Rural Household Labour Demand, Contract Choice, Hoarding Cost and Poverty: Evidence from Western Kenya.

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Abstract

This study determines the factors that influenced contract choice, labour demand and examines the existence of labour hoarding practice in Western region of Kenya. Data from Egerton University's Tegemeo Institute of Agricultural Policy and Development was used for the analysis.. A two step Heckman model was employed to estimate the extent of engagement in daily and semi-permanent contracts conditional on choice of contract. Results from the study show that casual and semi-permanent contracts are substitutes. Family labour negatively influences engagement in daily and semi-permanent contracts hence it is a substitute to the two forms of the contracts. Increase in wages paid to casual contracts is negative and significant to the extent of daily contract engagement but positive and significant to semi-permanent contracts supporting the substitutability of daily contracts for semi-permanent contracts. Methods and costs of farm preparation are significant in influencing the choice and demand for any type of contracts. The proxy variable for hoarding costs is significant and positive indicating that there are hoarding costs incurred in the maintaining a steady pool of labour within the farm. From the results the relatively asset poor farmers engage in the wage high daily contracts to avoid incurring hoarding costs as indicated by the dummy denoting poverty level. However, to avoid uncertainty during peak periods semi-permanent contracts are highly employed by the asset poor farmers. From the results, farmers willing to minimize hoarding costs may find themselves substituting family labour for daily contracts or in absence of family labour, semi-permanent contracts for daily contracts.

Keywords: Contracts, Kenya, Labour, Policy,

Introduction

It is estimated that 80% of the Kenyan population is rural based and derive their livelihoods largely from exploitation of agriculture through crop and livestock production and exploitation of forest and natural resources (Ministry of Agriculture, 2006). Out of this population 80 percent thrive as smallholders who contribute 25.5 percent of the agricultural GDP and account for the bulk of rural agricultural employment and hence key to rural economic growth. The sector's economic importance has been declining over the period of economic reforms prompting increasing unemployment which reached an estimated 14% by 2002 (CBS, 2002) and grossly contributing to the ever increasing rural poverty.

The rise in unemployment and rural poverty in recent years in Kenya has renewed interest in the interaction between labor market conditions and earnings. By far the largest costs incurred by agricultural undertaking are labor costs. Given the magnitude of labor costs, their impact on profits is critical, and relatively small changes either in the size or in the compensation of the labor force can result in a relatively large effect on profit. The demand for hired labor increases with technological advances such as the use of high-yielding seed varieties or land improvement factors but may decline with increased mechanization.

The premise of this study is entrenched within the assumptions that agriculture is the key to the rural economic growth as envisioned in the Economic Recovery Strategy, that smallholders constrained by the availability of productive resources best allocate them to maximize farm returns and hoard labour during slack periods to reduce resource uncertainty during peak periods. The factors that leads to choice of a specific labour contract in rural agricultural economies are yet unknown in the empirical literature. It is presuppose that technological advancement lead to complementary or substitution relationships between methods of land preparation, contract choice and labour demand in the rural areas. It is also plausible and appealing to assume that there exists equilibrium between labour supply and demand.

Theoretical Framework

We base our assumptions on the efficiency wage theory and proceed to build our case model in line with the theory on the basis of Shapiro and Stiglitz (1984) for this empirical regularity. Employers, who can imperfectly monitor workers' productivity, will offer a wage that will discourage workers from shirking (avoidance). Because the expected penalty for shirking, when detected, is greater when it becomes harder to find a job, firms can offer a lower wage premium during times of high unemployment. This shirking model has, as noted by (Card 1995), various advantages over the two other models. Firstly, it suggests that a short-run inverse correlation between wages and unemployment rates is not inconsistent with a long-run positive cross-sectional association between expected regional wages and unemployment rates, as suggested by Harris and Todaro (1970). An additional advantage of this theory is that it leads to the testable hypothesis that a group-specific unemployment rate should be a better predictor of group-specific wages than the average regional unemployment rate. This hypothesis can be tested to the extent that group-specific regional unemployment rates can be observed. Thirdly, since the shirking model is likely to be more relevant in relatively non-unionised economies, the model predicts that a decline in unionisation should lead to a more elastic wage curve.

