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# **Does non-farm sector employment reduce rural poverty and vulnerability? Evidence from Vietnam and India**

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# 1. Backgrounds

- An increasing share of agricultural households income from non-farm activities.
- Since the late 1990s, the role of **RNFE (Rural Non-farm Economy)** in economic *growth* and *poverty reduction* began to be increasingly recognised given its increasing share of across developing countries (e.g. Lanjouw and Lanjouw, 2001, Lanjouw and Murgai, 2009, Haggblade, et al., 2010).
- The share of income from RNFE in total rural income varies - from 34% in Africa, to 47% in Latin America and 51% in Asia.
- Structural Changes** (globalisation; commercialisation of agriculture; population growth in agriculture).
- Among Asian countries, the present study focuses on Vietnam and India.

- High average GDP per capita growth rate in 1990-2010: Vietnam 5.8%; India 4.9%; a decreasing share of agricultural value added in GDP in the same period (Vietnam 39% to 20%; India 29% to 16%).
- Vietnam experienced a faster poverty reduction in terms of headcount ratio based on US\$1.25 (64% in 1993 to 21% in 2006, further down to 13% in 2008), the speed of poverty reduction has been relatively slow in India (49% in 1994 to 42% in 2005).
- The speed of improvement in nutritional indicators has been slow in India in recent years (Imai et al. 2012a, b; Gaiha et al. 2012 a, b).

-The main hypotheses:

*whether access to RNFE reduces poverty and vulnerability in rural Vietnam and India &*

*whether different types of rural non-farm employment (e.g. “unskilled manual work”, “production”, “sales”, and “professionals/ clerk”) had different effects on poverty and vulnerability.*

-We use Vietnam Household Living Standards Survey (VHLSS) in 2002, 2004 and 2006 for Vietnam and National Sample Survey (NSS) Data in 1993-4 and 2004-5 for India.

-We apply treatment effects model, a variant of Heckman two-step sample selection model (Heckman, 1979).

## 2. The Literature

-**Vietnam:** van de Walle and Cratty (2004, *Economics of Transition*) used VLSS data on Vietnam in 1993 and 1998 & found significant effects of non-farm employment in reducing poverty. They estimated the share of hours worked in non-farm sector in total (or the probability of participating in non-farm sector) and poverty separately and compared the signs and statistical significance of coefficient estimates of explanatory variables without taking account of simultaneity.

-Estudillo et al. (2012) examined the effects of schooling and inherited land on job choice and showed that women remained the farm-sector jobs, while men tend to take non-farm jobs.

## Estudillo et al. (2012) for Vietnam

Table 5

Sources of household income in sample villages in Vietnam, 1996, 2009

Income source	1996		2009	
	US\$ in PPP 2005	%	US\$ in PPP 2005	%
<b>North Vietnam</b>				
Agriculture wage	44	3	0	0
Agriculture self-employment	1,012	65	1,454	36
<b>Nonfarm formal wage</b>	<b>77</b>	<b>5</b>	<b>1,394</b>	<b>34</b>
Nonfarm informal wage	239	16	758	19
Nonfarm self-employment	175	11	424	10
Remittances and others	na <sup>1</sup>	na	63	1
Total income per year	1,547	100	4,093	100
Household size	5.0		4.2	
Per capita income per year	309		974	
<b>South Vietnam</b>				
Agriculture wage	144	5	38	0
<b>Agriculture self-employment</b>	<b>2,019</b>	<b>70</b>	<b>9,362</b>	<b>80</b>
Nonfarm formal wage	98	3	1,071	9
Nonfarm informal wage	219	8	585	5
Nonfarm self-employment	416	14	313	3
Remittances and others	na	na	379	3
Total income per year	2,896	100	11,748	100
Household size	5.4		4.8	
Per capita income per year	536		2,447	

<sup>1</sup>means not available.

# Estudillo et al. (2012)

Table 10  
Determinants of job choice of respondents' generation (G2) in sample villages in Vietnam

Variables	North Vietnam					South Vietnam				
	Farm	Non farm Formal	Nonfarm Informal	Nonfarm self-employed	Housekeeper	Farm	Nonfarm formal	Non farm informal	Non farm self-employment	Housekeeper
	A	B	C	D	E	F	G	H	I	G
Year of birth	0.0176* (1.711)	-0.0115 (-1.016)	0.0427 (1.449)	0.0119 (0.576)	-0.0836*** (-3.008)	-0.0082 (-0.549)	0.0670*** (3.424)	0.0281 (0.996)	-0.0215 (-1.567)	-0.0363 (-1.293)
Female dummy (1=yes)	0.1665 (1.032)	0.0004 (0.002)	-6.8656 (-0.001)	0.5099 (1.276)	-0.0760 (-0.267)	-0.3030 (-1.364)	-0.6922** (-2.338)	-0.1734 (-0.422)	0.3343 (1.603)	0.6593 (1.639)
Hanoi dummy (1=yes)	0.3336 (1.496)	-0.3950* (-1.744)	-0.1610 (-0.288)	-0.1685 (-0.417)	0.3406 (1.216)					
Cantho dummy (1=yes)						0.6338* (1.678)	-0.5676 (-1.505)	-0.6877 (-1.192)	0.0809 (0.354)	-0.5412 (-1.559)
Completed years in school	-0.2381*** (-6.661)	0.2559*** (6.389)	-0.0874 (-0.998)	0.0145 (0.211)	0.0835* (1.708)	-0.3005*** (-6.523)	0.3998*** (6.157)	-0.1207 (-1.622)	0.0795*** (2.884)	0.0537 (1.169)
Inherited farmland	0.0001* (1.688)	-0.0001 (-1.386)	-0.0000 (-0.260)	0.0001 (0.599)	-0.0002 (-1.080)	0.0001*** (3.959)	-0.0001*** (-3.115)	-0.0002* (-1.705)	-0.0000** (-1.973)	-0.0002 (-1.260)
Constant	-31.5600 (-1.565)	18.9079 (0.854)	-86.2339 (-1.491)	-26.6320 (-0.655)	160.9525** (2.971)	18.6370 (0.639)	135.6211** (-3.505)	-56.9430 (-1.031)	39.8618 (1.486)	68.7060 (1.254)
Observations	803	803	803	803	803	506	506	506	506	506
Number of hhid	159	159	159	159	159	124	124	124	124	124



# Estudillo et al. (2012)

Table 11  
Determinants of job choice of children's generation (G3) in sample villages in Vietnam

