International Journal of Social Science and Economic Research

ISSN: 2455-8834

Volume:03, Issue:01 "January 2018"

WORKER PRODUCTIVITY AND WAGES IN KENYAN MANUFACTURING SECTOR

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ABSTRACT

This paper investigated one possible source of labour market distortion in Kenya. The prediction of the efficiency wage hypothesis is tested in a production function framework applied to a panel of firms in Kenyan manufacturing industry. The results demonstrate that the relative wages of firms in this industry are positively related with value-added per worker. The results are consistent with the efficiency wage hypothesis that paying wages above the market clearing wage raises worker productivity. This provides a potential explanation of why real wages in the manufacturing sector did not decline in the study period despite the huge labour supply pressure. So, even in the absence of other sources of labour market distortion (e.g. unions and minimum wages) labour market distortion can be present due to efficiency wage considerations in firms' wage policy.

Keywords: Kenya, unemployment, efficiency wage

1. INTRODUCTION

Underutilization of human resources remains a major challenge for many African countries; Kenya included (UNECA, 2005). In Kenya, estimates from the most recent labour force survey show that the national open unemployment rate in 2005-2006 was 12.7% (GoK, 2009). Simply put, for every 100 Kenyans of working age (15-64 years) about 12 were openly unemployed[1]. The same estimates further show, that unemployment was relatively higher in urban labour market (19.9%) than in rural labour market (9.8%). Unemployment has remained a challenge partly because there are inadequate employment opportunities to absorb the labour force. Many individuals, unable to secure formal sector jobs take up informal employment, which dampens the open unemployment rate.

[1] The openly unemployed are people who, during the reference period, "were without work but currently available for work and actively seeking work, or were without work because of layoff or off-season but currently available for work."

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Three important labour market theories attempt to explain the existence of unemployment (Borjas, 2000). One explanation is the job search process. In this case, imperfect information and mobility costs lead to a situation where unemployment and vacancies exist together. Consequently, job seekers adopt job search strategies while employers adopt recruitment strategies. Moreover, the strategies adopted by labour market agents could generate externalities and hence labour market inefficiencies.

The second major explanation for unemployment is inflexible wage rates. In the African context where labour markets tend to be segmented, wage rigidity in the formal sector may contribute not only to involuntary unemployment but also labour market segmentation (Kristensen and Verner, 2008). There are not enough jobs for those willing to work. In a competitive labour market model the wage rate adjusts to equate labor demand to labor supply and labour allocation is optimal (Borjas, 2000). As a result, unemployment is voluntary because at prevailing market wage an individual willing to work can find work. There is evidence that real wage maybe rigid in this industry (Bigsten et. al. 2000; Wambugu, 2003),

However, wage formation in the competitive labour market model ignores institutional characteristics of the labour market that could inject inflexibility in wage rates. For example, union wage bargaining may introduce labour market distortions. For example, in Kenya Manda, Bigsten and Mwabu (2005) find a significant union wage premium in Kenyan manufacturing. Another potential source of labour market distortion is minimum wage. In Kenya Pollin et. al. (2007) conclude that this may not be a major source of labour market distortion. Where institutional forces are strong and keep wages above the market clearing wage, involuntary unemployment is generated. Involuntarily unemployed persons, by definition, are willing to work at the going wage rate or lower but they can not find work.

A third explanation for unemployment is offered by efficiency wage theory. Even in the absence of labour market distortions generated by unions or minimum wages, labour market distrotion can be present if firms pay above market clearing wage. Efficiency wage theory attributes wage rigidity and the resulting involuntary unemployment to such employer behaviour. The theory predicts a relationship between relative wage levels and worker productivity (Katz, 1986; Akerlof and Yellen, 1986). Consequently, firms may find it profitable not to adjust wages towards market clearing wage to avoid productivity losses[2]. This explains a variety of otherwise puzzling behaviour such as the presence of involuntary unemployment (Cappelli and Chauvin, 1991).

[2] For example, the Ford motor company in the U.S.A. cut working hours from nine to eight and raised wages from $2.34 to $5.00 dollars per hour in 1914; productivity increased by 30-70%. In 1975, the management of Stanford Linear Accelerator Centre declined an offer by staff for a wage cut in lieu of layoffs. They argued that a wage cut would make good quality workers leave their company (see Riveros and Bouton, 1994).

