). The probability of selection was proportional to labor force size in their union. Phase 1 winners received immediate placement support, including medical checks and ten days of pre-departure training at technical centers. By April 2013, BMET had sent worker dossiers to Malaysia, where firms selected candidates for visa processing.

Selected migrants signed two-year, renewable contracts guaranteeing a minimum salary (MYR 900) and basic lodging. BMET finalized visa processing and collected a reduced intermediation fee of about US$450, much less than the US$3,000–4,000 typically charged by private intermediaries (Wickramasekara, 2016).

3 Study design and data

We collaborated with BMET to study the causal impact of the G2G program. The data collection included 3,512 lottery applicants from Dhaka, Mymensingh, and Chittagong Divisions: 1,127 Phase 1 winners who received early intermediation (T1), 1,138 Phase 2 or 3 winners who were assigned to delayed intermediation (T2), and 1,247 lottery losers (C). We exclude the T2 group because they did not receive intermediation during the study period. The three divisions account for about 53% of the national population, 38% of lottery applicants, and 50% of winners. The study focused on these three divisions to keep fieldwork manageable. 49 of 223 upazilas (i.e., administrative level 3) were randomly selected from these divisions, and the data collection covered all unions within those upazilas.

The team used BMET administrative records for winners and losers to track households; these records include each applicant's name, parents' names, and union of residence. The field team combined phone calls and field visits to track households. When numbers were available, enumerators called first; otherwise, they visited the union and village, checked with local officials, and asked residents to locate applicants. In each sampled union, enumerators first interviewed all T1 cases, then randomly ordered the control list and surveyed down the list until the number of completed control interviews matched the T1 count in that union. The household tracking rates were 94% for T1, 69% for T2, and 68% for the control group. Given limited contact information and a five-year time gap between application and interview, a 68% find rate for controls is high compared to similar studies conducted in other contexts. For comparison, Clemens & Tiongson (2017) were able to track about 44% in their Philippines–Korea study. The high success rate for T1 is because local officials knew of them through interactions during intermediation, and international migrants are generally well known in the community. Nevertheless, the large difference in the success rate of T1 vs other groups can affect inference. Mobarak et al. (2023) discuss this issue in detail and argue that the tracking gap stems from how the program was run, not from underlying economic differences across groups. We document the robustness of our findings to these differential tracking rates by reporting Lee bounds.

The G2G program boosted migration among lottery winners (online appendix Figure A1). About 76% of the Phase 1 lottery winners (T1) reported migrating abroad by 2018, of whom 92% did so through G2G intermediation. Government intermediation activities slowed down considerably and then were entirely halted after Phase 1 was completed. All regression results that follow compare T1 lottery winners to the control group (C).

3.1 Sample balance and characteristics

We compare applicants' and their parents' characteristics to check statistical balance among treatment and control groups. We focus on indicators that are predetermined and unaffected by the G2G program. Online appendix Table A1 shows that the early intermediation (T1) applicants are similar to control group applicants in terms of age, literacy, schooling (own and parents), marital status, household size, months worked, and income in 2012. The only significant T1–C difference is the height of applicants. The joint hypothesis test also shows that both groups are balanced across all covariates.

Online appendix Table A1 shows summary statistics by group. The lottery applicants were adult men, on average 34 years old. About 93% of the applicants are Muslim, 81% can read and write, with an average of 7 years of schooling. Parents of applicants have lower levels of education. Each household had about 5 members during the application period. Applicants were active in the labor market before the lottery.

4 Identification

We estimate the causal impact of winning a migration lottery on household outcomes using linear regression models. Random assignment of visas ensures that lottery winners and non-winners are comparable along observed and unobserved characteristics. Our baseline specification is as follows:

$$y_i = \alpha + \beta_1 \, \mathrm{T}_i + \mathbf{X}_i \boldsymbol{\gamma} + \varepsilon_i \tag{1}$$

where y_i represents an outcome variable. T_i indicates winner or loser of the lottery. $\mathbf{X}_i$ controls for applicants' height, religion, parental education, pre-lottery household size, survey tracking method, and upazila fixed effects. The error term ε_i is clustered at the union level. We use sampling weights to have the same number of observations within each union and treatment group. We also account for the False Discovery Rate (FDR) and present corrected q values for multiple hypothesis testing following Anderson (2008). The coefficient β_1 captures the intent-to-treat effects of winning the Phase 1 lotteries.

Because not every lottery winner ultimately migrated while some lottery losers did, we also report a two-stage least squares (2SLS) specification where a binary migration indicator M_i is instrumented with the randomized lottery outcome, to recover the magnitude of the effect of migration on the outcomes of interest:

$$y_i = \delta M_i + \mathbf{X}_i\boldsymbol{\gamma} + \varepsilon_i, \qquad M_i = \alpha \mathrm{T}_i + \mathbf{X}_i\boldsymbol{\gamma} + \nu_i, \tag{2}$$

where $M_i = 1$ if the applicant migrated abroad at any point after the lottery. All controls and clustering follow the ITT specification (Equation 1). The 2SLS coefficient $\hat{\delta}$ identifies the local average treatment effect (LATE) for compliers who were induced to migrate due to the lottery win.

5 Results

We organize the results in five parts. Part 1 documents the contraction in domestic income and production in response to the visa lottery. Part 2 rules out constraints on land, labor, and capital as the explanation for this contraction. Part 3 shows that loss in managerial capacity is the most likely explanation. Part 4 shows that land rentals keep agricultural incomes resilient. Part 5 explores alternative explanations for the set of results.

5.1 Domestic production and household income

Table 1 reports the effects of winning the visa lottery on household income derived from various economic activities. Domestic income-generation declines substantially among lottery-winning households. Nonfarm business income declines by about 59 percent[1], while local labor income earned in Bangladesh (not counting remittances received) falls by about 79 percent relative to lottery-losing households. In contrast, crop income shows no statistically significant change. Remittance income increases substantially. Total household income *including* remittances increases by roughly 55 percent, even though domestic income (excluding remittances) declines by about 53 percent. As a result, per capita consumption rises by about 12 percent. In summary, the household gets richer because the lottery winner supplies labor at a much higher wage rate in Malaysia while unlucky applicants mostly supply labor in Bangladesh. Beyond this change in labor income, household nonfarm business income falls, but agricultural income does not.

[1]Income and expenditure related outcomes are inverse-hyperbolic-sine transformed. The coefficients on these outcomes can be interpreted as semi-elasticities. We use 100(exp(β) - 1) to approximate percentage changes.

Table 1: Impact of winning the lottery on household income and production

	(1) Coefficient	(2)	(3) q value	(4)	(5) Control mean	(6) N
	ITT	LATE	ITT	LATE		
Income by categories						
Crop	-0.10	-0.18	0.103	0.101	6.58	2,373
	(0.225)	(0.379)				
Nonfarm	-0.90***	-1.54***	0.001	0.001	5.01	2,373
	(0.244)	(0.405)				
Labor	-1.57***	-2.70***	0.001	0.001	5.17	2,373
	(0.250)	(0.418)				
Remittance	4.36***	7.49***	0.001	0.001	2.42	2,373
	(0.294)	(0.443)				
Other	-0.08	-0.13	0.105	0.103	5.18	2,373
	(0.206)	(0.348)				
Aggregate income and consumption						
Domestic	-0.75***	-1.30***	0.001	0.001	11.30	2,373
	(0.144)	(0.238)				
Total (domestic and remittance)	0.44***	0.76***	0.001	0.001	11.64	2,373
	(0.139)	(0.234)				
Consumption per capita	0.11***	0.19***	0.001	0.001	11.83	2,364
	(0.022)	(0.037)				
Production expenses						
Crop: total	-0.57***	-0.98***	0.004	0.003	5.90	2,373
	(0.216)	(0.362)				
Fertilizer	-0.54***	-0.92***	0.004	0.001	5.03	2,373
	(0.194)	(0.325)				
Equipment/capital	-0.56***	-0.96***	0.001	0.001	4.93	2,373
	(0.191)	(0.318)				
Wages	-0.57***	-0.98***	0.004	0.001	4.85	2,373
	(0.203)	(0.340)				
Business: total	-0.73***	-1.25***	0.001	0.001	3.31	2,373
	(0.182)	(0.303)				
Equipment/capital	-0.66***	-1.13***	0.001	0.001	3.12	2,373
	(0.175)	(0.292)				
Wages	-0.31***	-0.54***	0.001	0.001	0.83	2,373
	(0.105)	(0.177)				