Labour demand and characterization of hoarding costs

The demand for labour in the rural areas follows the seasonal agricultural production. Assuming that the farmers are risk neutral in the sense that they organize their production using labour and land and also that the production of a particular crop follows two seasons, a slack (t=0) and a peak (t=1) period, C_0 and C_1 define the casual labour demand in the respective periods R is the regular labour hired at the beginning of the slack period. All the labour inputs are measured in labour hours (no of workers), then the production structure during the slack period is defined two stage similar to Pal (2002) as follows,

$$Y_0 = y(C_0, R, K, \theta)$$

Where Y_0 is the output during the slack period, K is the level of farmers land holding and θ is an uncertain random variable. The output in the slack period is used as an input in the peak period production such that the production structure during the peak period is defined by,

$$Y_1 = y(Y_0, C_1, R, K, \theta)$$

The production structure is assumed to be concave and twice differentiable such that the first and second derivatives are positive and negative respectively. Assuming that the farmers maximise their profits through maximising output, then there exists a dual cost minimisation objective underlying the primal production structure. Two cases, following the duality assumption are considered to explicitly elicit the issue of production cost minimization through minimization of transaction costs which are components of the cost structure.

Consider the first case in which the revenue of the regular worker when working in his small plot is higher than the daily regular wage. The workers production function in his own farm plot is defined by, $Y_h = y_h(l, k, \theta)$ where l is the labour at his disposal particularly household labour, *k* the size of the farm plots. The revenue from his farm is what he looses by engaging in regular contract. In order for the farmer to maintain the pool of regular labour, then s/he should compensate for the revenue lost by the regular worker. Taking ϕ_y to be the hoarding costs incurred due to the workers forgone costs then the farmers total costs of production can be expressed as follows

$$TC = F + \sum_{t=1} y_{rev}(l_1^* - R) + \sum_{t=1} (w_r + \phi_y)R$$

Where l_1^* is labour demanded during peak period, $l_1^* - R$ defines C_1 (casual labour demand in peak period), y_{rev} is the revenue forgone by the regular worker, F is the total fixed costs and w_r are the wages paid to regular workers.

The farmer is assumed to minimise costs with respect to amount of regular labour hired as follows

$$\frac{\partial TC}{\partial R} = \sum_{t=1} (\phi_y + w_r - y_{rev}) = 0 ,$$

Rearranging this then it is evident that the marginal hoarding costs equal the difference between the revenue forgone and daily regular wages

In the second case, consider a situation in which the casual wages w_c are higher than the regular wages w_r

and that the worker owns no significant production plot, there is a hoarding cost associated with maintaining of the pool of regular labour. This is because if there is a high probability p_c of securing a casual job then the regular workers will shift from their regular contracts to casual contracts. Taking hoarding costs incurred by the farmer due to higher casual wages to be ϕ_c then the total cost of production is

$$TC = F + \sum_{t-1} w_c(l_1^* - R) + \sum_{t-1}(w_r + \phi_c)R$$

The farm firm minimises the costs with respect to the pool of regular labour as

$$\frac{\partial TC}{\partial R} = \sum_{t=1}(w_r - w_c + \phi_c) = 0$$

Rearranging the above derivative clarifies that the marginal hoarding costs are equal to the difference between the casual and regular wages.

From the above two cases, hoarding costs are hypothesised to behave as follows;

In case one the hoarding costs are expressed as

$\sum_{t=1}\phi_y = \sum_{t=1}(y_{rev} - w_r)$, this implies that $\frac{\partial \phi_y}{\partial y_{rev}} > 0$ meaning that hoarding cost increase with the increase in the farm revenue forgone by the worker. An underlying implication is that as the workers land holding and the labour at his disposal increases, the farmers cost of maintaining labour pool (hoarding costs) also increases.

From the second case, hoarding costs are defined as

$\sum_{t=1}\phi_c = \sum_{t=1}(w_c - w_r)$, this implying that $\frac{\partial \phi_c}{\partial w_c} > 0$, hence as the casual wages increase in the labour market then the farmers cost of maintaining the pool of regular labour increases.

Model specification and estimation procedure

As aforementioned efficiency wage theory proposes a wage equal to the opportunity cost to reduce shirking. This is consistent with the transaction costs hypothesis that as the revenue forgone increases, hoarding costs increases and consequently the wages to labour. These consequently influence the demand for labour conditional on the decision to employ. This general hypothesis sets the study directly to its premise of identifying and empirically assessing the factors influencing contract choice and rural labour demand. To investigate choice of contract and the demand for labour, a multivariate model is adopted. The decision on how much to hire in any contract type is conditional on whether to hire any labour in any contract this raises the need for joint determination of the factors influencing choice of contract and labour demand and the significance of factors depicting hoarding costs. If μ is the contract type, then it is observable only when a farmer has chosen a contract or not. The underlying continuous variable μ^* is a function to a set of conditioning factors.