Variables	North Vietnam					South Vietnam				
	Farm	Non farm formal	Nonfarm informal	Nonfarm self-employed	Housekeeper	Farm	Nonfarm formal	Nonfarm informal	Nonfarm self-employed	Housekeeper
	A	B	C	D	E	F	G	H	I	G
Year of birth	0.0193 (0.990)	-0.0436** (-2.041)	0.0292 (0.813)	-0.0060 (-0.183)	0.0415 (1.025)	0.0688** (2.474)	-0.0463* (-1.844)	-0.0087 (-0.297)	-0.0260 (-0.956)	-0.0344 (-1.013)
Female dummy (1=yes)	0.7134** (2.537)	-0.8899*** (-2.708)	1.6480*** (-2.791)	-0.3992 (-0.777)	1.5380** (2.216)	0.0514 (0.147)	-0.0152 (-0.049)	-1.1298** (-2.569)	0.4414 (1.274)	1.2384** (2.558)
Hanoi dummy (1=yes)	-0.4151* (-1.785)	0.2609 (1.083)	0.2363 (0.553)	0.5694* (1.717)	-0.3450 (-0.870)					
Cantho dummy (1=yes)						1.3171*** (3.432)	0.9287*** (-2.961)	0.7924** (-1.989)	0.0680 (0.213)	0.0364 (0.093)
Completed years in school	-0.3897*** (-3.711)	0.4797*** (4.260)	-0.1160 (-0.678)	0.0888 (0.570)	0.1759 (0.803)	-0.7167*** (-5.270)	0.5540*** (5.001)	0.1702 (1.336)	0.1323 (1.248)	0.1258 (0.921)
Inherited farmland	0.0000 (0.177)	-0.0002 (-1.026)	-0.0001 (-0.571)	-0.0001 (-0.303)	-0.0001 (-0.232)	0.0001*** (2.898)	-0.0001** (-2.347)	-0.0001* (-1.940)	0.0000 (0.663)	-0.0001 (-1.180)

-**India:** Lanjouw and Murgai (2009, WB, Policy Research WP) used NSS in 1983, 1987/8, 1993/4, 1999/0, and 2004/5. Poverty in rural India declined only at a modest rate during this period.

- (i) During this period, **the rural nonfarm sector grew only modestly**, mainly between the last two survey rounds.
- (ii) Regular non-farm employment remains largely associated with education levels and social status.
- (iii) Econometric estimates for the panel based on NSS regions reveal that **expansion of the nonfarm sector is associated with falling poverty** via two routes: a direct impact on poverty and an indirect impact attributable to the positive effect of non-farm employment growth on agricultural wages. *---Endogeneity of non-farm sector employment is not taken into account.*

# Lanjouw and Murgai (2009) based on Indian NSS regions data

**Table 9: Correlates of Poverty Reduction Multivariate OLS**

	ln(Regional Headcount Rate) (1983, 1993 and 2004)			
	(1)	(2)	(3)	(4)
ln(real agricultural wages)	-1.09 (8.02) <sup>***</sup>	-1.07 (8.14) <sup>***</sup>	-0.7 (3.88) <sup>***</sup>	-0.69 (3.88) <sup>***</sup>
ln(yield)	-0.45 (3.36) <sup>***</sup>	-0.47 (3.56) <sup>***</sup>	-0.62 (2.81) <sup>***</sup>	-0.53 (2.48) <sup>***</sup>
ln(real urban mean per capita expenditure)	-0.31 (1.98) <sup>**</sup>	-0.34 (2.19) <sup>**</sup>	-0.41 (1.98) <sup>*</sup>	-0.37 (1.88) <sup>*</sup>
ln(land per capita)	-0.14 (2.53) <sup>**</sup>	-0.12 (2.26) <sup>**</sup>	-0.11 (1.66) <sup>*</sup>	-0.13 (2.06) <sup>**</sup>
1993 dummy	0.22 (3.02) <sup>***</sup>	0.23 (3.15) <sup>***</sup>	0.16 (1.58)	0.11 (1.08)
2004 dummy	0.25 (2.40) <sup>**</sup>	0.26 (2.59) <sup>**</sup>	0.19 (1.11)	0.1 (0.62)
ln(non-farm employment per adult population)	0.74 (2.07) <sup>**</sup>		-3.40 (2.27) <sup>**</sup>	
ln(non-farm employment share)*% with less than primary education	-0.7 (1.78) <sup>*</sup>		3.87 (2.31) <sup>**</sup>	
ln(nonfarm regular non-farm employment share)		0.61 (2.94) <sup>***</sup>		-3.81 (3.09) <sup>***</sup>
ln(nonfarm regular non-farm employment share)*% with less than primary education		-0.5 (2.30) <sup>**</sup>		4.46 (3.21) <sup>***</sup>
Constant	4.61 (4.55) <sup>***</sup>	5.12 (5.22) <sup>***</sup>	4.10 (2.90) <sup>***</sup>	3.87 (2.80) <sup>***</sup>
Fixed Effects	State	State	Region	Region
Observations	171	171	171	171
R-Squared	0.81	0.82	0.89	0.89
Absolute value of t-statistics in parentheses				
* significant at 10%, ** significant at 5% and *** significant at 1%				

\*Informal evidence from India and Bangladesh suggests that indirect effects matter, e.g. **the labour market tightening**, or expansion of casual non-farm employment is strongly correlated with growth in **agricultural wages**.

\*RNFE may cause or break **poverty traps: education/ nutrition**

-Participation in non-farm sector may require primary or secondary education.

-Reardon et al. (2000): the barriers faced by poor households that prevent them from investing in non-farm assets, suggesting the existence of the poverty trap.

-Employment in non-farm sector is less physically demanding (Imai, et al. 2012b).

-RNFE tend to better promote food security to the poor than farm employment (Owsu et al., 2011).

### 3. Data

#### *Vietnamese Data*

We use Vietnam Household Living Standards Surveys (VHLSS) 2002, 2004, and 2006.

\*Multi-subject Nationally Representative Cross-Sectional Data.

\*It includes the occupational codes.

#### *Indian Data*

We use the NSS data, 50<sup>th</sup> (1993/4) and 61<sup>st</sup> (2004/5): the 'Household Consumer Expenditure' schedule and the 'Employment and Unemployment' schedule (repeated cross-sectional data sets). Non-farm sector employment can be classified into sub-categories by using National Classification of Occupations (NCO).

## 4. Methodologies

### (1) Treatment Effects Model

- Take account of 'endogenous binary treatment' associated with non-farm labour market.
- 2 regimes: households participating only in the farm labour market and those with at least one member participating in both farm and non-farm labour markets.
- Outcome variables: consumption & ex-ante vulnerability (Chaudhuri 2003).
- In the first stage, access to non-farm sector is estimated by the probit model. In the second, we estimate log of household consumption or vulnerability measure after controlling for the inverse Mills ratio which reflects the degree of sample selection bias.

## **The weak aspects include**

- (i) strong assumptions are imposed on distributions of the error terms in the first and second stages;
- (ii) the coefficient estimates may be sensitive to choice of the explanatory variables and instruments; and
- (iii) valid instruments are rarely found in non-experimental data and if the instruments are invalid, the results will depend on the distributional assumptions.

For (iii) we estimated the individual wage rate for male workers and female workers separately and used their averages for instruments for the non-farm participation equation.

For (ii) we have tried different choices of explanatory variables.