Notes: This table reports ITT and LATE estimates of the effects of winning the visa lottery on income and production-related outcomes measured at the household level. Columns (1)–(2) report ITT and LATE estimates, respectively, and columns (3)–(4) report corresponding q values adjusted for multiple hypothesis testing within the table, applied separately to the ITT and LATE estimates following Anderson (2008); columns (5)–(6) report the control mean and sample size, respectively. The LATE (column 2) is estimated by 2SLS: actual migration ($M_i = 1$ if migrated abroad) is instrumented by lottery assignment. All the outcomes are inverse-hyperbolic-sine transformed; coefficients on these outcomes can be interpreted as semi-elasticities and are approximately equal to percentage changes computed as $100(exp(\beta) - 1)$. All regressions control for applicants' height, religion, father and mother education, pre-lottery household size, survey tracking method, and indicators for survey upazilas. Regressions are adjusted for sampling weights. Standard errors are clustered at the union level. The "Control mean" column shows the mean of each outcome for the control group (C), and "N" gives the number of observations. Significance levels are denoted by $^{***}p < 0.01$, $^{**}p < 0.05$, and $^{*}p < 0.10$.

Production-side data reported in the bottom panel of Table 1 show that household members remaining behind sharply reduce production expenditures in both farm and nonfarm sectors. Total cropping expenses fall by 44 percent, with similar-sized reductions in agricultural inputs across the board: spending on fertilizer (-42 percent), on farm capital and equipment (-43 percent), and on hired crop labor (-44 percent). Many households clearly chose to divest from agriculture after winning the visa lottery, while suffering no apparent loss in agricultural income (top panel).

The production contraction is also large in nonfarm activities: total business expenses decline by 52 percent, business capital by 48 percent, and business wage expenditures by 27 percent. All results remain statistically significant after adjusting for multiple hypothesis testing (see Anderson (2008) sharpened q values in columns 3 and 4). Unlike agriculture, the downsizing of nonfarm business activities is accompanied by a drop in nonfarm income (top panel). Overall, winning the visa lottery significantly reorganizes the household production portfolio. We still need to understand the asymmetric income versus production effects we observe in agriculture versus non-agricultural sectors.

We explore robustness to different survey tracking rates across treatment (94 percent of lottery winners tracked) and control (68 percent of lottery losers tracked) groups in Appendix B. We report two sets of Lee (2009) bounds: one for the full sample, and one restricted to applicants with a baseline telephone number, where response rates across the two groups are much closer, and the implied trimming is correspondingly lighter. Appendix Table B1 shows that the declines in nonfarm business and local labor income and production expenses, and the rise in remittance income, hold in both sign and significance at every bound. For the three aggregate outcomes, the lower-bound case flips sign in three instances in the full sample, though all three retain the sign of the ITT estimate throughout the phone sample.

5.2 Why does domestic production contract?

There are at least four potential reasons why domestic economic activities might contract when a household member migrates. Production activities depend on four factors of production: land, labor, physical capital, and management capabilities. Migration could undermine any of these four inputs. International migration is notoriously costly (Bazzi et al., 2026), and to pay the requisite intermediation fees, households often have to invest a substantial amount of capital or even sell off their land. We first test whether land, physical capital, or labor becomes a limiting factor by examining the treatment effects of the visa lottery win on the household credit position, on their land and real estate holdings, and on their labor market transactions.

Table 2: Impact of winning the lottery on access to finance and dwellings

	(1)	(2)	(3)	(4)	(5)	(6)
	Coefficient		q value		Control mean	N
	ITT	LATE	ITT	LATE		
Access to finance (0/1)						
Any loan	-0.06***	-0.10***	0.017	0.017	0.73	2,373
	(0.020)	(0.035)				
NGO	-0.08***	-0.14***	0.001	0.001	0.43	2,370
	(0.021)	(0.036)				
Friends	0.00	0.01	0.188	0.186	0.35	2,370
	(0.021)	(0.036)				
Moneylender	-0.06***	-0.11***	0.001	0.001	0.17	2,370
	(0.015)	(0.025)				
Banks/MFI	-0.03	-0.05	0.057	0.052	0.21	2,370
	(0.018)	(0.030)				
Can easily get 6,300 Taka	0.04**	0.08**	0.023	0.023	0.27	2,373
	(0.020)	(0.033)				
Loan to others	0.00	0.01	0.092	0.089	0.01	2,370
	(0.004)	(0.007)				
Dwellings						
Land amount (decimal)	10.51**	18.07**	0.033	0.031	65.18	2,373
	(5.316)	(8.964)				
Value of land	0.32**	0.55**	0.023	0.023	13.45	2,205
	(0.142)	(0.237)				
Concrete dwelling(s) (0/1)	0.05***	0.08***	0.017	0.017	0.21	2,373
	(0.018)	(0.030)				
Value of dwelling(s)	0.14***	0.24***	0.001	0.001	11.65	2,330
	(0.047)	(0.079)				

Notes: This table reports ITT and LATE estimates of the effects of winning the visa lottery on access to finance and dwellings-related outcomes measured at the household level. Columns (1)–(2) report ITT and LATE estimates, respectively, and columns (3)–(4) report corresponding q values adjusted for multiple hypothesis testing within the table, applied separately to the ITT and LATE estimates following Anderson (2008); columns (5)–(6) report the control mean and sample size, respectively. Access to finance indicators are binary. Values of land and dwelling(s) are inverse-hyperbolic-sine transformed; coefficients on these outcomes can be interpreted as semi-elasticities and are approximately equal to percentage changes computed as $100(exp(\beta)-1)$. The LATE (column 2) is estimated by 2SLS: actual migration ($M_i = 1$ if migrated abroad) is instrumented by lottery assignment. All regressions control for applicants' height, religion, parental education, pre-lottery household size, survey tracking method, and indicators for survey upazilas. Regressions are adjusted for sampling weights. Standard errors are clustered at the union level. The "Control mean" column shows the mean of each outcome for the control group (C), and "N" gives the number of observations. Significance levels are denoted by $^{***}p < 0.01$, $^{**}p < 0.05$, and $^{*}p < 0.10$.

5.2.1 Credit and land constraints

Table 2 shows that capital or credit constraints are unlikely to be the limiting factor, because lottery-winning households are significantly *less* likely to be indebted than lottery losers. Lottery winners borrow less across all major loan sources. They are also 4 percentage points more likely to report that they could access 6300 Bangladeshi Taka if necessary. Taken together, their lower loan take-up reflects reduced demand rather than restricted supply.

If households financed migration by liquidating land and assets, as they often do to afford private recruitment fees (Das et al., 2019), it might undermine the left-behind household members' ability to continue domestic economic activities. The bottom panel of Table 2 shows the opposite. Lottery-winning households hold about 16 percent more land than lottery-losers, and the value of that land is about 38 percent higher. They also hold more real estate. Lottery-winning households are 5 percentage points more likely to live in a concrete dwelling, and the value of their dwellings rises by about 15 percent. All these results remain significant after multiple-testing correction (columns 3 and 4). The credit results are also robust to differential tracking rates (Appendix Table B2). Some of the land and dwelling results change sign at the lower bound but hold at both upper bounds.

These results imply that neither land nor capital is the binding constraint behind the observed contraction in domestic activities. And these results are not surprising. The government charged roughly $450 for G2G migration intermediation, far below the $3,000 to $4,000 that control group migrants would have paid private intermediaries. Lottery winners therefore did not need to borrow or sell land to cover migration costs, and the subsequent remittance inflows eased liquidity constraints further and expanded their asset base. They ended up with more land, better housing, less debt, and better creditworthiness.

5.2.2 Labor constraints

Another possibility is that the lost labor from emigration undermines the household's ability to continue farm or nonfarm business activities. The household would need to either hire a replacement from the market, or reallocate work among members left behind in Bangladesh. Table 1 already showed that households did not use hired labor to substitute for the lost migrant labor. Wage expenditure on hired labor falls by 44 percent in crop activity and 27 percent in nonfarm activity. This is despite the household investing more in real estate with the extra capital the remittances generate, so money to pay wages was evidently not the limiting factor. Foster & Rosenzweig (2022) provide a simple explana-

tion for why rural households may choose not to hire: labor market transaction costs are prohibitive.

