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Does the Employment Guarantee Scheme Stabilise Household Incomes in Rural India?

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Abstract

Our analysis, based on the ICRISAT panel survey of villages in the semi-arid region of south India, confirms the income stabilising effect of the Employment Guarantee Scheme in India. Variability of household income is measured by an unconditional variance of residuals of an income equation. A (variant) of Heckman's sample selection model is employed to allow for the endogeneity of EGS participation and to assess its income stabilising role. The (instrumented) EGS participation reduces the residual variance of household income, implying consequent income stabilisation.

(85 words)

Key Words: Employment Guarantee, Shocks, Poverty, Vulnerability, Credit, Insurance

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Does the Employment Guarantee Scheme Stabilise Household Incomes in Rural India?[1]

1. Introduction

From a modest beginning in 1979, the Employment Guarantee Scheme (EGS) expanded rapidly into the most important poverty alleviation programme in Maharashtra. Following the National Rural Employment Guarantee Act of 2005, the employment guarantee scheme was extended to the poorest 200 districts in India.

In principle, the EGS (as a special case of rural public works) confers transfer and stabilization benefits. The transfer benefits can be direct- the gross earnings of participants less any cost they incur in participating- or indirect-including the share of the poor in the extra income generated by the scheme's output, and any other second round effects from other income sources (e.g., higher agricultural wage rates). The stabilization benefits arise mainly from the scheme's effect on the risk faced by the poor of a decrease in consumption. Since large segments of the rural population barely survive during slack periods, a reduction in the risk of consumption falling below a subsistence level matters a great deal. The reduction of this risk, in turn, may be the crucial welfare gain of the scheme, as a form of insurance that effectively increases *ex ante* contingent wealth and reduces *ex post* income volatility of workers.

The scheme guarantees that every adult who wants a job in rural areas will be given one, preferably within a radius of 8 kms. from her place of residence, provided that the person is willing to do unskilled manual work on a piece-rate basis. Self-selection of the poor is built

[1] Raghav Gaiha acknowledges the support given by Harvard's Centre for Population and Development Studies.

into the EGS. No choice of work is offered. Until 1988, the wage rate was usually below the agricultural wage rate. Most of EGS activity is concentrated in agricultural slack periods.

Although there a substantial literature on the transfer benefits of the EGS, the few studies of its income stabilising role are confined to income variability *before* and *after* or *with* and *without* the EGS .[2] The present analysis is designed to yield a more rigorous assessment of the latter.

The assessment of the stabilization effect may be relevant to the evaluation of the EGS, as its value and impact on workers' behaviour do not depend so much on income supplementation as on the enlargement of opportunities that it provides in the uncertain environment of the local labour market encompassing both farm and non- farm activities. Thus, rather than actual increase in income and employment, the EGS promises potential increases of these variables for given levels of volatility in the regular labour market, or, alternatively, potential decreases in volatility for given levels of income and employment. As in most insurance schemes, these effects, in turn, may change workers' behaviour in a way that may not be fully consistent with "ex ante" conditions. For example, the extent to which workers diversify their portfolio of activities may be reduced and a larger proportion of workers may participate in the regular labour market, rather than in self-employment in farm or non- farm activities, since the EGS provides a form of employment of last resort, at a fixed wage, that can be readily used to cover unemployment and wage risks.

[2] See Gaiha (2007), Gaiha (2000), and Gaiha and Imai (2006) for reviews of the EGS, and Datt and Ravallion (1994) for an important contribution. Note that Walker and Ryan (1990) assess the income stabilising role of the EGS in terms of differences in the coefficient of variation of household incomes *with* and *without* the EGS.

After describing the data briefly in the next section, we give a brief exposition of the methodology used in Section 3. This is followed by a discussion of the results obtained on determination of household income in Section 4. The next section first outlines a multi-stage estimation procedure for assessing the income stabilising effect of the EGS, followed by some comments on the results obtained. In Section 6, concluding observations are made.

2. Data

The ICRISAT data are based on panel surveys carried out at regular intervals from 1975 to 1984 covering production, expenditure, time allocation, prices, wages, and socio-economic characteristics for 240 households in 6 villages representing 3 agro-climatic zones in the semi-arid region in South India. We use a subset for two villages, Shirapur and Kanzara in Maharashtra, for which the EGS data are available. Details of the data are given in Walker and Ryan (1990).

3. Determinants of Household Income

We first estimate a household income equation, using panel data estimation techniques. The standard deviation of the residuals of this equation for each *crop* year is designed to capture variability of household income due to various shocks[3]. For example, if a household faces an unexpected income shortfall due to the illness of a household member during a crop year, the standard deviation of the residuals of income equations will be larger.[4]

[3] This is an extension of the methodology to construct a measure of profit risk, proposed by Ghosal and Loungani (2000). The unconditional uncertainty measure, based on GARCH (1, 1) applied to monthly income of each household, gives similar results. Details will be furnished on request.

