Are Wages and Productivity in Zimbabwe Affected by Human Capital Investment and International Trade?

Dorte Verner

Education, training, and increased openness to international markets appear to improve wages and productivity, but Zimbabwe's labor market is segmented, rather than competitive. Workers with similar skills in different sectors do not earn equal wages.

Summary findings

To analyze what determines wages and productivity in Zimbabwe, Verner analyzes an employer/employee dataset from Zimbabwe's manufacturing sector. Verner finds that:

- Formal education, training, and experience positively affect wages and productivity positively.
- Women are paid roughly 37 percent less than men although they are not measurably less productive.
- There is no strong indication of ethnic discrimination among employees, but Europeans are being paid more in larger firms, although they are marginally less productive than workers of African origin.
- The wage premium for workers who completed secondary school does not necessarily reflect greater productivity but may indicate a shortage of educated workers.
- Workers trained in-house earn more although in-house training does not instantly affect productivity. Training by outside trainers does improve productivity but is not rewarded with higher wages.
- Apprentices are paid more than non-apprentices. Perhaps an apprentice diploma serves as a screening device, when hiring.

- Temporary workers are more productive than permanent workers, perhaps hoping to get a permanent contract.

- Union members earn less than non-union members despite being more productive. Perhaps union members fight more to have skills upgraded than for wage increases.

- Larger exporting firms are marginally less productive and pay marginally less than the average firm, but are more productive than smaller firms (and their wages match productivity). Workers in larger woods and metals firms are paid less than workers in smaller firms, although they are not less productive.

- Exporting firms benefit more than employees do from trade openness and greater productivity.

- Foreign-owned firms are more productive than other firms (perhaps because of new technology).

- Firms that employ more expatriates tend to pay more. The more expatriates there are in metals firms, the more productive the employees are, perhaps because the expatriates bring knowledge about new technology to the enterprise.

- Employees in the metal and textile sectors are paid more than those in the food sector, but employees in metals are less productive than employees from other sectors.

This paper — a product of Human Development 3, Africa Technical Families — is part of a larger effort in the region to understand how labor markets work in Africa. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Hazel Vargas, room I8-138, telephone 202-473-7871, fax 202-522-2119, Internet address hvargas@worldbank.org. Policy Research Working Papers are also posted on the Web at <http://www.worldbank.org/html/dec/Publications/Workpapers/home.html>. The author may be contacted at dverner@worldbank.org. April 1999. (49 pages)

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1. Introduction

This paper studies labor markets in Zimbabwe. Zimbabwe has one of the most highly developed industrial sectors in Africa. It contributes more than 25 percent to GDP. The effectiveness of economic policy in generating economic growth and improving standards of living rests on the capability of creating more employment. This paper analyzes wage and productivity determination. Among the questions addressed are the following:

- Do experience, training and education impact wages and productivity?
- Does discrimination -- related to gender or ethnicity of employees -- exist in the Zimbabwean labor markets?
- Is the labor market competitive?
- Does trade unionization affect wages and productivity?
- Are wages and productivity affected by enterprise characteristics?
- Does international trade change wages and productivity?

The questions are analyzed jointly applying an employer-employee dataset from the manufacturing sector in Zimbabwe. The introduction of productivity and enterprise data adds a new dimension to wage analyses.

Most standard wage regressions do not control for firm characteristics that can affect the wage determination process. The reason is that information on firms and employees are often not available. We control for firm characteristics in this paper. Additionally, this paper goes a step further in that we jointly estimate wage and production functions. This approach allows not only for assessing the marginal impact of demographic and other characteristics on wages but also for comparing the impact of these variables on productivity and wages.

The main conclusions from this study are that formal education, training, and experience impact wages and productivity positively. However, there still exist some human capital gaps that need to be accommodated for the labor market to be characterized as competitive. Females are being paid less male employees despite that they are not measurably less productive. Hereof, there is at least two interpretations: first, this is poor discrimination against women; or second, that important data material has been left out of the analyses; hence the gender dummy variable pick up the impact on wages of these omitted variables. The findings show no strong indication of ethnic discrimination of employees in the Zimbabwean labor markets. Trade union members are found to be paid less than non-members despite that no gap is found in productivity. That wages are lower for union members can be explained by the fact that unions fight more for skill upgrading than for wage increases. Enterprise characteristics are also important.

Furthermore, we find that enterprise characteristics are associated with wages and productivity. Employees in firms engaged in exporting activities are not fully compensated for their high productivity, indicating that firms benefit more than employees do from enhanced productivity following increased openness. Firms with foreign ownership are more productive than other firms and a relatively high number of expatriates employed in a firm are associated with higher wages. Hence, the labor market in Zimbabwe is not perfectly competitive but rather segmented. For example, wages of workers, with similar skills employed in different sectors, are not equal. Therefore, we conclude that there exist structural differences across sectors.

The remainder of the paper is organized in eight sections. Section two briefly describes trends in employment, output and wages in Zimbabwe. Section three summarizes recent labor market studies and section four describes the methodology and data used in this study. Section five outlines the wage determination model and section six shows descriptive statistics. Section seven presents findings, and, finally, section eight concludes.

2. Recent Zimbabwean labor market studies

Until recently, we had little knowledge of which factors influence employment and wages in the dual labor market in Zimbabwe. Most recently, Mazumdar (1995) and Ann Velenchik (1996a, 1996b) apply a sample of relatively homogenous groups of manufacturing workers in analyzing whether labor markets are competitive, employer size effects, and rent sharing.²

Furthermore, Mazumdar (1994) estimated the marginal returns to male's education for four African countries. Earnings functions were estimated with variables capturing experience, dummy for permanent and temporary positions, and whether the worker had been an apprentice. The estimated incremental coefficients of the log of earnings for primary, secondary and university education are reported to be 0.5, 0.66 and 1.86. These high returns reflect larger occupational differentials observed in Zimbabwe. The coefficients are around three times higher in Zimbabwe and Zambia than in Cameroon and Kenya. However, the estimates may be biased or overestimated if education is correlated with firm characteristics³, indicating that workers in larger firms may be sharing rents from a protected market. Earnings functions with other control variables (industry dummies, ownership firm dummies, size of establishment dummies) indicate that earnings increase with size of establishment. The elasticity of value added with respect to firm size is statistically significant and positive (0.1).

Additionally, Mazumdar (1995) classifies size groups of enterprises. The findings show that differences in earnings are partly explained by enterprise size in Cameroon, Ghana, Kenya, Zambia, and Zimbabwe. The size of enterprise dummies is found to be important

² Other studies related to the labor market in Zimbabwe are on: rural labor markets (Vali (1995) and Adams (1991a, 1991b)); earnings and entries in micro enterprises and self employment (Steel and Webster (1992)); pay and employment reforms (Lindauer and Nunberg (1994)); job security regulations and policies (Fallon and Lucas (1991, 1993)), the macro wage curve (Verner; 1998), labor productivity in manufacturing (Pack (1993)), see Velenchik (1996a, b) and Addison (1996).