The probit model for accessing rural non-farm economy (RNFE):

$$D_i^* = X_i\beta + u_i \quad (1)$$

and  $D_i^* = 1$  if  $D_i^* = X_i\beta > 0$

$D_i^* = 0$  otherwise

where  $\Pr\{D_i = 1|X_i\} = \Phi(\gamma X_i)$

$$\Pr\{D_i = 0|X_i\} = 1 - \Phi(\gamma X_i)$$

$D^*$  is a latent variable.  $X$  is a vector of individual, household and regional characteristics and other determinants at commune or community levels.  $\Phi$  denotes the standard normal cumulative distribution function.



## Vietnam:

$$D_i^* = D_i(\hat{W}_i^m, \hat{W}_i^f, M_i, E_i, H_i, L_i, R) \quad (1)'$$

$\hat{W}_i^m$  : a household average of predicted wage rate of male members (Scandizzo et al., 2009: proxy for productivity)

Daily wage rate is estimated by individual characteristics:

- age, its square,
- dummy variables of educational categories,
- whether he is working for the household's own farm (or non-farm) sector as a wage worker,
- whether the household belongs to ethnic majorities,
- size of land and its square, &
- regional and locational dummy variables.

$\hat{W}_i^f$  : a household average of predicted wages of female members.

**Table A2**

Wage Equations for male and female workers in rural areas of Vietnam based on VHLSS data in 2002, 2004 and 2006 (Tobit estimations)

Dependent Variable	2002		2004		2006	
	Male wage Coef.	Female Wage Coef.	Male wage Coef.	Female Wage Coef.	Male Wage Coef.	Female Wage Coef.
Explanatory Variables*2	(t value)*1	(t value)	(t value)	(t value)	(t value)	(t value)
Age	0.358 (8.89)**	0.108 (2.77)**	1.612 (3.48)**	1.612 (3.15)**	0.628 (1.29)	0.257 (0.72)
Age <sup>2</sup>	-0.0004 (7.53)**	-0.0008 (1.24)	-0.018 (2.77)**	-0.017 (2.19)**	-0.010 (1.40)	-0.002 (0.38)
Whether completed primary education	0.561 (3.26)**	0.506 (4.07)**	2.453 (0.55)	8.180 (2.31)*	6.628 (2.36)*	-1.348 (0.23)
Whether completed lower secondary education	0.479 (2.04)*	0.682 (4.41)**	1.191 (0.29)	10.464 (3.19)**	10.903 (3.37)**	2.190 (0.37)
Whether completed upper secondary education	1.150 (5.07)**	2.023 (8.97)**	3.725 (0.79)	11.849 (3.46)**	14.349 (4.54)**	7.789 (1.28)
Whether completed technical education	2.673 (8.43)**	3.719 (15.34)**	8.193 (1.79)†	14.245 (4.34)**	39.283 (5.20)**	9.872 (1.65)
Whether completed higher education	5.086 (13.77)**	6.628 (12.16)**	17.784 (3.57)**	25.776 (6.30)**	-4.507 (3.01)**	25.513 (3.89)**

Whether working for their own farm sector as a wage worker	-2.960 (16.84)**	-2.016 (13.75)**	-11.609 (7.80)**	-3.782 (1.78)†	-4.507 (3.01)**	-5.709 (4.57)**
Whether working for their own nonfarm sector as a wage worker	-1.878 (9.53)**	-1.453 (5.65)**	-6.787 (2.50)*	-0.0845 (0.03)	-0.668 (0.20)	-3.480 (1.14)
Whether belonging to ethnic majorities	0.343 (1.36)	-0.005 (0.02)	-20.440 (1.56)	-0.084 (0.03)	2.461 (1.13)	-0.798 (0.56)
Size of land (hectare)	-2.32 (0.33)	-1.934 (0.40)	-1.171 (0.75)	0.824 (0.61)	1.455 (0.50)	-3.00 (0.95)
Size of land squared	-9.51 (0.19)	21.651 (1.80)†	0.074 (0.49)	-0.139 (1.46)	-0.220 (0.59)	0.534 (1.32)
Constant	0.601 (0.90)	2.562 (3.79)	18.79 (1.77)	9.78 (0.99)	27.388 (2.73)	28.306 (2.84)
Sigma	8.240 (6.07)**	5.884 (10.05)**	29.918 (8.06)**	24.955 (5.92)**	38.473 (3.64)**	22.932 (19.67)**
Observations	12280	7502	1243	795	1456	1293
Joint significant test	F(23,12257) =68.06**	F(23,7479) =53.25**	F(23,1220) =7.85**	F(23,772) =7.11**	F(23,1433) =5.13**	F(23,1293) =7.30**

*Other variables in the participation equation:*

$M_i$ : whether the household head is male.

$E_i$ : a set of dummy variables of educational attainment of the household head.

$H_i$ : household composition/ characteristics (household size; the share of female members; dependency burden (the share of household members below 15 years or above 65 years; whether a household belongs to ethnic majority).

$L_i$ : size of land (in hectare) owned by the household and its square for the  $i^{th}$  household.

$R$ : a set of regional dummy variables.

*India:*

$$D_i^* = D_i(\bar{W}, E_i, H_i, L_i, B_i, R) \quad (1)''$$

$\bar{W}$ : wage rate estimated using employment data and aggregated for NSS region. Explanatory variables in the wage rate equations:

- Age and its square
- Dummy variables on literacy and educational attainments
- Land,
- Scheduled Tribe (ST), Scheduled Caste (SC)
- Non-agricultural or agricultural self-employment,
- Religion.

**Table A3**

Wage Equations for male and female workers in rural areas of India based on NSS data in 1993 and 2004 (Tobit estimations)

	1993		2004	
	Male wage Coef. (t value)	Female Wage Coef. (t value)	Male Wage Coef. (t value)	Female Wage Coef. (t value)
Age	662.822 (8.65)**	204.695 (3.65)**	139.625 (37.08)**	49.933 (10.15)**
Age <sup>2</sup>	-4.072 (4.17)**	-1.257 (1.69)	-1.638 (39.07)**	-0.637 (10.24)**
Whether is literate, but has not completed primary school	3,542.99 (12.71)**	2,126.39 (7.36)**	92.081 (5.10)**	-205.98 (8.72)**
Whether completed primary school	7,518.66 (23.01)**	3,208.70 (7.49)**	175.043 (9.45)**	-227.04 (9.53)**
Whether completed middle school	14,163.75 (29.57)**	10,200.92 (8.09)**	360.514 (19.49)**	-192.21 (7.37)**
Whether completed secondary or higher secondary school	35,055.00 (56.87)**	38,201.86 (26.88)**	810.913 (33.86)**	201.04 (5.63)**
Whether completed higher education	57,151.06 (47.65)**	53,253.26 (17.32)**	1,473.09 (64.15)**	1,004.51 (20.43)**