To examine within-household labor adjustments, we turn to individual-level working hours and income data of non-applicant members in Table 3. While total hours worked or labor income don't change, *wage* employment (and hours and income) decline. Household members remaining behind do not expand their labor supply to compensate for the migrant's departure. These results on wage income survive multiple-testing correction (columns 3 and 4). They are also robust to correcting for differential attrition in our sample: the decline in wage income holds in sign and significance at every bound (Appendix Table B3).

These null results also do not reflect a shrinking household roster. The labor endowment left behind remains intact. Appendix Table A2 shows that non-applicant household composition is unaffected. Households appear unable to redeploy their own labor to maintain domestic economic activities.

5.3 Loss of management capacity

With land, labor, and capital unlikely to be the limiting factor, we now explore the role of "management capacity". Does the household scale back its production activities because it finds supervision and management more difficult after the migrant departs? Farm and nonfarm enterprises require active management and coordination. A household can hire labor from the market, but someone must still choose the input combination and monitor whether the hired hand is working. When the male migrant – often the household head – leaves, the household may lose that capacity even if their labor, land, and capital remain intact.

5.3.1 Supervision constraints

Rural Bangladeshi households' managerial capacity to oversee farm and nonfarm business activities depends on the presence of a working-age adult male (aged 18-64). To test for the importance of this "supervision constraint", we can exploit household-level variation in whether such a person is present after their lottery applicant departs.[2]

[2]This variation is not randomly assigned. A lot of this variation stems from whether the lottery applicant is the household head (40 percent of cases) or the son of the household head (45 percent of cases). Whether the household contains a second adult male after the applicant migrates therefore reflects whether the applicant's father is still alive, how many sons he had, and whether the family lives as an extended unit or a nuclear one. We control for applicant characteristics, pre-lottery household size, parental education, and upazila fixed effects to minimize concerns about confounders.

Table 3: Impact of winning the lottery on working hours and labor income of non-applicants

	(1)	(2)	(3)	(4)	(5)	(6)
	Coefficient		q value		Control mean	N
	ITT	LATE	ITT	LATE		
Hours worked (Hours)						
Total	12.21	21.21	0.613	0.613	714.95	5,563
	(26.285)	(45.244)				
Wage	-37.07*	-64.42**	0.213	0.213	208.03	5,563
	(18.974)	(32.853)				
Farm	19.22	33.40	0.399	0.399	343.10	5,563
	(14.785)	(25.492)				
Nonfarm	30.06	52.22	0.352	0.352	163.82	5,563
	(19.918)	(34.301)				
Income (IHS)						
Total	-0.10	-0.18	0.531	0.531	3.31	5,598
	(0.111)	(0.193)				
Wage	-0.25***	-0.43***	0.001	0.001	0.90	5,598
	(0.069)	(0.121)				
Farm	0.04	0.06	0.613	0.613	1.61	5,598
	(0.079)	(0.136)				
Nonfarm	0.07	0.13	0.531	0.531	0.80	5,598
	(0.070)	(0.121)				

Notes: This table reports ITT and LATE estimates of the effects of winning the visa lottery on working hours and income-related outcomes, measured at the individual level. The regressions are based on individual-level data of non-applicants aged between 15 and 64. Columns (1)–(2) report ITT and LATE estimates, respectively, and columns (3)–(4) report corresponding q values adjusted for multiple hypothesis testing within the Table, applied separately to the ITT and LATE estimates following Anderson (2008); columns (5)–(6) report the control mean and sample size, respectively. The LATE (column 2) is estimated by 2SLS: actual migration ($M_i = 1$ if migrated abroad) is instrumented by lottery assignment. Income-related outcomes are inverse-hyperbolic-sine transformed; coefficients on these outcomes can be interpreted as semi-elasticities and are approximately equal to percentage changes computed as $100(exp(\beta) - 1)$. All regressions control for applicants' height, religion, parental education, pre-lottery household size, survey tracking method, and indicators for survey upazilas. Employment and income regressions control for baseline values as additional independent variables. Regressions are adjusted for sampling weights. Standard errors are clustered at the union level. The "Control mean" column shows the mean of each outcome for the control group (C), and "N" gives the number of observations. Significance levels are denoted by ***$p < 0.01$, **$p < 0.05$, and *$p < 0.10$.

If managerial capacity is the binding constraint, then we should observe larger contractions in domestic income in households when no such member remains after the migrant departs, compared to households where only one of multiple working-age males emigrates, so that another member can act as the replacement supervisor. We estimate the following interacted specification to test for this heterogeneity:

$$y_i = \alpha + \beta_1 \mathrm{T}_i + \beta_2 A_i + \beta_3 (T_i \times A_i) + \mathbf{X}_i \boldsymbol{\gamma} + \varepsilon_i \tag{3}$$

where A_i is an indicator for the presence of a working-age adult male (aged 18–64), other than the applicant, in the household. Here, β_1 captures the treatment effect for households without another working-age adult male, while $\beta_1 + \beta_3$ captures the treatment effect for households with such a member present. We focus on the difference, β_3.

Figure 1 shows that the negative effect of winning the visa lottery on domestic income is substantially larger among households without another non-applicant adult male. Both crop income and nonfarm business income decline more substantially for such lottery-winning households where a replacement "manager" is not available. Labor income, remittance income, and other income sources are statistically similar across these two types of households, which is suggestive that such households are not differentially selected.

These results are consistent with managerial capacity being the binding constraint that limits domestic economic activities. When potential replacement managers are present, crop and nonfarm income (and therefore total domestic income) do not drop nearly as in lottery-winning households. In fact, crop, nonfarm, and total domestic income in such households are statistically similar to lottery losers. In contrast, this factor does not affect wage income, so it is not about the absence of labor hours per se, but the difficulty of managing and supervising self-employment activities. Maintaining production in those sectors depends critically on managerial oversight.

Appendix Table A4 tests this mechanism further using variation in the gender of the oldest non-applicant working-age member. In the rural Bangladesh context, older male members are more likely to assume managerial or supervisory responsibilities of the household's business activities after a migrant's departure. The table shows substantially larger contractions in domestic income and business activity when the oldest remaining working-age adult in the household is female rather than male. This is again suggestive that domestic income contracts more when management capacity is more constrained.

We also examine heterogeneity by the land-to-male-labor ratio within the household in Appendix Table A5 as a proxy for the intensity of supervisory demands in agricultural production. However, we do not find meaningful differences in treatment effects