³ The return to education after introducing other control variables are not reported in the paper.

and the coefficients are increasing with size.⁴ The workers employed by firms, employing 1500 or more workers receive the highest wages. In Zambia, Ghana, and Cameroon the highest wages were obtained in firms with more than 200 employees and in Kenya it was in the group with 400 or more workers that earned the most. Velenchik (1996a) also found a large premium associated with working for larger firms in Zimbabwe and the premium is found to be larger for white than blue collar workers. Findings suggest that larger firms use higher wages to increase the quality of the applicant pool, to reduce employment turn over, or to strengthen worker loyalty.

3. Data and Methodology

Wages and productivity determination are examined by matched employee-employer manufacturing sector data; the Regional Program on Enterprise Development (RPED) survey data from 1993. The number of firms and employees interviewed are 201 and 1609, respectively. About 10 randomly selected workers from different occupational categories are interviewed in each enterprise. Matched employee-employer datasets have advantages compared to pure employee or employer data sets. An employee dataset may contain information about the sector in which a worker is employed but limited information about the firm. On the other hand, an employer dataset contains information about firms but limited information about individuals employed in the firms, apart from aggregate wage, education, and training costs. An employer-employee dataset allows detailed analyses of hypotheses related to both firms and individuals.

Empirical studies of determinants of wages and earnings inequality have focused primarily on factors affecting labor supply. Examples of long-run labor supply factors

⁴ Earnings per worker could increase with the size of the enterprise because of institutional factors that are correlated with firm size or economic factors. The non-institutional economic factors relating to wage increases are: (i) the inelasticity of labor supply of individual firms, (ii) factors that can be classified under 'efficiency wages'; (iii) profits, economic rent and labor productivity may increase with firm size and wages are set with profit-sharing considerations (see Mazumdar (1995) for details).

are variables such as education, age, sex, and experience⁵. Variables controlled by the employers, the so-called demand factors, have not often been used. Without direct measures of productivity, gender or ethnicity, for example, cannot establish discrimination, established correctly. Additionally, it is generally the case that studies report positive coefficient estimates on the age of an employee, conditional on a variety of covariates. These estimates neither imply that older workers are more productive than younger ones, nor that wages rise faster with productivity (see Hellerstein, Neumark, and Troshe; 1996). These problems may be overcome by estimating individual wage and productivity equations jointly, and, thus, comparing wages and productivity for various groups of workers.

The general-to-specific methodology is used in the regression analysis. First, we formulate a general model that contains all relevant explanatory variables. Second, eliminating statistically insignificant variables one at the time reduces this model to a more parsimonious model. In this specification, only statistically significant variables are included.

The statistical models we use are simultaneous single level models. This may cause aggregation biases equivalent to problems produced in the learning achievement literature. Here workers are the unit of observation and firms are included in the individual vector of variables. It is worth noting that in general this methodology may cause aggregation biases; it may: (1) overestimate the group effect, that is, the firm effect, namely productivity; and (2) underestimate the individual effect on wages and productivity. Multilevel estimation takes aggregation biases into account. The firm level effect impacts average production but also the individual slope of, for example, gender.

⁵ Groshen (1991a) mentions that education, age, occupation, ethnicity, gender and union variables only account for 51 percent of the variation in the log of wages, analyzing (US) data from the Current Population Survey One Quarter Earnings Sample, 1986. Introducing demand related factors is likely to explain parts of the 49 percent of the variation in wages that workers' characteristics cannot account for.

The gender effect may be different in different firms. Furthermore, the group level effect may not be the same for every single worker. However, the small firms have too few employees to actually enable us to perform the multilevel analysis. Therefore, we report results obtained by estimating single level models.

The two dependent variables in the analysis --wages and productivity--may not be measured by the same accuracy. The information on wages may be both more accurate and precise than the information on productivity. The problem with the productivity series is, for example, that not all inputs which are used in the production process have been taken into account. If this were the case, one would obtain reasonably high quality estimates of how the various attributes and characteristics impact wages and lower quality estimates of how they affect productivity. This is an important caveat that should be kept in mind. If the productivity series is not measured with the same accuracy the findings from the two equations should be interpreted with caution and, therefore, not on a strictly parallel basis.⁶

4. Modeling Wages

Competing models of wage determination depend on the connection between wages, productivity, and employee-employer characteristics. Standard wage determination analyses (single-equation models) consider employee but rarely employer characteristics in the process of determining wages, and no link is made to productivity. In what follows wages, productivity, and employee-employer characteristics will be analyzed simultaneously.

Regression analyses are used to describe monthly productivity and wages of workers in the manufacturing sector, conditional on individual and firm characteristics. The following equation explains the wage and productivity model:

⁶ I am grateful to Gregory Ingram for this important comment.

$$y = \sum I\beta + \sum F\delta + \varepsilon$$

The dependent variable (y) is a vector containing two variables: wages (w) and productivity (v). The vector of explanatory variables consists of firm/employer characteristics (F), the demand factors, and employee characteristics (I), the supply factors. When y is reduced to scalar (w), the traditional wage determination model appears. The coefficients β and δ are parameters revealing marginal impacts of explanatory variables on wages and productivity. The random error term M reflects all other factors.

The production function is estimated in value-added form. The justification is that: (1) inputs may be endogenous; and (2) this specification embeds contrasting production function specifications, e.g., one in which the elasticity of substitution is zero, and, therefore, materials have to be used in fixed proportions and another in which the elasticity of substitution is infinite (see Grilliches and Ringstad; 1971).

The employee characteristics explaining wages and productivity can be classified under four headings: (1) experience, schooling, and training; (2) other individual indicators; (3) sector of employment; and (4) institutions. Firm characteristics are also organized under four headings: (1) openness; (2) location; (3) age; and, (4) size.

Worker characteristics⁷: First, a trained work force provides flexibility in adapting to economic changes. Further, human capital is important to enhance productivity and long-term economic growth (see Barro (1991); Mankiw, Romer and Weil (1992)). A more educated work force increases worker productivity, innovative behavior and facilitates the adoption and use of new technologies. More skilled employees can easier adjust to

⁷ They have been justified in great detail on theoretical grounds (e.g. Welch (1969), Mincer (1974), and Levey and Murnane (1992)).

changes in the economic and technological environment than less skilled workers. This analysis may indicate areas of scarcity in training and education. Second, other individual characteristics, for example, gender and ethnicity, are included. The gender and ethnicity variables reveal information on the female-male wage gap and wage differentials associated with different nationalities. Third, the sector of employment is included. The competitive model predicts the sector of employment having no impact on earnings differences of otherwise similar workers. Fourth, institutions such as trade unions are included, as they are important in determining wages.