Land Owned	0.349	-0.324	0.00	-0.082
	(0.98)	(4.86)**	(2.39)*	(8.35)**
Scheduled Tribe (ST) dummy (ST=1, otherwise=0)	-322.569	-1,018.14	-121.41	-108.96
	(0.87)	(4.08)**	(9.13)**	(7.53)**
Scheduled Caste (SC) dummy (SC=1, otherwise=0)	-2,177.57	-381.166	-	-
	(7.95)**	(1.89)		
non-agricultural self employment dummy (non-agricultural self employment=1 otherwise)	7,216.57	2,324.92	1,859.26	566.23
	(10.27)**	(5.49)**	(68.44)**	(21.97)**
agricultural self employment dummy (agricultural self employment=1 otherwise=0)	7,899.48	5,204.41	2,196.08	880.79
	(15.13)**	(14.37)**	(69.07)**	(22.83)**
Muslim dummy (Muslim=1, otherwise=0)	746.744	185.894	113.494	-330.9
	(1.61)	(0.46)	(5.59)**	(10.79)**
Constant	-2,171.00	4,216.78	-2,940.20	-1,749.97
	(1.50)	(4.18)**	(34.97)**	(16.65)**
Observations	33720	15849	67168	59221

*Other variables in the participation equation:*

$E_i$ : a set of variables on the highest level of educational attainment of household members.

$H_i$ : a set of variables indicating household composition, such as whether a household is headed by a female member, number of adult male or female members, dependency burden: the share of household members under 15 years old or over 60 years old.

$L_i$ : owned land as a measure of household wealth.

$B_h$ : Social backwardness of the household in terms of (i) whether a household belongs to SCs and (ii) whether it belongs to STs.

$R$ : a vector of state dummy variables.



## *The second stage:*

Dependent variable:

(1) Household consumption (log of MPCE for the Indian NSS data and log of per capita real household consumption for the Vietnamese VHLSS data) or

(2) Vulnerability derived by Chaudhuri's (2003) method which captures the probability of a household falling into poverty in the next period (Imai et al, 2011; Gaiha and Imai, 2009).

### *Deriving Vulnerability Measure (for (2) above)*

Vulnerability measure as an expected poverty is specified as:

$$VEP_{it} \equiv V_{it} = \Pr(c_{i,t+1} \leq z) \quad (\text{A.1})$$

where vulnerability of household  $i$  at time  $t$ ,  $V_{it}$ , is the probability that the  $i$ -th household's level of consumption at time  $t+1$ ,  $c_{i,t+1}$ , will be below the poverty line,  $z$ .

The consumption function is estimated by the equation (A.2).

$$\ln c_i = X_i\beta + e_i \quad (\text{A.2})$$

where  $c_i$  is log of real per capita household consumption (for Vietnam) and mean per capita consumption (MPCE) (i.e. food and non-food consumption expenditure) (for India) for the household and  $X$  is a vector of observable household characteristics and other determinants of consumption.

It is also assumed that the variance of the disturbance term depends on:

$$\sigma_{e,i}^2 = X_i\theta \quad (\text{A.3})$$

The estimates of  $\beta$  and  $\theta$  are obtained using a three-step feasible generalized least squares (FGLS). Using the estimates  $\hat{\beta}$  and  $\hat{\theta}$ , we can compute the expected log consumption and the variance of log consumption for each household as follows.

$$E[\ln C_i | X_i] = X_i \hat{\beta} \quad (\text{A.4})$$

$$V[\ln C_i | X_i] = X_i \hat{\theta} \quad (\text{A.5})$$

By assuming  $\ln c_i$  as normally distributed and letting  $\Phi(\cdot)$  denote the cumulative density function of the standard normal distribution, the estimated probability that a household will be poor in the future (say, at time  $t+1$ ) is given by:

$$V\hat{E}P_i \equiv \hat{v}_i = \hat{\Pr}(\ln c_i < \ln z | X_i) = \Phi\left(\frac{\ln z - X_i \hat{\beta}}{\sqrt{X_i \hat{\theta}}}\right) \quad (\text{A.6})$$

We denote household poverty or vulnerability as  $W_i$ .

$$W_i = Z_i \gamma + \theta D_i + \varepsilon_i \quad (2)$$

$$(u, \varepsilon) \sim \text{bivariate normal}[0, 0, 1, \sigma_\varepsilon, \rho].$$

where  $\theta$  is the average net effect (ANE) of access to rural non-farm sector employment.  $Z_i$  is a vector of determinants of  $W$ .

This is estimated by:

$$Z_i = Z_i(M_i, E_i, H_i, L_i, R) \quad (2)'$$

for Vietnam and

$$Z_i = Z_i(E_i, H_i, L_i, B_i, R) \quad (2)''$$

for India.

Using a formula for the joint density of bivariate normally distributed variables, the expected poverty for those with access to rural non-farm sector employment is written as:

$$\begin{aligned} E[W_i | D_i = 1] &= \beta'Z_i + \theta + E[\varepsilon_i | D_i = 1] \\ &= \beta'Z_i + \theta + \rho\sigma_\varepsilon \frac{\phi(\gamma'X_i)}{\Phi(\gamma'X_i)} \end{aligned} \quad (3)$$

where  $\phi$  is the standard normal density function. The ratio of  $\phi$  and  $\Phi$  is called the inverse Mills ratio.  $\rho\sigma_\varepsilon \equiv \beta_\lambda$

Expected poverty (or undernutrition or vulnerability) for non-participants is:

$$\begin{aligned} E[W_i|D_i = 0] &= \beta'Z_i + E[\varepsilon_i|D_i = 0] \\ &= \beta'Z_i - \rho\sigma_\varepsilon \frac{\phi(\gamma X_i)}{1 - \Phi(\gamma X_i)} \end{aligned} \quad (4)$$

The expected effect of poverty reduction (Average Treatment Effect or ATE) associated with RNFE is computed as (Greene, 2003, 787-789):

$$E[W_i|D_i = 1] - E[W_i|D_i = 0] = \theta + \boxed{\rho\sigma_\varepsilon} \frac{\phi(\gamma X_i)}{\Phi(\gamma X_i)[1 - \Phi(\gamma X_i)]} \quad (5)$$