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Although a number of studies have tested the efficiency wage theory in labor markets in developed countries, relatively little research has been conducted on this topic using data from developing countries, particularly in Africa. This is surprising given the pervasive unemployment and the implication of efficiency wages for unemployment and the debate about whether wage rigidity contributes to unemployment and loss of global competitiveness. In addition, results from the study can also shed light on the issue of pay inequality.

The aim of this paper is to use data from a panel of manufacturing firms in Kenya to investigate whether worker productivity depends positively on relative wages levels as hypothesized in efficiency wage models. However, positive correlation between relative wage levels and worker productivity does not unambiguously indicate presence of efficiency wage considerations in a firm's wage policy. Therefore, alternative interpretations of the relationship are assessed.

The chapter is organized as follows. In Section 2 we summarize the key points in the efficiency wages literature. Section 3 contains a description of the methodology employed while Section 4 presents estimates of the effect of relative wages on productivity. Section 5 offers concluding remarks.

2. REVIEW OF LITERATURE

Several rationales are advanced for the potential positive wage-productivity relationship. The employer can use wages to induce required effort from the work force (Solow, 1979; Shapiro and Stiglitz, 1984; Bulow and Summers, 1986), reduce labour turnover and hence the associated costs of hiring and training (Salop, 1979; Stiglitz, 1974), and improve quality of job applicants and raise the chances of hiring more productive workers (Weiss, 1980). A firm can also promote a gift exchange relationship whereby the firm pays higher wages to increase workers loyalty and workers reciprocate by working to raise productivity (Akerlof, 1982, 1984).

Analyses of developed country labour markets have paid much attention to the potential efficiency effects of higher relative wages. Some studies focus on the underlying rationales of efficiency wages. For instance, it has been found that wage premium is associated with lower labor turnover (Krueger and Summers, 1988); lower rates of disciplinary dismissals (Cappelli and Chauvin, 1991); lower supervision costs (Leornard, 1987); and greater market shares (Konings and Walsh, 1994).

In recent analysis of African labour markets, attention has focused on whether firm size wage differentials reflect efficiency wages. For instance, Valenchik (1997b) concluded that in Zimbabwean manufacturing the turnover, hiring, and sociological rationales for efficiency wage theory offer potential explanations for firm size wage differentials. In Kenyan manufacturing,

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Manda (2002) found that variables that capture shirking and labor turnover rationales of efficiency wage theory give mixed results in individual earnings function analysis. In another study on Zimbabwe, Valenchik (1997a) analyses wage growth from 1993 to 1994 and concluded that the pattern across sectors does not support the efficiency wage hypothesis.

Other studies (e.g. Azam and Ris, 2001) assess some rationales of efficiency wage theory without necessarily linking it to firm size wage differentials. Using a sample of workers from Ivorian manufacturing they estimated earnings functions and found that firms trade off wages and supervision intensity (proxied by hierarchy ratio). But the wage was not significantly correlated with variables that proxy labor turnover costs.

Azam and Lesueur (1997) set up a model to analyse the relation between wages and monitoring costs in Ivorian manufacturing: Their panel covered 1983 to 1989. They estimated a Cobb-Douglas production function modified to include an effort function, where effort is a function of supervision level. They found that for firms in unprotected sector, that is, investment goods and intermediate goods, the ratio of supervisory staff to total workforce has significant impact on output. But the result does not hold for the highly protected food and agro-industry.

In developed country labour markets the basic prediction of efficiency wages theory: that higher wages are associated with higher productivity has been tested. Wadhwani and Wall (1991) examined 219 manufacturing U.K. firms: They estimated a production function to examine the response of sales to an increase in firm's wage relative to industry wage. They found a positive relationship. Levine (1992) analysed a sample of 2000 business units from 250 large manufacturing firms in North America: the data covered the period from 1970 to 1985. He estimated a production function to test whether the productivity gain from a marginal wage increase is large enough to pay for itself. The results indicate a positive relation between manager's assessment of the firm's relative wage and changes in productivity. The increase in productivity could cover the wage increase. Moreover, the productivity-wage relation was stronger in non-unionized firms than in unionized ones, which strengthened the case for efficiency wage theory.

