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Outcomes of Worker Effort and Supervision in Tanzanian Labour Market

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This paper examines the impact of work effort and supervision in the Tanzanian labour market. In particular it focuses on the extent to which observed earnings and productivity of a worker might be influenced by both the individual effort of a worker and intensity of supervision. To assess the earnings effect of work effort, the paper estimates the hourly earnings equation, which includes work effort and monitoring intensity among the determinants of the hourly earnings. The estimates control for unobserved firm specific effects and GMM production functions. Key findings of the paper are that a worker who exerts higher effort at work increases hourly earnings by about 27 per cent. Estimates of productivity affect via GMM shows that increase in the monitoring intensity increased the gross output per employee by about 34 per cent. The estimated coefficient is stable even after a range of factors are controlled for. The paper concludes that labour market reforms introduced in Tanzania on increased autonomy and flexibility of firm level work supervision and pay have positive outcomes for both employers and employees.

Key Words: worker effort. Labour market, Tanzania, Supervision, outcomes

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Introduction

This paper examines the impact of work effort and work supervision in the labour market. In particular it focuses on the extent to which observed earnings and productivity of a worker might be influenced by both the individual effort of a worker and intensity of supervision. The paper focuses on Tanzania manufacturing. The labour market reforms introduced in Tanzania especially from the early 1990s increased autonomy and flexibility of firm level work supervision and reduced the role of state intervention in pay determination and work regulations. These changes may have had significant effects on the role of both work supervision and work effort in pay determination and productivity. Incentive pay theories for example, predict that in setting wages employers face both adverse-selection and moral hazard problems: only workers know the difficulty of their jobs, and they can shirk so as to obscure this information from employers. Therefore, in the absence of state intervention in wage setting in Tanzanian labour market, firm level work supervision is one of the potential strategies for eliciting hidden actions and hidden information of the workers.

Although the changes introduced in the Tanzania labour market have potential effects on the level of earnings received by workers along with firm level productivity, little is known about the relationship between monitoring and worker earnings differences, or about the impact of worker effort on individual earnings and firm level productivity. A better understanding of the structure and impact of internal supervision of work and worker effort is needed to understand their role in manufacturing development especially after the reforms. The goal of this paper is therefore to document several facts regarding work effort and intensity of work supervision in Tanzanian manufacturing.

The overall objective of the paper is thus to examine the impact of worker effort on observed productivity and earnings.

The specific objective of the paper is;

- To assess the extent to which individual effort of the worker influence the level of productivity of labour in a particular firm
- To analyse the link between observed earnings of an individual worker and the contribution he/she makes via the effort excreted at work
- How a combination of the level of earnings and productivity is a function of the efforts of their employees.

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The paper acknowledges the fact that there are measurement problems associated with estimating the impact of work effort and supervision heterogeneity. For example, while higher effort can lead to higher earnings, it is also possible that higher

earnings can be an incentive to elicit more effort. Likewise, there is a possibility that the employer can choose both the level of monitoring and earnings. If this is so then OLS estimates will be inconsistent. To address such problems, the paper estimates regression models that control for unobserved firm specific effects and GMM production functions. The data used has information on methods of pay, i.e. time rate and piece rate. Such information provides potential instruments that allow the paper to estimate two stage instrumental variable methods. After this introduction, the second section describes pay policy and work supervision in Tanzania over the period 1960-2012. In the third section theoretical framework underlying the assessment of earnings impact of pay method and work supervision is described. The discussion in this section reviews agency and efficiency wage theories that have been central to various models for analyzing pay method and work supervision. The Principal-Agent theory, shirking model of efficiency wage and other explanations of pay practices such as moral hazards, self -selection, and sociological explanations are briefly described in relation to work and supervision. The fourth section presents the models estimated in this paper along with possible measurement problems. Methods employed to mitigate estimation problems are also discussed in this section. Section five presents the estimation results whereas the sixth section summarizes and concludes.

