Labor-Tying and Poverty in a Rural Economy

Evidence from Bangladesh

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▶ In developing countries where poor face substantial risk, labor-tying is likely to be an important channel through which they smooth their income

▶ Empirical literature on informal insurance mainly focused on alternative channels such as reciprocal transfers (Udry(94)), pre-cautionary savings (Paxson (92), Rosenzweig & Wolpin (93))

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▶ Provide evidence on how poverty affects type of labor contract (tied vs casual) and participation in alternative consumption-smoothing mechanisms

  ▶ exploit an exogenous shock to wealth generated by the randomized roll-out of a large asset transfer program

▶ Develop a simple theoretical framework that provides predictions on the effects of the program on:

  ▶ participation of treated individuals in tied-labor and reciprocal transfers
  ▶ general equilibrium effects on terms of contracts in the village

Setting

- ▶ Rural villages in poorest parts of Bangladesh
- ▶ targeted poor: *women* at the bottom of the wealth
  distribution within the village
  - ▶ typically agricultural day-laborers, maids
  - ▶ very little or no assets
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    - ▶ dependent on help from others
- ▶ "Ultra-poor" program: gives them a *large* asset transfer + training + weekly visits by program officers
    - ▶ asset transfer is big: 130 USD, nearly *twice* the mean value of assets of the targeted poor at baseline
    - ▶ training + visits: making sure targeted poor know how to make money out of the asset

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▶ Randomization at the village level, allows me to identify general equilibrium effects on non-treated households

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    - ▶ wages of men in casual contracts unaffected, but wages for men in tied contracts increases by 13%
- ▶ Treated households more likely to engage in reciprocal transfer arrangements with wealthier households in the village
- ▶ Increase in outside option of treated households makes them switch from suboptimal tied-labor contracts to better yielding casual contracts and reciprocal transfer arrangements

Related Literature

- ▶ Empirical literature on informal insurance typically focuses on alternative mechanisms of informal insurance
  - ▶ reciprocal exchange: Udry (94), Fafchamps and Lund (03)
  - ▶ pre-cautionary savings: Paxson (1992), Rosenzweig and Wolpin (2003))

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▶ Evidence on the role of tied-labor in rural labor markets limited (Bardhan and Rudra (1978))

▶ I show that tied-labor is an important channel through which the poor smooth their income, hence their consumption

▶ Moreover, I show that the type of mechanism households use to smooth their consumption depends on their wealth

Outline

- ▶ Ultra-Poor Program
- ▶ Theoretical Framework
- ▶ Data Description
- ▶ Empirical Results
    - ▶ Findings
    - ▶ Alternative mechanisms
- ▶ Conclusion

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    - ▶ replicated in Haiti, India, Pakistan, Yemen, Honduras Peru, Ethiopia and Canada

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  - ▶ 860,300 households to be targeted by 2011 in Bangladesh
  - ▶ replicated in Haiti, India, Pakistan, Yemen, Honduras Peru, Ethiopia and Canada
- ▶ The program involves:
  - ▶ asset transfer 9459TK (140USD) on average (e.g. livestock, poultry, trees)
  - ▶ enterprise training $+$ regular visits by BRAC
  - ▶ subsistence allowance (Tk 15 per day) for the first 40 weeks
  - ▶ monthly health visit $+$ access to BRAC's legal services

Identifying the "Ultra-Poor"

- ▶ BRAC Centre: Identifies distrcits to be targeted
- ▶ BRAC branch office: Identifies "village"s to be targeted -
  geographically distinct cluster of on average 90 hh's, 387
  individuals
- ▶ Participatory wealth ranking (1 (richest) - 5 (poorest))
    - ▶ wealth rank 5 "community-selected ultra poor"
    - ▶ everyone in wealth rank 5 is included in a "primary selection
      survey"
    - ▶ further examination to verify exclusion/inclusion criteria
- ▶ Final selection

Identifying the "Ultra-Poor"

▶ Exclusion criteria (all binding)

    ▶ Household is borrowing from a micro-credit providing NGO

    ▶ Household is recipient of government development program (e.g. poverty cards)

    ▶ There is no adult woman in the household who is physically able

▶ Inclusion criteria (need to satisfy at least 3)

    ▶ Total land owned including homestead is not more than 10 decimals

    ▶ No adult male income earner in the household

    ▶ Adult women in the household work outside the homestead

    ▶ School going-aged children have to work

    ▶ Household has no productive assets

Who is the "Ultra-Poor"?