# 5. Results

## Vietnam 2002: 1<sup>st</sup> Stage

		2002			
1 <sup>st</sup> Stage:	Dependent Variable	Participation in Non-farm sector employment			
		Coef.	Z value *1	Coef.	Z value
<b>Explanatory Variables *2</b>					
	Predicted Daily Male Wage Rate	0.205	(20.57)*	0.139	(15.78)**
	Predicted Daily Female Wage Rate	0.180	(13.74)*	0.076	(6.53)**
	Whether a head is male	-0.170	(-6.12)*	-0.128	(-4.05)**
	Whether completed primary school	0.051	(1.47)	0.004	(0.11)
	Whether completed lower secondary school	0.260	(7.32)**	0.181	(4.98)**
	Whether completed upper secondary school	0.259	(6.51)**	0.296	(7.25)**
	Whether completed technical school	0.347	(7.04)**	0.478	(9.30)**
	Whether completed higher school education	-0.009	(-0.15)	0.277	(4.35)**
	Size of household	0.033	(5.41)**	0.029	(4.56)**
	Share of female members	0.023	(0.47)	-0.066	(-1.32)
	Dependency Burden (share of household members under 15 or above 60)	0.171	(3.73)**	-0.079	(-1.66)†
	Size of land (hectare)	-24.483	(-22.71)**	-16.296	(-14.29)**
	Size of land squared	30.071	(16.90)**	42.264	(9.77)**
	Age of a household head	-0.120	(-23.71)**	-0.111	(-20.72)**
	Age squared	0.001	(25.47)**	0.001	(23.28)**
	Whether a household head is married	-0.122	(-3.81)**	-0.100	(-2.86)**
	Whether belonging to ethnic majorities	0.389	(10.53)**	0.383	(9.34)**
	Constant	0.049	(0.35)	0.355	(2.39)*
	$\hat{\beta}_\lambda$	-0.217	(-21.12)**	-0.207	(-57.62)**
	$\hat{\rho}$	-0.473	(-23.89)**	-0.795	(-95.06)**

# Vietnam 2002: 2<sup>nd</sup> Stage

2 <sup>nd</sup> Stage: Dependent Variable	log per capita consumption		Vulnerability	
	Coef.	Z value *1	Coef.	Z value
Whether a head is male	-0.035	(-3.75)**	0.064	(9.95)**
Whether completed primary school	0.120	(10.93)**	-0.085	(-12.99)**
Whether completed lower secondary school	0.222	(19.48)**	-0.225	(-33.20)**
Whether completed upper secondary school	0.397	(30.68)**	-0.338	(-43.49)**
Whether completed technical school	0.501	(31.54)**	-0.430	(-43.33)**
Whether completed higher school education	0.802	(46.73)**	-0.383	(-33.38)**
Size of household	-0.091	(-48.98)**	-0.003	(-2.63)*
Share of female members	-0.050	(-3.21)**	0.048	(4.78)**
Dependency Burden (share of household members under 15 or above 60)	-0.276	(-19.39)**	0.401	(44.52)**
Size of land (hectare)	6.474	(21.36)**	-0.767	(-3.64)**
Size of land squared	-8.582	(-12.87)**	1.611	(1.71)†
Age of a household head	0.026	(16.02)**	0.017	(17.53)**
Age squared	0.000	(-15.18)**	0.000	(-20.14)**
Whether a household head is married	0.123	(11.79)**	-0.011	(-1.57)
Whether belonging to ethnic majorities	0.188	(15.96)**	-0.463	(-64.07)**
$\hat{\theta}$	0.574	(33.94)**	0.208	(32.31)**
Constant	7.019	(153.30)	0.231	(8.29)
No. of Observations	25136		20205	
Wald Chi <sup>2</sup> (27)	20778**		1010**	
Variable	log per capita consumption		Vulnerability	
Treat With RNFE	8.015		0.115	
Control Without RNFE	7.823		0.265	
Average Treatment Effect (ATE) $(= \theta + \rho\sigma_{\varepsilon} \frac{\phi(\gamma X_i)}{\Phi(\gamma X_i)[1 - \Phi(\gamma X_i)]})$				
t statistics in brackets	+19.2%	(55.34)**	-14.9%	(-63.84)**

# Vietnam 2004: 1<sup>st</sup> Stage

		2004			
1 <sup>st</sup> Stage:	Dependent Variable	Participation in Non-farm sector employment			
		Coef.	Z value	Coef.	Z value
<b>Explanatory Variables *2</b>					
	Predicted Daily Male Wage Rate	0.017	(4.56)**	0.012	(4.78)**
	Predicted Daily Female Wage Rate	-0.006	(-1.56)	-0.004	(-1.57)
	Whether a head is male	-0.064	(-0.82)	-0.077	(-1.05)
	Whether completed primary school	-0.323	(-1.08)	-0.652	(-2.42)*
	Whether completed lower secondary school	-0.083	(-0.28)	-0.361	(-1.34)
	Whether completed upper secondary school	0.115	(0.38)	-0.140	(-0.51)
	Whether completed technical school	0.276	(0.91)	0.032	(0.12)
	Whether completed higher school education	0.330	(1.04)	0.035	(0.12)
	Size of household	0.031	(2.17)*	0.014	(1.08)
	Share of female members	-0.068	(-0.54)	-0.075	(-0.65)
	Dependency Burden (share of household members under 15 or above 60)	0.020	(0.22)	-0.052	(-0.61)
	Size of land (hectare)	-20.501	(-7.63)**	-13.885	(-6.18)**
	Size of land squared	56.908	(5.56)**	42.433	(4.90)**
	Age of a household head	-0.132	(-10.51)**	-0.098	(-8.44)**
	Age squared	0.001	(10.88)**	0.001	(9.26)**
	Whether a household head is married	-0.181	(-2.01)*	-0.032	(-0.38)
	Whether belonging to ethnic majorities	0.317	(3.55)**	0.807	(9.62)**
	Constant	2.161	(4.68)**	1.082	(2.55)
	$\hat{\beta}_\lambda$	0.041	(0.47)	-0.157	(-45.61)**
	$\hat{\rho}$	0.103	(0.47)	-0.865	(-106.47)**



# Vietnam 2004: 2<sup>nd</sup> Stage

2 <sup>nd</sup> Stage: Dependent Variable	log per capita consumption		Vulnerability	
	Coef.	Z value	Coef.	Z value
Whether a head is male	-0.044	(-1.85)†	0.022	(1.99)**
Whether completed primary school	0.112	(1.26)	-0.076	(-1.90)†
Whether completed lower secondary school	0.260	(2.97)**	-0.192	(-4.77)**
Whether completed upper secondary school	0.439	(4.97)**	-0.272	(-6.71)**
Whether completed technical school	0.580	(6.47)**	-0.327	(-8.03)**
Whether completed higher school education	0.803	(8.55)**	-0.308	(-7.28)**
Size of household	-0.086	(-20.23)**	0.000	(-0.12)
Share of female members	-0.075	(-2.02)*	0.039	(2.29)*
Dependency Burden (share of household members under 15 or above 60)	-0.121	(-4.49)**	0.071	(5.69)**
Size of land (hectare)	5.500	(5.17)**	-0.236	(-0.75)
Size of land squared	-15.160	(-4.27)**	1.675	(1.35)
Age of a household head	0.018	(2.59)**	-0.003	(-1.66)*
Age squared	0.000	(-2.26)*	0.000	(0.19)
Whether a household head is married	0.099	(3.52)**	-0.008	(-0.64)
Whether belonging to ethnic majorities	0.273	(9.68)**	-0.424	(-37.32)**
$\hat{\theta}$	0.060	(0.42)	0.196	(31.62)**
Constant	7.415	(32.41)	0.748	(12.43)
No. of Observations	4032		4030	
Wald Chi <sup>2</sup> (27)	2698**		7227**	
Variable	log per capita consumption		Vulnerability	
Treat With RNFE	8.040		0.088	
Control Without RNFE	7.912		0.162	
Average Treatment Effect (ATE)				
$( = \theta + \rho\sigma_{\varepsilon} \frac{\phi(\gamma X_i)}{\Phi(\gamma X_i)[1 - \Phi(\gamma X_i)]} )$				
t statistics in brackets	<b>+12.9%</b>	<b>(18.40)**</b>	<b>-7.3%</b>	<b>(16.42)**</b>