[4] The coefficient of correlation between household income variability and illness measures (i.e, total number of monthly dummy variables (summed over an entire crop year) as to whether a particular member of the household is ill for at least one day) is 0.30.

Real monthly household income is determined as follows.

$$Y_{it} = \alpha + D_t\beta_0 + A_{it}\beta_1 + \beta_2 I + \gamma_i + e_{it} \qquad (1)$$

where i and t denote household and crop year/ month (t=1, July 1979, ---, t=72, June 1984); Y_{it} is household monthly income; α is a constant term, D_t denotes a vector of 5 year-dummies and 11 monthly-dummies; A_{it} refers to a vector of socio-demographic characteristics of a household; I is a village dummy designed to capture village- specific differences (e.g. infrastructure); γ_i denotes unobserved household individual fixed or random effects (viz. ability); and e_{it} is an error term.

4. Results

The results for equation (1) are given in Table 1. Both fixed and random- effects specifications are considered. Most of the results are consistent with a priori expectations and plausible.

Household head's age has a positive effect on income but it is significant only in the fixed-effects specification. Its square has a negative coefficient but it is weakly significant in the random effects case. So the non-linearity between household income and household head's age is weak, if any. Household size has a significant positive effect in both specifications. By contrast, dependency burden-defined as the share of children and elderly not working among household members- has a significant effect in both cases. As expected, household income is positively related to land owned. Controlling for these effects, there is a weak caste effect (only for mid-high castes in the random- effects case). As the Hausman test favours the fixed-effects specification, we use it for the following analysis.

Table 1

Determinants of Monthly Household Income

Estimation Method	Fixed-effects Model	Random-effects Model
Explanatory Variables	Coef. (*t*-ratio)	Coef. (z-ratio)
A_{it}		
Household head Age	615.04 (6.61)**	44.51 (1.30)
(Household head Age)^2	-0.19 (-0.37)	-0.40 (-1.17)
Household Size	129.55 (3.87) **	125.53 (6.87)**
Dependency Burden	-403.73 (-3.26)**	-300.41 (-2.57)*
Owned Land (ha.)	73.13 (3.16) **	60.92 (5.00)**
Whether high caste	-	-25.30 (-0.31)
Whether mid-high caste	-	261.81 (1.51)
Whether mid-low caste	-	75.76 (0.41)
I: A Village dummy:		
Whether Shirapur or not	-	-318.05 (-2.24)*
Constant	-31331.97 (-7.50)	-1565.64 (-1.91)
Number of Observations	5183	5183
Joint Significance	F (21, 5090) =32.63**	Wald Chi^2(25) =710.73**
Hausman Test	Chi ^{2} (20)= 61.12**	

Notes: [1)] Number in parentheses is *t* or *z* ratio. **= significant at 1% level. *= significant at 5% level. †= significant at 10% level. [2)] Results for year and monthly dummies are not shown. [3)] Time invariant variables are not used in fixed-effects model as the estimation involves first-differencing.

5. Income Stabilising Role of the EGS

Since a risk averse person can be expected to be more likely to participate in the EGS, the endogeneity of EGS participation must be taken into account before assessing its income stabilising role. First, the Heckman sample selection model (Heckman, 1979) is applied to estimate duration of participation in the EGS (i.e. number of days). Specifically, in the first stage, a probit model is applied to identify the determinants of EGS participation and, in the second, conditional on participation, 'days-of-work' is determined by household and village characteristics. In the third stage, the predicted value of 'days-of-work' is used to assess its effect on residual variance of monthly income, controlling for other effects.

First Stage

$$P_{EGSit} = 1 \text{ if } P^*_{it} > 0$$

$$= 0 \text{ otherwise}$$

$$P^{*}_{it} = f(H_{it}, \left(\frac{W_{EGS}}{W_{AGR}}\right), A_{it}, V_{it}, R_{i}, I, \varepsilon_{it}) \quad (2)$$

Explanatory variables include: the ratio of EGS wage to agricultural wage; H: a health indicator viz. BMI index, A_{it} : a vector of socio-demographic and household characteristics (viz. age, gender, caste, schooling and occupation of household head), V_{it} : a measure of wealth (land owned), R_{t} : a measure of aggregate risk faced by households (viz. coefficient of variation of monthly rainfall); I: a village dummy and; ε (lack of aversion for manual work, proxied by cumulative days work in the EGS in previous periods- an instrument).

Second Stage:

Secondly, duration of participation in the EGS is determined by the following relation:

$$L_{EGSit} = f(H_{it}, A_{it}, V_{it}, I) \quad (3)$$

$$= X_{it}\beta + v_{it}$$

Third Stage:

Finally, an assessment of the income stabilising role of the EGS is based on relation (4),

$$U_{it} = f(\hat{L}_{EGS\,it}, H_{it}, A_{it}, V_{it}, I) \quad (4)$$

where U_{it} is the standard deviation of residuals of monthly household income obtained from the fixed-effects version of equation (1).

Table 2 reports the results. Since the measure of household income variability is at the household level and most of the explanatory variables are at the individual level, we cluster the estimation at the household level in such a way that variables within a household are dependent and those across households are independent.

