JOURNAL OF ECONOMIC DEVELOPMENT 137
Volume 29, Number 1, June 2004

DO LARGE EMPLOYERS PAY MORE? THE CASE OF FIVE DEVELOPING AFRICAN COUNTRIES

ERIC STROBL AND ROBERT THORNTON*

CORE, Université Catholique de Louvain and Lehigh University

Using comparable data sets for five African countries, we evaluate possible explanations for the employer-size wage effect across these countries. Our results indicate that, apart from observable worker characteristics, most theories cannot explain very much of the wage premium received in larger firms. Moreover, we find that the employer-size wage effect does not differ greatly across the five African countries. As is the case with other developing nations, however, the effect is larger than that found in the industrialised world, though unlike the industrialised world it is larger for white collar workers than for blue collar workers. Data for one of the African countries, in conjunction with other evidence, suggest that this may in part be the result of skill-biased technology having a greater effect on the firm's size-wage distribution across skill groups in developing countries.

Keywords: Employer Size Wage Effect, Firm Size Wage Premium
JEL classification: O0, J4

1. INTRODUCTION

The fact that larger firms appear to pay higher wages than smaller firms for equally productive workers was noted as early as Moore (1911). However, despite a re-emergence of interest in this aspect of the labour market in the late 1980s,[1] the availability of richer data sets, and the use of more sophisticated statistical techniques, there has been little consensus on the cause of this empirical observation.[2] This phenomenon is also not confined solely to the developed world. Recently a number of studies have confirmed the existence of what is often termed the firm-size wage effect in

* We are grateful to the CSAE for provision of the data. In particular we would like to thank Francis Teal for his help and advice on numerous matters regarding the data. Thanks are also due to Holger Goerg for comments and Eric Fishbein for research assistance.

[1] See Brown and Medoff (1989) and Evans and Leighton (1989).

[2] For a recent review of the literature see Oi and Idson (1999).

a number of developing nations as well; see, for example, Little *et al*. (1987), Schaffner (1998), Mazumdar and Mazaheri (1999), Velenchik (1997), and Marcelle and Strobl (2003). Moreover, the wage premium associated with working in larger firms appears to be larger in developing countries than in developed countries, a feature that also remains as of yet unexplained. (Biggs and Srivastava (1966, p. 33))

Unearthing the causes of the employer-size wage effect in developing countries is important for a number of reasons. First, because labour markets in developing countries differ in many respects from those in the developed world, exploring the firm-size wage premium in these countries can provide further pieces to the puzzle. Secondly, the employer-size wage effect is likely to add to income inequality, which already tends to be high in developing countries. While clearly the understanding of and reduction in income inequality is a complex issue, if the firm-size wage effect is large, its role in policy formulation cannot be ignored. In particular, development agencies and policy makers often view small firms as alternative employers for surplus labour and as a means to achieve more productive employment and more equitable distribution of the benefits of growth (Biggs *et al*. (1998)).

In this paper we use the Regional Programme for Enterprise Development (RPED) database to investigate the firm-size wage effect for five African countries: Cameroon, Ghana, Kenya, Zambia, and Zimbabwe. Using this particular data set has a number of advantages. While most theoretical explanations for the employer-size wage effect stress the matching of employers and employees as the driving force, studies have traditionally used either worker or workplace data independently. Only in the last few years have researchers gained access to employer-employee matched data that have allowed them to evaluate these theoretical explanations more accurately. (See, for instance, Reilly (1995) and Trotske (1999)) The RPED data set is unique in that it is one of the only employer-employee matched data sets for developing countries and, hence, is ideally suited for our purposes. Specifically, the RPED data set provides comparable data for the countries that it covers.

Our paper is not the first to use the RPED data to examine the firm-size wage effect in Africa. Previously, Velenchik (1997) explored a large number of explanations for the wage premium for employees of large firms using the Zimbabwe data and found that a sizeable portion of the premium remained unexplained. Mazumdar and Mazaheri (1999) examined the impact of labour productivity on the firm-size wage effect for Ghana, Kenya, Zambia, and Zimbabwe using a somewhat different approach than what has become the norm in the literature, namely by simultaneously estimating wage and labour productivity determination equations under the assumption that the capital-labour ratio does not affect an individual's wage directly. Although they found that more of the employer-size wage effect could be explained with their approach in terms of economies of scale and capital intensity effects, a large portion still remained unaccounted for.

The current paper adds to the existing literature in a number of ways. First of all, ours is one of the few studies for developing countries that can address a large variety of explanations of the firm-size wage premium by taking advantage of a rich employer-

employee matched data set.[3] Moreover, because of the comparability of the data across the five countries in our analysis, we are able to explicitly focus on cross-country comparisons of the firm-size wage effect, thus providing a further dimension with which to evaluate the validity of the many proposed explanations. This latter aspect is particularly important in that previous studies, both for developing and developed countries, that have addressed international comparisons have all been somewhat limited by the lack of strict comparability of data sets. The RPED was specifically designed and collected to circumvent such problems.[4]

The paper proceeds as follows. In the next section (Section 2) we briefly describe our data set and present summary statistics relevant to examining the firm-size wage effect. We then (in Sections 3 and 4) systematically address and test for alternative explanations of the firm-size wage premium in our five African countries. In Section 5 we compare our results with those found for other developing and developed nations and provide concluding remarks in the last section.

2. THE RPED DATA SET[5] AND SUMMARY STATISTICS

The data used in this study are drawn from three years (1991-93) of the RPED survey for Cameroon, Ghana, Kenya, Zambia, and Zimbabwe. These data are part of a cross-country panel employer-employee matched data set compiled by the RPED at the World Bank. In each of the five countries, approximately 200 enterprises were surveyed across four sectors - food processing, wood and furniture, textiles, and metalworking - with these sectors comprising about eighty percent of manufacturing employment. Additionally, within each firm approximately ten workers were individually interviewed. The firms were selected on the basis of size in order to generate a sample representative of the complete size distribution of firms in the manufacturing sectors of these countries, whereas the workers were selected in a random fashion. Apart from the matched information on firms and employees, the fact that the data were collected in all five countries at about the same time and with more or less identical questionnaires makes the data particularly well-suited for cross-country comparisons.

The data constituting the variables used in this study were generously made available to the authors by the Centre for the Study of African Economies (CSAE) at Oxford. In addition, we used more detailed data available for Ghana, also made publicly available by CSAE. Definitions of all variables used are given in the Appendix. For the purposes of this paper, we excluded all data derived from firms with any state ownership and all

[3] Even for developed countries most studies in the past have not had access to employer-employee matched data. Exceptions include Reilly (1995) and Trotske (1999).

[4] See, for instance, Schaffner (1998), Marcelle and Strobl (2003), and Albaek *et al.* (1998).