The enterprise characteristics: First, the openness variables are: engagement in Research and Development (R&D) activities, export, number of expatriates, and licensing of technology. Firms engaged in export activities are particularly vulnerable to external shocks. Second, the location may be important as, for example, the cost of living in cities are generally higher than in towns; hence workers require compensation. Third, enterprise age may impact wages as more established firms can afford to pay higher wages than newly established firms do. On the other hand, the former may have lower productivity as older firms may not have the recent technology available. Fourth, the impact of firm size has been studied (see Velenchik; 1996a, b and Mazumdar; 1995).

We estimate the wage and value added equations jointly. The multivariate regression, being a joint estimator, estimates the between-equation covariances, so we are able to test parameter restrictions across equations. Since it is assumed that employees with different characteristics are perfect substitutes in the production process, but with potential different productivity simultaneous estimation allows for comparison of relative productivities and wages of employees distinguished by various characteristics. This includes evidence related to gender and ethnic discrimination in wages, the causes of increasing remuneration over the life cycle, etc. The case in which equality of the parameter estimates of a particular variable in the two equations cannot be statistically rejected is interpreted as evidence compatible with competitive spot labor markets (see

Hellerstein, Neumark and Troshe (1996)). The instances where the parameter estimates can be rejected to be equal points towards non-competitive labor markets or discrimination.

5. Descriptive statistics and background information

In the following sub-sections we present background information on key variables in the joint wage and productivity determination. We consider different elements contributing to human capital accumulation such as formal education and training. Furthermore, we shed light on ethnicity.

5.1 Formal education and training

Table 1 gives the distribution of workers' highest education in the manufacturing sector. A small share (1.6 percent) of workers in the sample did not complete any level of formal education. This compares to primary and secondary education, completed by 41 percent and 54 percent of all workers, respectively.⁸ The data indicate no large discrepancy in the level of education between female and male employees. Of females 35 percent had completed primary school and 57 percent secondary school, compared to 42 percent and 43 percent for males. Furthermore, workers of European origin have higher education than African workers. The percentage of Europeans with secondary education is 17 percentage points higher than Africans.

Human capital can be increased by workers training on-the-job or off-the-job. Training increases the flexibility of the work force to acquire new skills for new jobs as the structure of economies and occupations change. Skilled workers enhance the quality and

⁸ The gross enrollment rates in primary, secondary, and tertiary school were 106 percent, 38 percent, and 5 percent, respectively, in 1993.

efficiency of product and output development and they also train co-workers with lesser skills. In industrialized countries, governments have increasingly emphasized the importance of employer-led training. Training provides workers with the skills necessary for improving competitiveness, adaptability and GDP-growth. Furthermore, skill acquisition may reduce wage inequalities.

Table 1
Highest Level of Completed Education (%)

	All	Women	Men
No education	1.6	1.6	1.5
Primary	40.9	35.0	42.3
Secondary	53.5	57.0	52.5
Vocational	1.5	1.7	1.5
University	1.5	2.3	1.3

Data Source: RPED data.

The incidence of training off-the-job in Zimbabwe is low as compared to industrialized and semi-industrialized countries. Data indicate that a small number of firms in Zimbabwe train workers formally. Around 17 percent of the employees receive formal training in-house or by outside providers. The low number may indicate that manufacturing enterprises in our sample underinvest in formal training. Biggs *et al.* (1995) compare Zimbabwe to Japan and find that only about one-fifth of the number of people trained in Japan are trained in Zimbabwe, and around half of the number in West-Germany. Tan and Batra (1995) find that in Taiwan 38 percent of large firms and 4 percent of small firms train employees in-house.

In Zimbabwe, external training is carried out in technical schools and training courses, and sometimes abroad. The metal sector trains its employees more than any other manufacturing subsector. More than 40 percent of the firms supply in-house training to their employees. The metal sector also engages more than other sectors in external training. This may be explained by the technological complexity in the metal sector. The

woodworking sector trains the least; 35 percent of the firms train externally and 23 percent provide internal training.

5.2 Ethnic groups

This paper considers three ethnic groups. The 1982 census reports that 97.5 percent of the Zimbabweans were African. The second largest ethnic group, Europeans, accounts for 2 percent of the total population. The RPED data sample consists of 95 percent Africans, 3 percent Europeans, and 2 percent of Asian origin. Hence, the sample reflects the actual composition of the population.

Prior to 1980 skilled jobs were more or less reserved for Europeans or other white people and education was intended to benefit this group in particular. Hence, Africans are less well equipped in terms of education than Europeans to engage in formal labor market activities. Therefore, the immigration of Europeans commencing in the middle of the 1970s led to a skill shortage in Zimbabwe. Africans were not only discriminated against in terms of education but also in apprenticeships controlled by trade unions⁹.

6. Findings

This section presents evidence amassed from the data. Appendix A encloses a list of variables and describes how each variable is constructed. The findings of the regression analysis are presented in Appendix B.

6.1 Regression findings

This sub-section reports findings of the joint estimation of wages and productivity. The tables present a subsection of the findings of presented in the tables in Appendix B.

⁹ The number of apprentices has not increased since Independence, rather it has decreased by 25 percent: there were 2000 in 1981 and 1500 in 1993 (Kanyenze; 1995).

The regressands are the log of monthly wages and value added in manufacturing. The regressors are mentioned above. The regression models reported are all parsimonious specifications obtained from model reduction.

6.1.1 Formal education and occupation differentials

Do education and occupational affect wages and productivity? Employees are distinguished by occupation and divided into six groups: (1) manager; (2) administrative or clerk; (3) commercial or salesperson; (4) supervisor or foreman; (5) technician; and (6) the remaining. We find that each occupational title, controlling for other individual and firm characteristics, is statistically significant and positive (the reference group being workers in maintenance, production, support, and trainees. The introduction of individual occupational controls in the wage equation shrinks the relationship between wages and education, particularly in the case of highly educated workers.

The estimated coefficients on the education variables in the wage equation reveal the impact of human capital on wages (Table 2). Completed secondary, vocational, technical and university education impact wages positively and the coefficients are statistically significantly different from zero (completed primary education and no education completed being the reference category). This finding is as expected; the more education a worker has completed the higher the wage the worker receives, conditional on a variety of individual and enterprise covariates including occupation. The size of the parameter estimates shows that the wage premium increases rapidly with the completed level of education. An employee who has completed secondary education receives a 17 percent wage premium compared to that of an employee having completed primary or no education. The wage gap in favor of university graduates is 65 percent.¹⁰ The impact on monthly wages of vocational training at the highest level of education is 23 percent.

¹⁰ The premia are calculated as follows: for coefficient estimates in the range -0.25 to 0.25 the absolute value is used. Coefficients larger than this are used in the formula: $100 * (\exp\{\text{abs}[\text{parameter estimate}] - 1\})$ to obtain the premia.