Table 1 : Descriptives at Baseline

	Selected Poor	Non-selected Poor	Middle Class	Top Class
	(1)	(2)	(3)	(4)
Wealth	5635.3	13291.2	141287.8	853759.9
	(30046.0)	(64870.1)	(313143.2)	(973480.1)
Pce	3958.7	4258.5	5433.5	12002.0
	(2272.3)	(3049.5)	(5106.7)	(34611.4)
Male hh head	0.58	0.77	0.94	0.95
	(0.49)	(0.42)	(0.24)	(0.22)
Work for another hh	0.74	0.67	0.40	0.04
	(0.44)	(0.47)	(0.49)	(0.20)
Work for another hh in same village	0.49	0.48	0.42	0.28
	(0.50)	(0.50)	(0.49)	(0.45)
Receives food transfer	0.93	0.92	0.83	0.42
	(0.26)	(0.28)	(0.37)	(0.49)
Gives food transfer	0.44	0.53	0.70	0.81
	(0.50)	(0.50)	(0.46)	(0.39)
Can have at least 2 meals a day	0.42	0.54	0.81	0.97
	(0.51)	(0.60)	(0.54)	(0.25)
N	6746	7757	7903	2407

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Environment

▶ Two types of agents:

  ▶ N risk-averse workers that maximize life time utility,
  ▶ a risk-neutral employer that maximizes expected profit

▶ Imperfect credit and insurance markets, no saving.

Environment (ctd.)

▶ Infinite horizon with two stylized seasons:

  ▶ Every even numbered period lean season - no employment on employer's farm

  ▶ Every odd numbered period peak season - random labor demand: $L = Ax$

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- ► Outside option of workers consists of:
    - ► fixed component: y^i
    - ► probability of a negative shock: p_k, increasing in k

- ► Expected outside option of worker (i, k) is

$$\widetilde{y}_k^i \equiv (1 - p_k)u(y^i) \tag{1}$$

Occupational Choice

▶ At t=0, workers need to decide whether to enter tied-labor

  ▶ tied-labor: employer provides fixed wage c in all periods

    ▶ if worker breaks the contract he/she is punished for P periods by being excluded from the village labor market

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        - ▶ For t=0,2,4... (lean season): workers receive their outside option, $\widetilde{y}_k^i$ in expectation
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- ▶ $\widehat{y} \equiv$ threshold level of $\widetilde{y}_k^i$ below which worker (i, k) prefers tied-labor over self-employment/casual-labor

Equilibrium in Labor Market

- L_T^D : Demand for tied workers determined by employer's profit max.

- L_T^S : Supply of tied workers given by $N \times G(\tilde{y}_k^i)$ where $G(.)$ is the cdf of expected outside options

- c^* given by $L_T^D = L_T^S = L_T^*$

- In every peak season (t=1,3,5..) where $Ax > L_T^*$ there will be positive demand for casual labor

- Since the only workers who are not in a tied labor contract are those with outside options $\geq \hat{y}$, W^* will be at least be as high as c^*