[5] The data description is mostly take from Biggs *et al*. (1998).

data on apprentices. It should also be noted that, as in most previous studies, our measure of the wage rate and worker characteristics is at the worker level and, given the employer-employee matched nature of our data, that we supplement this worker level information with firm-level variables.[6]

Table 1. Summary Characteristics - All Firms[1]

	Cameroon	Ghana	Kenya	Zambia	Zimbabwe
Size (mean)	112	52	97	80	350
Size (st. dev.)	395	80	247	181	671
Hourly Wage (mean)	3.66	0.89	4.81	1.85	4.31
Hourly Wage (st. dev.)	1.91	0.55	2.36	1.36	1.73
FAge	10	14	18	N/A	25
Union (% Firms)	38.0	31.9	47.5	43.3	78.9
Union (% Emp.)	28.1	69.9	34.6	34.8	49.6
Foreign	31.8	19.7	16.5	13	25.6
K/L	26,884	7,786	19,021	17,070	23,446
% Skill	51.2	15.0	88.7	81.2	73.9
% Univ.	15.4	1.5	10.7	10.0	8.9
% Sec.	55.8	24.5	59.1	52.1	41.9
% Sec. Man.	50.7	16.3	39.7	42.4	34.3
% Univ. Man.	19.5	3.4	4.5	8.2	4.4
% Supvis.	26.1	7.5	64.5	58.5	54.2

Note: [1] For detailed definitions of variables see Appendix.

In Table 1 we have calculated some summary statistics concerning our sample of firms for each country. Among the more important characteristics to note are that firms

[6] Another point regarding the use of the data for the analysis of the firm-size wage premium is noteworthy. Given the employer-employee nature of our data, one could argue that in all our econometric specifications we should control for both worker- and firm-level fixed effects. There are a number of reasons why we do not do this. Firstly, with regard to worker-level fixed effects, while the RPED data allow one to link firms over time, workers are neither given a code that would allow them to be traced across interviews nor are they specifically chosen so as to be re-interviewed. With regard to firm-level fixed effects, there is not enough time variation in firm size or in our other firm level explanatory variables across the (maximum of) three annual observations per firm to allow for this. For example, over 95 per cent of the variation in firm size is due to the variance across firms; therefore purging a firm fixed effect from any estimation would be purging the very thing we are trying to explain. Regardless of these limitations, one should note that the set of firm and worker level explanatory variables is arguably rich enough to account for almost any potentially biases due to those normally unobserved time invariant factors.

in Zimbabwe are on average substantially larger in terms of numbers of workers than in the other African countries while those in Ghana are smaller. We also find that the mean hourly wage rate, converted to $US at purchasing power parity, varies considerably across the manufacturing sectors of the five countries. For instance, Ghana is characterized by the lowest average hourly wage rate, with firms in Kenya having an average hourly wage rate more than five times that in Ghana. It is clear from these averages that the countries with the largest average firm-sizes do not necessarily also have the highest average wage rates. Table 1 also reveals that there are significant differences across the countries with respect to other firm characteristics such as unionization, capital intensity, and the distribution of skill levels.

3. THE BASIC EMPLOYER-SIZE WAGE PREMIUM

We have already noted that from the firm level averages there appears to be no strong relationship between employment size and the hourly wage rate *across* countries. Of course, as the standard deviations show (see Table 1 again), there is considerable variation *within* countries. Hence we plotted for each country the average wage rate in each firm against its size for each country (with all values in logged terms). As we found, there clearly exists a positive relationship between the average hourly wage rate and the size of a firm. Moreover, in all five countries this relationship appears to be reasonably linear, although the slopes differ somewhat.

In order to estimate the employer-size wage relationship and derive the most rudimentary employer-size wage premium, we first simply regressed the logged values of the hourly wage rate on the logged values of firm employment for the given sample of workers for each country, controlling only for year-specific effects with time dummies. The resulting coefficients of this exercise are given in the summary Table 2 (line 1).[7] As can be seen, the hourly wage rate of workers is positively and significantly related to employer size in all five countries, with the coefficients roughly of the same magnitude.

Of course, to assess the impact of the employer-size wage effect on the actual wage distribution one must take into account differences in the size distribution of firms across countries. Following Brown and Medoff (1989), we define the magnitude of the employer-size wage premium as twice the product of the coefficient of log employment and the standard deviation of log employment (within each country). Our estimate can then simply be interpreted as the percentage wage premium received by employees in a firm whose size is one standard deviation above the mean log employment relative to the wage premium received by employees in firms one standard deviation below the mean log employment. The derived wage premiums corresponding to the estimated coefficients for the previous regression and for all following regressions are reported in

[7] More detailed results of these and all other regressions are available from the authors.

Table 3. As can be seen in line 1 of Table 3, clearly differences in the size distribution matter in terms of assessing the premium across countries. Using our definition we find that the gross wage premium ranges from 57.1 percent in Kenya to 72.3 percent in Zimbabwe.

Table 2. Summary Table: Employer-Size Wage Effects[1] (Regression Coefficients)[2]

	Sample	Controls[3]	Cameroon	Ghana	Kenya	Zambia	Zimbabwe
(1)	All workers	None	0.277	0.250	0.185	0.243	0.234
(2)	All workers	F	0.234	0.215	0.157	0.197	0.203
(3)	All workers	F,W	0.098	0.114	0.090	0.096	0.138
(4)	All workers	F,W,K	0.099	0.109	0.088	0.096	0.125
(5)	All workers	F,W,S	0.100	0.105	0.095	0.098	0.136
(6)	All workers	F,W,P	0.101	0.100	0.092	0.085	0.137
(7)	All workers	F,W,A	0.102	0.130	0.089	N/A	0.126
(8)	All workers	F,W,U	0.099	0.084	0.095	0.093	0.142
(9)	Non-Man.	F,W,E	0.079	0.068	0.087	0.088	0.125
(10)	Non-Man.	F,W	0.084	0.111	0.087	0.089	0.119
(11)	Non-Man.	F,W,M	0.087	0.111	0.093	0.118	0.111
(12)	All workers	F,W, all other signif. controls	0.097	0.116	0.088	0.081	0.127
(13)	White Collar	F,W	0.117	0.162	0.095	0.122	0.247
(14)	Blue Collar	F,W	0.072	0.086	0.083	0.074	0.098

Notes: [1] All regressions include year dummies. [2] All coefficients are statistically significant at least at the five percent level. [3] Control Variables: W - worker characteristics; F - firm characteristics; S - skill level of firm; K - capital/labour ratio; P - firm profit; A - firm age; U - firm level union density; E - educational level of managers; M - percentage of managers.

Table 3. Summary Table: Magnitudes of Employer-Size Wage Premiums[1]

	Sample	Controls[2]	Cameroon	Ghana	Kenya	Zambia	Zimbabwe
(1)	All workers	None	66.8	57.3	57.1	63.8	72.3
(2)	All workers	F	56.5	49.2	48.4	51.7	62.7
(3)	All workers	F,W	23.6	26.1	27.8	25.2	42.6
(4)	All workers	F,W,S	24.1	24.0	29.3	25.7	42.0
(5)	All workers	F,W,K	23.9	25.0	27.1	25.2	38.6
(6)	All workers	F,W,P	24.4	22.9	28.4	22.3	42.3
(7)	All workers	F,W,A	24.6	29.8	27.5	N/A	38.9
(8)	All workers	F,W,U	23.9	19.2	29.3	24.4	43.9
(9)	Non-Man.	F,W,E	19.1	15.6	26.8	23.1	38.6
(10)	Non-Man.	F,W	20.3	25.4	26.8	23.4	36.8

Table 3. (Continued)

Sample	Controls[2]	Cameroon	Ghana	Kenya	Zambia	Zimbabwe
(11) Non-Man.	F,W,M	21.0	25.4	28.7	31.0	34.3
(12) All workers	F,W, all other signif. controls	23.4	26.6	27.1	21.3	39.2
(13) White Collar	F,W	28.2	37.1	29.3	32.0	76.3
(14) Blue Collar	F,W	17.4	19.7	25.6	19.4	30.3

Notes: [1] Calculated as twice the product of the coefficient of log firm-size and the standard deviation of log employment. The standard errors of log employment were 1.20653, 1.145184, 1.542234, 1.313117, and 1.544475 for Cameroon, Ghana, Kenya, Zambia, and Zimbabwe, respectively.