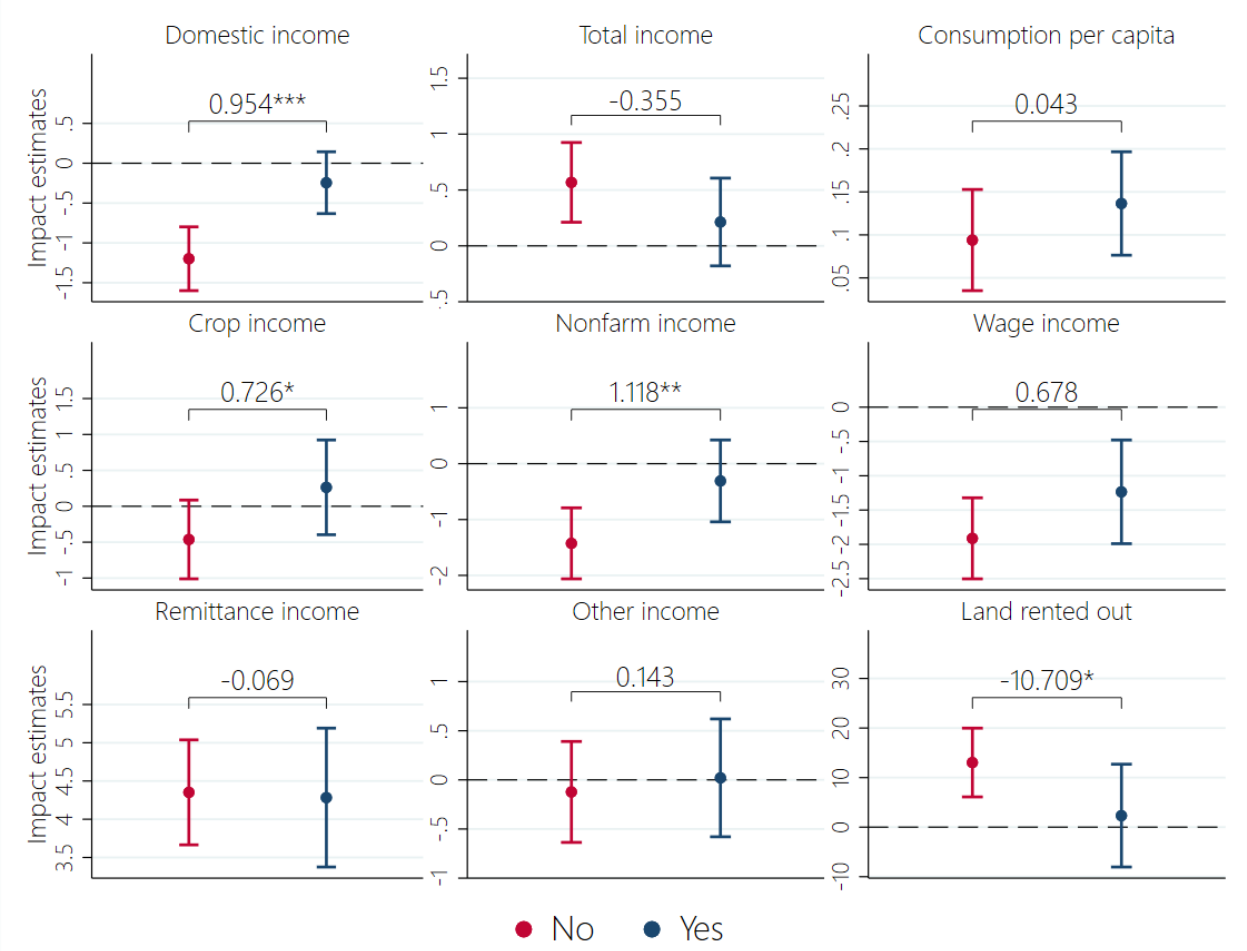

Figure 1: Heterogeneous effects of winning the lottery: an adult male (aged 18 to 64 years) among non-applicants is present in the household

Notes: N= 2,373. The figures show heterogeneous treatment effects across outcome variables. Each subplot is based on a separate linear regression. The "Yes" category reports the treatment effect for households where an adult male (aged 18 to 64 years), among non-applicants, is present in the current household, while the "No" category shows the treatment effect for the opposite group. Income outcomes are inverse-hyperbolic-sine transformed; coefficients on these outcomes can be interpreted as semi-elasticities and are approximately equal to percentage changes computed as $100(exp(\beta)-1)$. Land rent-out is in decimals (i.e., one hectare is about 247 decimals). Group-specific effects and their 95% confidence intervals are obtained through linear combination tests: $\beta_1+\beta_3$ for "Yes" and β_1 for "No". The difference (β_3) and its significance level are shown above the bars. All regressions control for applicants' height, religion, parental education, pre-lottery household size, survey tracking method, and indicators for survey upazilas. Regressions are adjusted for sampling weights. Standard errors are clustered at the union level. Appendix Table A3 shows corresponding numbers.

across households with high versus low land-to-labor ratios. Agricultural activities versus nonfarm production appear to be different in terms of their management capacity requirements, with agriculture not as exposed. The very last panel of Figure 1 hints at a different way that households might react to the supervision constraint in agriculture. We see that constrained households are more likely to rent out land. We explore this solution

in greater depth in the next section, to generate further insights on when and where the lack of management capacity binds.

5.3.2 Delegating agriculture through land rental markets

While both farm and nonfarm activities require supervision, crop production can be partially delegated through land rental arrangements, whereas nonfarm businesses generally cannot. This fact can help explain why both agriculture and nonfarm business activities would contract when the household loses managerial capacity, but agricultural income would remain resilient even when nonfarm business income does not. We directly test this by running treatment effects regressions of the effect of winning the lottery on land use in Table 4. Indeed, lottery-winning households rent out 45% more land than lottery losers. Renting out land allows households to keep their land productive and income-generating, without needing to directly supervise cultivation. Consistent with this explanation, we already saw that lottery winners significantly reduce crop production expenses but do not experience any loss in crop income (Table 1), and they are no more likely to be working on farming (Table 3). Furthermore, the fact that households with a non-applicant adult male are less likely to rent out land after winning the lottery (Figure 1) shows that the presence of a potential replacement supervisor reduces the need to delegate production through rental markets.

This delegation margin helps to explain the asymmetry between agriculture and nonfarm businesses in how households react to the loss of an emigrant. Nonfarm businesses have no comparable market mechanism for delegation.

5.4 Alternative explanations

We argue that the contraction in economic activity among lottery-winning households is due to the loss of their managerial capacity. We have shown that the data and setting are not consistent with leading explanations that involve other factors of production that the household may lose when a member emigrates – land, labor, or capital. This section explores whether other economic forces can explain the data patterns we highlight in arguing for the centrality of managerial capacity.

Risk and Diversification. Agriculture is a risky enterprise, so rural households choose a portfolio of activities across members to diversify income sources. Remittances from Malaysia provide insurance because it is less correlated with local weather and can alter the portfolio irrespective of the production constraints the household faces.

Table 4: Impact of winning the lottery on land use pattern

	(1)	(2)	(3)	(4)	(5)	(6)
	Coefficient		q value		Control mean	N
	ITT	LATE	ITT	LATE		
Total	10.51**	18.07**	0.082	0.067	65.18	2,373
	(5.316)	(8.964)				
Homestead	0.45	0.78	0.137	0.132	10.41	2,373
	(0.440)	(0.739)				
Non-homestead	10.06*	17.29**	0.082	0.067	54.77	2,373
	(5.163)	(8.711)				
by use						
Cultivable	8.26*	14.21*	0.082	0.067	46.33	2,373
	(4.368)	(7.379)				
Rented in	3.36	5.77	0.159	0.154	29.15	2,373
	(4.041)	(6.841)				
Rented out	8.59***	14.76***	0.064	0.001	18.90	2,373
	(3.073)	(5.160)				

Notes: This table reports ITT and LATE estimates of the effects of winning the visa lottery on land-related outcomes measured at the household level. Columns (1)–(2) report ITT and LATE estimates, respectively, and columns (3)–(4) report corresponding q values adjusted for multiple hypothesis testing within the table, applied separately to the ITT and LATE estimates following Anderson (2008); columns (5)–(6) report the control mean and sample size, respectively. Land outcomes are in decimals (i.e., one hectare is about 247 decimals). The LATE (column 2) is estimated by 2SLS: actual migration ($M_i = 1$ if migrated abroad) is instrumented by lottery assignment. All the outcomes are continuous. All regressions control for applicants' height, religion, parental education, pre-lottery household size, survey tracking method, and indicators for survey upazilas. Regressions are adjusted for sampling weights. Standard errors are clustered at the union level. The "Control mean" column shows the mean of each outcome for the control group (C), and "N" gives the number of observations. Significance levels are denoted by $^{***}p < 0.01$, $^{**}p < 0.05$, and $^{*}p < 0.10$.

Diversification motives cannot easily explain some of the heterogeneity and ancillary results we present, such as the asymmetric response for households with a second adult male member present even after the migrant departs (Figure 1). The second adult's labor diversifies the household's income sources, but we observe those households contracting their nonfarm activities *less*. Similarly, diversification cannot explain the asymmetry by the gender of the oldest working-age member, where households with men – who have greater labor market access in rural Bangladesh than women – contract less (Table A4). Furthermore, the fact that lottery-winning households choose to delegate agricultural activities by renting their land out (Table 4) – which transfers agricultural risk to tenants, instead of hiring in labor to cultivate their own farm (table 1) – which makes the household the residual claimant and retains risk, is not consistent with the risk diversification motive.

Finally, we examine the treatment effect of the lottery win on the diversification index of domestic economic activities, defined as (1 - Herfindahl index of domestic income

concentration). The lottery has no significant effect on activity concentration (Table A6) after the households make their various economic adjustments.

Human capital. With the migration opportunity and remittance income, households may choose to invest in human capital and scale back domestic economic activities. But Table 3 shows that working hours of working-age non-applicants do not change in aggregate. We study treatment effects of the migration lottery on human capital investments separately for children (aged 6-15) and working age adults in Table A7. We find no effect on current enrollment, regular attendance, days attended in the past week, or highest grade completed for adults. The only statistically significant effect is on children's educational expenses. The contraction in domestic activity does not appear to reflect left-behind adults reallocating their time away from work and into education.