It is worth noting that, the 1990s have seen a reversal of many policies in Tanzania. Specific reform measures undertaken in the Tanzania labour market that may have direct impact on previous wage policy are: gradual elimination of fixed wages and introduction of flexible wage bargaining at enterprise level (both individually and collectively bargained wage); and allowing employers to provide fringe benefits (such benefits as food allowances, housing allowance, transport etc) to their employees when they find it appropriate (see Tsikata et al, 1999 Mjema et al, 1998, Mans, Darius 1994). Following the reforms in pay and work organization described above, several firms including the state owned ones, introduced performance based pay scheme, and most of the profitable firms increased wages substantially (Mans, Darius 1994)[1]. During pre-reform period, earnings differentials were low due to pay compression policy. The standard rate pay system, and absence of performance related pay and various constraints limited employers' powers and authority over the employees. After the reforms, the current average earnings among the workers and across firms might differ significantly[2]. This study therefore addresses the question, whether and to what extent variation in earnings can be

[1] Performance based pay scheme was introduced in Tanzania Breweries Limited, Tanzania Cigarette Company, TPDC, Tanzania Electrical Company, IPP limited, Somaia group and others.

[2] For example, Tanzania Breweries Limited raised the monthly minimum wage from Tanzania shillings 5,000 (about $ 16) in 1991 to 100,000 in mid 1990s and 186,000 recently (about $ 177) (Kileo, 2003). In addition to paying higher minimum wage, companies like Tanzania Breweries provide free medical treatment and free meals at lunch.

accounted for by heterogeneous pay method and supervision intensity during the post reform era. In the next section we describe the theoretical framework of our study.

Literature on Work and Efforts.

Previous studies in this area (see for example Strobl and Walsh, 2003) have argued that to correctly specify the impact of monitoring on earnings, the interaction between monitoring and work effort needs be modelled. The principal-agent framework (see for example, Ross 1973, Grossman and Hart 1983; and Sappington 1991 for details), is based on designing efficient explicit or implicit contracts between the principal (employer) and the agent (employee) in a situation where there are incentives for employees to cheat about their true work effort, largely arising from information asymmetries and monitoring costs. Related to the Principal-Agent explanation is the theory of implicit contracts (Azariadis (1975), Baily (1974) and Gordon (1974)). Based on this theory, if a firm is risk averse, it would like its workers to take a wage cut in bad states. However, if only the firm and not the workers can observe the state, wages cannot be made to depend on the state directly (Malcomsom, 1999). In the shirking model of Shapiro and Stiglitz (1984), workers can choose whether to work or shirk. Sociological explanations associated with George Akelof (1982) have also been a source of theoretical base for modeling monitoring, pay and earnings. According to Yellen (1984), sociological explanations can explain economic phenomenon related to pay such as reasons for forbidding piece rates even when feasible, or why workers might exceed firms set work standards.

In studies by (Lindberg and Snower (1987); Ewing and Payne (1999)) it is shown that workers earn more where monitoring is more difficult. Brown (1992); Ewing (1996); Parent (1999); Booth and Frank (1999) reveal that workers who are employed in jobs that have pay based on performance earn more. In other studies (such as Leonard (1987), Kruse (1992), Green and Mclntosh (1998), Groshen and Krueger (1990) etc), it is confirmed that there is a negative correlation between supervisory intensity and earnings. Such findings suggest that a worker will get more pay if he/she is less supervised. Yet, there is hardly any estimate of the earnings effect of monitoring intensity in Tanzanian labour market on a national level representative data for the recent period.

Theoretical Framework

In this section the theoretical framework for estimating the effect of pay method and work supervision are described. Possible estimation problems that may be encountered during estimating the link between monitoring work supervision and earnings also form part of our discussion here. The theoretical frameworks underlying much of the previous work on the link between work effort, monitoring, earnings and productivity are based on agency theory (principal-agent framework), and efficiency wage theory, shirking model, adverse selection, moral hazard and sociological explanations.[1] The

[1] (see Ross 1973, Grossman and Hart 1983; Sappington 1991;Carlo Shapiro and Stiglitz, 1982; Steven Stoft, 1982; Samuel Bowles, 1981,1983;James Malcomson, 1981; Stiglitz, 1979b; Andrew Weiss, 1980;George

principal-agent framework (see for example, Ross 1973, Grossman and Hart 1983; and Sappington 1991 for details), is based on designing efficient explicit or implicit contracts between the principal (employer) and the agent (employee) in a situation where there are incentives for employees to cheat about their true work effort, largely arising from information asymmetries and monitoring costs. Employers are therefore forced to prepare contractual arrangements that are often self-enforcing, in the sense that they are designed to elicit the private information of the employees, providing them an incentive to provide their true efforts. The formal description of the Principal-Agent model is described below followed by other models from in the literature the area of pay method and monitoring.