Therefore,

$\mu = 1,$ If $\mu^* > 0$,

Otherwise

$=0$, if $\mu^* \leq 0$

Where

$$\mu^* = \beta' X_i + \varepsilon_i \ldots\ldots(1)$$

ε Is assumed to be $N(0, \sigma_\varepsilon^2)$

$$P(\mu_1 = 1, .. \mu_n = 1) = F_\rho(\beta_1 X_1 .... \beta_n X_n)$$

Where, F_ρ, is a multivariate correlation coefficient and reduces to univariate logit or probit when there are only two alternatives. The choice of logit or probit is depended on the assumption of the random term distribution. X_i, denote the factors that influence contract choice. The amount of labour in any form of contract chosen is conditional on whether the choice of contract has been made. Let the demand for labour which is the dependant variable in the second stage of the estimation is denoted by $DLab \geq 0$ which is observable only if $\mu = 1$ and is equal to a latent variable, Z^* then

$$Z^* = \alpha' W_i + \theta' \Phi_i + \nu_i \ldots\ldots\ldots\ldots(2)$$

Where, W_i is a vector of variables that influence labour demand and Φ is an instrumental variable (This is normally an Inverse Mills Ratio (IMR) estimated as the ratio of normal probability density function to the cumulative density function. These are estimated from the parameters of the first probit equation and used in the second stage OLS estimation)for bias correction estimated from the first probit equation. A two-step Heckman framework is used in this analysis. The technique involves estimation of the probit and then using the probit parameters to estimate the OLS model. In this case a normal distribution of the random term is assumed hence a probit model for the contract choice equation 1. The labour demand equation (equation 2) is corrected for selection bias by incorporating an instrumental variable estimated from the parameters of the first probit equation (equation 1). The error terms of the two equations are here assumed to be jointly normally distributed at zero mean and constant variances σ_ε^2 and σ_v^2 and correlation coefficient ρ . This model operates on the premise that the rural farmer has a supply of labor from the household. Since the farmer has a fixed size of land and operates in a mixed farming system, he will have to maintain a minimum number of workers irrespective of the season. During the peak season however, the farmer will have to acquire extra help, which comes in the form of casual. At the same time some farm enterprises require constant labor throughout the agricultural year. This 'permanent' labor exists to maintain some of those enterprises, which may not be productive for a certain period but still, needs to be looked after. The farmer has to decide on the opportunity cost of maintaining a 'permanent' employee and using the household labor for this purpose. The farmer therefore uses three forms of labor contracts i.e. regular or permanent, casual or household labor, in varying proportions.

Empirical model

The dependent variable in the first equations for each contract are dummy variables, while the selection equations dependent variables are continuous. The inclusion of the independent variables was not without *apriori* theoretical assumptions. The inclusion of farm size was justifiable as the proxy variable for labour hoarding cost. The variable has previously been used as a proxy by Pal (1999 and 2002). It is justified under the fact that, larger farms have higher and steadier demand for labour that smaller farms (Pal, 1999). Hired daily contract wage was included to bring in the aspect of labour contract segmentation under the market. The poverty variable (pov) takes a value of 0=poor for those with income below 10,000 Ksh monthly and 1=rich for those above 10,000 as per the classification highlighted in CBS, 2004. It is hypothesized that resource endowment influences the form of contract engagement. Other variables such as LNMANACR, LNTRACR and LNOXACRE are included to elicit the effects of farm husbandry practices that may warrant hoarding of labour within the farm. An efficient method of land preparation is assumed to reduce the engagement in any of the contracts.

This assumption holds since most of the labour hired is used for weeding. While tractor land preparation may be efficient in reducing the growth rate of weeds, oxen land preparation may be less efficient with manual preparation of land being even less efficient. The inclusion of the cost (expenditures) of these methods is justifiable although one may expect multicolinearity with their respective area covered. Multicolinearity doesn't arise in this case because of market imperfections and the terrain of land which guarantee different per acre preparation prices between and within household farms respectively

Results and Discussion

Results from the analysis (Annex 1) indicate that both casual (lndhire) and semi-permanent (lnco) contracts are substitutes. Family labour is a substitute to both contracts also. This implies that as farmer engages more family labour (lnfaml) the less the contractual engagement while engagement in any of the contracts diminish the resources and hence the probability of engaging in the alternative contractual form. Daily wage (lndwage) increases leads to decline in engagement in casual contracts however, this leads to more engagement in the semi-permanent contracts. As wages paid to casual contracts increases, farmers tend to engage in the less costly and more reliable semi-permanent contracts as a way of minimizing labour costs.