The main findings are as follows. The higher the ratio of EGS wage to agricultural wage, the greater is the probability of participation in the EGS. Somewhat surprising is the result that the coefficient of variation of monthly rainfall does not have a significant effect on participation. As expected, participation and land owned are inversely related, implying that the landless or small holders are more likely to participate in this scheme. Also, agricultural workers are more likely to participate. The coefficient of ε, a measure of lack of aversion for manual work, and an instrument for the first stage equation, is positive and significant. In the second stage, somewhat surprisingly, 'days of work' is higher among high caste participants. As expected, duration of participation and land owned are inversely related.

The risk-reducing effect of the scheme is confirmed by the negative and significant coefficient days of EGS participation. That is, the longer the duration of participation in the EGS, the lower is the residual income variance. Or, in other words, the longer the EGS participation**,** the greater is the income stabilising effect of the EGS,

Table 2 Income Stabilising Effect of the EGS

	First Stage			Second Stage			Third Stage		
Model	Probit			OLS			OLS		
Dependent Variable	**Whether participates in the EGS**			**Days-of- Work**			**Risk**		
	Coef.	**(Z ratio)**		**Coef.**	**(Z ratio)**		**Coef.**	**(t ratio)**	
Predicted Days-of- Work in the $\hat{L}_{EGSit}$							**-20.6378**	**(-2.16)**	*
W_{EGS}/W_{AGR}	**0.0301**	**(3.85)**	**	-	-		-	-	
H_{it}									
BMI	2.5697	(1.14)		-155.8958	(-0.71)		**1442.7860**	**(2.27)**	*
BMI^2	-0.7090	(-1.14)		51.8000	(0.87)		-	-	
A_{it}									
Household head Age	0.0413	(1.25)		-1.0237	(-0.37)		**-84.0059**	**(-3.71)**	**
$(\text{Household head Age})^2$	-0.0006	(-1.47)		0.0204	(0.57)		**1.0766**	**(3.33)**	**
Whether high caste	-0.0823	(-0.38)		**26.9367**	**(1.86)**	†	**829.2837**	**(3.65)**	*
Whether medium high caste	0.1981	(0.93)		-1.1843	(-0.08)		-179.2349	(-0.65)	

Whether medium low caste	0.2877	(0.96)		1.7173	(0.14)		134.6455	(0.64)	
Household head's schooling years	0.0674	(1.23)		3.0134	(0.65)		97.1979	(1.54)	
(Household head's schooling years) ^{2}	**-0.0088**	**(-1.98)**	*	-0.0769	(-0.14)		**-7.5799**	**(-1.87)**	†
Whether household head is agricultural labourer	**0.4537**	**(2.67)**	**	14.7855	(1.38)		-153.0818	(-1.20)	
Whether household head is female	0.3641	(1.22)		-1.1637	(-0.05)		**-311.2115**	**(-2.42)**	*
V_{it}									
Land (land owned: acre)	**-0.0205**	**(-1.97)**	†	**-1.2916**	**(-2.69)**	**	-14.1962	(-1.01)	
R_t									
Coefficient of Variation of Monthly Rainfall	-0.0019	(-0.51)		-	-		-	-	
I									
Whether from Shirapur	0.2893	(1.64)		-2.8633	(-0.22)		-66.1069	(-0.27)	
$L_{EGS\ it}$									
Accumulated days of EGS participation in the past (days)	**0.0040**	**(4.87)**	**	-	-		-		
β_λ [3)]	-	-		-10.1624	(-1.30)		-	-	
Constant	-4.3952	(-2.06)		165.9340	(1.01)		738.8055	(1.66)	
Number of Observations	1059 [2)]			179			179		
Joint Significance Tests									
LR Chi^2 (16)	264.61**			-			-		
Wald Chi^2 (26)	-			91.49**			-		
F(13, 45)	-			-			8.80**		
Pseudo R^2	0.2750			-			-		
R^2	-			-			0.4438		

Notes: [1)] **= significant at 1% level. *= significant at 5% level. † = significant at 10% level.

[2)] It consists of 880 censored observations for non-participants and 179 uncensored observations for participants.

[3)] Maximum likelihood estimation for Heckman Model is applied only for the first and the second stages. β_λ is the coefficient estimate of the inverse mills ratio which shows the extent to which sample selection bias exists. This is significant only at the 20% level. So the use of the Heckman procedure is not unjustified.

6. Conclusion

Our analysis confirms the income stabilising role of the EGS and suggests that a major motivation for participation may be the expected reduction of uncertainty associated with what amounts to a form of social insurance. Thus, a substantial increase in contingent wealth may be associated with the Employment Guarantee Scheme in situations where shocks, to which large segments of the rural population are frequently exposed, result in not just short-term welfare losses but also in longer-term impoverishment. As credit and insurance markets remain patchy and incomplete, the case for a more comprehensive coverage of the National Rural Employment Guarantee Scheme is indeed a strong one.

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