Principal-Agent Model

The models, consider a production function of an employee (the agent) such as;

$$Q = X(e) + \varepsilon, \qquad [1]$$

Where e is the employee's (agent's) investment of effort, which is unobservable to the employer (principal), and X (*e*) defines expected output, which is strictly concave in effort, that is, X' (*e*) > 0 and X"(*e*) < 0, and where X (0) = 0. The second term, ε, is a random variable with zero mean. The variance of variable ε could be regarded as a measure of the risk of output. The employee's (agent's) utility, denoted as *U*, is a general function of his or her net payoff,

$$P - C, \qquad [2]$$

Where *P* is the realized wage and *C* is the cost of effort. The utility function is strictly concave in net payoff, that is, $U'(P - C) > 0$ and $U''(P - C) < 0$.

The cost function is strictly convex in effort, that is, $C'(e) > 0$ and $C''(e) > 0$, except at $e = 0$ where $C'(0) = 0$. The model assumes a linear pay contract for the agent, $P = \alpha + \beta Q$, where α is the fixed component of pay or insurance pay, and β the incentive parameter or pay-performance sensitivity. In the literature of managerial incentives, β is interpreted as incentive strength. The agent chooses effort to maximize his or her expected utility, $E[U(P - C)]$, where *E* is the expectation operator, yielding the following incentive compatibility constraint:

$$\beta X'(e) - C'(e) = 0. \qquad [3]$$

The constraint dictates that effort increases with the incentive parameter. The principal is risk-neutral in a competitive labor market and earns zero expected profit. Then, $E(Q - P) = 0$, or

$$\alpha = (1 - \beta)X(e) \qquad [4]$$

The optimisation problem of the model is to maximize the agent's expected utility subject to the incentive compatibility constraint, equation (1), and the zero expected profit condition, equation (2). Before we describe how this framework will be useful for the analysis of this paper, we first describe other models that potentially link the pay method and monitoring with earnings.

Akerlof 1982; Edward Lazear (1981), Armen Alchian and Harold Dmsetz (1972), Stephen Ross (1973)).

Model Specification and Data

The purpose of this section is to outline the specification of the models to be estimated in analysing the effect of pay method and work supervision in our data. Also data available used in the study and the variables estimated are discussed. Two models are specified. First is the earnings function for assessing the effect of pay method, work effort and monitoring on earnings level. Second, the production functions for assessing the productivity effects of monitoring and effort are specified. The data used in this study is also described in this section. The discussion on data includes a detailed account of how various variables used in our estimation are created. The model specifications are given below.

Model Specification

The paper first specifies an earnings equation in which work effort and monitoring are among the regressors in the earnings function. The earnings equation [1] specified below include control variables for a range of firm and worker characteristics that may account for earnings differences.

Earnings Function

$$LnW_{ijt} = \beta o + \beta_1 H_{ijt} + \beta 2 E_{ijt} + \beta_3 M_{jt} + \beta_4 F_{ijt} + \beta_5 T_{ijt} + \pi_j + \nu_{ijt} \quad [1]$$

Where i, j and t are subscripts of individual, firm and time respectively, *LnW* is the log of real earnings of worker i in firm j during time t. E_i is the measure of work effort exerted by individual i. We construct the measure of work effort from self-reported measurement of the level of effort supplied by the workers. We will describe the computation of this effort variable below. M is the measure of work monitoring intensity. This is calculated as the percentage of managers and supervisor employed in a given firm. *H*i is a vector of observable characteristics of worker i at time t (these characteristics could be human capital such as years of schooling, job tenure, work experience, job training and characteristics such as union membership etc), *F* is a vector of other control variables such as firm characteristics of ownership, location etc. The variable π represents unobservable characteristics i.e. omitted variables that may be correlated with explanatory variables in our earnings function and ν is the error term.

Production Function

For estimating the productivity effect of monitoring and work effort, a real a gross real output production function is specified in equation 2.

The gross real output production function is specified as follows;

$$LnQ_{jt} = \alpha_0 + \alpha_1 LnK_{jt} + \alpha_2 LnL_{jt} + \alpha_3 JT_{jt} + \alpha_4 LnOH_{jt} + \alpha_5 LnRM_{jt} + \alpha_6 LnIND_{jt} + \alpha_7 E_{jt} + \alpha_6 M_{jt} + \alpha_8 C_{jt} + \mu_j + \epsilon_{jt}$$

Whereby j and t are firm and time subscripts,

LnQ = log of real gross output

LnK = log of physical capital,

LnL = log of a number of labour available in a firm,

JT = variable for firm level job training,

OH = other human capital variables of weighted averages of schooling, age and tenure
E = Variable for weighted Average Firm level Effort
M = Variable for Firm Level Monitoring Intensity
C = observable firm characteristics such as firm location, sector ownership, age export and others.
LnRM = log of raw materials
LnIND = log of indirect costs.
μ = Firm Fixed effects and;
ϵ = error term.