Social networks. Migration may alter the household's network position or connections. If the member who migrates was the person most active in interacting with others on production input exchange or calling on neighbors when needed, his departure could cost the household access. Business activity might contract due to the reduction in interactions rather than managerial capacity. Table A6 reports treatment effects of the lottery win on network transfers, and we observe a significant *increase* in "transfers given" of 66 percent, with no change in "transfers received". Table 2 had also shown no change in lottery winners' borrowing behavior from friends and relatives. All of this suggests that lottery-winning households remain embedded in their networks, so the contraction in domestic activity does not reflect a change in social network connections.

Chain migration. Table A2 shows that household composition residing in Bangladesh (everyone other than the lottery applicant) remains unchanged. It's not that other household members immediately followed the migrant abroad and contracted due to that additional labor loss. This is not surprising, because the Malaysian government did not permit migrants to bring family members with them. And we had already established that household resources such as land, capital, and labor hours either increased or remained unchanged (e.g. Table 2).

6 Conclusion

Migration out of rural agriculture is central to the mechanics of foundational models of economic development, like Lewis (1954). Our detailed individual-level, sector-specific data on economic activities combined with our experimental setup allow us to update

the canonical Lewis-model intuition about rural economic readjustments and downsizing in the nonfarm sector. We develop a new insight: management capacity – the ability to supervise economic activities – is lost when an adult male emigrates, and it is the key factor of production that determines how rural households reorganize in response to migration opportunities. Macroeconomists characterize structural transformation as either due to urban pull factors or rural push factors (Alvarez-Cuadrado & Poschke, 2011; Gollin, 2023), and we show that managerial capacity mediates the link between the two: an urban pull can sometimes lower rural productivity.

Adult men disproportionately occupy managerial roles in rural Bangladesh. We see that losses in domestic economic activity are larger when the migrant was the only working-age man in the household, and larger still when the oldest remaining non-applicant is a woman. This is yet more evidence of women's limited role in economic activities in South Asia (Jalota & Ho, 2024). Social norms restrict women's mobility and market interactions (Jayachandran, 2021; Field et al., 2010). Women in our sample households do not work less after the migrant's departure; they simply do not assume the supervisory and managerial activities the migrant leaves behind. This implies that capital subsidies or input transfers alone may be insufficient to sustain domestic activity in migrant-sending households. Therefore, policies that strengthen intra-household succession, such as business management training for spouses or female household members, may complement remittance-based income gains in contexts where male migration is prevalent and supervision-intensive activities constitute the primary domestic income source.

Our analysis also provides a new explanation for the surprisingly low levels of out-migration from rural South Asia noted by others (Munshi & Rosenzweig, 2016; Bryan et al., 2014). Households may choose not to migrate to chase rural-urban wage differentials if they cannot easily replace the managerial input the working-age male provides in the rural economy. At the same time, the land rental result points to an underappreciated adjustment margin: markets permit households to keep their agricultural land productive despite the loss in supervision capacity, by transferring cultivation to a tenant. This explains why out-migration rates increased when Mexico issued land ownership certificates (De Janvry et al., 2015). Bangladesh's rental market runs largely on unregistered, informal arrangements, so a household that rents out agricultural land relies on norms and power rather than enforceable contracts. Formalizing tenancy contracts can also improve tenants' agricultural productivity (Banerjee et al., 2002). Tenure security benefits both sides and can further unlock the profitability of migration, which is already a key driver of South Asian development.

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Online Appendix

A Additional Figures and Tables

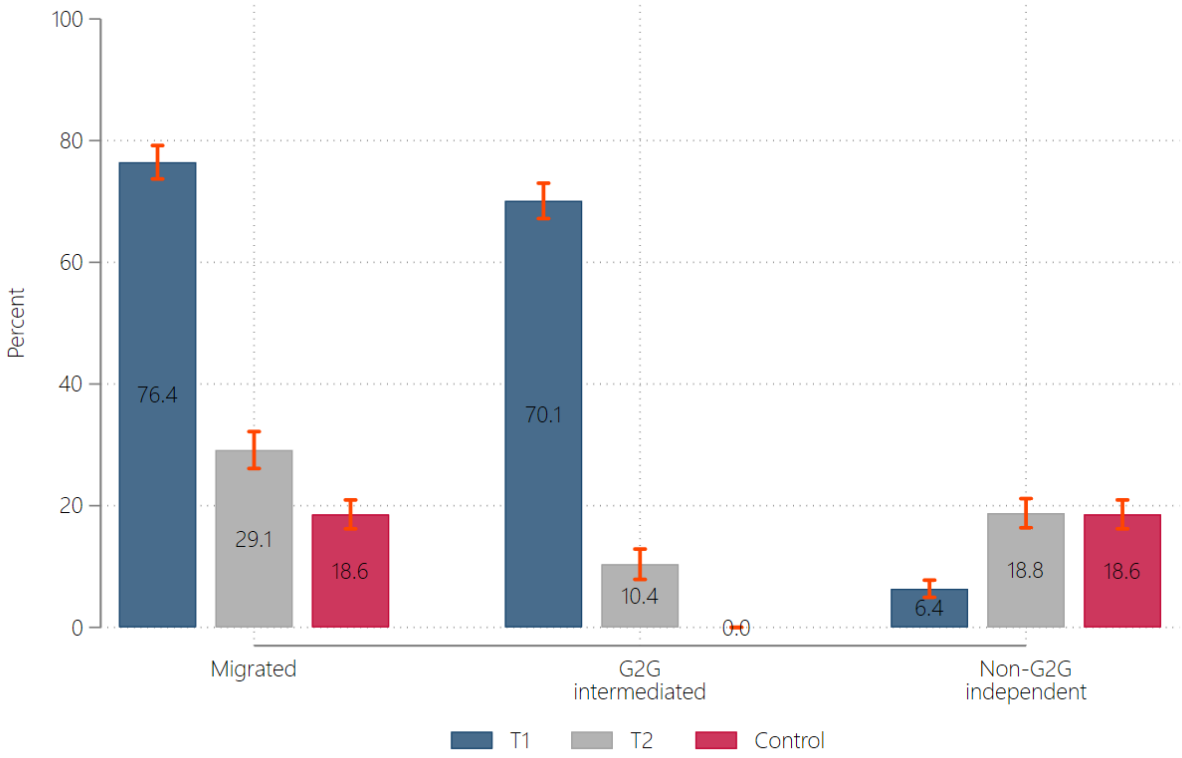

Figure A1: Impact on migration

Notes: The figure shows the impact of winning the lottery on migration rates. The vertical lines show a 95 percent confidence interval.

Table A1: Balance in observable characteristics across treatment groups

	(1) Overall	(2) Treatment	(3) Control	(4) Difference	(5) P value
Applicant profile					
Age	33.90	33.79	34.01	-0.220	0.462
Height, inches	65.09	65.20	64.98	0.218	0.004
Muslim	0.936	0.943	0.928	0.015	0.125
Married before lottery	0.607	0.599	0.615	-0.016	0.384
Can read and write	0.810	0.811	0.808	0.003	0.855
Completed years of education	6.75	6.66	6.83	-0.175	0.308
Months worked in 2012	11.34	11.32	11.37	-0.051	0.498
Average monthly income in 2012	9043	9274	8810	564.2	0.235
Parental and household characteristics					
Father is alive	0.583	0.579	0.588	-0.009	0.682
Father's years of education	3.03	2.90	3.16	-0.258	0.112
Mother is alive	0.831	0.826	0.835	-0.009	0.574
Mother's years of education	1.63	1.59	1.67	-0.077	0.495
HH size before lottery	4.88	4.79	4.98	-0.185	0.108
Joint p-value across all outcomes					0.170

Notes: Each row reports a baseline covariate. Columns (1), (2), and (3) show mean values for each variable for all, early treatment (T1), and C groups, respectively. Columns (4)–(5) report the difference between early treatment (T1) and Control and its two-sided p-value. Estimates come from OLS of y on T1 with upazila fixed effects, using probability weights. Standard errors are clustered at the union level. Joint p-values at the bottom are from a system of equations estimated by `sureg` across all outcomes, testing H_0: T1 $= 0$.