# Vietnam 2006: 1<sup>st</sup> Stage

		2006			
1 <sup>st</sup> Stage:	Dependent Variable	Participation in Non-farm sector employment			
		Coef.	Z value	Coef.	Z value
<b>Explanatory Variables *2</b>					
	Predicted Daily Male Wage Rate	0.007	(4.22)**	0.003	(3.49)**
	Predicted Daily Female Wage Rate	0.010	(3.94)**	0.006	(3.56)**
	Whether a head is male	0.190	(2.30)*	0.112	(1.45)
	Whether completed primary school	0.139	(0.44)	0.090	(0.29)
	Whether completed lower secondary school	0.290	(0.92)	0.284	(0.92)
	Whether completed upper secondary school	0.424	(1.34)	0.425	(1.36)
	Whether completed technical school	0.619	(1.94)†	0.595	(1.91)†
	Whether completed higher school education	0.740	(2.20)*	0.673	(2.08)*
	Size of household	0.049	(3.30)**	0.048	(3.52)**
	Share of female members	-0.099	(-0.79)	-0.114	(-0.99)
	Dependency Burden (share of household members under 15 or above 60)	0.171	(1.54)	-0.200	(-1.92)†
	Size of land (hectare)	-10.523	(-4.29)**	-7.270	(-3.34)**
	Size of land squared	21.561	(2.59)*	17.278	(2.50)*
	Age of a household head	-0.123	(-8.98)**	-0.097	(-7.59)**
	Age squared	0.001	(9.04)**	0.001	(7.97)**
	Whether a household head is married	-0.272	(-3.00)*	-0.178	(-2.09)*
	Whether belonging to ethnic majorities	0.187	(2.24)*	0.554	(7.38)**
	Constant	1.136	(2.25)	0.387	(0.81)
	$\hat{\beta}_\lambda$	-0.056	(-0.80)	-0.151	(-49.12)**
	$\hat{\rho}$	-0.142	(-0.81)	-0.879	(-122.40)**

# Vietnam 2006: 2<sup>nd</sup> Stage

2 <sup>nd</sup> Stage: Dependent Variable	log per capita consumption		Vulnerability	
	Coef.	Z value	Coef.	Z value
Whether a head is male	-0.005	(-0.22)	-0.001	(-0.11)
Whether completed primary school	0.175	(1.94)†	-0.144	(-3.70)**
Whether completed lower secondary school	0.270	(2.97)**	-0.257	(-6.61)**
Whether completed upper secondary school	0.442	(4.75)**	-0.309	(-7.87)**
Whether completed technical school	0.561	(5.85)**	-0.350	(-8.89)**
Whether completed higher school education	0.753	(7.27)**	-0.343	(-8.39)**
Size of household	-0.093	(-19.71)**	-0.007	(-4.00)**
Share of female members	-0.008	(-0.22)	0.002	(0.11)
Dependency Burden (share of household members under 15 or above 60)	-0.257	(-7.72)**	0.202	(14.29)**
Size of land (hectare)	7.029	(9.43)**	-0.306	(-1.09)
Size of land squared	-15.385	(-6.97)**	1.585	(1.77)†
Age of a household head	0.014	(2.12)*	0.011	(6.18)**
Age squared	0.000	(-1.93)†	0.000	(-6.55)**
Whether a household head is married	0.109	(3.78)**	0.010	(0.85)
Whether belonging to ethnic majorities	0.276	(11.49)**	-0.305	(-30.36)**
$\hat{\theta}$	0.226	(1.93)†	0.197	(35.30)**
Constant	6.982	(37.16)	0.304	(4.90)
No. of Observations	4091		4091	
Wald Chi <sup>2</sup> (27)	3050**		6039**	

Variable	log per capita consumption		Vulnerability	
Treat With RNFE	7.650			
Control Without RNFE	7.510			
Average Treatment Effect (ATE)				
$( = \theta + \rho\sigma_{\varepsilon} \frac{\phi(\gamma'X_i)}{\Phi(\gamma'X_i)[1 - \Phi(\gamma'X_i)] } )$				
t statistics in brackets	<b>+13.1%</b>	<b>(17.73)**</b>	<b>-5.9%</b>	<b>(-16.46)**</b>

**Table 2 Vietnam: Disaggregated**  
The Results of Averaged Treatment Effect (ATE) on the Effects of Rural Non-Farm  
Employment by Occupational Categories in Vietnam

Dependent Variable	2002				2004				2006			
	log per capita consumption		vulnerability		log per capita consumption		Vulnerability		log per capita consumption		vulnerability	
	ATE	t value *1	ATE	t value	ATE	t value	ATE	t value	ATE	t value	ATE	t value
<b>Aggregate Effect</b>	<b>+19.2%</b>	<b>(55.34)**</b>	<b>-14.9%</b>	<b>(-63.84)**</b>	<b>+12.9%</b>	<b>(18.40)**</b>	<b>-7.3%</b>	<b>(16.42)**</b>	<b>+13.1%</b>	<b>(17.73)**</b>	<b>-5.9%</b>	<b>(-16.46)**</b>
<i>Does RNFE Reduce Poverty (or Vulnerability) Significantly?*</i> <sup>3</sup>	YES		YES		YES		YES		YES		YES	
<b>Unskilled/ Manual</b>	<b>+5.1%</b>	<b>(12.78)**</b>	<b>+0.5%</b>	<b>(1.30)</b>	<b>+11.0%</b>	<b>(12.84)**</b>	<b>+5.2%</b>	<b>(7.35)**</b>	<b>+1.3%</b>	<b>(1.46)</b>	<b>+5.8%</b>	<b>(10.07)**</b>
<i>Does RNFE Reduce Poverty (or Vulnerability) Significantly?</i>	YES		NO		YES		NO		NO		NO	
<b>Production</b>	<b>+15.7%</b>	<b>(41.31)**</b>	<b>-15.6%</b>	<b>(-45.70)**</b>	<b>+3.2%</b>	<b>(3.91)**</b>	<b>-2.1%</b>	<b>(-3.20)**</b>	<b>+13.8%</b>	<b>(16.23)**</b>	<b>+1.2%</b>	<b>(8.15)**</b>
<i>Does RNFE Reduce Poverty (or Vulnerability) Significantly?</i>	YES		YES		YES		YES		YES		NO	
<b>Sales</b>	<b>+29.6%</b>	<b>(78.37)**</b>	<b>-26.7%</b>	<b>(-100.00)**</b>	<b>+21.0%</b>	<b>(24.80)**</b>	<b>-8.7%</b>	<b>(-13.60)**</b>	<b>+22.2%</b>	<b>(25.48)**</b>	<b>-6.0%</b>	<b>(-11.62)**</b>
<i>Does RNFE Reduce Poverty (or Vulnerability) Significantly?</i>	YES		YES		YES		YES		YES		YES	
<b>Professionals/ Clerk</b>	<b>+20.0%</b>	<b>(5.64)**</b>	<b>-24.9%</b>	<b>(-84.47)**</b>	<b>+15.4%</b>	<b>(17.02)**</b>	<b>-5.5%</b>	<b>(-7.88)**</b>	<b>+22.0%</b>	<b>(23.72)**</b>	<b>-7.3%</b>	<b>(-13.71)**</b>
<i>Does RNFE Reduce Poverty (or Vulnerability) Significantly?</i>	YES		YES		YES		YES		YES		YES	