Data and variables

Data source is the Tanzanian manufacturing firm surveys over a long span of time. The data were originally collected under the Regional Program of Enterprise Development (RPED) surveys by World Bank, later continued by the University of Oxford and later the University of Dar-es-Salaam. Work effort variable is measured using self-reported measure of the effort level exerted at a worker level. This is derived from a psychological question asked during the data collection. In particular, a worker is asked "How tired are you at the end of the day? Each worker is expected to choose one out of the following four answers: 1) very tired, (2) tired (3) not really tired (4) not tired at all. Using these four responses we construct a zero-one dummy variable of effort that takes the value of one if a worker is either very tired or tired and zero otherwise. Specifically, if a worker feels very tired or tired then is regarded as "High Effort worker" and Low Effort worker if he feels not really tired or not tired at all. We denote this variable as *E* in the model [1] above.

The weighted average of work effort within a firm is derived from firm level information about individual level of self-reported effort. To arrive at the firm level effort variable, the individual level effort value is weighted by the proportion of workers in a given occupational category in a firm. Earnings variable is the hourly rate of earnings obtained using information on the number of hours worked and the total current earnings received. The hourly earnings include salary/wage, plus any allowances received. Other variables are as defined in the previous papers.

Empirical Results

This section presents empirical results based on the earnings and production functions. The paper first estimate the earnings effect of work effort and monitoring from earnings function, and then present the results of the estimates of productivity effect of these variables using the production function. The OLS results are presented first and then consideration of other options of estimates mentioned earlier, of the firm effect within regressions and GMM (for the productivity effects) is effected. While the earnings effects of work effort and monitoring are presented in section 5.1, we present the productivity effect of these two variables in section 5.2.

Estimates of earnings effect of pay methods and monitoring on earnings

In estimating the results, the key question here is whether there is any evidence of

earnings effect of high work effort in our data. This hypothesis is supported by the results. As the results in column two of table 1, controlling for human capital, there are earnings differences accounted for by the fact that a worker exerts higher effort. The estimated coefficient on work effort is 0.269. It is highly significant at 1 percent. This coefficient has positive sign suggesting that a worker who exerts higher effort at work increases hourly earnings by about 27 per cent. Therefore, the results support the hypothesis that controlling for the pay method and human capital those who work hard are paid more. Hence, the monitoring level will influence the earnings effect of work effort. We therefore move to the third column and see how monitoring in our data influences hourly earnings. The major hypothesis tested using the results in column [3] are whether high monitoring can reduce the necessity of paying higher earnings. The results reported in this third column strongly accept this hypothesis. There is evidence of a negative correlation between monitoring intensity and hourly earnings in our data. The coefficient on monitoring is 0.554. It has a negative sign suggesting that highly monitored workers are less paid.

To account for the effect of such influence in our estimation we interact the work effort with monitoring level. The results of earnings function that estimate the earnings effect of the interaction between work effort and monitoring are presented in column 4 of table 1. The results indicate a negative effect of the interaction between work effort and monitoring on the individual effect of monitoring on earnings, although the coefficient estimate is not statistically significant. Specifically, we find that after we control for the joint effect of the interaction between work effort and monitoring, the coefficient size of monitoring does not change, while the statistical significance is reduced by half although is still significant. We interpret this as some evidence that the earnings effect of monitoring work through work effort.

However, work effort and the level of monitoring are likely to be influenced by worker characteristics and firm characteristics. Our estimates in columns [1-4] do not control for other factors that might be picked up by the pay methods and monitoring coefficients. For this reason, the paper stepwise adds the control variables of firm and worker characteristics in columns [5-6] respectively. The Tanzania Manufacturing Enterprise Survey from which our data is drawn contains various firm and individual characteristics such as location, sector, occupation, and ownership. The estimates first add job classification, sector ownership and location in column [5]. Moving to the right hand side of the table, it is certainly clear that the earnings effect of work effort and monitoring operate through these other factors. For instance it is confirmed that controlling for occupation and other firm characteristics in column [5] significantly changes the coefficient size of all our variables of interest. The coefficient estimate of work effort is more than halved, and becomes weakly significant. Such findings suggest that the earnings effect of work effort work through other characteristics such as occupation. In column [5] the estimates control for observable characteristics that have potential influence on or earnings

effect of work effort and monitoring. are still observed.