Huang, Hallam, and Patterno (1998) point out that variation in measures of firm's relative wage used by previous studies could be attributed to differences in human capital across firms. They examined a sample of two-digit manufacturing industries in the U.S.A: the sample period is 1968 to 1991. They estimated a production function including the portion of the wage that is not correlated with human capital as the efficiency wage measure. They found that 88% of the productivity effect of industry wages can be attributed to observable human capital component of the wage while 12% of the productivity effect was attributable to efficiency wages measured by

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the unobserved component of industry wage. In addition, they also found support for the prediction of the Shapiro-Stiglitz shirking model, that the unemployment rate is positively associated with higher output. High unemployment disciplines workers to put more effort so that output increases.

The potential productivity-wage relationship in African labour markets has not been widely investigated. Teal (1995) analysed a survey of 200 Ghanaian manufacturing firms: the panel covered 1993 to 1995. He estimated firm-level log wage equations and production functions to discriminate between efficiency wages and rent-sharing hypotheses.[3] Although the results support rent-sharing theory, it is noted that the interpretation of the comparative test hinges on the validity of instruments. He used the share of intermediate costs in total output and amount of formal borrowing per employee as instruments. The point is that the two variables affect relative wages but not productivity. Söderbom and Teal (2001) investigate the effect of firm size and human capital on earnings and productivity in Ghana. They conclude that the size effect reflects rent sharing rather than efficiency wages (see Teal, 1996 for other evidence of rent-sharing in Ghana).

3. METHODOLOGY

3.1 The Model

The firm hires L workers, K units of physical capital and other factors Z to produce Q units of output. The standard production function for the firm is represented by

$$q = f(L, K, Z) \qquad (1)$$

However, unlike the standard production function, efficiency wage considerations focus on worker efficiency, *e*. In this case what is important is not just the actual units of labour input; it is the efficiency units of labour input, *eL*. This means that in gauging labor's contribution to output, a firm will consider both the number of workers hired and their effort levels. Higher wages increase work effort and hence worker productivity (output per worker). To investigate whether higher relative wages are reflected in higher productivity, this paper considers an efficiency wage model in which the firm's relative wage level affects worker efficiency by augmenting the labor input. It is assumed that the firm's technology is represented by a Cobb-Douglas production function[4]. The production function can be written as:

[3]The rent-sharing theory predicts that higher productivity leads to higher profits and higher profits enable firms to pay higher wages. In contrast, the efficiency wages theory predicts that higher wages lead to higher productivity and higher profits.

[4]Levine (1992), Wadhwani and Wall (1991) and Teal (1995) also used augmented Cobb-Douglas production functions to test for efficiency wages in U.S., U.K., and Ghana respectively.

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$$q_{it} = A_i (eL)^{\beta} K_{it}^{1-\beta} \exp(\sum \gamma_m Z)\varepsilon \qquad (2)$$

Production is subject to time-invariant firm-specific productivity effect (A) such as the ability of managers, and stochastic shocks (ε). Z includes other observed factors that make some firms more or less productive than others. Workers' effort in the efficiency wage model depends on the wage. The effort function can be written as

$$e = \alpha\left(w_f / w_h\right)^{\delta} \qquad (3)$$

where w_f is the actual wage a firm pays and w_h is a predicted alternative (or outside) wage, and α is a parameter. The assumption is that if a worker were to exit the current job, the relative wage is the alternative wage. The labour efficiency parameter, δ varies across firms and over time, while the stochastic component of the model is assumed to be independent of changes in δ, L or K. Substituting (3) into (2) and taking logarithms yields

$$\ln q_{it} = \ln A_i + \beta \ln L_{it} + \beta^{*} \ln(w_f / w_h) + (1-\beta) \ln K_{it} + \sum \gamma_m Z + \varepsilon \qquad (4)$$

Using a differenced form of the production function, Levine (1992) showed that the coefficient on change in relative wage and that on change in employment should be equal if firms maximize profits and pay efficiency wages. Letting workers' effort be labor augmenting implies that the relative wage elasticity of effort is unity, that is, $\beta=\beta^{*}$ in equation (4). This restriction can be tested.

3.2 Data and Model Specification

The data used in this paper are from surveys of manufacturing firms in Kenya. The first is a survey that was part of the World Bank Regional Program on Enterprise Development (RPED) in 1993-95. The second is a UNIDO-financed survey conducted in 2000. In both surveys around 200 firms were visited. There is a panel element in the data especially those generated in the RPED survey. The UNIDO survey traced around 80 of the RPED firms. The surveys used face-to-face interviews with firm managers to administer a pre-prepared questionnaire. In addition a workers questionnaire was administered to a sample of up to ten workers in each firm. The managers provide a wide range of firm-level information; while workers provide information on personal characteristics, wages, and occupations among other information. Thus employers and employees can be matched.