# India 1993-4: 1<sup>st</sup> Stage

		1993-94 (NSS 50)			
1 <sup>st</sup> Stage:	Dependent Variable	Participation in Non-farm sector employment			
		Coef.	Z value* <sup>1</sup>	Coef.	Z value
<b>Explanatory Variables*<sup>2</sup></b>					
	Whether a household is headed by a female member	-	-	-	-
	Number of adult female members	0.030	(2.03)*	0.034	(2.31)*
	Number of adult male members	0.066	(4.92)**	0.059	(4.38)**
	Dependency Burden (share of household members under 15 or above 60)	-0.150	(-3.33)**	-0.186	(-4.05)**
	Age of household head	-1.237	(-2.93)**	-1.386	(-3.28)**
	Age squared	1.073	(2.29)*	1.262	(2.70)**
	The max. education of adult (Primary)	0.301	(8.94)**	0.305	(9.02)**
	The max. education of adult (Middle)	0.481	(12.10)**	0.481	(11.95)**
	The max. education of adult (>=Matriculates)	0.527	(9.12)**	0.528	(9.01)**
	Land (0.1<=2.5 ha) (default: the landless)	-0.033	(-0.66)	-0.040	(-0.80)
	Land (>2.5 ha) (default: the landless)	0.164	(1.99)*	0.242	(2.90)**
	Whether a household belongs to SC (Scheduled Caste)	-0.021	(-0.68)	-0.028	(-0.89)
	Whether a household belongs to ST (Scheduled Tribe)	-0.170	(-7.29)**	-0.176	(-7.46)**
	Predicted male wages (at NSS region)	0.012	(14.71)**	0.008	(9.40)**
	Aggregate Price (at NSS region)	-	-	-	-
	Constant <sup>3</sup>	-0.470	(-2.63)	-0.235	(-1.32)
	$\hat{\beta}_\lambda$	-0.196	(-14.38)**	0.012	(1.27)
	$\hat{\rho}$	-0.452	(-15.93)**	0.049	(1.27)

# India 1993-4: 2<sup>nd</sup> Stage

2 <sup>nd</sup> Stage:	Dependent Variable	log per capita MPCE		Vulnerability	
	Whether a household is headed by a female member	-	-	-	-
	Number of adult female members	-0.402	(-92.40)**	0.153	(64.48)**
	Number of adult male members	-0.339	(-86.29)**	0.152	(70.72)**
	Dependency Burden (share of household members under 15 or above 60)	2.343	(176.86)**	-1.543	(-213.27)**
	Age of household head	0.051	(0.41)	0.989	(14.38)**
	Age squared	-0.134	(-0.96)	-0.997	(-13.13)**
	The max. education of adult (Primary)	0.052	(4.78)**	-0.055	(-9.18)**
	The max. education of adult (Middle)	0.096	(7.05)**	-0.116	(-15.43)**
	The max. education of adult (>=Matriculates)	0.182	(9.35)**	-0.228	(-21.24)**
	Land (0.1<=2.5 ha) (default: the landless)	0.048	(3.38)**	-0.078	(-10.11)**
	Land (>2.5 ha) (default: the landless)	0.040	(1.47)	-0.093	(-6.18)**
	Whether a household belongs to SC (Scheduled Caste)	-0.140	(-15.01)**	0.090	(17.79)**
	Whether a household belongs to ST (Scheduled Tribe)	-0.070	(-10.17)**	0.057	(15.20)**
	$\hat{\theta}$	0.456	(18.65)**	-0.059	(-3.61)**
	Constant	7.927	(143.21)	1.180	(38.56)

No. of Observations

21883

21883

Wald Chi<sup>2</sup>(37) [Wald Chi<sup>2</sup>(95) for NSS61]

52256\*\*

62554\*\*

Variable	Log MPCE		Vulnerability	
<b>Treat With RNFE</b>	<b>8.693</b>		<b>0.6036</b>	
<b>Control Without RNFE</b>	<b>8.591</b>		<b>0.6415</b>	
<b>ATE</b> ( $= \theta + \rho\sigma_{\varepsilon} \frac{\phi(\gamma X_i)}{\Phi(\gamma X_i)[1 - \Phi(\gamma X_i)]}$ ); t value in brackets.	<b>+10.2%</b>	<b>(15.99)**</b>	<b>-3.79%</b>	<b>(-9.94)**</b>

# India 2004-5: 1<sup>st</sup> Stage

2004-2005 (NSS 61)

1<sup>st</sup> Stage:

Dependent Variable

Participation in Non-farm sector employment

Coef. Z value Coef. Z value

Explanatory Variables\*2

Whether a household is headed by a female member	-0.039	(-1.18)	-0.064	(-2.02)*
Number of adult female members	0.002	(0.12)	-0.034	(-2.12)*
Number of adult male members	0.046	(2.88)**	0.012	(0.77)
Dependency Burden (share of household members under 15 or above 60)	-0.099	(-2.23)**	0.143	(3.39)**
Age of household head	-2.658	(-5.74)**	-2.308	(-5.24)**
Age squared	2.237	(4.58)**	2.072	(4.48)**
The max. education of adult (Primary)	0.195	(7.73)**	0.232	(9.48)**
The max. education of adult (Middle)	0.389	(14.89)**	0.429	(17.01)**
The max. education of adult (>=Matriculates)	0.541	(13.02)**	0.561	(14.27)**
Land (0.1<=2.5 ha) (default: the landless)	-0.091	(-4.31)**	-0.053	(-2.60)**
Land (>2.5 ha) (default: the landless)	0.147	(1.31)	0.171	(1.68)†
Whether a household belongs to SC (Scheduled Caste)	-0.119	(-3.82)**	-0.153	(-5.02)**
Whether a household belongs to ST (Scheduled Tribe)	-0.166	(-7.51)**	-0.195	(-9.14)**
Predicted male wages (at NSS region)	-	-	-	-
Aggregate Price (at NSS region)	0.026	(1.19)	0.013	(1.17)
Constant	0.848	(2.70)	0.730	(3.87)
$\hat{\beta}_\lambda$	-0.061	(-1.42)	-0.212	(-49.99)**
$\hat{\rho}$	-0.163	(-1.44)	-0.800	(-85.56)**