Equilibrium Occupational Choice
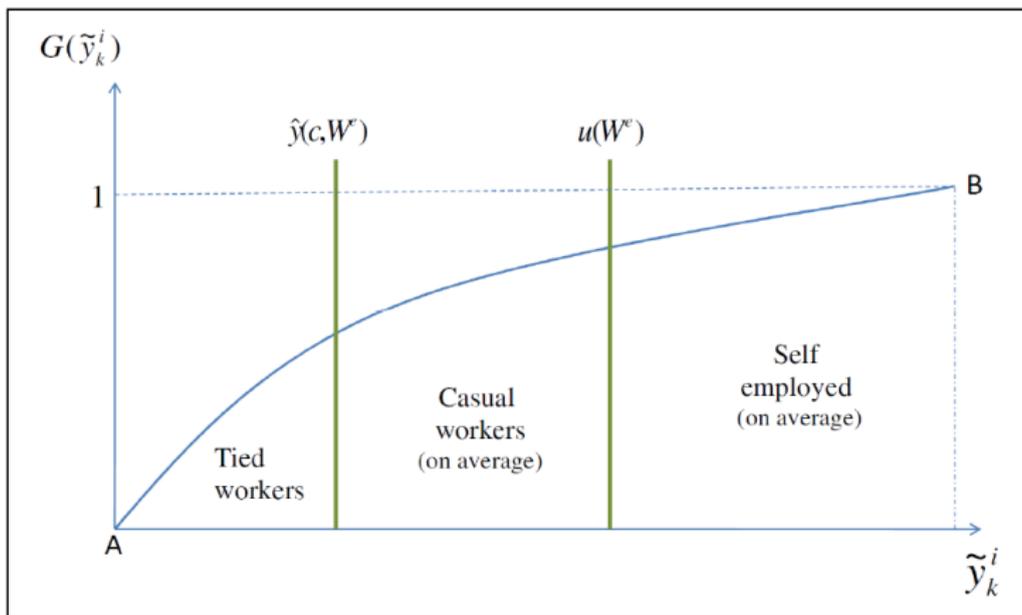
Comparative Statistics

▶ "Ultra-poor" program shifts up the expected outside option of poorest workers by giving them y^i

▶ It is not clear ex ante whether the outside option shifts enough to

  ▶ specialize in self-employment
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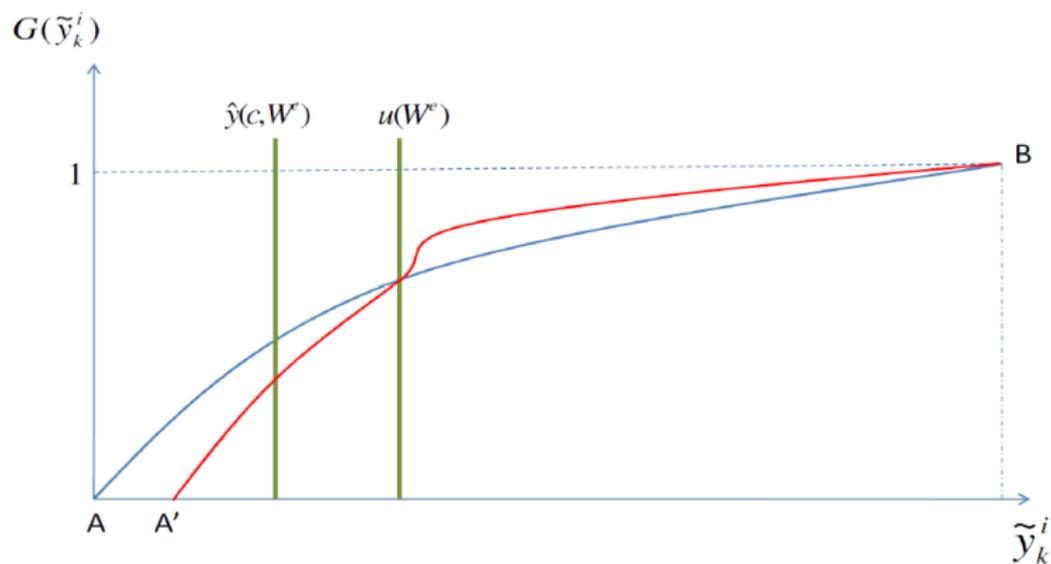
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Prediction 2: If treated worker (i, k) remains in wage employment, she will be more likely to be in a casual contract and less likely to be in a tied contract. This effect will be decreasing in the vulnerability of worker (i, k) to shocks, i.e. in p_k

