ESTIMATING THE WAGE ELASTICITY OF OFF-FARM LABOUR SUPPLY OF FARMERS IN KEMUBU, KELANTAN

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ABSTRACT

Off-farm labour supply is very important in the transformation of agricultural economies to industrial economies. Two econometric models were used to estimate the wage elasticity of off-farm labour supply in Kemubu, Kelantan, Malaysia. A wage elasticity of approximately 2.0 was obtained from both models. The study revealed that severe poverty exist in single-cropped areas outside Kemubu. Farm households are more pressed for time with off-farm employment in double-cropped areas inside Kemubu. The twin-strategies of intensifying paddy cultivation and creating off-farm employment opportunities can be carried out concurrently. To induce farmers to seek off-farm employment to augment farm incomes, off-farm employment opportunities should be created close to farm households and development policies should aim at improving the level of educational and vocational skills of farmers.

Introduction

Off-farm employment has received considerable attention in economic development studies of the developed and developing countries (Oshima, 1971 and 1978; Ho, 1978 and 1979; Kada, 1980 and 1982; Sumner, 1982; Robinson et al., 1982 and Shand, 1983). Its role in augmenting farm incomes and providing employment, given the limited labour absorption capacities of the agricultural sectors in developing countries, is very important in transforming from monsoon agricultural economies to industrial economies (Oshima, 1983).

The rural/paddy sector of Malaysia which is basically a monsoon agricultural economy, is characterised by low productivity, low incomes, small farm size and surplus labour. An important means for the farmers to relieve the poverty in this sector is to undertake off-farm employment. Studies have shown that the proportion of paddy households'

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incomes from off-farm sources was substantial. For example, Taylor (1981) reported that 89 per cent of the paddy households in Malaysia had non-paddy sources of income mainly from off-farm employment.

High incidence of off-farm labour supply have considerable implications on rural development, rural employment and rural income. The characteristics of off-farm labour supply have many policy implications. In this study, an attempt is made to estimate the wage elasticity of off-farm labour supply of paddy farmers in the Kemubu irrigation area in Kelantan, Malaysia.

Background and Data

Kelantan is a relatively underdeveloped state in the northeast Malaysia. A large project, called the Kemubu project, was implemented in 1972 to provide irrigation for approximately 19,000 hectares of paddy land cultivated by an estimated 23,000 families.

In 1980, a survey of 500 households inside Kemubu[1], and more than 200 outside Kemubu[1] was undertaken as part of the World Bank's appraisal of the project (Shand et al., 1982). In the subsequent year, another survey of the same sample was conducted to examine in greater depth issues emerging from the first study (Shand and Ariff, 1983).

The prevalence of off-farm job-holding by Kemubu household members (60%) and the sizeable contribution of off-farm income (approximately 70%) to the average household income were shown in both surveys (Shand, et al., 1983).

The wage elasticity of off-farm labour supply of Kemubu farmers in this paper is estimated using data from these surveys.

Models

A single equation and a simultaneous equations model were specified to estimate the wage elasticity of off-farm labour supply. Alternative models were used to examine whether or not there exist differences in wage-elasticity resulting from different specification details.

Single Equation Model

In the single equation model, only off-farm labour of the household head was specified. The log-linear equation was estimated as follows:

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[1] Inside Kemubu refers to those paddy areas which are irrigated and double-cropped while outside Kemubu refers to those nonirrigated and single-cropped paddy areas.

(1)   LOFFTH = f(LWAGE, LINOWFA, LINOTFA, LINOFOM,
                    LFAMZ, LTFZ, TD, ID, KD)

> where:
>
> LOFFTH is log of number of weeks per year worked off-farm by household
>   head;
>
> LWAGE is log of imputed wage (of off-farm labour) per week;
>
> LINOWFA is log of income per acre from own farm derived from sale
>   of paddy and other agricultural products;
>
> LINOTFA is log of income of household derived by household head and/
>   or other family members from working on others' farm;
>
> LINOFOM is log of income derived from off-farm sources by other family
>   members plus miscellaneous welfare remunerations;
>
> LFAMZ is log of total number of working members in the family;
>
> LTFZ is log of total farm size in acres operated per year;
>
> TD is tenancy dummy where "no land = 1" and "own land = 0";
>
> ID is irrigation dummy where "with irrigation and double cropping = 1"
>   and "without irrigation and single cropping = 0";
>
> KD is state dummy where "outside Kelantan = 1" and "inside Kelantan
>   = 0".

The LWAGE variable, as usual, poses problem due to unavilability of data on observed wage rate. The wage rate was computed by dividing total off-farm income by the number of working weeks. If this computed wage is used directly in (1) above, the usual endogeneity problem arises. To overcome this problem, an auxiliary wage function based on human capital theory was estimated, where wage is regressed against education, age and age-squared (assuming the quadratic form). Such a "first stage" derived wage variable was used as LWAGE.