The measures of firm's relative wage in the literature include the ratio of firm wage to industry wage (Wadhwani and Wall, 1991 and Levine, 1992); ratio of firm wage to wage in local labor

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market (Cappelli and Chauvin, 1991) and the ratio of actual firm level wage to the wage predicted by human capital embodied in the work force (Teal, 1995). Huang et. al. (1998) used residuals from firm level wage function.

The measure of relative wage used in this paper is the ratio of firm level wage per employee to wage per employee predicted by human capital in the firm (see Teal, 1995). The level of wage per employee is regressed on average age, average education, and average tenure in the firm. The three variables explain 12.4% of the variation in wage per employee in the firm. The fitted values from this regression indicate the level of wage per employee the firm would pay given its endowment of human capital.[5] If the actual average wage is higher than the average wage predicted by human capital variables, the question to investigate is whether it reflects efficiency wage consideration in firms' wage policy. The distribution of the log of this measure of relative wage is plotted in Figure 1 for each wave, with the normal distribution superimposed.

To test whether the efficiency wage hypothesis holds in Kenyan manufacturing, we specify an augmented production function. The dependent variables are log value added and log value added per employee. Value added is measured as the gross output minus cost of intermediate inputs and deflated by a firm-specific output deflator. Figure 2 shows the distribution of log value added per employee for each of the waves. The variable is well behaved.

Apart from the measure of relative wage, the explanatory variables included in the production functions are labor, capital or capital-labor ratio, and measures of human capital. Other aspects of heterogeneity across sectors, union status, foreign ownership status, and location are captured by dummy indicator variables. Time dummies for survey waves are also included to capture aggregate time effects that have same influence on value added of all firms. Labor input is measured as the number of workers in the firm. Physical capital is the total value of machines and equipment. The firm-level measures of human capital (average education, age, tenure) are weighted averages (see Bigsten et. al. 2000 on the procedure used to construct firm-level averages of human capital from individual workers data). The addition of human capital variables in the production function reduces the possibility that our measure of relative wage reflects some effect captured by these variables.[6]

[5]We computed an alternative measure of the relative wage as the ratio of the wage per employee in a firm to the wage per employee in the sector. The correlation between this measure and the one we use is over 0.90.

[6]Söderbom and Teal (2001) point out that adding the earnings term in a production function that also controls for inter-firm differences in human capital is equivalent to addition of earnings premium.

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4. EMPIRICAL RESULTS

Ordinary least squares regression on pooled cross-sections of the four survey waves produces the value added production function estimates in Table 1, column (1). Labour, physical capital, human capital (education and age), sector, foreign ownership, and location in Nakuru and Eldoret have significant impact on log value added. The sum of the coefficients on labour and capital is approximately unity, which suggests constant returns to scale. Pooled OLS regression ignores the panel nature of the data. It assumes that observations for a given firm are serially uncorrelated and random errors have constant variance across firms and waves.

Columns (2) and (3) present results of estimation by random effects and fixed effects (Within-Groups) estimators respectively. The Hausman specification test does not reject the null hypothesis (χ^2= 7.07; p-value =0.63).[7] Given this result, the random effects specification is preferred. The move from pooled OLS to the random effects model leads to loss of significance for education and foreign ownership status. The coefficients of other variables are similar to those of pooled OLS.

Table 1: Value Added production Equations for Kenyan Manufacturing Industry (Without controlling for Relative Wage)

	OLS	Random Effects	Fixed Effects
Ln (Labour)	0.8115	0.8177	0.5833
	(12.512)***	(11.812)***	(3.836)***
Ln (physical capital)	0.2003	0.1913	0.0591
	(4.735)***	(5.014)***	(0.310)
Average age	0.0199	0.0223	0.0317
	(1.709)*	(1.886)*	(1.867)*
Average education	0.0620	0.0435	0.0090
	(2.054)**	(1.364)	(0.191)
Average tenure	-0.0084	-0.0169	-0.0227
	(0.530)	(0.947)	(0.895)
Wood sector	-0.5315	-0.4894	
	(3.647)***	(2.938)***	
Textile sector	-0.5892	-0.5198	
	(4.418)***	(3.106)***	
Metal sector	-0.4235	-0.3619	

[7] Hausman (1978) suggested a test to check if unobserved effects are correlated with regressors. Under the null hypothesis of no correlation, random effects and fixed effects estimators are consistent, but while the random effects estimator is efficient, the fixed effects estimator is not. Under the null the difference in coefficients is not systematic.