Table 2
Education and Occupation Differentials

	Productivity				Wages			
	Coef.	Std. Err.	t	P> t	Coef.	Std. Err.	t	P> t
jobman	-0.194	0.141	-1.382	0.167	1.112	0.069	16.229	0.000
jobamd	0.060	0.110	0.548	0.584	0.687	0.053	12.858	0.000
jobcom	-0.092	0.156	-0.588	0.557	0.390	0.076	5.138	0.000
jobsup	0.040	0.104	0.384	0.701	0.499	0.051	9.847	0.000
jobtech	0.105	0.215	0.487	0.626	0.882	0.105	8.410	0.000
duni	-0.088	0.261	-0.340	0.734	0.501	0.127	3.944	0.000
dvoc	0.125	0.244	0.512	0.609	0.232	0.119	1.949	0.052
dsec	0.126	0.070	1.786	0.074	0.172	0.034	5.023	0.000

The estimated wages of a manager, an administrative or a clerk, a commercial or salesperson, a supervisor or a technician are all significantly different from the wages of the reference group (workers in maintenance, production, support staff, and trainees). The wage premia are 204 percent, 99 percent, 47 percent, 65 percent and 42 percent, respectively.

After analyzing the impact of education and occupation on wages we now turn to their impact on productivity. The findings reveal no occupational productivity differential (see Table 2, second column). The estimated productivity of managers, administratives or clerks, commercials or sales people, supervisors or technicians is surprisingly not statistically significant from that of the reference group. The same holds for workers that have completed vocational and higher education. However, there exists a positive and marginally significant production differential by completed secondary education. The workers with completed secondary education are 13 percent more productive than their co-workers with no or completed primary education.

Are the above mentioned estimated impacts different in the wage and productivity equations? We find that the productivity differentials by education fall behind wage differentials by education. Furthermore, significantly so for completed secondary

education as the test of equality of the wage and productivity differentials rejects equality ($F = 4.91$, $\text{Prob} > F = 0.03$). Hence, the positive wage gap between workers with completed secondary education and non or little completed education cannot be completely justified by higher productivity. These findings indicate shortage of educated employees. Also productivity differentials by occupation fall behind wage differentials by occupation. This is revealed by the rejection of all tests of equality between the two estimates ($F(\text{jobman}) = 82.87$, $\text{Prob} > F = 0.00$; $F(\text{jobamd}) = 31.39$, $\text{Prob} > F = 0.00$; $F(\text{jobcom}) = 9.18$, $\text{Prob} > F = 0.001$, $F(\text{jobsup}) = 18.71$, $\text{Prob} > F = 0.00$; $F(\text{jobtech}) = 2.52$, $\text{Prob} > F = 0.00$)).

Another regression model, where completed secondary education is substituted with completed primary education, shows that the return to primary education is below that of secondary education. The coefficient estimates of the other human capital variables are in line with the previously reported.

6.1.2 Differentials by training

Does training impact wages and productivity? Regressions indicate that training is associated with higher firm-level productivity. The productivity effect of skilled worker training is estimated to be high in other low-income countries, for example, 1.43 for Indonesia and 0.39 for Columbia (see Tan and Batra (1996)). This indicates that return to training in Zimbabwe is in the lower end comparing among low-income countries.

The hypothesis that in-house training has no impact on wages is rejected. Formal structured training in-house is associated with a wage-premium. Employees trained inside the firm earn 64 percent more than workers who have not been trained in-house do. However, the productivity enhancing effect of in-house training is not statistically significantly higher compared to the workers who did not receive training (see Table 3). This may indicate that in-house training is not productive. However, it seems more likely that it takes time before effects are revealed as increased productivity.

Table 3
Training

	Productivity				Wages			
	Coef.	Std. Err.	t	P> t	Coef.	Std. Err.	t	P> t
dtrain	-0.136	0.230	-0.593	0.554	0.420	0.112	3.747	0.000
dtraiou	0.332	0.103	3.208	0.001	0.075	0.050	1.490	0.137
metatrai	-0.024	0.076	-0.313	0.754	-0.120	0.037	-3.245	0.001
texttra	0.118	0.299	0.395	0.693	-0.484	0.146	-3.324	0.001
woodtra	-0.083	0.469	-0.178	0.859	-0.454	0.229	-1.987	0.047
nexptrao	-0.115	0.094	-1.218	0.223	-0.168	0.046	-3.664	0.000

Training obtained outside an enterprise is revealed in productivity. The employees receiving training from external suppliers are statistically significantly more productive than non-trained co-workers, but trained employees are not compensated equally. This is revealed by the wage differential not being significantly different from zero. Another explanation is that the impact of training is not instantaneously reflected in wages due to a delay from the time the productivity increase from the training is realized until this productivity increase is rewarded as higher wages.

Trade unions are often associated with training. This seems also to hold in Zimbabwe. Trade union bargaining at the firm level may increase social welfare by counterbalancing a firm's monopsonistic power in wage determination.¹¹ Long term contracts are socially optimal when workers are being trained because workers' incentive to quit and leave with the skills obtained is reduced. Alternatively, firms and local unions wage bargaining may ensure that post-training wage is set sufficiently high to defer inefficient quits, and thus to ensure that the number of trainees the firm takes on is near the social optimal number. Hence, we would expect to see higher post-training wages in our findings. In fact, we did so for training supplied by outside providers.

¹¹ This is shown theoretically in Brooth and Chatterji (1997).

Does Zimbabwe underinvest in training? The answer obtained from the regression analysis appears to be 'yes'. Evidence of underinvestment in training is suggested by very high returns to in-the-house training reflecting its relative scarcity. The reasons for no or too little training being provided may be imperfect capital markets, limited access to information, and other market failures.

Another implication of the figures is that policies to encourage increased enterprise training will lead to larger productivity gains for the economy. Firm level gains from training and exporting (see below) are shared with employers in the form of higher pay. These activities generate skills and knowledge that are employee specific in the sense that the employee may quit and take the accumulated human capital with her. This makes trained employees more valuable to the firm than other workers from other firms. To the extent that knowledge obtained from training is a partly firm specific, employer and employees have an incentive to share the costs and benefits of investing in training. In Zimbabwe, employer-investments in training are associated with a wage premium and employers in firms engaged in exporting (see Table 3) obtain an additional premium.

Manufacturing subsectors

In the following we consider different subsectors in manufacturing. The analysis shows that we can reject the hypothesis that employees trained within the firm have no impact on wages in the metal and textile sectors. Trained employees receive lower wages in these sectors than in the food sector. This is in addition to what is already captured by the sector variable (see below). However, workers in the metal and textile sectors are not statistically significantly less productive. These findings indicate that structural differences exist across sub-sectors.

Employees trained by outside providers that work in enterprises with a high number of expatriates receive lower wages. However, they are not less productive than the employees who did not undergo training outside the firm are. An explanation for this could be that the higher the number of expatriates working in a firm, the more open it is

to international markets, and, therefore, wages are affected by external factors. Hence, training is necessary to keep up with international developments and it is an investment that does not (instantly) show up in wages, but does in productivity.