Education was found to be the only significant variable in the auxiliary wage function (Chew and Shand, 1983). This is consistent with the findings by Rozenweig and Morgan (1976) that the use of age, rather than computed experience, has little consequence in terms of explanatory power. The other variables, LINOWFA, LINOTFA, LFAMZ, and LTFZ in equation (1) represent other possible income streams affecting the opportunity costs of the household head working off-farm.

Simultaneous Equations Model

A simultaneous equations model was specified on the argument that simultaneity effects exist between decisions made by the household head and other family members as well as between farm and off-farm work. Therefore, a theoretically correct and consistent framework would be one which jointly determines the labour allocation of household members (including household head) amongst farm and off-farm work.

The simultaneous model has four linear equations as follows:

(2–1)   OFLSOP = f(FLDOP, IWAGEO, IWAGEWA, NHLINC,
          AGEO, AGEWA, CHILD, FAMSZ);

(2–2)   OFLSWA=f(FLDWA, IWAGEO, IWAGEWA, NHLINC,
          AGEO, AGEWA, CHILD, FAMSZ);

(2–3)   FLDOP = f(FLDWA, IWAGEO, IWAGEWA, NHLINC,
          FARMS, HRLB, AGEO, FTR, FTENST);

(2–4)   FLDWA = f(FLDOP, IWAGEO, IWAGEWA, NHLINC,
          FARMS, HRLB, AGEWA, FTENST)

where:

OFLSOP is hours of off-farm labour worked by household head;

OFLSWA is hours of off-farm labour worked by other working adults in the household;

FLDOP is hours of household head's labour employed on the farm;

FLDWA is hours of other household working adults' labour employed on the farm;

IWAGEO is off-farm wage rate of household head per hour imputed by an auxiliary wage function;

IWAGEWA is off-farm wage rate of other household working adults per hour imputed by another auxiliary wage function;

NHLINC is non-labour household income;

AGEO is age of household head in years;

AGEWA is average age of other household working adults in years;

CHILD is number of dependent children;

FAMSZ is number of working adults in the household;

FARMS is farm area operated in acres;

HRLB is hours of hired labour employed on farm;

FTR is a dummy variable where "household head received agricultural training = 1", "otherwise = 0";

FTENST is farm tenancy in % of operational area owned;

The endogenous variables are FLDOP and FLDWA. The three-stage least square procedure was used to estimate the model (Tai, 1983).

The simultaneous equations model differs from the single equation model in two major aspects. Other than the simultaneity treatment, the "age" variable appears in the off-farm supply function in the simultaneous equations model whereas it was included in the separate auxiliary wage function in the single equation model. This difference reflects the different perceptions as to whether age is more closely correlated with duration rather than wage rate, of off-farm employment or vice versa. Besides these differences, the two models are basically similar with regard the exogenous variables which were used to capture the different influences on the opportunity costs of off-farm employment.

The simultaneous equations model was estimated separately for inside Kemubu and outside Kemubu. Given that the two groups of farmers display different characteristics, this separation represents a distinct improvement over the single equation model where both groups of farmers were com-

bined into a single group.

The Results and Discussions

The estimated results of both the single equation and simultaneous equations (for inside and outside Kemubu) models were presented in Tables 1 and 2 respectively. Only the household head's off-farm labour supply equations were presented in Table 2 since the central concern in this paper is the wage elasticity of off-farm labour supply of the household heads.

The estimate coefficient for LWAGE from Table 1 was positive indicating that increase in the wage rate will induce increase supply of labour by household heads off-farm. The mean level wage elasticity was estimated to be 2.2, which is high compared to 1.1 in a developed country (Sumner, 1982). Given institutional rigidities and poorer information flows in developing countries, a lower wage elasticity would be expected. The high wage elasticity obtained could well be due to:

1. Underemployment exists on paddy farms in Kemubu such that the household head is indeed much more responsive and flexible in his response to off-farm opportunities; nevertheless underemployment is not that severe as to cause the household head to "grab" any off-farm job as that would imply a very low wage elasticity; and/or

TABLE 1   SINGLE EQUATION MODEL ESTIMATES OF OFF-FARM LABOUR SUPPLY FUNCTION OF HOUSEHOLD HEADS IN KEMUBU, 1982

Explanatory variables	Coefficients
Intercept	−6.01
LWAGE	2.23
	(0.68)
LINOWFA	0.01
	(0.007)
LINOTFA	−0.02
	(0.01)
LINOFOM	0.004
	(0.007)
LFAMZ	−0.18
	(0.14)
LTFZ	−0.14
	(0.06)
TD	−0.02
	(0.10)
ID	0.07
	(0.09)
KD	−0.59
	(0.11)

Note: Standard errors of coefficients are shown in parentheses.
Source: Chew and Shand, 1983.

2. It is also possible that given the *ad hoc* seasonal nature of off-farm employment in Kemubu, there is great variation in duration of labour employed off-farm, resulting in the statistical illusion of high wage elasticity. Thus the high wage elasticity may not necessarily imply greater responsiveness to wage singnals compared to the responsiveness obtained in developed country conditions.