[2] Control Variables: W - worker characteristics; F - firm characteristics; S - skill level of firm; K - capital/labour ratio; P - firm profit; A - firm age; U - firm level union density; E - educational level of managers; M - percentage of managers.

4. POSSIBLE EXPLANATIONS FOR THE EMPLOYER-SIZE WAGE PREMIUM - EMPIRICAL ANALYSIS

We have thus far shown that on average large employers pay higher wages in all five of our African countries. However, worker and firm characteristics may differ across firm size, and these differences must be controlled for. Moreover, there are a number of theories that seek to explain why large employers tend to pay more. In order to evaluate these theories further, we estimate below the following model of wage determination:

$$\ln w_i = \alpha + \ln E_i \beta + Z_i \lambda + X_i \partial + \mu_i \quad (1)$$

where $\ln w_i$ is the logged value of the worker's hourly wage rate (in PPP $US), $\ln E_i$ is the (logged) employment size of the firm in which the individual is employed, Z_i is a vector of firm-specific characteristics, X_i is a vector of worker-specific observable characteristics, and μ_i is a worker-specific error term. The approach that we will use is one that is standard in the literature: namely, we systematically add various control variables to Equation (1) to evaluate various potential explanations for the employer-size wage premium. The control variables that we use to evaluate these potential explanations are the following:

- Various firm characteristics (e.g. foreign ownership, location, industry group);
- Observed worker characteristics (gender, tenure, age, education, occupation);
- Capital-labour ratios;
- Average worker skill levels;
- Sharing of monopoly profits;
- Age of firm;

- Union avoidance;
- Manager skill levels;
- Efficiency wages;
- The desire to reduce worker turnover;
- The desire to avoid paying worker benefits.

In the remainder of this section, we discuss each of the control variables and the extent to which they are able to explain the employer-size wage premium for our five African countries.

Firm Characteristics

Clearly there are many factors affecting the wage rates that individuals receive. For example, in their classic study Krueger and Summers (1988) show that there are differences across industries. Also, it has been shown that foreign firms tend to pay higher wages than domestic firms, probably due to the formers' greater use of technology. (See for instance Aitken *et al*. (1996)). Furthermore, if labour markets are at least to some degree regional, then the location of a firm may be an important determinant of wages, in part due to differences in labour market tightness and differences in the cost of living. If these factors are unevenly distributed across firm-size, then they may provide some explanation as to why larger firms pay higher wages.

Indeed our data set allows us to identify whether firms are foreign-owned, whether they are located in the country's capital city, and in which broad industry group within manufacturing they belong (e.g., textiles). According to raw correlations of these and other variables with firm size, we find that larger firms are more likely to be foreign-owned. Furthermore, in all countries except Kenya larger firms are more likely to be located in the capital city, although the correlation coefficients here are fairly low. From these correlations it is also apparent that the sectoral locations of firms by size are not necessarily similar across countries. The results of including these firm characteristics as explanatory variables in Equation (1) are given in our summary Table 2 (line 2). Not surprisingly, we find that foreign firms and firms located in the capital city pay higher wages in all five countries. Additionally, the significance of at least some of the industry dummies in all countries is in line with what has been found in the literature on inter-industry differentials. Most importantly, though, while the coefficient on firm size is reduced for all five countries, the magnitude of the reduction is generally not large and is insignificant in all cases. Nevertheless, as Table 3 (line 2) shows, even small changes in the coefficient can substantially alter the magnitude of the wage premium, reducing it by about ten percentage points in all five countries.

Observable Worker Characteristics

According to Becker's (1962) theory of human capital, observed wage differences compensate for skills of workers, so that no worker should receive above-market wages given his/her skill level and experience. We therefore next investigate whether observable worker characteristics can explain the employer-size wage effect in the five African countries. The worker characteristics available to us were gender, tenure, age, education, and occupation. The results of including these variables in the wage regressions are reassuring in the sense of giving the expected and significant signs for most countries. Most importantly, however, when we compare these results (summarized in Table 2, line 3) with the prior results in Table 2, we find that the inclusion of observable worker characteristics substantially reduces the magnitude of the coefficients on firm size - in the case of Cameroon and Zambia more than halving their magnitudes. This finding has clear implications for the magnitude of the employer-size wage premium as we have measured it here, reducing it between 20 and 30 percentage points, as shown in Table 3 (line 3). Overall, our results suggest that observable worker characteristics are important determinants of the hourly wage rate, and that these characteristics are unevenly distributed across firm size. Specifically, large firms tend to hire those workers with higher levels of observable human capital. This finding is also consistent with what has been found in other studies for both developing and developed countries. In the remainder of this paper, therefore, as we test various explanations, all of our regressions will include both firm and worker characteristics, and we will refer to this as our "base specification" of Equation (1).

Unobserved Worker Skill Levels

We realize, of course, that our limited number of worker control variables may not be adequately proxying all skill differences across workers. In other words, differences in *unobserved* worker ability are also likely to be an important determinant of the employer-size wage effect. One of the earliest related theories in this regard is the capital-skill complementarity hypothesis of Hamermesh (1980), based on the model by Lucas (1978). According to this hypothesis, the most skilled managers manage the largest firms, both in terms of the number of workers and the size of the capital stock. If labour and capital are complements, then these managers will hire the most skilled workers and will have to pay these workers more. In order to assess this explanation, we therefore include the capital-labour ratio (as did Troske (1999)) in our "base regression" along with firm and worker characteristics.

When we calculate the correlations of the capital-labour ratio (K/L) with firm-size, we find that larger firms do tend to have higher capital intensities, although the correlation is not very strong for any of the countries. The coefficient of this explanatory variable in Equation (1) with worker and firm characteristics is, however, significant only for the Ghana, Kenya, and Zimbabwe data sets. Furthermore, as can be seen from

Table 2 (line 4), it only slightly lowers the coefficient on firm-sizes for Kenya and Zimbabwe, and the changes turn out to be statistically insignificant. Thus, the capital intensities of firms cannot account for the employer-size wage premiums observed in our five African countries. Similar results were also found by Troske (1999) and Reilly (1995) for the U.S and Canada, respectively.