Evidences of earnings effect of monitoring

Table 1: Firm level hourly earnings effect of work effort and monitoring in Tanzanian manufacturing

	OLS1	OLS2	OLS3	OLS4	OLS5	FFE-M
Years of Education	-0.034	-0.026	-0.032	-0.031	-0.028	-0.019
	(1.87)	(1.44)	(1.74)	(1.73)	(1.56)	(1.20)
Education Squared	0.006	0.005	0.006	0.006	0.005	0.004
	(4.74)**	(3.82)**	(4.19)**	(4.14)**	(3.58)**	(3.09)**
Currently Job training	0.016	0.019	0.001	0.001	0.018	-0.099
	(0.28)	(0.34)	(0.02)	(0.02)	(0.33)	(1.80)
Past Job Training	0.123	0.124	0.117	0.117	0.085	0.012
	(3.11)**	(3.14)**	(2.99)**	(2.99)**	(2.19)*	(0.34)
Age	0.074	0.072	0.069	0.069	0.064	0.056
	(6.81)**	(6.64)**	(6.47)**	(6.47)**	(6.05)**	(5.69)**
Age squared	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(6.19)**	(6.08)**	(5.97)**	(5.97)**	(5.62)**	(5.04)**
Years of Tenure	0.001	0.001	0.000	0.000	0.001	0.004
	(0.50)	(0.23)	(0.15)	(0.14)	(0.39)	(1.52)
High Work Effort		0.251	0.267	0.267	0.108	0.091
		(5.61)**	(6.01)**	(6.01)**	(1.52)	(1.52)
Monitoring Intensity			-0.564	-0.530	-0.917	-0.692
			(5.73)**	(2.81)**	(4.47)**	(2.07)*
Effort*Monitoring				-0.044	0.330	0.303
				(0.21)	(1.46)	(1.47)
Administration					-0.081	-0.200
					(0.65)	(1.88)
Cleric					-0.345	-0.384
					(2.88)**	(3.81)**
Sales					-0.436	-0.481
					(3.18)**	(4.10)**
Supervisor					-0.227	-0.418
					(1.90)	(4.06)**
Technical					-0.374	-0.427
					(2.96)**	(3.90)**
Production					-0.510	-0.591
					(4.20)**	(5.69)**
Apprentices					-0.731	-0.615
					(4.34)**	(3.95)**
CONTROL VARIABLES						
Location	NO	NO	YES	YES	YES	YES
Ownership	NO	NO	NO	YES	YES	YES
Sector	NO	NO	NO	NO	YES	YES
Firm Fixed Effects	NO	NO	NO	NO	NO	YES
Observations	1821	1821	1821	1821	1821	1821
R-squared	0.32	0.34	0.35	0.35	0.37	0.26

Absolute values of t-statistics are in parentheses. Significance at the 1 per cent, 5 per cent and 10 per sent level is indicated by ***, ** and * respectively.

Estimates of the Impact of Work Efforts and Monitoring on Firm Level Productivity

This section uses firm level measures of work monitoring and effort to test if there is any evidence of productivity effect of these variables. It does so by estimating the firm level gross output production functions in which weighted average work effort and firm level monitoring intensity of a firm are used as the determinants of firm level productivity. The results of the estimates of productivity outcomes of monitoring and efforts are presented in table 2 below. To begin with the estimate checks if constant returns to scale are accepted. The test results for constant returns to scale reported in column [1] of Table 2 indicates that the constant returns to scale is rejected. Further findings are that weighted average work effort has positive effect on firm level productivity measured by gross output. The estimated coefficient on average work effort is 0.21. It has a positive sign implying that a 1 per cent increase in average work effort of the firm will increase gross output by 0. 21 percent. However, the results are weakly significant (t=1.34). The coefficient on monitoring has a negative sign but its level of statistical significant is very low (t=0.89). Therefore, based on these results, controlling for production inputs and human capital, there are weak evidences of positive effect of work effort on productivity.