Table A2: Impact of winning the lottery and migration on the non-applicant roster

	(1)	(2)	(3)	(4)	(5)	(6)
	Coefficient		q value		Control mean	N
	ITT	LATE	ITT	LATE		
Household size	0.07	0.12	0.905	0.861	4.27	2,368
	(0.077)	(0.130)				
Number of males	0.05	0.09	0.905	0.861	1.68	2,368
	(0.050)	(0.084)				
Number of females	0.02	0.03	1.000	1.000	2.59	2,368
	(0.053)	(0.089)				
Number of males aged 15–64	0.06	0.09	0.835	0.725	0.74	2,368
	(0.036)	(0.061)				
Number of females aged 15–64	-0.01	-0.01	1.000	1.000	1.71	2,368
	(0.036)	(0.061)				
Number of children aged 0–13	-0.02	-0.04	1.000	1.000	1.48	2,368
	(0.047)	(0.079)				
Number of elderly aged 65+	0.04*	0.07*	0.835	0.725	0.34	2,368
	(0.024)	(0.041)				

Notes: This table reports ITT and LATE estimates of the effects of winning the visa lottery on non-applicant member related outcomes measured at the household level. The LATE (column 2) is estimated by 2SLS: actual migration ($M_i = 1$ if migrated abroad) is instrumented by lottery assignment. All the outcomes are continuous. Columns (1)–(2) report ITT and LATE estimates, respectively, and columns (3)–(4) report corresponding q values adjusted for multiple hypothesis testing within the table, applied separately to the ITT and LATE estimates following Anderson (2008); columns (5)–(6) report the control mean and sample size, respectively. All regressions control for applicants' height, religion, parental education, pre-lottery household size, survey tracking method, and indicators for survey upazilas. Standard errors are clustered at the union level. The "Control mean" column shows the mean of each outcome for the control group (C), and "N" gives the number of observations. Regressions are adjusted for sampling weights. Significance levels are denoted by $^{***}p < 0.01$, $^{**}p < 0.05$, and $^{*}p < 0.10$.

Table A3: Heterogeneous effects of winning the lottery: an adult male (aged 18 to 64 years) among non-applicants is present in the household

	(1) Domestic	(2) Total	(3) Consumption per capita	(4) Crop	(5) Nonfarm	(6) Wage	(7) Remittance	(8) Other	(9) Land rented out
Panel A: Regression coefficients									
Lottery	-1.20***	0.57***	0.09***	-0.46*	-1.43***	-1.91***	4.35***	-0.12	13.04***
	(0.204)	(0.182)	(0.030)	(0.279)	(0.323)	(0.301)	(0.349)	(0.261)	(3.531)
Adult male	0.90***	0.91***	-0.01	1.43***	1.36***	1.53***	1.23***	-0.58**	8.11**
	(0.220)	(0.228)	(0.029)	(0.321)	(0.367)	(0.356)	(0.383)	(0.287)	(3.982)
Lottery × Adult male	0.95***	-0.35	0.04	0.73*	1.12**	0.68	-0.07	0.14	-10.71*
	(0.290)	(0.265)	(0.043)	(0.419)	(0.504)	(0.470)	(0.552)	(0.386)	(6.206)
Panel B: Group effects and difference									
ITT (adult male present)	-0.24	0.21	0.14***	0.26	-0.31	-1.23***	4.28***	0.02	2.33
	[0.216]	[0.286]	[0.000]	[0.433]	[0.408]	[0.001]	[0.000]	[0.946]	[0.660]
ITT (no adult male)	-1.20***	0.57***	0.09***	-0.46*	-1.43***	-1.91***	4.35***	-0.12	13.04***
	[0.000]	[0.002]	[0.002]	[0.098]	[0.000]	[0.000]	[0.000]	[0.639]	[0.000]
Difference	0.95***	-0.35	0.04	0.73*	1.12**	0.68	-0.07	0.14	-10.71*
	[0.001]	[0.181]	[0.320]	[0.084]	[0.027]	[0.149]	[0.901]	[0.711]	[0.085]
Observations	2,373	2,373	2,364	2,373	2,373	2,373	2,373	2,373	2,373

Notes: N= 2,373. This table reports heterogeneous treatment effects across outcome variables. Each column is based on a separate linear regression. Income outcomes are inverse-hyperbolic-sine transformed; coefficients on these outcomes can be interpreted as semi-elasticities and are approximately equal to percentage changes computed as $100(exp(\beta)-1)$. Land rent-out is in decimals (i.e., one hectare is about 247 decimals). The "ITT (adult male present)" category reports the treatment effect for households where an adult male (aged 18 to 64 years), among non-applicants, is present in the current household, while the "ITT (no adult male)" category shows the treatment effect for the opposite group. These group-specific effects are obtained through linear combination tests: $\beta_1 + \beta_3$ for "Yes" and β_1 for "No". All regressions control for applicants' height, religion, parental education, pre-lottery household size, survey tracking method, and indicators for survey upazilas. Regressions are adjusted for sampling weights. Standard errors are clustered at the union level.

Table A4: Heterogeneous effects: a male (aged 18 to 64 years) is the eldest person among non-applicants

	(1) Domestic	(2) Total	(3) Consumption per capita	(4) Crop	(5) Nonfarm	(6) Wage	(7) Remittance	(8) Other	(9) Land rented out
Panel A: Regression coefficients									
Lottery	-1.02***	0.46***	0.10***	-0.18	-1.24***	-1.76***	4.39***	-0.12	13.46***
	(0.179)	(0.165)	(0.026)	(0.256)	(0.293)	(0.278)	(0.323)	(0.236)	(3.238)
Oldest is male	0.63***	0.62**	0.01	1.63***	0.85**	0.54	1.24**	-0.44	12.40**
	(0.229)	(0.248)	(0.032)	(0.356)	(0.384)	(0.401)	(0.496)	(0.328)	(5.567)
Lottery × Oldest is male	0.90***	-0.11	0.03	0.11	1.23**	0.56	-0.22	0.21	-18.48**
	(0.301)	(0.284)	(0.045)	(0.473)	(0.548)	(0.555)	(0.656)	(0.479)	(7.529)
Panel B: Group effects and difference									
ITT (oldest is male)	-0.12	0.35	0.13***	-0.07	-0.01	-1.21**	4.18***	0.08	-5.02
	[0.603]	[0.140]	[0.000]	[0.872]	[0.988]	[0.016]	[0.000]	[0.844]	[0.475]
ITT (oldest is female)	-1.02***	0.46***	0.10***	-0.18	-1.24***	-1.76***	4.39***	-0.12	13.46***
	[0.000]	[0.006]	[0.000]	[0.487]	[0.000]	[0.000]	[0.000]	[0.600]	[0.000]
Difference	0.90***	-0.11	0.03	0.11	1.23**	0.56	-0.22	0.21	-18.48**
	[0.003]	[0.710]	[0.529]	[0.815]	[0.025]	[0.316]	[0.742]	[0.667]	[0.014]
Observations	2,368	2,368	2,359	2,368	2,368	2,368	2,368	2,368	2,368

Notes: N= 2,373. This table reports heterogeneous treatment effects across outcome variables. Each column is based on a separate linear regression. Income outcomes are inverse-hyperbolic-sine transformed; coefficients on these outcomes can be interpreted as semi-elasticities and are approximately equal to percentage changes computed as $100(exp(\beta)-1)$. Land rent-out is in decimals (i.e., one hectare is about 247 decimals). The "ITT (oldest is male)" category reports the treatment effect for households where a male is the eldest person (among non-applicants within 18 to 64 years); while the "ITT (oldest is female)" category shows the treatment effect for the opposite group (i.e., a female is the eldest person). These group-specific effects are obtained through linear combination tests: $\beta_1 + \beta_3$ for "Yes" and β_1 for "No". All regressions control for applicants' height, religion, parental education, pre-lottery household size, survey tracking method, and indicators for survey upazilas. Regressions are adjusted for sampling weights. Standard errors are clustered at the union level.