Average Worker Skill Levels

Troske (1999) has argued that the *average* skill level of the workforce in a firm may also be important. Specifically, employers may find it more profitable to match workers with high skill levels with other workers with high skill levels. If there are greater fixed costs associated with hiring and training more skilled workers rather than less skilled ones, then large firms would be more likely to match together highly skilled workers.[8] In order to determine the possible contribution of this explanation to the firm-size wage effect, Troske (1999) includes the average level of experience, education, and occupation status as explanatory variables in his wage regression. We similarly examine this possibility by including the proportion of the workers in a firm who have completed secondary and university education (% Sec and % Univ) respectively and the mean level of potential experience in a firm (Pexp) as proxies for the average level of skill in a firm. Our results show that only in Cameroon, Ghana, and Zimbabwe does the average skill level of the workforce, as measured by our proxies, seem to significantly raise the hourly wage rate of workers. However, even in these countries, these factors do not significantly reduce the impact of firm size on pay - as is apparent from summary Table 2 (line 5).

Rent Sharing

Another possibility we consider is that larger employers are more likely to earn monopoly profits and, in order to elicit the optimum amount of effort from their employees, are willing to share some of these rents. Traditionally, some researchers have examined this possibility by including measures of market power, although these measures have not been found to have an effect on the employer-size wage premium.[9] Other researchers, such as Velenchik (1997) for Zimbabwe and Troske (1999) for the U.S., have used value-added or profit-per-employee as measures of rents; but again these measures were not found to have a significant impact. Since we do not have access to measures of industry concentration for our five African countries, we follow the latter approach by using profit per employee (Profit/L) as a proxy for potential rent sharing.

[8] See also Kremer (1993), Kremer and Maskin (1995), and Barron *et al*. (1987).

[9] See, for instance, Weiss (1966), Mellow (1982), Brown and Medoff (1989), and Troske (1999) for the U.S.

Simple raw correlations show that this variable is indeed positively related to firm size, except for Kenya. However, as can be seen from Table 2 (line 6), the inclusion of this variable in our base specification does not appreciably alter the coefficients on firm size in any of the countries, even though profit per employee is a significant positive determinant of the wage rate in Ghana and Zambia.

We must note several problems with this approach, however. Dipak and Mazaheri (1999) argue that value-added (or profit) per employee as a proxy for potential rent sharing is likely to be an endogenous variable in the wage equation. For if an individual's wage reflects unmeasured productivity, this is likely to increase a firm's labour productivity.[10] To address this problem, Dipak and Mazaheri estimate the wage equation and the firm's labour productivity equation simultaneously, and are thus able to distinguish economies of scale and capital intensities from other (unexplained) size effects on wages. They find that the economies-of-scale and capital-intensity factors account for about 18 percent, 11 percent, and 26 percent of the single equation size coefficient for Ghana, Zambia, and Zimbabwe, respectively, but only 1 percent for Kenya. Nevertheless, even for the former three countries a large size effect remains.[11] In order to assess the possibility of endogeneity on our results, we used information from the more detailed Ghana data set to construct dummy variables indicating whether the firm is a price taker and whether the firm's main competitors were foreign and used them as instruments in an instrumental variables estimation. However, this did not significantly alter the coefficient on the firm-size variable in our Profit/L specification for Ghana.[12]

Another potential problem is that even if a firm practices rent sharing, not all workers may share in the rents. Again, the more detailed Ghana data allowed us to examine this potential problem by providing worker-level information on whether the worker's wage was a share of sales and whether the worker received a merit/production bonus. We constructed dummy variables for these and then interacted them with Profit/L. Our results (not reported here) again did not significantly alter the degree of the employer-size wage effect.

Firm Age

Brown and Medoff (1989) have suggested that employers who treat their employers well, such as by paying them relatively high wages, are more likely to grow and survive, and that this could also produce the employer-size wage effect. Their argument is related

[10] This may particularly problematic for small firms in which an individual's unmeasured productivity is more likely to influence the overall labour productivity in the firm than in large firms.

[11] Moreover, it still remains larger than what has been found in comparable studies for industrialised countries.

[12] Results are available from the authors upon request.

to efficiency-wage theory in the sense that in a competitive market firms paying higher wages incur higher costs and will survive only if their workers are more productive.

Calculating the raw correlations of firm age (FAge) with firm-size, we indeed find that these two variables are indeed positively correlated. In order to investigate whether this may be responsible for the firm-size wage premium in our five African countries, we included a firm's age as an additional explanatory variable, although unfortunately information was not available to us for Zambia. However, this variable has a statistically significant effect on the hourly wage only for Ghana and even so is not of the expected sign.[13] Furthermore, in no case does the inclusion of this variable significantly alter the coefficient on firm-size as revealed in summary Table 2 (line 7). Our finding of no impact of firm age on the wage premiums paid by larger firms is in line with the findings of Troske (1999) for the U.S.

Union Avoidance

There is some evidence in industrialized countries that larger firms may pay higher wages to avoid unionism among their workers.[14] Velenchik (1997) examines this possibility for Zimbabwe by including a control for whether a firm is unionized in the wage determination equation and finds that this reduces the magnitude of the employer-size wage effect between small and medium sized firms, but not for other parts of the wage distribution. We similarly examine the importance of union avoidance for our five African countries. However, rather than categorizing firms as either unionized or non-unionized, we use the percentage of the workforce in each firm that is unionized, since this measure can capture differences in union intensity among unionized firms. Our results show that union density in a firm does not have a significant impact on an individual's wage for any of the five countries.

Another way of measuring the effect of union avoidance is to examine the employer-size wage effect for unionized and non-unionized workers separately. Ceteris paribus, if union avoidance is an important determinant of the employer-size wage effect, then one should expect to find wage premiums in larger firms for non-unionized workers only. Unfortunately, additional data on the union status of workers are available to us only for the 1992 and 1993 observations for Ghana. Nevertheless, when we ran our base specification with worker and firm characteristics for these two samples separately using the Ghana data, we found that the coefficient on firm-size for the non-unionized sample was 0.186, while the coefficient for the unionized sample turned out to be 0.101. Although the larger coefficient for the non-unionized sample does suggest evidence of

[13] A lack of a positive correlation between firm age and wages was previously found by Brown and Medoff (1989) and is also consistent with the results of Troske (1999).

[14] For instance, for the U.S. Freeman and Medoff (1984) documented that the wage differential between unionised and non-unionised members is much smaller in larger establishments.

the existence of union avoidance among larger firms, the fact that unionized workers also enjoy large firm-size wage premiums suggests that union avoidance can at best explain only a small portion of this phenomenon.

Manager Skill Levels

Another possible explanation for the firm-size wage effect is suggested by Oi's (1983) model and related to one offered earlier by Hamermesh (1980). In Oi's model the most skilled managers work in the largest firms but must divide their time between monitoring workers and managing the firm. The model assumes that the more skilled managers are better at managing the firm than they are at monitoring workers, while the more skilled workers require less monitoring. Hence, one would expect that the more skilled managers hire the more skilled workers, with a resulting firm-size wage premium observed if the skill level of managers is not controlled for.

As in Troske (1999), we thus included in our base specification of equation 1 proxies for managerial ability in regressions for non-managerial worker samples. Specifically, we controlled for the proportion of managers in the firm whose highest level of education was secondary (Mansec) and for the proportion of managers whose highest level of education was at the university level (Manuniv).[15] However, our measures of managerial ability seem to have a significant positive impact on wages only in Cameroon and Ghana.