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	(2.912)***	(2.198)**	
Union status	0.1461	0.2093	0.3824
	(1.159)	(1.483)	(1.579)
Foreign ownership status	0.2659	0.2417	
	(1.963)*	(1.501)	
Firm located in Mombasa	-0.1700	-0.1913	
	(1.286)	(1.292)	
Firm located in Nakuru	-0.5498	-0.5503	
	(2.879)***	(2.867)***	
Firm located in Eldoret	-0.5122	-0.5190	
	(3.346)***	(2.512)**	
Wave 2	0.0202	0.0256	0.0628
	(0.137)	(0.217)	(0.491)
Wave 3	0.0846	0.1197	0.1727
	(0.642)	(0.986)	(1.239)
Wave 4	-0.4282	-0.3820	-0.3463
	(3.126)***	(2.626)***	(1.626)
Constant	3.4919	3.6567	5.9091
	(7.239)***	(7.163)***	(2.073)**
No. of Observations	641	641	641
R-squared	0.763		0.103
Number of firms		319	319

Robust t statistics in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%

Table 2 reports the production function in Table 1 with the relative wage included as an additional explanatory variable. Table 3 reports estimates of a productivity equation with relative wage included also. Section 3 indicated that if firms maximize profits and pay efficiency wages, the relative wage elasticity of effort would be unity. That is, the coefficient on relative wage will equal that on labour. Based on parameter estimates in Table 2, the ratio of the coefficient on relative wage to the coefficient on labour ranges from 0.5 in the fixed effects regression to 0.7 in the OLS. This may imply that firms are already exploiting the productivity effect of efficiency wages.

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Table 2: Value Added production Equations for Kenyan Manufacturing Industry (With Control for Relative Wage)

	OLS	Random Effects	Fixed Effects
Ln (Labour)	0.9161	0.9232	0.7886
	(14.188)***	(14.906)***	(5.181)***
Ln (Physical capital)	0.1237	0.1157	-0.0447
	(3.105)***	(3.377)***	(0.242)
Ln(Relative wage)	0.6467	0.6134	0.4116
	(8.945)***	(11.158)***	(4.991)***
Average age	0.0274	0.0293	0.0376
	(2.674)***	(2.697)***	(2.297)**
Average education	0.0973	0.0872	0.0391
	(3.405)***	(2.973)***	(0.857)
Average tenure	0.0014	-0.0051	-0.0208
	(0.100)	(0.314)	(0.853)
Wood sector	-0.4751	-0.4424	
	(3.619)***	(3.111)***	
Textile sector	-0.5090	-0.4684	
	(4.115)***	(3.266)***	
Metal sector	-0.3757	-0.3343	
	(2.891)***	(2.371)**	
Union status	0.0506	0.0957	0.3437
	(0.415)	(0.756)	(1.471)
Foreign ownership status	0.1627	0.1384	
	(1.222)	(1.007)	
Firm located in Mombasa	-0.0438	-0.0556	
	(0.376)	(0.436)	
Firm located in Nakuru	-0.2111	-0.2382	
	(1.262)	(1.434)	
Firm located in Eldoret	-0.1424	-0.1652	
	(0.890)	(0.921)	
Wave 2	0.0251	0.0293	0.0669
	(0.181)	(0.258)	(0.542)
Wave 3	-0.0547	-0.0333	0.0713
	(0.465)	(0.286)	(0.525)
Wave 4	-0.6774	-0.6442	-0.4644
	(5.746)***	(4.711)***	(2.248)**
Constant	3.7233	3.8373	6.4198
	(8.541)***	(8.521)***	(2.336)**

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No. of Observations	641	641	641
R-squared	0.807		0.170
Number of firms		319	319

Robust t statistics in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%

In Table 3, estimates for the productivity regressions are reported. Column (1) reports the pooled OLS regression. The significant determinants of productivity are; the capital-labor ratio, human capital (education and age), and sector of business. The coefficient on log of relative wage is 0.65. Productivity is positively correlated with relative wage. Column (2) is the random effects estimator. Hausman specification test rejects the specification although not very strongly (χ^2 = 16.43; p-value=0.0879).