Table A5: Heterogeneous effects: high land-to-labor ratio

	(1) Domestic	(2) Total	(3) Consumption per capita	(4) Crop	(5) Nonfarm	(6) Wage	(7) Remittance	(8) Other	(9) Land rented out
Panel A: Regression coefficients									
Lottery	-0.77***	0.56***	0.11***	-0.10	-0.98***	-1.58***	4.37***	0.04	8.79***
	(0.154)	(0.153)	(0.023)	(0.238)	(0.263)	(0.266)	(0.303)	(0.217)	(2.607)
High land-labor ratio	0.79***	1.14***	0.14***	3.31***	0.26	-0.35	1.76**	1.10**	61.37***
	(0.303)	(0.258)	(0.037)	(0.471)	(0.563)	(0.557)	(0.740)	(0.459)	(10.757)
Lottery × High land-labor ratio	0.14	-1.09**	0.03	-0.09	0.71	0.07	-0.20	-1.04	-3.27
	(0.432)	(0.427)	(0.058)	(0.645)	(0.751)	(0.728)	(0.969)	(0.671)	(15.729)
Panel B: Group effects and difference									
ITT (high land-labor ratio)	-0.63	-0.52	0.13**	-0.19	-0.27	-1.51**	4.18***	-1.00	5.52
	[0.114]	[0.172]	[0.014]	[0.756]	[0.698]	[0.029]	[0.000]	[0.119]	[0.725]
ITT (low land-labor ratio)	-0.77***	0.56***	0.11***	-0.10	-0.98***	-1.58***	4.37***	0.04	8.79***
	[0.000]	[0.000]	[0.000]	[0.668]	[0.000]	[0.000]	[0.000]	[0.858]	[0.001]
Difference	0.14	-1.09**	0.03	-0.09	0.71	0.07	-0.20	-1.04	-3.27
	[0.745]	[0.011]	[0.664]	[0.894]	[0.346]	[0.923]	[0.840]	[0.123]	[0.835]
Observations	2,373	2,373	2,364	2,373	2,373	2,373	2,373	2,373	2,373

Notes: N= 2,373. This table reports heterogeneous treatment effects across outcome variables. Each column is based on a separate linear regression. Income outcomes are inverse-hyperbolic-sine transformed; coefficients on these outcomes can be interpreted as semi-elasticities and are approximately equal to percentage changes computed as $100(exp(\beta)-1)$. Land rent-out is in decimals (i.e., one hectare is about 247 decimals). The "ITT (high land-labor ratio)" category reports the treatment effect for households with a land-to-labor ratio above the sample median, where the land-to-labor ratio is defined as total household land divided by the number of non-applicant working-age adult males (aged 18–64) in the household. We deduct any new purchases in the 36 months before the interview from the land amount for this analysis. The "ITT (low land-labor ratio)" category reports the treatment effect for households below the median. These group-specific effects are obtained through linear combination tests: $\beta_1 + \beta_3$ for "Yes" and β_1 for "No". All regressions control for applicants' height, religion, parental education, pre-lottery household size, survey tracking method, and indicators for survey upazilas. Regressions are adjusted for sampling weights. Standard errors are clustered at the union level.

Table A6: Impact of winning the lottery and migration on diversification and informal network

	(1)	(2)	(3)	(4)	(5)	(6)
	Coefficient		q value		Control mean	N
	ITT	LATE	ITT	LATE		
Income diversification	-0.01	-0.02	0.137	0.128	0.22	2,239
	(0.009)	(0.016)				
Social network						
Transfer in	-0.27	-0.47	0.137	0.128	4.89	2,373
	(0.203)	(0.344)				
Transfer out	0.51***	0.88***	0.001	0.001	2.81	2,373
	(0.179)	(0.303)				

Notes: This table reports ITT and LATE estimates of the effects of winning the visa lottery on diversification and social transfer outcomes measured at the household level. The LATE (column 2) is estimated by 2SLS: actual migration ($M_i = 1$ if migrated abroad) is instrumented by lottery assignment. Social transfers are inverse-hyperbolic-sine transformed; coefficients on these outcomes can be interpreted as semi-elasticities and are approximately equal to percentage changes computed as $100(exp(\beta) - 1)$. Columns (1)–(2) report ITT and LATE estimates, respectively, and columns (3)–(4) report corresponding q values adjusted for multiple hypothesis testing within the table, applied separately to the ITT and LATE estimates following Anderson (2008); columns (5)–(6) report the control mean and sample size, respectively. All regressions control for applicants' height, religion, parental education, pre-lottery household size, survey tracking method, and indicators for survey upazilas. Regressions are adjusted for sampling weights. Standard errors are clustered at the union level. The "Control mean" column shows the mean of each outcome for the control group (C), and "N" gives the number of observations. Significance levels are denoted by $^{***}p < 0.01$, $^{**}p < 0.05$, and $^{*}p < 0.10$.

Table A7: Impact of winning the lottery on the education of non-applicants

	(1) Coefficient	(2)	(3) q value	(4)	(5) Control mean	(6) N
	ITT	LATE	ITT	LATE		
Children (6 to 15 years)						
Currently attending school	-0.01	-0.01	0.954	0.954	0.93	2,447
	(0.011)	(0.019)				
Attends school regularly	-0.01	-0.01	0.954	0.954	0.91	2,447
	(0.013)	(0.022)				
Days attended school (last 7 days)	-0.06	-0.10	0.954	0.954	5.38	2,447
	(0.071)	(0.122)				
Highest grade completed	-0.10	-0.18	0.954	0.954	3.72	2,447
	(0.117)	(0.199)				
Education expenses (000)	0.88**	1.52**	0.177	0.177	8.51	2,447
	(0.401)	(0.691)				
Working age (16 to 24 years)						
Currently attending school	-0.01	-0.01	1.000	1.000	0.37	1,666
	(0.026)	(0.045)				
Attends school regularly	0.01	0.01	1.000	1.000	0.25	1,666
	(0.023)	(0.039)				
Days attended school (last 7 days)	0.05	0.08	1.000	1.000	1.55	1,666
	(0.127)	(0.218)				
Highest grade completed	-0.04	-0.07	1.000	1.000	8.84	1,666
	(0.168)	(0.290)				
Education expenses (000)	0.75	1.33	1.000	1.000	6.27	1,666
	(0.667)	(1.147)				

Notes: This table reports ITT and LATE estimates of the effects of winning the visa lottery on education outcomes measured at the individual level, aged between 6 and 24 years. Age group is defined by education levels: 6 to 15 years covers grades 1 to 10 and 16 to 24 covers grades 11 and above. The LATE (column 2) is estimated by 2SLS: actual migration ($M_i = 1$ if migrated abroad) is instrumented by lottery assignment. The education expenses variable is continuous. Columns (1)–(2) report ITT and LATE estimates, respectively, and columns (3)–(4) report corresponding q values adjusted for multiple hypothesis testing within the table, applied separately to the ITT and LATE estimates following Anderson (2008); columns (5)–(6) report the control mean and sample size, respectively. All regressions control for applicants' height, religion, parental education, pre-lottery household size, survey tracking method, and indicators for survey upazilas. Regressions are adjusted for sampling weights. Standard errors are clustered at the union level. The "Control mean" column shows the mean of each outcome for the control group (C), and "N" gives the number of observations. Significance levels are denoted by ***$p < 0.01$, **$p < 0.05$, and *$p < 0.10$.

B Differential attrition rates

A potential concern is that the large difference in tracking rates between lottery winners (94 percent) and lottery losers (68 percent) could bias our estimates if untracked households differ systematically from those surveyed. We argue that this gap reflects the administrative design of the G2G program rather than selection on outcomes. Lottery winners maintained continuous contact with BMET officials throughout the intermediation process, making them readily identifiable to enumerators, local officials, and community members. On the other hand, control group applicants received no institutional engagement after the lottery draw and were consequently harder to locate five years later. The tracking gap thus stems from differential visibility generated by program participation, not from underlying differences in economic trajectories.

We nonetheless bound our estimates following Lee (2009) to assess the worst-case implications of differential attrition. Because the lottery winner group has a higher response rate, we trim the top and bottom of the treatment group outcome distribution by approximately 27 percent and re-estimate the ITT on the trimmed samples using the identical regression specification. As Mobarak et al. (2023) note, a trim of this magnitude is large and naturally produces wide bounds. We therefore estimate a second set of bounds restricting the sample to applicants for whom phone records were available, using phone-based survey response as the selection indicator. Within this subsample, the differential finding rate narrows to approximately 55 percent for treatment versus 47 percent for controls, reducing the required trim fraction to roughly 15 percent.