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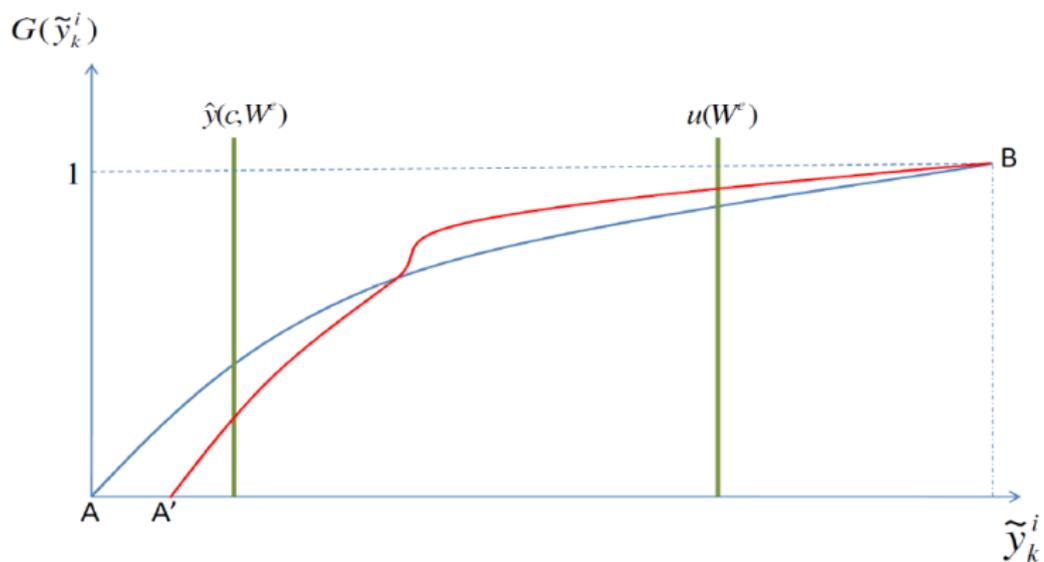
Comparative Statistics (ctd.)

Prediction 3:

(a) If the program causes supply of both casual and tied workers to fall, then both c and W will increase

(b) If the program causes the supply of tied workers to fall, but total supply of workers (tied+casual) does not change then c will increase but W will remain unchanged.

Comparative Statistics (ctd.)

▶ Until now the outside option of worker (i, k) was assumed to be autarky. In practice, there may be alternative insurance mechanisms - e.g. formal insurance, reciprocal transfer arrangements, pre-cautionary savings

▶ As long as the access to such mechanisms is increasing with the outside option of the worker, the predictions of the model will be reinforced

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Prediction 4: If workers are matched assortatively by their outside options in reciprocal transfer arrangements, treated workers will be able to enter into "better" reciprocal transfer links with wealthier households. This will increase their likelihood to terminate tied-labor contracts.

To summarize, predictions of the model are:

▶ **Prediction 1:** Treated workers may be less likely to be working for a wage.

▶ **Prediction 2:** Conditional on remaining in wage-employment, treated workers will be less likely to be in tied contracts.

▶ **Prediction 3: (a)** If the program leads to a fall in supply of both casual and tied workers, then the wages for both types of labor will increase. **(b)** If the program does not affect participation of treated workers in wage employment but makes them switch from tied to casual contracts, the wage for tied labor will increase

▶ **Prediction 4:** If workers are matched assortatively by their outside options in reciprocal transfer arrangements, they will enter into reciprocal transfer links with wealthier households.

Methodology

- ▶ The roll-out of the program was randomized in collaboration with BRAC.

- ▶ Randomization at the branch office level: half treated in 07, half to be treated in 11

- ▶ Selected-poor identified in both treatment and control villages through the same procedure

- ▶ Selected-poor in treatment villages are treated in 2007, those in control villages will be treated in 2011

Data

- ▶ Census of all households in both treatment and control communities at baseline (2007) - data on wealth, household demographics, occupations and education

- ▶ Detailed household survey on all the poor (selected+non-selected) + a 10% sample from other wealth classes

- ▶ Baseline in 2007, followup in 2009, next followup 2011.

- ▶ 40 branches, 1409 communities, 25068 households

- ▶ respondent: main female of the household

- ▶ For business activities and land, hh head (if different from main female) was also surveyed

Data (ctd.)