To assess whether the inclusion of managerial ability controls has had an impact on the employer-size wage effect, we also estimated our base equation for the non-managerial worker subgroup with only the worker and firm level characteristics. As can be seen from Table 2 (lines 9 and 10), the coefficients on the firm-size variable are substantially smaller relative to those of the unrestricted samples for all five countries and imply a wage premium for working in a large firm that ranges between 19 and 35 percent for this subgroup in Africa. In contrast, Troske (1999) finds no relationship between wages and managerial ability, and concludes that the latter does not alter the firm-size wage effect or premium.

Monitoring

Firms may also pay higher wages to workers to entice them not to shirk on the job. If the cost of shirking is more expensive in larger firms or the cost of monitoring is higher in larger firms, then one should expect larger firms to pay higher wages - in this context known as efficiency wages - and engage in less monitoring than smaller firms.[16] If this

[15] We consider both managers and supervisors as part of the managerial category.

[16] See Velenchik (1997).

is the case for our five African countries, then controlling for monitoring might be able to account for some of the employer-size wage effect.

Using information on the distribution of workers by occupational group, we calculated the ratio of supervisors and managers (Supvis) relative to the total workforce for each firm. The raw correlation of this with firm-size is indeed negative for all countries except Ghana. However, the inclusion of this variable in our base specification of Equation (1) for our sample of non-managerial workers does not significantly alter the firm-size coefficient, as reported in line 11 of Table 2. Our results may not be surprising, though. Velenchik (1997) argues that, since the threat of dismissal is integral to the shirking argument and because of the difficulty in dismissing permanent workers in sub-Saharan Africa, the efficiency wage argument outlined above is not likely to have had an effect on the firm-size wage distribution. In Zimbabwe, for example, employers maintain a stock of casual workers under fixed (but often renewed) term contracts, and statistics show that the proportion of these workers in the workforce rises with employment size. One should also note that Troske (1999) in his study of the U.S. used a proxy for monitoring intensity that turned out to be significant and of the expected sign; however, its inclusion did not significantly alter the employer-size wage premium. And in their simultaneous equations model of the firm-size wage effect, Mazumdar and Mazaheri (1999) also used the wage premium (calculated as the residual wage from an earnings regression much like our Equation (1)) as a proxy for efficiency wages. They found that only in the case of Kenya did it significantly increase labour productivity.[17]

Worker Turnover

As noted by Oi and Idson (1999), worker turnover rates tend to be inversely related to firm-size. One possible reason for this is that large firms provide more on the job training and/or that hiring is more expensive for larger firms in general. Given these larger overhead costs, it may thus be in the interest of larger firms to reduce labour turnover relatively more by offering higher wages. Using data that is solely available for Ghana for worker turnover, we calculated the degree of excess turnover - i.e., worker turnover in excess of net employment changes - for each firm over the three years in order to include it in our wage equation.[18] Given that excess turnover may be to some

[17] One possibility is that our results are biased given that one could argue that the rate of monitoring is simultaneously determined with wages as firms are likely to choose both the wages they offer and the degree of monitoring at the same time. For Ghana, for which we have more detailed data, there is information on whether the firm is affected by legislative restrictions on hiring, firing, and layoffs; and we thus used a zero-one type variable indicating whether firms were subject to such restrictions as an instrument for monitoring under an instrumental variables estimation. This did not significantly alter the coefficient on employment size.

[18] Excess turnover was, as in other countries, negatively correlated with firm size.

extent simultaneously determined as firms set wages according to desired turnover rates, we instrumented this variable with a dummy indicating whether the firm was subject to hiring and firing restrictions. The subsequent coefficient on our excess turnover rate variable turned out to be, contrary to expectations, positive and significant, and did not significantly alter the size of the employer coefficient (0.133), indicating that higher wages in larger firms are not likely to be significantly associated with reducing costs associated with worker turnover.[19]

Benefits

As with the union avoidance argument, one could argue (see Brown and Medoff (1989)) that larger firms may pay higher wages in order to avoid paying benefits to their workers. Using our detailed data set for Ghana, we were able to derive information on whether firms provided health care benefits for their workers and/or their families, as well as overtime pay, paid leave, paid public holidays, and pension funds. We then included a set of dummies indicating the provision of these benefits in the regression for Ghana. The sample for which there are complete observations on these benefit dummies produced a firm-size coefficient of 0.105. Including the set of dummy variables reduced this coefficient to 0.086, suggesting a small but insignificant reduction in the employer-size wage effect. Moreover, those dummy variables that were significant, namely the provision of health care benefits and overtime pay, had a positive effect on wages, suggesting that higher paid jobs are more likely to provide these benefits.

Still Other Explanations

Of course our data do not allow us to examine all the possible explanations for the employer-size wage effect that have been put forth and examined in the literature thus far. Among those explanations that we do not have sufficient data to address are those suggesting that differences in working conditions, the importance of filling vacancies, and differences in job-specific training across firm size are responsible. However, it must be noted that those prior studies in which data did allow these aspects to be examined were unable to explain very much of the employer-size wage effect.[20]

We also have not addressed institutional explanations, other than union avoidance, that may be able to explain the wage premium. For example, minimum wage legislation could conceivably affect the premium if compliance differs across firm sizes. However, Velenchik (1997), Schaffner (1998), and Marcelle and Strobl (2003) have argued that

[19] We also experimented with including a dummy for whether the worker received on the job training, but this variable was not significant and did not alter the employer size coefficient.

[20] For a study of the impact of working conditions, see, for instance, Schmidt and Zimmermann (1991). Velenchik (1997) does not find any evidence of quit rates differing across employers.

minimum wage legislation seems to have had little impact on the firm-size wage effect in Zimbabwe, Peru, or Trinidad and Tobago, respectively. Moreover, in their comparative study of four Nordic countries with the U.S., Albaek *et al*. (1996) show that, despite large differences in the institutional arrangements of the Nordic and U.S. labour markets,[21] the magnitudes of the employer-size wage effect were fairly similar. They therefore conclude that labour market institutions are unlikely to be responsible for this wage premium.

There are also other methods that take account of such problems as sample selection bias or unobserved factors that are correlated with employer size that we were unable to implement. More specifically, models like the adverse selection model of the efficiency wage theory (see Blinder and Choi (1990)) argue that if workers differ in their productivity, if at least some of these productivity differences are unobservable, and if unobservable productivity differences are correlated with outside wage offers, then firms offering lower wages will attract an inferior applicant pool. And if it is more important for larger firms to avoid inferior workers because of, for example, their lower complementarity with better capital, then larger firms may pay higher wages to reduce the probability of hiring inferior workers. To correct for this sample selection bias, however, would require the separate estimation of a selection equation with the appropriate exclusion criteria, a notoriously difficulty task with the data sets normally at hand, including the current one. Moreover, as the review of the literature by Oi and Idson (1999) demonstrates, these methods have not been able to solve the puzzle of the firm-size wage premium in the U.S.; and studies by Schaffner (1998) and Marcelle and Strobl (2003) have arrived at similar conclusions for developing countries.