Table B1: Impact of winning the lottery on household income and production (Lee bound)

	(1)	(2)	(3)	(4)	(5)
		Lee bounds (full sample)		Lee bounds (phone sample)	
	ITT	Lower	Upper	Lower	Upper
Panel A: Income by categories (IHS)					
Crop	-0.103	-1.829***	0.338	-0.602**	0.267
	[0.651]	[0.000]	[0.115]	[0.014]	[0.232]
Nonfarm	-0.923***	-3.977***	-0.923***	-2.146***	-1.208***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Labor	-1.607***	-4.524***	-1.607***	-2.791***	-1.821***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Remittance	4.318***	2.561***	4.984***	4.226***	5.492***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Other	-0.094	-2.119***	-0.094	-0.733***	-0.038
	[0.657]	[0.000]	[0.657]	[0.001]	[0.866]
Panel B: Aggregate income and consumption (IHS)					
Domestic	-0.771***	-1.689***	0.746***	-1.216***	-0.261**
	[0.000]	[0.000]	[0.000]	[0.000]	[0.043]
Total (domestic and remittance)	0.401***	-0.104	1.212***	0.270*	0.880***
	[0.004]	[0.512]	[0.000]	[0.066]	[0.000]
Consumption per capita	0.119***	-0.115***	0.322***	0.026	0.190***
	[0.000]	[0.000]	[0.000]	[0.236]	[0.000]
Panel C: Production expenses (IHS)					
Crop: total	-0.576***	-2.710***	-0.576***	-1.288***	-0.638***
	[0.009]	[0.000]	[0.009]	[0.000]	[0.005]
Fertilizer	-0.553***	-2.506***	-0.553***	-1.211***	-0.599***
	[0.005]	[0.000]	[0.005]	[0.000]	[0.004]
Equipment/capital	-0.569***	-2.557***	-0.569***	-1.248***	-0.629***
	[0.003]	[0.000]	[0.003]	[0.000]	[0.002]
Wages	-0.570***	-2.732***	-0.570***	-1.312***	-0.625***
	[0.006]	[0.000]	[0.006]	[0.000]	[0.004]
Business: total	-0.739***	-3.266***	-0.739***	-1.845***	-0.952***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Equipment/capital	-0.674***	-3.110***	-0.674***	-1.743***	-0.865***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Wages	-0.287***	-0.808***	-0.287***	-0.641***	-0.344***
	[0.009]	[0.000]	[0.009]	[0.000]	[0.001]

Notes: Column (1) replicates the ITT estimate using OLS regression of each outcome on T1. It uses households the survey team attempted to interview, so that the ITT and the bounds in Columns (2) and (3) share the same sample. The coefficients, therefore, differ slightly from the main tables. The survey finding rates are 94% for T and 68% for the control group, implying a trimming fraction of $(0.94 - 0.68)/0.94 \approx 0.27$. The lower (upper) bound removes the highest (lowest) 27% of T outcomes to produce a worst-case lower (upper) bound on the ITT. p-values are obtained via the bootstrap method. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table B2: Impact of winning the lottery on non-applicant composition, access to finance, and land use (Lee bound)

	(1)	(2)	(3)	(4)	(5)
		Lee bounds (full sample)		Lee bounds (phone sample)	
	ITT	Lower	Upper	Lower	Upper
Panel A: Access to finance (0/1)					
Any loan	-0.061***	-0.061***	-0.061***	-0.072***	-0.072***
	[0.004]	[0.004]	[0.004]	[0.001]	[0.001]
NGO	-0.079***	-0.079***	-0.079***	-0.091***	-0.091***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Friends	0.006	0.006	0.006	-0.003	-0.003
	[0.772]	[0.772]	[0.772]	[0.887]	[0.887]
Moneylender	-0.067***	-0.177***	-0.067***	-0.130***	-0.071***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Banks/MFI	-0.027	-0.219***	-0.027	-0.027	-0.027
	[0.138]	[0.000]	[0.138]	[0.151]	[0.151]
Can easily get 6,300 Taka	0.046**	0.046**	0.046**	0.047**	0.047**
	[0.025]	[0.025]	[0.025]	[0.027]	[0.027]
Loan to others	0.004	-0.007***	0.004	-0.001	0.005
	[0.375]	[0.005]	[0.375]	[0.695]	[0.290]
Panel B: Land and dwellings					
Land amount (decimal)	11.702**	-38.436***	31.097***	-14.469***	18.278***
	[0.030]	[0.000]	[0.000]	[0.003]	[0.002]
Value of land	0.295**	-0.393**	1.171***	0.062	0.711***
	[0.042]	[0.019]	[0.000]	[0.700]	[0.000]
Concrete dwelling(s) (0/1)	0.048***	-0.192***	0.048***	0.051***	0.051***
	[0.008]	[0.000]	[0.008]	[0.006]	[0.006]
Value of dwelling(s)	0.147***	-0.235***	0.648***	-0.004	0.284***
	[0.003]	[0.000]	[0.000]	[0.940]	[0.000]
Panel C: Land use pattern					
Homestead	0.448	-3.966***	2.763***	-0.786*	1.494***
	[0.315]	[0.000]	[0.000]	[0.068]	[0.002]
Non-homestead	11.254**	-36.132***	11.254**	-14.605***	10.663*
	[0.031]	[0.000]	[0.031]	[0.002]	[0.057]
Cultivable	9.551**	-30.704***	9.551**	-12.199***	9.323*
	[0.030]	[0.000]	[0.030]	[0.002]	[0.054]
Rented in	3.276	-25.869***	3.276	-12.257***	3.653
	[0.420]	[0.000]	[0.420]	[0.000]	[0.402]
Rented out	8.871***	-16.679***	8.871***	-5.453**	8.562***
	[0.005]	[0.000]	[0.005]	[0.030]	[0.010]

Notes: Column (1) replicates the ITT estimate using OLS regression of each outcome on T1. It uses households the survey team attempted to interview, so that the ITT and the bounds in Columns (2) and (3) share the same sample. The coefficients, therefore, differ slightly from the main tables. The survey finding rates are 94% for T and 68% for the control group, implying a trimming fraction of $(0.94 - 0.68)/0.94 \approx 0.27$. The lower (upper) bound removes the highest (lowest) 27% of T outcomes to produce a worst-case lower (upper) bound on the ITT. p-values are obtained via the bootstrap method. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.

Table B3: Impact of winning the lottery on employment, working hours, and income of non-applicants (Lee bound)

	(1)	(2)	(3)	(4)	(5)
		Lee bounds (full sample)		Lee bounds (phone sample)	
	ITT	Lower	Upper	Lower	Upper
Panel A: Hours worked					
Total	8.564	-312.381***	8.564	25.340	4.661
	[0.746]	[0.000]	[0.746]	[0.344]	[0.865]
Wage	-36.930*	-211.228***	-36.930*	-18.318	-34.706*
	[0.056]	[0.000]	[0.056]	[0.340]	[0.086]
Farm	18.801	-150.501***	18.801	40.015***	22.521
	[0.210]	[0.000]	[0.210]	[0.009]	[0.150]
Nonfarm	26.693	-166.547***	26.693	37.212*	16.846
	[0.194]	[0.000]	[0.194]	[0.057]	[0.412]
Panel B: Income (IHS)					
Total	-0.111	-0.982***	-0.111	-0.093	-0.132
	[0.330]	[0.000]	[0.330]	[0.438]	[0.270]
Wage	-0.252***	-0.887***	-0.252***	-0.217***	-0.249***
	[0.001]	[0.000]	[0.001]	[0.003]	[0.001]
Farm	0.031	-0.843***	0.031	0.067	0.029
	[0.705]	[0.000]	[0.705]	[0.428]	[0.735]
Nonfarm	0.082	-0.626***	0.082	0.094	0.061
	[0.258]	[0.000]	[0.258]	[0.202]	[0.411]

Notes: Column (1) replicates the ITT estimate using OLS regression of each outcome on T1. It uses households the survey team attempted to interview, so that the ITT and the bounds in Columns (2) and (3) share the same sample. The coefficients, therefore, differ slightly from the main tables. The survey finding rates are 94% for T and 68% for the control group, implying a trimming fraction of $(0.94 - 0.68)/0.94 \approx 0.27$. The lower (upper) bound removes the highest (lowest) 27% of T outcomes to produce a worst-case lower (upper) bound on the ITT. p-values are obtained via the bootstrap method. *** $p<0.01$, ** $p<0.05$, * $p<0.10$.