The estimated wage elasticity appeared realistic when compared to the estimated by Charlamwong (1983) of 1.9 and 4.8 for North and Northeast Thailand respectively. However, it was eleven times larger when compared to Bardhan's (1979) estimate of 0.2 for ordinary farm labour in India but such direct comparison may be misleading since we are dealing with off-farm labour supply, where the household head is probably always seeking off-farm opportunities to supplement his household income.

The results of the simultaneous equations model in Table 2 showed the existence of a very strong influence of wage rate on off-farm labour supply of household heads inside Kemubu (with an elasticity of 2.0), while a weak influence was obtained for household heads outside Kemubu. This might imply that, perhaps, farmers outside Kemubu were so poor that they would "snatch" any off-farm job opportunity irrespective of its wage, assuming of course that the off-farm wage rate is higher than the opportunity cost of on-farm employment. This severe poverty thesis would be consistent with Shand's (1983) findings. On the other hand, farmers

TABLE 2 SIMULTANEOUS EQUATIONS MODEL ESTIMATES OF OFF-FARM LABOUR SUPPLY OF HOUSEHOLD HEADS IN KEMUBU, 1982

Variables	Inside Kemubu	Outside Kemubu
Endogenous:		
FLDOP	−0.41	0.08
	(0.24)	(0.07)
Exogenous:		
IWAGEO	973.53	−560.19
	(460.10)	(405.60)
IWAGEWA	52.41	142.16
	(170.37)	(144.94)
AGEO	−11.78	−23.14
	(6.87)	(5.35)
AGEWA	19.44	26.36
	(7.73)	(4.44)
NHLINC	−0.12	−0.08
	(0.15)	(0.12)
FAMSZ	61.91	−187.78
	(70.06)	(40.92)
CHILD	45.28	42.50
	(32.53)	(14.57)
Intercept	−991.05	2088.60

Note: Asymptotic standard errors are shown in parentheses.
Source: Tai, 1983.

inside Kemubu are more fully employed on-farm because of the availability of irrigation and more productive land. Therefore, they are more selective in their choice of type and duration of off-farm employment.

The results obtained for outside Kemubu farmers were thus comparable to Bardhan's (1979) conclusion that labour supply of farmers is determined more by socio-demographic factors rather than by wage rate. However, as development proceeds inside Kemubu, the overwhelming influence of socio-demographic structures falters and wage effect asserts itself.

Other results obtained bear important policy implications. The estimated coefficient of KD from the single equation model showed that off-farm work outside Kelantan involve a shorter duration than those inside Kelantan because of the distance involved in outside Kelantan employment and the necessity to dovetail on-farm and off-farm activities so that paddy cultivation schedules would not be disturbed.

The coefficient of FLDOP for farmers inside Kemubu, from the simultaneous equations model showed that an additional hour of farm work leads to a reduction of 0.4 hour of off-farm work. In a perfectly competitive relationship where additional farm work necessitates an equivalent reduction in off-farm work, the coefficient should be 1. This showed that household heads inside Kemubu were not fully employed and therefore can still increase their work load. On the other hand, the trade-off between off-farm and farm employment for household heads outside Kemubu does not exist. This reinforces our severe poverty hypothesis above.

Conclusions

The general scenario that emerges from this study of off-farm labour supply in Kemubu is one of severe underemployment and poverty in single-cropped areas outside Kemubu, whereas in the double cropped areas inside Kemubu the household heads are more pressed for time with off-farm employment. Off-farm work inside Kemubu has a wage elasticity of approximately 2.0. Thus Bardhan's finding of low wage elasticity and the overwhelming influence of socio-demographic factors in determining labour supply in poor agrarian economies has limited applicability in Kemubu. Given the proximity of Kemubu to a large urban centre (Kota Bahru) and the fact that this study deals with off-farm labour in contrast to ordinary farm labour as in Bardhan's study, this large wage elasticity is, perhaps, to be expected.

One of the important policy implications from this study is that even with improved technology in paddy production inside Kemubu to augment productivity, there is still surplus labour available to be tapped in

off-farm employment, as shown by the non-perfect substitution relationship between farm and off-farm work inside Kemubu. This implies that increase intensity of farming inside Kemubu will not result in any major shift of labour from off-farm employment back to farm work. In addition, since off-farm labour supply of farmers is wage elastic, the surplus labour can be utilized in off-farm work if the wage offer is made attractive. Therefore, the twin development strategies, that is, intensification of paddy farming and increased off-farm employment opportunities, can be administered concurrently. Since farmers' involvement in off-farm employment inside Kelantan had a longer duration, this suggests that more off-farm jobs should be created close to the farmers' households to enhance greater involvement by them.

The other important policy implication follows from the result which showed that education is an important determinant of wage rate. By improving th e level of educational and vocational skills of farmers, the value of their labour can be enhanced in off-farm jobs. This will induce farmers to seek more off-farm employment to further augment their household incomes.

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