5. COMPARISON WITH OTHER DEVELOPING AND DEVELOPED COUNTRIES

Our results thus far suggest not only that existing theories are unable to empirically account for much of the wage premium associated with larger employers, but also that the effect does not differ greatly across our five African countries. Even when we include *all* our significant control variables for each country, as shown in summary Table 2 (line 12), the coefficients remain largely unchanged relative to our base specification (line 3) and also fairly similar across countries. As a matter of fact, simple *t*-tests reveal that the coefficients do not differ significantly between any of the countries. This being the case, we thus now proceed to compare our results to those of other developing nations and the industrialized world.

[21] For example, markets in the Nordic countries are more regulated and union density is higher.

Comparison with Other Developing Countries

Direct comparisons of the employer-size wage effect for countries within the developing world are difficult, given both their paucity and the range of data and the employer-size variables used. Using our African data set, we constructed firm-size dummies similar to those used in Schaffner (1998) for Peru, and in Table 4 we display the coefficients of these using firm and worker characteristics in conjunction with Schaffner's results. It must be kept in mind, however, that the African data is for manufacturing only and is limited to formal sector employees. Moreover, the choice of firm-size dummies is in a sense a bit arbitrary, and a different set could conceivably result in different conclusions. Furthermore, an argument could also be made that the different size distributions of firms across countries should also be controlled for when selecting the firm size categories; however, we were unable to do so.

Table 4. Comparison of Employer-Size Wage Effects of U.S. and Peru with African Countries

Firm Size	Peru	Cameroon	Ghana	Kenya	Zambia	Zimbabwe	U.S.
6-20	0.291^{+}	0.106	0.273***	0.122**	0.041	0.414**	0.143^{+}
21-200	0.340^{+}	0.287***	0.424***	0.317***	0.203**	0.546***	0.215^{+}
201^{+}	0.425^{+}	0.508***	0.514***	0.404***	0.398***	0.694***	0.297^{+}

Notes: The firm-size results for Peru and the U.S. are from Schaffner (1998). The + sign indicates statistical significance but the levels of significance for results in the Schaffner study were not specified. In this Table and in Table 5, ***, **, and * denote one, five, and ten percent significance levels, respectively.

As can be seen in Table 4, relative to micro firms (5 or fewer employees) small firms (6-20 employees) pay significantly higher wages only in Ghana, Kenya, and Zimbabwe, although this may be because of the lack of coverage of the informal sector in the African data sets. We also find that the medium-sized-firm (21-200 employees) wage effect, again relative to micro firms, is noticeably higher in Ghana and Zimbabwe. Compared to Peru, the largest firms (201+ employees) in Cameroon, Ghana, and Zimbabwe pay higher wages relative to micro level firms, while in the remaining two African countries the differentials are roughly similar. Perhaps the most striking observation in Table 4, however, is that the firm-size wage effect in Zimbabwe is always considerably greater than in Peru. This occurs despite our not including the informal sector, which one would expect to magnify the employer-size wage effect even further.[22]

We also had access to data used in Marcelle and Strobl (2003) for Trinidad and Tobago, and with this data we constructed comparable estimates for the employer-size

[22] This point has been previously made by Velenchik (1997).

wage effect for firms with at least ten employees.[23] Accordingly, the coefficient on this zero-one type employer size variable for Trinidad and Tobago (0.469) was larger than those for Cameroon, Ghana, Kenya, and Zambia (0.191, 0.314, 0.249, and 0.112, respectively) but was smaller than that of Zimbabwe, (0.618). One should note, however, that, as in the case for the Peruvian data, the Trinidad and Tobago data also include informal sector employees. Hence one would expect the coefficients for the African countries to underestimate the true firm-size wage effect.

Comparisons with Developed Countries

Although the number of studies of developing countries is small compared to those done for the developed world, they thus far strongly indicate that the employer-size wage effect is substantially larger in the developing world. For instance, in her previously mentioned study of Peru, Schaffner (1998) constructs a firm-size variable similar to ones that have been constructed for the U.S. and finds the wage effect to be much larger in Peru than in the U.S., particularly for workers employed in very small establishments. These results are also given in Table 4. As the table further shows, the employer-size wage effect appears to higher in the African countries than in the U.S., particularly for larger firm-size categories. Again it must be pointed out that the exclusion of the informal sector is likely to underestimate the firm-size wage effect for our five African nations.[24] Similar studies also suggest that in relative terms the employer-size wage effect is large in developing country labour markets; see, for instance, Little *et al*. (1987) for evidence for Bombay and Malaysia.

In their study of Nordic countries, Albaek *et al.* (1998) use (as we have here) a continuous measure of firm size which allows for a direct comparison with our results, except for the fact their data set covers the entire labour market in each country rather than just the manufacturing sector. Using worker characteristics[25] and industry and regional dummies, they find the coefficients on firm size to be 0.025, 0.020, 0.025, and 0.021 for Denmark, Finland, Norway, and Sweden, respectively. These coefficients are, of course, considerably smaller than those for our five African countries. The study that is probably the most directly comparable to the one undertaken here, however, is that of Troske (1999), who also uses an employer-employee matched data set and a continuous

[23] This choice of firm-size categories was due to data restrictions in the Trinidad and Tobago data set. We furthermore reduced the Trinidad and Tobago sample to employees in the manufacturing sector and only included control variables that were common to both data sets. Detailed results are available from the authors.

[24] For instance, when we compare the Peruvian data, which include informal sector employees, there is clearly a large effect. However, this effect does not seem to increase as one moves to larger firm-size categories.

[25] The worker characteristics are schooling, experience, experience squared, seniority, gender and occupational dummies.

measure of firm size for the U.S. manufacturing sector. In his base specification with worker and firm control variables, he finds the coefficient on firm size to be 0.033. Again, his employer-size wage effect is considerably smaller than the ones we find here for our African countries.

One finding by Troske, documented earlier by Brown and Medoff (1989), suggests why the employer-size wage effect is larger in developing countries. Troske found that in the U.S. the employer-size wage effect is slightly smaller for white collar workers than for blue collar workers. For instance, for white collar workers (excluding managers) he finds a coefficient on the firm size variable of 0.021 compared to 0.032 for blue collar workers.[26] In an earlier study, Doms *et al*. (1997) noticed that firm size had the same impact across skill categories, whereas Oi and Idson (1999) found a decreasing effect with rising skill level. (Both studies were done for the U.S.) Although this question has not been examined for other developed nations, given that the employer-size effect does not appear to differ dramatically we suspect that a similar pattern - the same or only a slightly smaller firm-size wage effect for higher skill levels and white collar workers - would be found in other developed nations as well. In contrast, for those developing country studies which have estimated the employer-size wage effect separately for white and blue collar workers (namely Mazumdar (1983) for Bombay, Mazumdar (1981) for Malaysia, as well as Schaffner (1998) and Marcelle and Strobl (2003)), white collar workers have been found to be subject to a larger effect. Also, using RPED data Mazumdar (1994) noticed a similar trend for Kenya, Zambia, Zimbabwe, and Cameroon. For completeness sake, we have therefore similarly divided the data for our five African countries into blue-collar and white-collar sub-groups and estimated the firm-size wage effect for each group, as shown in Table 2, lines 13 and 14. As can be seen, Ghana exhibits the same pattern as the other four African countries; in all cases the coefficient is higher for white collar workers.[27] As did Troske (1999), we also estimated the firm-size wage effect separately for those white collar workers who are supervisors and managers and found the effect for this group to be higher than for the remaining white collar workers.[28] In contrast, Troske finds the effect to be even smaller for this group.