- ▶ In addition to standard data on wealth and welfare, data on respondent's networks were collected

  - ▶ Whether they have connections with any other household in:

    - ▶ family ties
    - ▶ market transactions - labour, land and other assets' sale and rental, credit
    - ▶ transfers in cash/kind (food, crisis-coping, other transfers)

  - ▶ If they interact with another hh within the same village, then I can identify which hh it is

- ▶ Food Exchange

  - ▶ "Does your household ever borrow rice or other food items from other households?"
  - ▶ "If yes, most important 3 households"

Overlap of borrowing and employment links

	proportion of employers who are also source of food transfers	proportion of food transfer links that are also food lending links
selected poor	0.26	0.37
	(0.43)	(0.45)
other poor	0.25	0.45
	(0.43)	(0.46)
middle class	0.19	0.62
	(0.05)	(0.44)
richest class	0.04	0.73
	(0.19)	(0.40)

Correlation of Wage Rate with Contract Type at Baseline

	Log earnings per hour	Log total daily wage	Log daily wage in cash	Log daily wage in kind
	(1)	(2)	(3)	(4)
tied worker	-0.045**	-0.042**	-0.323***	0.235***
	(0.019)	(0.021)	(0.078)	(0.073)
log wealth	0.020***	0.014***	0.008	-0.004
	(0.004)	(0.004)	(0.017)	(0.014)
cons	1.696***	3.615***	2.795***	2.484***
	(0.058)	(0.060)	(0.222)	(0.216)
N	2447	2396	2391	2391

controls: hh size, no of dependents, schooling (respondent and max), age, age2, government benefit, NGO participation, whether muslim

Seasonality of Wage Income
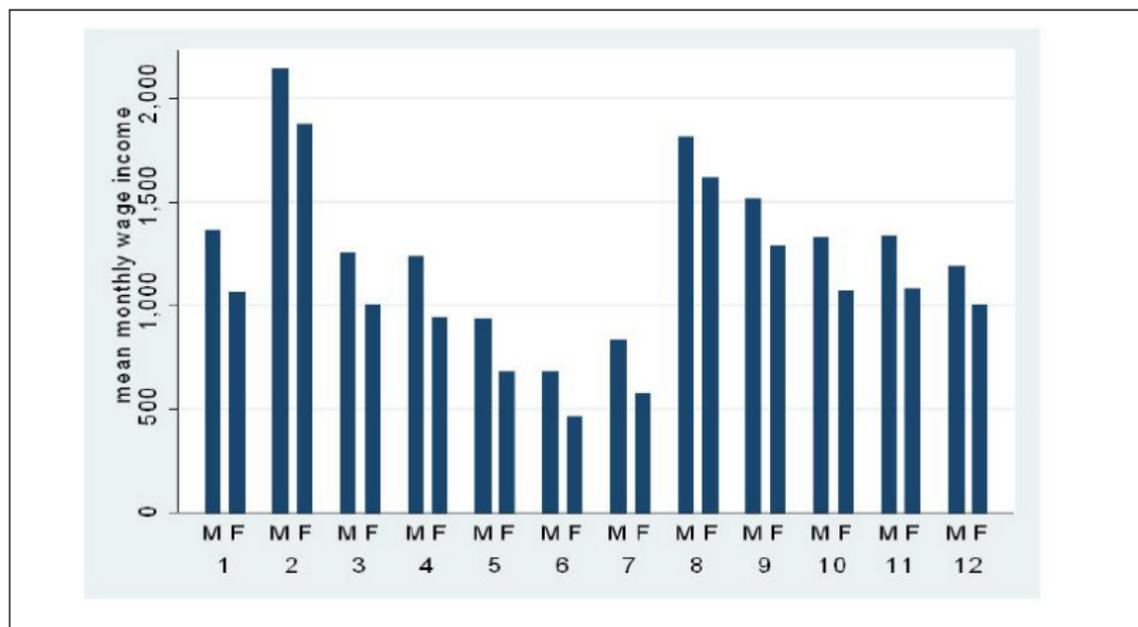
Notes: This figure shows the monthly earnings from wage employment for male and female workers respectively. Every bar labeled "M" gives the mean total wage income of male household heads from wage employment in a given month. Every bar labeled "F" gives the mean total wage income of main female respondents from wage employment in a given month. Sample is restricted to baseline observations.