6.1.3 Differentials by experience

Labor market experience is now considered. The worker's age is included in the wage equation both in level and squared allowing for non-linearities. The findings show that age both in level and squared is statistically significantly different from zero and of the expected sign (see Table 4). The estimated life-cycle wage profile has the quadratic shape known also from industrialized countries. The positive effect of experience on wages is increasing in the younger age and continues at older age but at a decreasing rate. The productivity profile follows the pattern of wages and the wage gap and productivity gap are equal in size.

Table 4
Experience

	Productivity				Wages			
	Coef.	Std. Err.	t	P> t	Coef.	Std. Err.	t	P> t
age	0.056	0.016	3.535	0.000	0.056	0.008	7.313	0.000
agesq	-0.001	0.000	-3.000	0.003	-0.001	0.000	-5.979	0.000

Other individual characteristics

6.1.4 Differentials by apprenticeship and contracts

Does the type of contract and undertaking apprenticeship affect wages and productivity? It is of interest for both the employer and the employee to form a long-run employment relationship, thereby helping to build and retain firm-specific skills. Table 5 shows the estimated wage differential associated with permanent employment. It is estimated to 12 percent and is statistically significant. Hence, workers with permanent contracts obtain

higher wages than workers with temporary contracts. Therefore, the policy implemented after Independence to protect employees seems not to have affected wages directly as they are higher than those of unprotected workers are. This finding is coherent with what Fallon and Lucas (1991) found estimating wage equations using time series data. However, the labor legislation may have affected the number of permanent jobs created negatively because firms have invested more in physical capital than in long-term engagement to employment. There does not seem to be a trade off between enhanced job security and wages. Rather the contrary, job security endows insider workers with bargaining power enhancing the possibility of achieving higher wages.

Table 5
Apprenticeship and Contracts

	Productivity				Wages			
	Coef.	Std. Err.	t	P> t	Coef.	Std. Err.	t	P> t
dpermem	-0.245	0.098	-2.500	0.013	0.118	0.048	2.468	0.014
apprmeta	0.027	0.056	0.478	0.633	0.107	0.027	3.939	
dappr	-0.064	0.121	-0.531	0.596	0.282	0.059	4.780	0.000

The productivity differential associated with holding a permanent contract is negative and statistically significant. Is the impact from the type of contract of the same size on wages and productivity? We reject the hypothesis of equality of productivity and wages of permanently employed, with a p-value of effectively zero, ($F=13.17$, $\text{Prob} > F = 0.00$). This finding contradicts the intuitive explanation presented in Fallon and Lucas (1991) that temporary workers lack the incentive to work hard because they are not covered by Zimbabwe's permission clause. Temporary workers are more productive than permanent indicating that the former may be working hard in an attempt to obtain a permanent contract.

In the sub-sectors we find that the wage premium obtained by permanently employed workers is statistically insignificantly different from zero in woods, textiles, and metals,

the sector of comparison being food. Hence, for permanent employees higher wages and no higher productivity are a pattern, which seems equal across the entire manufacturing sector. *Summa summarum*, the findings indicate that workers with a permanent contract not only benefit in terms of increased job security but they also get higher wages, despite being less productive.

In Zimbabwe limited apprentice programs are available. Moreover, apprentices are paid a low wage, while employers of apprentices are not compensated. Do employees who have been an apprentice obtain higher wages than others do? The point estimate of the wage differential is 0.28 and the wage gap 33 percent; a difference that is significantly different from zero, controlling for individual and firm characteristics. For the value-added specification, the estimate of the productivity differential is negative, but statistically insignificant. Hence, the wage premium is out of line with productivity. An apprentice diploma may serve as a screening device in staff selection as diplomas often do in developed countries.

Turning to the four sectors; apprentices in the metal sector obtain a significantly higher wage premium than apprentices in other sub-sectors. Furthermore, an apprentice working in metals impact productivity positively, but is statistically insignificant. This indicates that productivity is not higher for apprentices in metals than in other sectors.

6.1.5 Ethnicity differentials

Does ethnic discrimination in wages exist in Zimbabwe accounting for productivity? Under perfect competition in the capital and labor markets, equivalent employees in equivalent jobs are compensated equally, that is, there is no discrimination. Findings in the regression analysis indicate that the origin of an employee is not very important per se, controlling for the level of human capital and other characteristics. Wages of Africans, Asians, and Europeans are not statistically different.

Table 6
Ethnicity

	Productivity				Wages			
	Coef.	Std. Err.	t	P> t	Coef.	Std. Err.	t	P> t
europa	1.839	0.729	2.523	0.012	-0.116	0.355	-0.326	0.744
empleuro	-0.253	0.137	-1.841	0.066	0.152	0.067	2.273	0.023
textasia	1.725	0.536	3.216	0.001	1.045	0.261	4.000	0.000
woodasia	0.812	0.665	1.222	0.222	0.753	0.324	2.327	0.020
emplasia	-0.179	0.080	-2.224	0.026	-0.059	0.039	-1.503	0.133

The tests of the null hypotheses that workers of European or Asian ethnic origins are generally not paid more than African workers is not rejected. However, the findings from the production functions show that on average Europeans are more productive than Asians and Africans. Europeans employed in larger firms are paid (statistically significantly) more than Africans but are also less productive. The overall effect, however, is that Europeans are more productive than any other ethnic group.

The wage gap between Asians and Africans increases with firm size and Asians are paid marginally -- although not significantly -- less than Africans. Moreover, the Asians are statistically significantly less productive in larger firms than in smaller compared to employees of other ethnic background.

In the textile and wood sectors Asians are paid higher wages, and, furthermore, they are significantly more productive in the former sector than in other sectors. However, the test for parameter equality indicates that wages and productivity are in line in textiles, the p-value is high, indicating that the coefficients are not different.

6.1.6 Gender differentials

Are men and women equally productive and paid the same? The regression analyses reveal that female employees are paid statistically significantly less than their male co-workers, controlling for individual and other characteristics. It seems dubious whether

this finding is due alone to women being less productive than men are. In fact, the point estimate of the productivity differential is not statistically different from zero. This implies that, on average, women's lower wages do not reflect lower productivity than men's do. One interpretation of this finding is that men and women filling the same jobs in enterprises, and despite being equally productive, women are paid less, consistent with the standard wage discrimination hypothesis. The productivity gap is insignificant and the wage gap is 13 percent, thus the entire wage gap might be attributed to discrimination.¹²

Table 7
Gender

	Productivity				Wages			
	Coef.	Std. Err.	t	P> t	Coef.	Std. Err.	t	P> t
dfemale	-0.019	0.082	-0.232	0.817	-0.127	0.040	-3.182	0.001

The lower wages that Zimbabwean women earn do not seem to originate from being employed in the textile sector. The findings show that women working in textiles do not earn less than their male colleagues, controlling for the textile sector. Furthermore, when interaction variables for completed education and being a female were included, they turned out to be statistically insignificant and that indicates that returns to women's completed education is not lower than men's return.¹³ Furthermore, the gender gap is not different across manufacturing sub-sectors.