Table 3: Value Added (per worker) production Equations for Kenyan Manufacturing Industry (Controlling for Relative Wage)

	OLS	Random Effects	Fixed Effects
Ln (Labour)	0.0398	0.0388	-0.2561
	(1.006)	(0.848)	(1.138)
Ln (capital/worker)	0.1237	0.1157	-0.0447
	(3.105)***	(3.377)***	(0.242)
Average age	0.0274	0.0293	0.0376
	(2.674)***	(2.697)***	(2.297)**
Average education	0.0973	0.0872	0.0391
	(3.405)***	(2.973)***	(0.857)
Average tenure	0.0014	-0.0051	-0.0208
	(0.100)	(0.314)	(0.853)
Ln (Relative wage)	0.6467	0.6134	0.4116
	(8.945)***	(11.158)***	(4.991)***
Wood sector	-0.4751	-0.4424	
	(3.619)***	(3.111)***	
Textile sector	-0.5090	-0.4684	
	(4.115)***	(3.266)***	
Metal sector	-0.3757	-0.3343	
	(2.891)***	(2.371)**	
Union status	0.0506	0.0957	0.3437
	(0.415)	(0.756)	(1.471)
Foreign ownership status	0.1627	0.1384	
	(1.222)	(1.007)	
Firm in Mombasa	-0.0438	-0.0556	
	(0.376)	(0.436)	

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Firm in Nakuru	-0.2111	-0.2382	
	(1.262)	(1.434)	
Firm in Eldoret	-0.1424	-0.1652	
	(0.890)	(0.921)	
Wave 2	0.0251	0.0293	0.0669
	(0.181)	(0.258)	(0.542)
Wave 3	-0.0547	-0.0333	0.0713
	(0.465)	(0.286)	(0.525)
Wave 4	-0.6774	-0.6442	-0.4644
	(5.746)***	(4.711)***	(2.248)**
Constant	3.7233	3.8373	6.4198
	(8.541)***	(8.521)***	(2.336)**
Observations	641	641	641
R-squared	0.378		0.126
Number of firms		319	319

Robust OLS t statistics and RE and FE z-statistics in parentheses* significant at 10%; ** significant at 5%; *** significant at 1%

The coefficient on the log relative wage is 0.41 and significant at 1% level of significance. In Ghana Teal (1995) found an OLS coefficient of 0.49 and 0.45 in a first differenced equation. For the U.S.A., the elasticity reported by Levine (1992) is 0.46. Levine (1992) showed that if firms pay efficiency wages the labour share parameter and the relative wage elasticity would be equal. The labour share parameter in the production function falls from 0.81 in OLS and RE regressions to 0.58 in the fixed effects regression. The coefficient on relative wage term in the productivity equation is approximately 0.65 in OLS and RE models and 0.41 in FE model. The corresponding estimates for Ghana are 0.54 and 0.45 (Teal, 1995).

The presence of unions leads to an additional test for efficiency wages (Levine, 1992). Where unions are effective, they can extract a wage premium above the efficiency wage a firm would pay voluntarily. But at wage levels above the efficiency wage, productivity would diminish. The hypothesis is that efficiency wage considerations in a firms' wage policy would be weaker in unionized firms where workers can raise wages through the bargaining mechanism, than in non-union firms. This may be the case in Kenyan manufacturing where evidence (see Manda, Bigsten and Mwabu, 2005) indicates positive union wage premium. To test if the effect of relative wage varies by union status, we extend the productivity equation by including the interaction between union status and relative wage. The coefficient on this term is negative and significant (production function estimates not shown but available). This suggests that the productivity effect of higher wages is lower in firms with some unionized labour. Levine (1992) found a similar result for the U.S.

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The significant effect of relative wage on productivity and closeness of the labour share parameter and relative wage elasticity suggest that firms in Kenyan manufacturing pay efficiency wages. An increase in relative wage is associated with increase in productivity, controlling for human capital, capital intensity, sector of operation, firm location, and year of survey. However, such findings can be consistent with alternative theories (Levine, 1992). First, when job search and mobility are costly, firms hit by short run positive productivity shocks can increase wages to attract workers. Second, the productivity effect of relative wage may reflect differences in labour quality across firms. Because we control for observed inter-firm differences in human capital, the possibility is minimized. Also, firm fixed effects may control for unobserved labour quality.