Correlation of Contract Type with Seasonality in Income

$$y_{it} = \alpha + \beta \text{tied}_i + \delta \text{season}_t + \lambda \text{tied}_i \text{season}_t + \gamma' X_{it} + \epsilon_{it}$$

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	Log Wage Earnings of selected-poor females	Log Wage Earnings of selected-poor males
	(1)	(2)
peak season	0.602***	0.427***
	(0.052)	(0.047)
lean season	-1.825***	-1.563***
	(0.091)	(0.121)
tied	0.108	-0.019
	(0.084)	(0.098)
peak × tied	0.003	-0.024
	(0.078)	(0.080)
lean × tied	0.412***	0.248
	(0.126)	(0.209)
total effect for	0.112*	-0.042
tied workers at peak season	(0.064)	(0.097)
total effect for	0.520***	0.229
tied workers at lean season	(0.143)	(0.232)
N	5499	2673

Identification

▶ To identify the causal effect of the program on outcomes of interest, I use difference-in-difference

$$y_{it} = \alpha + \beta T_i + \delta R_t + \lambda T_i R_t + \gamma X_{it} + \epsilon_{it}$$

▶ y_{it} is outcome of interest on network n of individual i in survey wave t, T_i treatment branch, R_t repeat survey, X_{it} controls

▶ To identify heterogeneity of effects with respect to contract type at baseline

$$y_{it} = \alpha + ... + \lambda_1 T_i R_t + \lambda_2 T_i R_t Z_{i0} + \gamma' X_{it} + \epsilon_{it}$$

▶ where Z_{i0} is whether in a tied contract at baseline

Effects on Treated Women: Labor Supply for Wage-Work

	Extensive Margin: Whether respondent works for a wage	Intensive Margin: Hours spent in wage employment
	(1)	(2)
treatment	0.028*	-0.079
	(0.017)	(23.606)
post	-0.008	-73.902***
	(0.012)	(18.219)
treat × post	-0.047***	-72.195***
	(0.017)	(22.593)
cons	0.468***	646.531***
	(0.031)	(42.603)
N	13490	13490

Effects on Treated Women: Labor Contracts

	Tied-Labor	Wage per Hour	Wage per Hour	Volatility	Volatility
	(1)	(2)	(3)	(4)	(5)
treatment	-0.024	-0.114	0.078	-0.022	-0.022
	(0.023)	(0.202)	(0.191)	(0.018)	(0.019)
post	-0.006	0.004	0.230	-0.052***	-0.040***
	(0.023)	(0.190)	(0.179)	(0.014)	(0.016)
treat × post	-0.053*	0.723***	0.571**	-0.030	-0.026
	(0.031)	(0.277)	(0.291)	(0.020)	(0.021)
treat × post × tied at base			0.378		-0.030
			(0.596)		(0.040)
total effect for			0.949*		-0.057
workers tied at base			(0.542)		(0.037)
N	3389	3389	3389	3367	3367

Effects on Treated Women: Heterogeneity

- ▶ Prediction 2 suggests that the effects on contract type should be greater for women closer to the threshold $\widehat{y}$, i.e. for women with lower vulnerability

- ▶ A good proxy for vulnerability in this setting is the gender of the household head

- ▶ Male-headed households are larger (have more working-age members) + have easier access to health services

- ▶ Caveat: gender of household head may be correlated with unobservables

▸ hh head

Effects on Treated Women: Heterogeneity

	Panel A: Female-Headed Treated Poor				
	Tied-Labor	Wage per Hour	Wage per Hour	Volatility	Volatility
	(1)	(2)	(3)	(4)	(5)
treat × post	0.042	1.030**	0.972**	-0.036	-0.044*
	(0.038)	(0.456)	(0.489)	(0.025)	(0.026)
treat × post × tied at base			-0.406		0.016
			(0.936)		(0.056)
total effect for			0.566		-0.028
workers tied at base			(0.812)		(0.053)
N		1847	1847	1847	1832	1832