¹² However, there exist other possible explanations for this finding. Women might be employed in lower-paying jobs or occupations although these jobs are not less productive. Then the level of detail of occupation would have to be finer than the one that we use. This could arise because of so-called taste discrimination (see Becker 1971). Another explanation for women's wages being lower than their productivity may occur if enterprises deviate in the degree to which they have implemented labor-saving technological change. Normally, such changes are not fully accounted for in the book value of capital and if technological change eliminates more jobs held by females than males the parameter estimates could be biased.

¹³ There is too few observations on females to perform a sensitivity analysis of women's wage determination.

6.1.7 Differences by trade unions

Table 8
Trade Unions

	Productivity				Wages			
	Coef.	Std. Err.	t	P> t	Coef.	Std. Err.	t	P> t
dunion	0.141	0.063	2.222	0.026	-0.172	0.031	-5.585	0.000

Does unionization make a difference to wages? The answer is yes, as the union premium in the Zimbabwean manufacturing sector is statistically significant and negative. Union members earn less than non-union members do when controlling for firm and individual characteristics in the wage regression. The estimated wage differential associated with being a union member is approximately -17 percent. This provides evidence that trade unions reduce wage differentials, and, therefore, positively affect the income distribution. This finding is surprising because findings from wage analyses in developed countries usually show that union members earn more than their non-union member colleagues. However, Rama (1997) finds also that union members are paid less in CFA countries applying a cross-section dataset of African countries. Additionally, union members are statistically significantly more productive than non-members; the productivity gap is 14 percent. The test of the hypothesis that the wage and productivity gap is of equal size is highly rejected ($F=23.48$, $\text{Prob} > F = 0.00$).

Enterprise characteristics

Are employer or enterprise characteristics associated with individual wages and productivity. Findings not presented in this version indicate that omitting enterprise-level control variables from the analysis would bias the coefficient estimates in an individual-

level wage equation, as leaving out significant variables will cause omitted variable biases.¹⁴

6.1.8 Differentials by sectors

Does the sector in which an employee is employed make a difference to wages? Employees in the metal and textile sectors earn more and less, respectively, than their colleagues in the food sector, controlling for other firm and individual characteristics in the regression. The sectoral wage premium is 7 percent for metals and minus 30 percent for textiles, compared to the food and wood sectors.

Table 9
Sectors

	Productivity				Wages			
	Coef.	Std. Err.	T	P> t	Coef.	Std. Err.	t	P> t
metal	-0.232	0.077	-3.026	0.003	0.069	0.037	1.840	0.066
textile	-0.921	0.375	-2.454	0.014	-0.358	0.183	-1.957	0.051
textiexp	-0.015	0.004	-4.139	0.000	-0.006	0.002	-3.226	0.001
metatrai	-0.024	0.076	-0.313	0.754	-0.120	0.037	-3.245	0.001
texttrai	0.118	0.299	0.395	0.693	-0.484	0.146	-3.324	0.001
woodtrai	-0.083	0.469	-0.178	0.859	-0.454	0.229	-1.987	0.047
textasia	1.725	0.536	3.216	0.001	1.045	0.261	4.000	0.000
woodasia	0.812	0.665	1.222	0.222	0.753	0.324	2.327	0.020
apprmeta	0.027	0.056	0.478	0.633	0.107	0.027	3.939	0.000
nexpmeta	0.152	0.039	3.874	0.000	0.078	0.019	4.061	0.000
emplmeta	0.042	0.016	2.565	0.010	-0.009	0.008	-1.083	0.279
folimeta	0.328	0.058	5.674	0.000	0.110	0.028	3.897	0.000
nexpTEXT	0.100	0.092	1.092	0.275	0.074	0.045	1.642	0.101
emplTEXT	0.240	0.055	4.397	0.000	0.045	0.027	1.706	0.088
fountext	-0.016	0.003	-5.038	0.000	0.003	0.002	2.071	0.039
nexpwood	-0.496	0.286	-1.733	0.083	0.405	0.139	2.909	0.004
emplwood	-0.122	0.026	-4.783	0.000	-0.032	0.012	-2.545	0.011

¹⁴ The introduction of enterprise-level covariates reduces the estimated relationship between wages, and, for example, completed university education consistent with the controls being correlated with employee quality. Nevertheless, a significant positive relationship is still present.

However, in both sectors the employees are statistically less productive than in the food and wood sectors. The employees in metals and textiles are, respectively, 21 percent and 60 percent less productive. The p-value testing equality shows that productivity is equal to wages in the textile sector, but not in the metal sector ($F(\text{metal}) = 14.78$, $\text{Prob} > F = 0.00$; $F(\text{textile}) = 2.16$, $\text{Prob} > F = 0.14$). These findings indicate that on average wages are too high in the metal sector, which may be caused by rents. However, wages in the textile sector are in line with productivity. Therefore, there is no direct evidence of economic rents due to, for example, monopoly power in textiles.

Firms operating in the textile sector which are engaged in export activity pay a marginally lower wage premia than the ones not engaged in these activities. Furthermore, on average, the employees are statistically significantly less productive than in other sub-sectors. The coefficient estimates are very small but equality of gaps is rejected ($F = 6.33$, $\text{Prob} > F = 0.01$).

The number of expatriates employed in an enterprise proves important in determining wages in the metal, textile and wood sectors, all parameters are statistically different from zero and positive. Furthermore, the number of expatriates is statistically significant in the determination of value added in metals ($F = 3.46$, $\text{Prob} > 0.06$). However, in the other two sectors they are insignificantly different from zero. Hence, employees with more expatriates around are only marginally more productive in metals, controlling for a number of covariates.

The age of an enterprise is only significant in determination of wages in the textile sector, but the coefficient estimate is low. The same holds for productivity. In the other sectors the number of years since the firm was founded has no significant impact on wages or productivity, controlling for other enterprise and employee characteristics.

The enterprises in the metal sector with foreign licenses pay statistically significantly higher wages than other firms. The wage premium associated with being employed in

metals in a firm holding foreign licenses is 11 percent. Furthermore, these enterprises have employees that are statistically significantly more productive (39 percent) than in other sectors. The hypothesis testing that the coefficient estimates in the wage and production function are equal is highly rejected, indicating that employees are more productive than wages reveal ($F=13.70$, $\text{Prob} > F = 0.00$).

As mentioned above, the hypothesis that training within the firm has no impact on wages in the metal, wood and textile sectors can be rejected, foods being the reference group. Trained employees get a lower wage in these sectors than in the food sector, but they are not statistically significantly less productive.