Velenchik (1995), who similarly found a larger effect for her earlier study of Zimbabwe using the same data source, suggests a number of possible reasons. First, if unfilled positions are more costly in larger firms because they have higher stocks of potentially idle capital and if the labour market for white collars is relatively more tight, then the firm-size wage premium would be higher for white collar workers. A similar effect would be expected if the acquisition of firm-specific human capital is more

[26] The coefficient on a sample of managers only was 0.004.

[27] We also used total worker samples and included a white collar dummy variable and an interaction term of this and firm size. In all cases the interaction term was positive and significant, except in the case of Ghana were it was marginally insignificant.

[28] Results are available from the authors.

important for white collar workers in general, but specifically in larger firms. On the other hand, although both of these explanations seem plausible, it is still not clear why this effect should be less important in developed countries like the U.S. Velenchik (1995) also suggests that the difference across these two broad occupational groups could be due to the fact that monitoring costs are higher for white collar workers. But, again, there appears to be little reason why this should be different in the developed world.

Perhaps the most promising explanation for the occupational difference in the firm-size wage effect derives from results found by Tan and Batra (1997), who examine the impact of technology on the firm-size wage effect for skilled and unskilled workers in Colombia, Mexico and Taiwan. They find that the wage effect is higher for skilled workers than for unskilled workers only in technology-investing firms. They argue that the likely explanation is that technological change is skill-biased and that larger firms are more likely to be technology-intensive. This could very well account for the broad occupational differences in the employer-size wage effect in developing countries relative to that found for the U.S. if larger firms in the U.S. are not more likely to be technology-intensive and/or if technological change in the U.S. is not skill biased. However, indirect empirical evidence does not provide strong support for either of these two possibilities. For example, with regard to technological intensity, Dunne and Schmitz (1995) find that in the U.S. larger firms are in fact more likely to use advanced technology. In terms of skill-biased technological change, Katz and Murphy (1992) and Davis and Haltiwanger (1991) discover that skill-biased technological change has played a major role in wage inequality between skilled and unskilled workers. On the other hand, Troske (1999) finds that the inclusion of total new investment in computers as a control variable does not significantly alter the employer-size wage effect, although he does not carry out this particular exercise separately for white collar and blue collar workers. More plausibly, it may be that the difference in technology use across firm size is not that large in the industrialized world. Also, it may be that at higher absolute levels of technology, such a white collar effect is simply not important.

In order to determine whether a similar explanation is likely for Sub-Saharan Africa, we classified employers in Ghana (the only one of the five countries for which these data were available) into technology-intensive and non-technology-intensive firms. Specifically, we classified firms as technology-intensive if they were actively conducting R&D, were foreign firms or exporters, or had invested in new capital equipment in the last three years.[29] We found that technology-intensive firms had an average of 64 employees, while the non-technology-intensive firms had an average of only 28 employees, clear evidence for the assertion that larger firms are more technology intensive. Using this classification we then ran separate regressions for these

[29] Batra and Tan (1997) classified firms as technology-intensive if they exported, conducted R&D, or provided training to their employees.

groups on the determinants of the hourly wage rate using the remaining firm and worker characteristics while also including a white collar dummy (WhiteC) and its interaction with firm size. The results of this exercise are given in Table 5. As can be seen, the coefficient of the white collar dummy variable and its interaction with firm size is insignificant for the non-intensive sample. The coefficient on the firm size variable, 0.267, is significant, however, and considerably larger than what was found for the overall sample. In contrast, for employees working in technology-intensive firms, the coefficient on the employer-size wage effect (.053) is far smaller. Moreover, the coefficient on the interaction term of the white-collar-worker dummy with employment (0.063) is significant, and suggests that the "white collar worker effect" is more than double the firm-size wage effect in technology-intensive firms. The results of this exercise thus indicate that differences in the employer-size wage effect between blue and white collar workers may exist only in firms that are technology intensive, thus providing support for a skill-biased technical change explanation of occupational differences. Moreover, given the relative total employer-size wage effect across these two groups of firms, our results suggest that much of the large employer-size wage effect in developing countries may be due to the wage structure of low technology firms.

Table 5. Technology Intensity and the "White Collar Effect"

	Intensive	Non-Intensive
Log Size	0.053*	0.267***
	(0.029)	(0.078)
WhiteC	0.104	0.000
	(0.160)	(0.000)
WhiteC*(Log Size)	0.063*	0.040
	(0.038)	(0.094)
Constant	-2.351***	-2.731***
	(0.261)	(0.434)
Observations	1129	328
F-Test	40.17	258.91
R-squared	0.49	0.49

6. CONCLUSION

In this paper we have examined the wage premium associated with working in large firms for five African countries. Specifically, we have evaluated a large number of theoretical explanations that have been put forth to explain this phenomenon by taking advantage of a rich employer-employee matched data set which allows for comparability across countries. As in virtually all previous studies for developed countries, few of our explanations can account for a substantial proportion of the employer-size wage

premium. The notable exception is that of observable worker characteristics, which suggests that workers with higher amounts of human capital tend to work in larger firms. Nevertheless, a large portion of the wage premium remains unexplained.

Interestingly, we have found that the unexplained portion of the employer-size wage effect is not significantly different across the five African countries studied, so that differences in the actual premium are due to differences in the firm size distribution. A similar lack of differences in the employer-size wage effect has also been found in the industrialized world, even among countries with markedly different labour market institutions, although with less comparable data. However, comparisons of the developed world to the developing world have consistently shown that the effect is noticeably larger in the latter, and our study lends further support to this finding.

There is one additional striking finding unearthed in our study that may go some way towards explaining the differences across levels of development. Unlike what has been observed for industrialized nations, we have found that the employer-size wage premium is higher for white collar and skilled workers than for blue collar workers. Evidence from one of the countries (Ghana) for which richer data were available, in conjunction with results from other studies, suggests that this may reflect the fact that larger firms are more likely to embody new technologies and that the technical change associated with this is skill-biased. As to why a similar trend is not apparent in developed nations, or at least not in the U.S., there are a number of possible reasons**.** There may be a wider dispersion of technology in developing countries, or at lower levels of technology this effect may be more important. Or it may be the case that skill-biased technical change has not been much different across firm sizes in the industrialized world. As even richer data sets become available, this aspect will warrant further research.