	Panel B: Male-Headed Treated Poor				
	Tied-Labor	Wage per Hour	Wage per Hour	Volatility	Volatility
	(1)	(2)	(3)	(4)	(5)
treat × post	-0.090**	0.430*	0.241	-0.028	-0.011
	(0.044)	(0.261)	(0.277)	(0.025)	(0.030)
treat × post × tied at base			1.046*		-0.069
			(0.587)		(0.049)
total effect for			1.286**		-0.079**
workers tied at base			(0.552)		(0.039)
N		1542	1542	1542	1535	1535

Effects on Spouses of Treated Women: Labor Supply for Wage-Work

	Extensive Margin: Whether respondent works for a wage	Intensive Margin: Hours spent in wage employment
	(1)	(2)
treatment	0.008	-2.733
	(0.017)	(32.037)
post	-0.041**	-114.593***
	(0.018)	(30.265)
treat × post	0.009	15.023
	(0.022)	(36.538)
cons	0.250***	1540.729***
	(0.038)	(79.961)
N	7472	7472

Effects on Spouses: Labor Contracts

	Tied-Labor	Wage per Hour	Wage per Hour	Volatility	Volatility
	(1)	(2)	(3)	(4)	(5)
treatment	0.005	-0.322	-0.219	-0.007	-0.011
	(0.028)	(0.202)	(0.214)	(0.018)	(0.019)
post	0.014	0.332*	0.357*	-0.050***	-0.049***
	(0.036)	(0.199)	(0.211)	(0.017)	(0.018)
treat × post	-0.085**	0.444*	0.294	-0.020	-0.013
	(0.043)	(0.266)	(0.274)	(0.021)	(0.022)
treat × post × tied at base			1.060*		-0.057
			(0.623)		(0.056)
total effect for			1.354**		-0.070
workers tied at base			(0.611)		(0.053)
N	1611	1528	1528	1510	1510

Effects on Non-Treated Workers

Prediction 3:

(a) If the program causes supply of both casual and tied workers to fall, then both c and W will increase

(b) If the program causes the supply of tied workers to fall, but total supply of workers (tied+casual) does not change then c will increase but W will remain unchanged.

Findings suggest that effects on female labor market will be in line with **(a)**, effects on male labor market will be in line with **(b)**

Effects on Non-Treated Women: Labor Contracts

	Tied-Labor	Wage per Hour	Wage per Hour	Volatility	Volatility
	(1)	(2)	(3)	(4)	(5)
treatment	-0.020	-0.505*	-0.455*	-0.002	-0.004
	(0.027)	(0.289)	(0.235)	(0.017)	(0.019)
post	-0.007	-0.364*	-0.251	-0.045***	-0.039***
	(0.022)	(0.214)	(0.203)	(0.012)	(0.013)
treat × post	-0.035	0.869***	0.904***	-0.026	-0.028
	(0.031)	(0.320)	(0.293)	(0.019)	(0.021)
treat × post × tied at base			-0.608		0.026
			(0.779)		(0.043)
total effect for			0.296		-0.002
workers tied at base			(0.771)		(0.039)
N	2975	2975	2975	2953	2953

Effects on Non-Treated Men: Labor Contracts

	Tied-Labor	Wage per Hour	Wage per Hour	Volatility	Volatility
	(1)	(2)	(3)	(4)	(5)
treatment	-0.035	-0.360**	-0.273	0.019	0.015
	(0.024)	(0.160)	(0.170)	(0.019)	(0.020)
post	-0.045**	0.600***	0.613***	-0.057***	-0.060***
	(0.021)	(0.152)	(0.157)	(0.014)	(0.016)
treat × post	0.001	0.336	0.244	-0.028	-0.025
	(0.030)	(0.216)	(0.222)	(0.021)	(0.022)
treat × post × tied at base			0.829*		0.005
			(0.470)		(0.061)
total effect for			1.073**		-0.020
workers tied at base			(0.479)		(0.060)
N	2502	2357	2357	2327	2327