Does firm size impact wages and productivity. In metals productivity is statistically significantly higher in larger firms than smaller firms are. However, wages are not significantly higher. In the textile sector larger firms are both more productive and pay higher wages. Furthermore, the productivity gap is larger than the wage gap in textiles ($F = 12.2$, $\text{Prob} > F = 0.00$). Additionally, in woods the wage and productivity gaps are both significant and negative. This indicates that employees in woods are less productive and are paid lower wages than in foods. The test statistics reveal that the negative gaps are of equal size, indicating wages are in line with productivity in the wood sector ($F = 12.06$, $\text{Prob} > F = 0.0$).

6.1.9 Differentials by location

Does the location of the enterprise -- Harare, Bulawayo or else where -- impact on wages and productivity? We estimate the location premium to be statistically significant and positive (see Table 10). Workers employed in an enterprise placed in Harare receive a 34 percent wage premium and workers in Bulawayo receive 19 percent more than their colleagues working outside these locations. These wage-premia may be interpreted as compensation to city-based employees due to the generally higher price-level. Moreover,

employees in Harare and Bulawayo are by far more productive than colleagues elsewhere.

Table 10
Location

	Productivity				Wages			
	Coef.	Std. Err.	t	P> t	Coef.	Std. Err.	t	P> t
Harare	0.794	0.104	7.612	0.000	0.293	0.051	5.761	0.000
Bulawayo	0.441	0.111	3.992	0.000	0.191	0.054	3.541	0.000

We reject equality of productivity and wages of workers employed in both Harare and Bulawayo ($F(\text{Harare})=22.2$, $\text{Prob} > F = 0.00$ and $F(\text{Bulawayo})= 4.94$, $\text{Prob} > F = 0.03$). These findings indicate that workers in Harare and Bulawayo are far more productive than elsewhere but they are not being fully compensated herefore.¹⁵

6.2.10 Differentials by openness

Does increased internalization benefit Zimbabwean manufacturing workers? Increased openness to trade itself exacerbates the influence of new technologies, because trade liberalization induces more imitation, makes reverse engineering easier, and makes complementary imports cheaper. Increased openness also increases competition, thereby increasing the incentives to imitate. The percentage share of exports in enterprise production here measures openness. Additionally, we include three other proxies for openness in the analysis: (1) foreign licenses; (2) the number of expatriates; and (3) spending on research and development.

The findings in Table 11 indicate that employees in exporting firms are paid statistically significantly more (0.6 percent) than workers in firms not exporting. An increase in the

¹⁵ One observation related to these findings, is that there are only a few firms outside these two locations (13 percent). Another point is that some of the higher productivity is reflected in non-wage benefits, not included in wages, hence, total earnings may be in line with productivity.

export share leads to an increase in wages, controlling for individual and firm characteristics. A 10-percentage-points increase in the export share increases wages by 0.06 percentage points. Furthermore, if the employee has been trained, the impact on wages is 0.12. Additionally, the finding that trained and educated workers employed in exporting firms obtains a significant wage-premium provides evidence of a skill-biased technological change, suggesting that a more open economic environment benefit workers. This is due to, for example, that they are more likely to be trained and, thus, to obtain higher wages. Employees working in larger firms receive less than workers in smaller firms do when the export share increases; the effect on wages is 0.11 percentage points.

Table 11
Openness

	Productivity				Wages			
	Coef.	Std. Err.	t	P> t	Coef.	Std. Err.	t	P> t
exportsh	0.021	0.006	3.414	0.001	0.006	0.003	1.943	0.052
forownsp	0.540	0.095	5.670	0.000	0.070	0.046	1.501	0.134
numexpat	-0.115	0.070	-1.656	0.098	0.064	0.034	1.875	0.061
trainexp	0.009	0.006	1.591	0.112	0.006	0.003	2.079	0.038
textiexp	-0.015	0.004	-4.139	0.000	-0.006	0.002	-3.226	0.001
forowexp	-0.019	0.004	-4.943	0.000	0.000	0.002	0.063	0.950
emplexp	-0.003	0.001	-2.672	0.008	-0.001	0.001	-1.986	0.047
nexptrao	-0.115	0.094	-1.218	0.223	-0.168	0.046	-3.664	0.000
nexpmeta	0.152	0.039	3.874	0.000	0.078	0.019	4.061	0.000
folimeta	0.328	0.058	5.674	0.000	0.110	0.028	3.897	0.000
nexpTEXT	0.100	0.092	1.092	0.275	0.074	0.045	1.642	0.101
nexpwood	-0.496	0.286	-1.733	0.083	0.405	0.139	2.909	0.004

Furthermore, the size of export share impacts productivity positively and it is statistically significant. Hence, firms with higher export shares are more productive due to, e.g., resources are used more efficiently. The impact on productivity is 0.21 percentage points of a 10-percentage-point increase in the export share of production. In addition, if employees are being trained the impact increase to 0.3 percentage points.

The test of equal coefficient estimates in the wage and productivity equations indicates that they are not of equal size ($F=5.85$, $\text{Prob} > F = 0.02$). Hence, a higher degree of internationalization improves productivity more than wages.

Is the impact of openness equal across manufacturing sectors? The answer to this question is 'no'. An increase in export share has no significant impact on wages in the wood and metal sectors, revealed by the interaction variables between the sector and export share in output being statistically insignificantly different from zero. However, exports affect wages in the textile sector negatively, compared to the other sub-sectors. The size of the negative wage premium in textiles shows that it completely offsets the overall export premium. However, the impact on productivity in textiles is statistically significant and positive but lower than in the other sub-sectors. In textiles, the effect of a 10-percentage-point increase in export shares on productivity is 0.06 compared to 0.21 on the average in manufacturing.

The variable *emplexp* reveals that larger firms engaged in export activities are marginally less productive and pay marginally lower wages than the average firm is. However, larger exporting firms are still more productive than other firms are. The test for equality of the parameter estimates in the two equations is only marginally non-rejected ($F=2.79$, $\text{Prob} > F = 0.09$). This indicates that wages are more in line with productivity in larger sized exporting firms than in average sized firms.

The second variable related to openness is the ownership structure of a firm. A firm with some foreign ownership is more likely to be attached to international markets than purely Zimbabwean firms. In fact, the foreign ownership variable proves to have an impact on productivity, controlling for both enterprise and individual characteristics. Enterprises owned or partly owned by foreigners are statistically significantly more productive than firms owned by locals, but they do not pay statistically significantly higher wages.

Foreign or partly foreign owned firms engaging in export activities do not pay an additional wage premium. Findings for the productivity equation show that the level of productivity gained from exports and foreign ownership are not additive, as the coefficient estimate on *forowexp* is negative and statistically significant. This finding indicates that there exist productivity gains from internationalization and, further, that proxies used to capture this all contribute differently.