The second column, add exports and firm age variables. The results show that when export and firm age are controlled for, there is slightly decline in the coefficient estimate and the statistical significance. But there is still evidence that average work effort of a firm has a positive effect on firm level productivity measured by gross output. In the third and fourth columns, more firm characteristics and time invariant unobserved characteristics are controlled for respectively. The results show that, when a broad range of firm characteristics is controlled for both the coefficient size and statistical significance of the firm level effort variable falls substantially. In particular, it is found that control for the firm fixed effects eliminates the statistical significance the effort variable (as t falls to 0.36). Further results are that the productivity impact of monitoring increases substantially. The estimated coefficient is now positively correlated with productivity and the statistical significance nearly doubles although still insignificant (t=1.39). The results suggest that the productivity effect of work effort work and monitoring partly work through unobserved firm fixed effects. Thus the OLS productivity effect of work effort observed in the OLS gross output production function might be picking up these unobserved firm fixed effects.

The results reported in tables 2 are based on OLS hence do not control for endogeneity problem we discussed above. To account for this problem, the paper adds estimate the gross output production functions using GMM. The results are reported in table 3. Based on the results, the estimates based on the gross output per employee in table shows a significant positive impact of monitoring on gross output per employee. The coefficient estimate is 0.34. It suggests that increase in the monitoring intensity increases the gross output per employee by about 34 per cent. The estimated coefficient is stable even after a range of factors is controlled

for. The results partly reflect the size effect. The level of monitoring intensity decreases with firm size. Therefore an in gross output per employee is likely to be a increased efficiency of monitoring.

Table 2: OLS estimate results of the impact of work effort on firm level gross real output

	OLS1	OLS2	OLS3	FE (Within)
Log of Capital	0.016	0.018	0.015	0.009
	(1.28)	(1.36)	(1.12)	(0.07)
Log of labour	0.167	0.170	0.185	0.127
	(6.61)**	(6.72)**	(7.47)**	(1.44)
Log of Raw Materials	0.649	0.649	0.646	0.703
	(25.98)**	(26.28)**	(26.44)**	(17.46)**
Log of indirect Cost	0.198	0.192	0.185	0.092
	(6.81)**	(6.59)**	(6.55)**	(1.76)
Weighted Average Effort	0.210	0.207	0.187	0.084
	(2.34)	(2.31)	(2.19)	(1.46)
Weighted Average Monitoring	0.061	0.052	0.044	0.024
	(1.89)*	(1.75)*	(1.63)*	(1.39)
Weighted Past Training	0.044	0.067	0.062	-0.056
	(0.59)	(0.91)	(0.84)	(0.47)
Weighted Current Training	-0.123	-0.127	-0.103	0.581
	(1.10)	(1.12)	(0.93)	(2.45)*
Average Years of Education	-0.004	-0.005	-0.002	0.025
	(0.45)	(0.53)	(0.19)	(1.84)
Average Years of Tenure	0.006	0.006	0.007	-0.012
	(1.67)	(1.70)	(1.79)	(1.97)
Average Years of Experience	0.005	0.005	0.005	0.004
	(1.77)	(1.78)	(1.67)	(0.79)
Exports		0.049	0.043	0.042
		(0.93)	(0.81)	(0.38)
Firm Age		-0.001	-0.001	-0.005
		(1.18)	(1.02)	(0.11)
CONTROL VARIABLES				
Location	NO	NO	YES	YES
Ownership	NO	NO	YES	YES
Sector	NO	NO	YES	YES
Firm Fixed Effect	NO	NO	NO	YES
Observations	297	297	297	297
R-squared	0.99	0.99	0.99	0.84
CRS[1]test Σßi=1(p-value)	0.034	0.050	0.040	0.64

Absolute values of t-statistics are in parentheses. Significance at the 1 per cent, 5 per cent and 10 per sent level is indicated by ***, ** and * respectively. CRS test is an F-test for constant returns to scale that the coefficients on inputs sums to unity. The weighted average of schooling, tenure, job training and age are derived from firm level information about individual highest level of education completed, the occupational specialization, work tenure whether an individual attended job training and experience. Each value is weighted by the proportion of workers in a given occupational category in each firm to obtain a weighted average for each firm. The occupational categories included are managers, administration, sales, clerical supervisor, technicians, production workers and support staff.