Effects on Reciprocal Transfer Arrangements of Treated Households

	Log Wealth	Reciprocity	Reciprocity with top class	Reciprocity with middle class	Reciprocity with non-selected poor	Reciprocity with selected poor
	(1)	(2)	(3)	(4)	(5)	(6)
treatment	-0.047***	0.001	-0.064***	-0.017	-0.019	0.055
	(0.016)	(0.020)	(0.023)	(0.021)	(0.028)	(0.040)
post	0.079***	0.046***	0.051**	0.052***	0.004	0.024
	(0.010)	(0.013)	(0.020)	(0.014)	(0.021)	(0.033)
treat × post	0.045***	0.068***	0.104***	0.057***	0.109***	0.033
	(0.013)	(0.017)	(0.027)	(0.019)	(0.028)	(0.039)
N	12405	12329	3035	9465	4185	2560
Sample	Selected poor	Selected poor	Selected poor	Selected poor	Selected poor	Selected poor

Summary of Findings

- ▶ Treated women are
    - ▶ less likely to be in wage employment
    - ▶ those working for a wage are 5% less likely to be in tied-labor
- ▶ Spouses of treated women are 8% less likely to be in tied-labor
- ▶ GE effects on village labor market:
    - ▶ wages of women in casual contracts increase by 16%, wages of women in tied contracts unaffected
    - ▶ wages of men in casual contracts unaffected, but wages for men in tied contracts increases by 13%
- ▶ Treated households more likely to engage in reciprocal transfer arrangements with wealthier households in the village

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- ▶ Treated households more likely to engage in reciprocal transfer arrangements with wealthier households in the village
- ▶ **Question:** Why does the wage for female tied labor remain unchanged?

Wages for Female Tied Labor Unchanged?

	Mechanism 1: Hours spent in chores by employer females	Mechanism 2: Assistance received by non-selected women
	(1)	(2)
treatment	-0.721	0.057
	(27.942)	(0.045)
post	-3.639	0.078**
	(24.011)	(0.040)
treat × post	-82.948**	-0.041
	(33.288)	(0.057)
treat × post × "tied at base"	367.531**	0.262***
	(183.159)	(0.101)
total effect for	284.584	0.222**
"tied at base"	(183.193)	(0.096)
N	10086	2308
Sample	Employers	Non-selected poor

Conclusions

- ▶ Tied-labor is an important channel through which poor households in rural economies smooth their consumption

- ▶ An exogenous increase in self-employment opportunities of poorest women in rural Bangladesh:

  - ▶ allows them to terminate tied-labor contracts and enter employment with higher yield
  - ▶ allows their spouses to do the same
  - ▶ benefits non-treated women through an increase in their wages
  - ▶ benefits non-treated men in tied contracts
  - ▶ allows treated households to switch from tied labor to reciprocal transfer arrangements

Policy

▶ Risk plays a key role in livelihood of the poor: Insurance may increase welfare not only through smoother consumption but by allowing the poor to switch to more efficient employment opportunities

▶ Large-scale programs (such as the ultra-poor program) have large GE effects in rural economies (Angelucci and DeGiorgi (2009))

  ▶ Likely to be heterogenous, due to segmentation of labor markets by gender

▶ Ultra-poor program design: Combine with insurance for women in female-headed households?

Appendix

Baseline Characteristics of Economic Links

- ▶ Among the selected poor:
  - ▶ 74% works for another hh
  - ▶ 93% borrow food from another hh
  - ▶ 44% lends food from another hh
  - ▶ 5% rents land, 15% borrows cash, almost none hires, lends cash to, buys assets from another hh

- ▶ Both food borrowing and lending networks are within-spot (95%)

- ▶ 45% of selected poors' employment links are within the same spot, this diminishes slightly by wealth class

Male vs Female Household Head

	Male-headed poor	Female-headed poor	Difference p-value
	(1)	(2)	(3)
Wealth	6367.6	4617.7	0.01
	(28994.3)	(31426.0)	
Pce	3784.7	4209.9	0.05
	(1998.1)	(2597.7)	
Household size	4.10	2.08	0.00
	(1.44)	(1.25)	
Working-age member	2.62	1.57	0.00
	(0.95)	(0.86)	
Main female literate	0.10	0.03	0.00
	(0.30)	(0.17)	
Main female undernourished	0.51	0.55	0.00
	(0.50)	(0.50)	
Can have at least 2 meals a day	0.45	0.37	0.00
	(0.52)	(0.51)	
N	3923	2823	