APPENDIX

Variable Definitions

Variable	Definition
Hourly Wage Rate (Log)	Logged value of hourly wage rate converted to PPP $US
Size (Log)	Logged value of employment in firm
Foreign	Dummy for any foreign ownership
CapCity	Dummy for location in capital city
Wood	Dummy for operating in the Wood & Furniture Sector
Metal	Dummy for operating in the Metals Sector
Textile	Dummy for operating in the Textile Sector
Male	Dummy for males
Age	Age
Age^2	Squared value of age
Tenure	Tenure in firm

(Continued)

Variable	Definition
$Tenure^2$	Squared value of tenure
Primary	Dummy for highest level of education is primary
Secondary	Dummy for highest level of education is secondary
University	Dummy for highest level of education is university
Mgmt	Dummy for managers
Admin	Dummy for administrators
Sales	Dummy for sales persons
Super	Dummy for supervisors
Tech	Dummy for technicians
%Sec	Weighted average of workers whose highest level of education is secondary
%Univ	Weighted average of workers whose highest level of education is university
Pexp	Weighted average of potential experience
K/L	Value of capital stock per employee in PPP $US
Profit/L	Profits per employee in PPP $US
FAge	Age of Firm
Union	Percentage of workforce unionised
ManSec	Weighted average of managers with highest level of education is secondary
ManUniv	Weighted average of managers with highest level of education is university
Supvis	Ratio of supervisors and managers to the total workforce
WhiteC	Dummy for white collar workers

REFERENCES

Aitken, B., A. Harrison, and R.E. Lipsey (1996), "Wages and Foreign Ownership: A Comparative Study of Mexico, Venezuela, and the United States," *Journal of International Economics*, 40, 345-371.

Albaek, K., M. Arai, R. Asplund, E. Barth, and E. Madsen (1998), "Measuring Wage Effects of Plant Size," *Labour Economics*, 5, 425-448.

Barron, J., A.D. Black, and M.A. Loewenstein (1987), "Employer Size: The Implications for Search, Training, Capital Investment, Starting Wages, and Wage Growth," *Journal of Labour Economics*, 5, 76-89.

Becker, G. (1962), "Investment in Human Capital: A Theoretical Analysis," *Journal of Political Economy*, 70, 9-49.

Biggs, T., V. Ramachandran, and M.K. Shah (1998), "The Determinants of Enterprise Growth in Sub-Saharan Africa: Evidence from the Regional Programme on

Enterprise Development," World Bank RPED Paper No. 103.
Biggs, T., and P. Srivastava (1996), *Structural Aspects of Manufacturing in Sub-Saharan Africa: Findings from a Seven Country Enterprise Survey*, Discussion Paper 346, Africa Technical Department Series, World Bank. Washington, D.C.
Blinder, A., and D. Choi (1990), "A Shred of Evidence on Theories of Wage Stickiness," *Quarterly Journal of Economics*, 105, 1003-1015.
Brown, C., and J. Medoff (1989), "The Employer Size Wage Effect," *Journal of Political Economy*, 97, 1027-59.
Davis, S.J., and J. Haltiwanger (1991), "Wage Dispersion between and within U.S. Manufacturing Plants, 1963-86," NBER Working Paper Series, No. 3722.
Doms, M., T. Dunne, and K.R. Troske (1997), "Workers, Wages and Technology," *Quarterly Journal of Economics*, 112, 253-290.
Dunne, T., and J. Schmitz (1995), "Wages, Employment Structure and Employer Size-Wage Premia: Their Relationship to Advanced-Technology Usage at U.S. Manufacturing Establishments," *Economica*, 62, 89-107.
Evans, D.S., and L.S. Leighton (1989), "Why Do Smaller Firms Pay Less?" *Journal of Human Resources*, 24, 299-318.
Freeman, R., and J. Medoff (1985), *What Unions Do*, New York: Basic Books.
Hamermesh, D.S. (1980), "Commentary," in *The Economics of Firm Size, Market Structure and Social Performance*, ed. by J.J. Siegfried, Washington, D.C.: Federal Trade Commission.
Katz, L.F., and K.M. Murphy (1992), "Change in Relative Wages, 1963-1987: Supply and Demand Factors," *Quarterly Journal of Economics*, 107, 35-78.
Kremer, M. (1993), "The O-Ring Theory of Economic Development," *Quarterly Journal of Economics*, 108, 551-575.
Kremer, M., and E. Maskin (1995), "Segregation by Skill and the Rise in Inequality," mimeo.
Krueger, A., and S. Summers (1988), "Efficiency Wages and the Inter-Industry Wage Structure," *Econometrica*, 56, 259-293.
Little, I.M.D., D. Mazumdar, and J.M. Page (1987), *Small Manufacturing Enterprises: A Comparative Study of India and Other Economies*, Oxford University Press: New York.
Lucas, R.E. (1978), "On the Size Distribution of Business Firms," *The Bell Journal of Economics*, 9, 508-523.
Marcelle, M., and E. Strobl (2003), "Do Smaller Firms Pay Less in the Caribbean? The Case of Trinidad and Tobago," *Journal of Development Studies* (forthcoming).
Mazumdar, D. (1981), *The Urban Labour Market and Income Distribution: A Case Study of Malaysia*, Oxford: Oxford University Press.
_____ (1983), "The Rural-Urban Wage Gap, Migration and the Working of Urban Labour Markets: An Interpretation Based on a Study of the Workers in Bombay City," *Indian Economic Review*, 18, 169-198.
_____ (1994), "The Structure of Wages in Africa," World Bank RPED Paper No. 33.

Mazumdar, D., and A. Mazaheri (1999), "The Structure of Labour Markets in Africa," World Bank RPED Paper No. 106.

Mellow, W. (1982), "Employer Size and Wages," *Review of Economics and Statistics*, 64, 495-501.

Moore, H.L. (1911), *Laws of Wages: An Essay in Statistical Economics*, New York: Augustus M. Kelly.

Oi, W.Y. (1983), "The Fixed Employment Costs of Specialised Labour," in *The Measurement of Labour Costs*, ed. by J.E. Triplett, Chicago: University of Chicago Press.

Oi, W.Y., and T. Idson (1999), "Firm Size and Wages," in *Handbook of Labor Economics*, eds. by O. Ashenfelter and D. Card, Amsterdam, North-Holland.

Reilly, K.T. (1995), "Human Capital and Information," *Journal of Human Resources*, 30, 1-18.

Schaffner, J.A. (1998), "Premiums to Employment in Larger Establishments: Evidence from Peru," *Journal of Development Economics*, 55, 81-113.

Schmidt, C.M., and K.F. Zimmermann (1991), "Work Characteristics, Firm Size and Wages," *Review of Economics and Statistics*, 73, 705-710.

Tan, H., and G. Batra (1997), "Technology and Firm-Size Wage Differentials in Colombia, Mexico, and Taiwan (China)," *World Bank Economic Review*, 11, 59-83.

Troske, K.R. (1999), "Evidence on the Employer-Size Wage Premium from Worker-Establishment Matched Data," *Review of Economics and Statistics*, 81, 15-26.

Velenchik, A.D. (1996), "Government Intervention, Efficiency Wages and the Employer-Size Wage Effect," RPED Discussion Paper, Africa Technical Department, World Bank. Washington, D.C.

_____ (1997), "Government Intervention, Efficiency Wages and the Employer-Size Wage Effect," *Journal of Development Economics*, 53, 305-38.

Weiss, L. (1966), "Concentration and Labour Earnings," *American Economic Review*, 56, 96-117.

Mailing Address: Robert J. Thornton, Department of Economics, Lehigh University, 621 Taylor Street, Bethlehem, PA 18015. E-mail: rjt1@lehigh.edu

Manuscript received March, 2003; final revision received February, 2004.