Table 3: GMM estimate results of the impact of work effort on firm level gross real output per employee

	GMM1	GMM2	GMM3	GMM4
Log Capital Per Employee	0.132	0.158	0.143	0.118
	(1.58)	(1.70)	(1.53)	(1.89)
Log of Raw Materials Per Employee	0.699	0.662	0.678	0.669
	(7.91)**	(6.37)**	(8.15)**	(9.56)**
Log of Indirect Cost	0.066	0.072	0.078	0.103
	(0.90)	(0.95)	(0.92)	(1.64)
Weighted Average Past Training	0.021	0.063	0.075	0.115
	(0.13)	(0.41)	(0.49)	(0.71)
Weighted Average Current Training	-0.130	-0.148	-0.160	-0.251
	(0.57)	(0.68)	(0.72)	(0.99)
Average Years of Education	0.002	0.001	0.004	-0.003
	(0.19)	(0.07)	(0.33)	(0.18)
Average Years of Tenure	0.003	0.003	0.003	0.003
	(0.55)	(0.45)	(0.64)	(0.50)
Average Years of Experience	0.009	0.009	0.008	0.007
	(2.12)*	(1.95)	(2.16)*	(2.00)*
Weighted Average Work Effort	0.144	0.121	0.101	-0.056
	(0.67)	(0.52)	(0.43)	(0.22)
Firm Level Monitoring Intensity	-0.344	-0.391	-0.359	-0.370
	(1.79)	(1.90)	(1.57)	(2.25)*
Exports		0.009	-0.034	-0.114
		(0.07)	(0.35)	(1.31)
Firm Age		-0.005	-0.004	-0.002
	(1.56)	(1.48)	(0.79)	
Observations	172	172	172	129
Robust z-statistics in parentheses				
CONTROL VARIABLES				
Location	NO	NO	YES	YES
Ownership	NO	NO	YES	YES
Sector	NO	NO	YES	YES
Firm Fixed Effect	NO	NO	NO	NO
2000	0.000	0.000	0.000	0.000
Observations	114	114	114	114
CRS[1]test Σßi=1(p-value)	0.27	0.25	0.42	0.38

Absolute values of t-statistics are in parentheses. Significance at the 1 per cent, 5 per cent and 10 per sent level is indicated by ***, ** and * respectively. CRS test is an F-test for constant returns to scale that the coefficients on inputs sums to unity. The weighted average of schooling, tenure, job training, work effort and age are derived from firm level information about individual highest level of education completed, the occupational specialization, work tenure whether an individual attended job training and experience. Each value is weighted by the proportion of workers in a given occupational category in each firm to obtain a weighted average for each firm. The occupational categories included are managers, administration, sales, clerical supervisor, technicians, production workers and support staff.

Conclusion

This paper set out to assess the impact of work effort and work supervision on earnings and productivity in Tanzanian manufacturing over the period 1990-2012. The paper makes use of self- reported measures of effort to test if there are any gains from working hard. The OLS based finding is that high effort workers are compensated for exerting more effort at work. In particular, the results show that a worker who exerts higher effort at work increases hourly earnings by about 27 per cent. The paper argues that such results support the hypothesis that controlling for the pay method and human capital those who work hard are paid more. In estimating the earnings effect of monitoring, the results are evident that controlling for human capital monitoring intensity reduces earnings by 0.554.

The argument partly reflect size effect but most interestingly are consistent with the incentive theories which suggest that loosely monitored workers receive more real earnings than highly monitored ones. Connected to this finding the paper confirms earnings effect of monitoring work through work effort. However, the results based on firm fixed effects regressions have revealed that to a large extent the OLS based effects are influenced by the unobserved time invariant firm attributes. We argued that this reflected that the effects picked up by OLS are plagued with these effects. Estimates of productivity affect via GMM shows a significant positive impact of monitoring on gross output per employee. The coefficient estimate suggests that increase in the monitoring intensity increased the gross output per employee by about 34 per cent. The estimated coefficient is stable even after a range of factors are controlled for. The level of monitoring intensity decreases with firm size. Therefore an increase in gross output per employee is likely to be a reflection of efficiency in production from effective monitoring. The paper concludes that labour market reforms introduced in Tanzania on increased autonomy and flexibility of firm level work supervision and pay have positive outcomes for both employers and employees. This is so because prior to the centrally controlled pay system significantly reduced the ability of manufacturing firms to design establishment level motivation such as performance based and productivity enhancing schemes. Hence any increase in work effort or monitoring cold not affects pay or incentives to work more.

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