# India 2004-5: 2<sup>nd</sup> Stage

2 <sup>nd</sup> Stage:	Dependent Variable	log per capita MPCE		Vulnerability	
	Whether a household is headed by a female member	-0.036	(-3.90)**	0.051	(7.69)**
	Number of adult female members	-0.149	(-32.14)**	0.101	(30.57)**
	Number of adult male members	-0.093	(-20.08)**	0.094	(29.32)**
	Dependency Burden (share of household members under 15 or above 60)	0.662	(52.52)**	-0.527	(-59.97)**
	Age of household head	0.596	(4.09)**	0.084	(0.90)
	Age squared	-0.291	(-1.97)*	-0.331	(-3.40)**
	The max. education of adult (Primary)	0.048	(5.71)**	-0.143	(-28.39)**
	The max. education of adult (Middle)	0.121	(10.02)**	-0.269	(-50.48)**
	The max. education of adult (>=Matriculates)	0.259	(14.48)**	-0.342	(-40.25)**
	Land (0.1<=2.5 ha) (default: the landless)	0.026	(4.10)**	-0.047	(-11.21)**
	Land (>2.5 ha) (default: the landless)	0.093	(2.98)**	-0.188	(-8.51)**
	Whether a household belongs to SC (Scheduled Caste)	-0.147	(-16.15)**	0.222	(36.19)**
	Whether a household belongs to ST (Scheduled Tribe)	-0.067	(-9.07)**	0.121	(27.63)**
	$\hat{\theta}$	0.205	(2.90)**	0.284	(37.95)**
	Constant	9.330	(123.29)	-0.024	(-0.87)

No. of Observations

Wald Chi<sup>2</sup>(37) [Wald Chi<sup>2</sup>(95) for NSS61]

Variable	Log MPCE		Vulnerability	
<b>Treat With RNFE</b>	<b>9.5887</b>		<b>0.1705</b>	
<b>Control Without RNFE</b>	<b>9.4848</b>		<b>0.2412</b>	
<b>ATE</b> ( $= \theta + \rho\sigma_{\varepsilon} \frac{\phi(\gamma X_i)}{\Phi(\gamma X_i)[1 - \Phi(\gamma X_i)]}$ ); t value in brackets.	<b>+10.4%</b>	<b>(38.47)**</b>	<b>-7.08%</b>	<b>(-24.50)**</b>



# India: Disaggregated

**Table 4**

The Results of Averaged Treatment Effect (ATE) on the Effects of Rural Non-Farm Employment by Occupational Categories in India

Dependent Variable	1993-94 (NSS 50)				2004-2005 (NSS 61)			
	log per capita consumption		vulnerability		log per capita consumption		Vulnerability	
	ATE	t value *1	ATE	t value	ATE	t value	ATE	t value
Explanatory Variables *2								
<b>Aggregate Effect</b>	<b>+10.2%</b>	<b>(15.99)**</b>	<b>-3.8%</b>	<b>(-9.94)**</b>	<b>+10.4%</b>	<b>(38.47)**</b>	<b>-7.1%</b>	<b>(-24.50)**</b>
<i>Does RNFE Reduce Poverty (or Vulnerability) Significantly?*</i> <sup>3</sup>	<b>YES</b>		<b>YES</b>		<b>YES</b>		<b>YES</b>	
<b>Unskilled/ Manual</b>	<b>+6.0%</b>	<b>(9.06)**</b>	<b>-4.0%</b>	<b>(-10.08)**</b>	<b>+8.4%</b>	<b>(30.06)**</b>	<b>-7.6%</b>	<b>(-24.05)**</b>
<i>Does RNFE Reduce Poverty (or Vulnerability) Significantly?</i>	<b>YES</b>		<b>YES</b>		<b>YES</b>		<b>YES</b>	
<b>Production</b>	<b>+14.3%</b>	<b>(20.54)**</b>	<b>-2.8%</b>	<b>(-6.69)**</b>	<b>+15.3%</b>	<b>(47.38)**</b>	<b>-9.5%</b>	<b>(-26.49)**</b>
<i>Does RNFE Reduce Poverty (or Vulnerability) Significantly?</i>	<b>YES</b>		<b>YES</b>		<b>YES</b>		<b>YES</b>	
<b>Sales</b>	<b>+14.7%</b>	<b>(20.37)**</b>	<b>-2.6%</b>	<b>(-6.04)**</b>	<b>+13.3%</b>	<b>(42.55)**</b>	<b>-9.7%</b>	<b>(28.95)**</b>
<i>Does RNFE Reduce Poverty (or Vulnerability) Significantly?</i>	<b>YES</b>		<b>YES</b>		<b>YES</b>		<b>YES</b>	
<b>Professionals/ Clerk</b>	<b>+24.1%</b>	<b>(33.98)**</b>	<b>-4.6%</b>	<b>(-10.74)**</b>	<b>+24.1%</b>	<b>(72.89)**</b>	<b>-15.2%</b>	<b>(45.99)**</b>
<i>Does RNFE Reduce Poverty (or Vulnerability) Significantly?</i>	<b>YES</b>		<b>YES</b>		<b>YES</b>		<b>YES</b>	

## 6. Conclusion

1. Participation in non-farm sector employment significantly increased per capita consumption or expenditure and reduced vulnerability in 2002, 2004, and 2006 for rural Vietnam and in 1993-1994 and 2004-2005 for rural India.

2. Disaggregation of non-farm sector employment by occupational categories shows that access to more skilled employment is likely to have larger poverty and vulnerability reducing effects than unskilled or manual employment.

a) **Non-farm employment in “Sales” and “Professionals/ Clerk” categories has stronger effects in reducing poverty and vulnerability** in both Vietnam and India.

- b) “Unskilled/ Manual” employment significantly reduces poverty and vulnerability in India over the years and access of the rural poor to unskilled or manual employment is likely to be important in India given that the poor do not have easy access to skilled employment in non-farm sector.
- c) The poverty reducing effect of unskilled/ manual non-farm employment is observed in 2002 and 2004, but not in 2006 in Vietnam but with greater household vulnerability in 2004 and 2006.
- d) Non-farm employment associated with “Production” significantly reduced poverty and vulnerability over time in both India and Vietnam, except in 2006 when vulnerability rose in Vietnam.

e) We generally observe **more consistent poverty and vulnerability reducing effects of relatively unskilled/ physical demanding jobs in non-farm sector for India than for Vietnam.**

**3. Policy interventions designed to help agricultural households diversify into non-farm sector activities (e.g. skill training; microfinance) would potentially reduce not only poverty but also vulnerability.**

4. That Vietnam has adapted rapidly to a market-oriented policy regime may in fact be key to why similarities in the impact of rural non-farm employment are so much more striking in these two countries.

# Thank You!

## Q&A