Third, the positive relationship between relative wage and productivity might reflect compensating wage differentials. To the extent that working conditions vary systematically across firm size, sectors, and location, these are controlled for in the regressions. Fourth, a rent-sharing interpretation is that higher productivity leads to higher profits and greater ability to pay higher wages. For a rent-sharing interpretation to hold, the coefficient on the relative wage term should be inverse of the profit elasticity of relative wage (Teal, 1995). This is not the case in these data. Table 4 presents the relative wage regressions, which include profit per employee-a measure of potential rents or firms' ability to pay.

Table 4: Determinants of relative wage for Kenyan Manufacturing Industry

	OLS	Random Effects	Fixed Effects (Within)
Ln (Labour)	-0.0312	-0.0358	-0.2773
	(0.982)	(1.058)	(1.644)
Ln (capital/worker)	0.0727	0.0881	0.2486
	(2.872)***	(3.331)***	(1.898)*
Average age	-0.0163	-0.0159	-0.0081
	(2.316)**	(2.005)**	(0.628)
Average education	-0.0672	-0.0673	-0.0481
	(2.821)***	(3.058)***	(1.334)
Average tenure	-0.0074	-0.0080	-0.0015
	(0.659)	(0.675)	(0.083)
Ln (Profit/worker)	0.1785	0.1588	0.0387
	(5.560)***	(6.404)***	(0.995)
Wood sector	0.0159	-0.0165	
	(0.159)	(0.154)	
Textile sector	-0.0852	-0.0928	

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	(0.926)	(0.852)	
Metal sector	0.0275	-0.0049	
	(0.281)	(0.047)	
Union status	0.0681	0.0808	0.1793
	(0.855)	(0.857)	(0.957)
Foreign ownership status	0.0646	0.0875	
	(0.678)	(0.854)	
Firm located in Mombasa	-0.1681	-0.1676	
	(1.875)*	(1.762)*	
Firm located in Nakuru	-0.4154	-0.3942	
	(4.243)***	(3.177)***	
Firm located in Eldoret	-0.5153	-0.5060	
	(4.588)***	(3.793)***	
Wave 2	-0.0649	-0.0607	-0.0414
	(0.725)	(0.709)	(0.431)
Wave 3	0.1952	0.2041	0.2178
	(2.126)**	(2.398)**	(2.129)**
Wave 4	0.5198	0.5162	0.3061
	(4.818)***	(5.134)***	(1.962)*
Constant	-0.8293	-0.8760	-1.7939
	(2.548)**	(2.583)***	(0.892)
Observations	551	551	551
R-squared	0.224		0.158
Number of firms		299	299

Robust OLS t statistics and RE and FE z-statistics in parentheses* significant at 10%; ** significant at 5%; *** significant at 1%

We see that the inverse of the coefficients on this variable are larger than the coefficients on the relative wage term in Table 3. This casts doubt on the rent-sharing interpretation of the positive correlation between relative wage and productivity. The OLS and RE regressions indicate that the higher the profit per employee, the proxy for rents, the higher the relative wage. However, when the firm fixed effects are assumed to be constant (FE regression), the significance of the profit per worker term vanishes and its size falls. Since the Hausman test rejected the RE specification, we conclude from the FE specification that there is no evidence of a significant effect of profits on relative wage.

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5. CONCLUDING REMARKS

The objective of this study was to investigate whether efficiency wage theory offers a possible source of labour market inefficiency using a panel of firms from Kenyan manufacturing sector. The empirical evidence obtained suggests that relative wages and value added per worker are positively related as efficiency wage theory predicts. In the analysis, we control for unobserved firm fixed effects, observed inter-firm differences in human capital, and variables (e.g. sector, union status, ownership status) that may capture compensating wage differentials. Further, the productivity effect of relative wage is higher in firms without some unionized labour as efficiency wage theory would predict. In addition, evidence from a fixed effects relative wage regression indicates insignificant impact of profits per employee, suggesting that the positive productivity effect of relative wage may not be reflecting rent-sharing. The results imply that even in the absence of union wage effects or distortions from minimum wages, firms may not fully adjust real wages even when faced with enormous labour supply pressure, leading to labour market segmentation and inefficiency. Future studies can consider the channels through which the productivity-enhancing relative wage effect operates and whether productivity increases adequately to pay for the efficiency wage. An additional issue to consider is whether the relative wage premium is really an efficiency wage or a type of unobserved human capital not picked up by observable human capital characteristics controlled for in the analysis. Finally, it is important to test whether or not the minimum wage in Kenya is an efficiency wage.

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