This raises the pertinent issue of whether farmers should incur hoarding costs or pay higher to the casual workers during the peak period. Normally casual contracts attract higher daily wages relative to the semi-permanent contracts. The proxy variable (area of farm in acres-lnacres) for hoarding costs is positive and significant in both contract forms implying that hoarding costs increase as the size of land cultivated increases. Further, as casual daily wage increases, hoarding costs increases due to the shifts from casual engagement to the semi-permanent contracts

The poverty dummy (pov, taking values of 0, for the poor and 1 for the rich) is significant in semi-permanent contracts. While the asset poor farmers just contemplate on engaging in casual contracts, it is the relatively well endowed who go ahead and engage in these casual contracts. On the other hand, results hold to the conventional wisdom that, it is the relatively well endowed farmers who would engage in semi-permanent contracts as they have the capacity to incur labour hoarding costs. This gives the well endowed head start in production decisions relative to the less endowed hence the ever increasing inequity in rural areas.

Other factors that influence contractual engagement include the level of technological advancement especially in land preparation which is key husbandry practice in rural agricultural production. While agriculture is labour intensive in developing countries, capital augmented technologies lead to increased efficiency in production and may also lead to reduced labour demand and consequently increasing rural unemployment. Policies that enhance redistribution are in this case appropriate to equitably distribute the margins of production as technology advances to the marginal costs of unemployment.

There is lack of empirical literature on hoarding costs and poverty hence no meaningful comparative analysis that could be done.

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Annex1. Two step-Heckman model regression results

Casual Contracts			Semi-permanent Contracts		
Number of observations 327					327
Wald Chi2(21)=93.71					236.12
Prob >chi2=0.0000					0.0000
uncensored observations 118					162
Demand for Casual contracts			Demand for semi permanent contracts		
	Coef.	P>|z|		Coef.	P>|z|
lndwage	-0.5662**	0.0490	Lndwage	0.0061	0.9150
lnacres	0.5159**	0.0170	Lnacres	0.9743***	0.0000
lnmanacr	-0.1640	0.1400	Lnmanacr	0.0234	0.8170
lntracr	-0.4832**	0.0490	lntracr	0.3196*	0.0980
lnoxacre	0.0280	0.8600	Lnoxacre	-0.1634	0.2210
lnoxco	-0.0354	0.2000	Lnoxco	0.0273	0.2680
Lnotraco	0.0510	0.1880	Lnotraco	-0.0014	0.9650
Lnmanuco	0.0528	0.3610	Lnmanuco	0.0586	0.2860
lnfamla	-0.1608	0.1340	Lnfamla	-0.1138	0.2540
lnco	-0.0667	0.1100	Lndahire	-0.0024	0.9790
pov	0.1096	0.5770	pov	0.4336**	0.0350
cons	5.4612***	0.0000	cons	6.3556***	0.0000
Choice of casual contracts			Choice for semi permanent contracts		
	Coef.	P>|z|		Coef.	P>|z|
Lnacres	0.3081*	0.0760	lnacres	0.5505***	0.0020
Lnmanacr	-0.0468	0.5940	Lnmanacr	-0.1751**	0.0420
lntracr	0.5262**	0.0200	Lntracr	-0.2197	0.2750
Lnoxacre	-0.0016	0.9910	Lnoxacre	-0.1418	0.3620
Lnoxco	0.0027	0.9090	Lnoxco	0.0227	0.3420
Lnotraco	-0.0593	0.1030	Lnotraco	0.1010***	0.0020
Lnmanuco	0.1365***	0.0000	Lnmanuco	0.2541***	0.0000
Lnfamla	-0.2615**	0.0150	Lnfamla	-0.4380***	0.0000
Lnco	0.0633**	0.0150	Lndahire	0.0791	0.3820
pov	-0.0191	0.9210	pov	0.4307**	0.0270
cons	0.3858	0.5430	cons	1.3153*	0.0610
lambda	-0.7138	0.2520	lambda	0.0406	0.9290
Rho	-0.7185		rho |	0.0412	
Sigma	0.9935		sigma |	0.9862	