The third variable that proxy openness is ownership of foreign licenses. Firms that purchased foreign licenses do not on average pay significantly higher wages than other firms nor are they on average more productive. However, ownership structure impacts statistically significantly wages in metals, and this sector has also higher productivity. The hypothesis that the coefficients are of equal magnitude is rejected ($F=13.70$, $\text{Prob} > F = 0.00$). This finding indicates that firms possessing foreign licenses are more productive than others in the metal sector are, and these firms do not compensate employees equally in terms of wages. There is no impact on wages or productivity in the other sectors.

The fourth variable related to openness is expatriates. Wages are statistically significantly higher the more expatriates employed in a firm. One more employed expatriate is associated with a 6 percent increase in wages, *ceteris paribus*. Furthermore, there exists an additional premium, which is statistically significant and positive in all sub-sectors, foods being the reference sector. The premium ranges from 41 percent in the wood sector to 7 percent in textiles. The production function estimates show that only firms with expatriates in metals are more productive than workers in the other sectors, and the productivity is only marginally higher than wages ($F= 3.46$, $\text{Prob} > F = 0.06$).

6.1.11 Differentials by firm size

Do larger firms pay their employees more than smaller firms do, and, if so, are wages in line with productivity? Yes, larger firms -- measured by the number of full-time and part-time workers in the firm -- do pay higher wages than smaller firms (see Table 12). This

finding is in line with Velenchik (1996a, 1996b).¹⁶ Not only do larger firms pay more than smaller firms do in Zimbabwe but they are also more productive as revealed by the production function estimates. The impact of the firm size on wages and productivity is both statistically significant and positive but the impact on the latter is far larger than on the former ($F = 1022.6$, $\text{Prob} > F = 0.00$). A 10-percentage-point increase in firm size increases wages by 1.86 percentage points.

Table 12
Firm Size

	Productivity				Wages			
	Coef.	Std. Err.	t	P> t	Coef.	Std. Err.	t	P> t
lemp1	1.366	0.036	37.775	0.000	0.186	0.018	10.577	0.000
emplexp	-0.003	0.001	-2.672	0.008	-0.001	0.001	-1.986	0.047
empleuro	-0.253	0.137	-1.841	0.066	0.152	0.067	2.273	0.023
emplasia	-0.179	0.080	-2.224	0.026	-0.059	0.039	-1.503	0.133
emplwood	-0.122	0.026	-4.783	0.000	-0.032	0.012	-2.545	0.011
emplmeta	0.042	0.016	2.565	0.010	-0.009	0.008	-1.083	0.279

In the above sections the importance of the firm size was already mentioned. We can summarize the findings as follows. Larger firms engaged in export activities pay lower wages but are a little less productive. Europeans are paid more than employees of African origin in larger firms, but are also less productive than these ethnic groups, *ceteris paribus*. Employees working in woods and metals in larger firms are paid less than in smaller firms, but they are not less productive.

The employees in firms engaged in R&D are not paid statistically significantly more or less than workers in firms not participating in these activities. It should be noted that manufacturing workers is a privileged group of workers because they have a stable income and often receive extra benefits. It is one of the groups with the highest incomes

¹⁶ That earnings increase with establishment size has been found elsewhere (see Groshen (1991)).

in the economy. However, the above mentioned findings show that more openness to trade does not necessarily decrease overall wage inequality, as this group will not lose its privileges due to increased international competition, except for in textiles.

7. Conclusion

This paper applies individual-level data on employees matched with firm-level data to estimate wage and production functions of employees with different demographic and other characteristics.

Most standard wage regressions do not control for firm characteristics that can affect the wage determination process. The reason is that information on firms and employees are often not available. We control for firm characteristics in this paper. Additionally, we go a step further in that we jointly estimate wage and production functions. This approach allows not only for assessing the marginal impact of demographic and other characteristics on wages but also for comparing the impact of these variables on productivity and wages.

For certain groups of workers, wage differentials match productivity differentials, while for others they do not. First, female employees are generally paid less than male employees and the negative wage premium they receive do not reflect a corresponding negative productivity premium. This may suggest gender discrimination. The wage differential between men and women is estimated at around 37 percent. However, for the case of the textile sector, no discrimination seems to be present.

Second, we find that employees' experience as measured by age is reflected equally in wages and productivity differentials over the life-cycle, both wages and productivity increase, but at a decreasing rate. No clear differences exist in returns to education due to gender. No direct link between firm-specific experience is established. Rather, the link is indirect, as firm-specific experience is implicitly captured by the age-variable.

Third, we find that the wage premium increases with the level of education and with occupational title. Productivity differences are revealed for secondary education and they fall behind wage differentials by education. Hence, the positive wage gap between workers with completed secondary education and workers with no or little completed education cannot be completely justified by higher productivity, but may rather indicate shortage of educated workers. Further, no overall occupational productivity differential is established, whereas productivity differentials fall behind wage differentials when examining wages and productivity of the occupational groups individually.

Fourth, the findings reveal the existence of an asymmetry in training: formal in-house training is found to be associated with higher wages, while there does not seem to be any (instantaneous) effect on productivity from formal in-house training. The opposite seems to be true for training by outside providers: here there is a productivity enhancing effect, while this is not awarded as higher wages, however.

Furthermore, an additional wage and productivity premium exist for enterprises engaged in exporting activities, indicating that new technology has an enhancing effect on both.

Fifth, long-term contracts help firms to retain and build firm specific skills. We find no trade-off between enhanced job security and wages, but rather that job security endows insiders with increased bargaining power. Eventually, that may lead employers to invest relatively more in physical capital than in long-term engagement to employment. The trend in manufacturing employment has been slowly increasing since 1980, which further strengthens this finding. However, the productivity differential associated with a permanent contract is negative, indicating that temporary workers do not lack the incentive to work hard as might otherwise be expected. Temporary workers are more productive than permanent workers, indicating that the former may work hard in an attempt to obtain a permanent contract.

Sixth, the findings indicate that apprentices obtain a positive wage premium but they are not more productive than their colleagues who have not been an apprentice are. This indicates that an apprentice diploma may serve as a screening device when hiring. Furthermore, the wage premium related to apprenticeship is higher in metals than in any other sub-sector.

Seventh, the ethnic origin -- African, European or Asian -- of an employee is not very important in the determination of wages. However, Europeans are more productive than others are. Europeans employed in larger firms are paid more than others controlling for education, occupation and other individual and firm characteristics. Eighth, union members earn less than non-union members despite being more productive.

Enterprise characteristics are associated with individual wages and productivity: First, workers employed in an enterprise located in Harare and Bulawayo are both more productive and paid higher wages. The productivity differential is significantly larger than the wage differential.

Second, employees of firms engaged in exporting activities are paid higher wages, which can be explained by higher productivity in these firms. However, employees are not fully compensated for their high productivity, indicating that firms benefit more than employees do from the enhanced productivity following from opening up the economy to world markets.

Third, larger exporting firms are marginally less productive and pay marginally lower wages than the average firm, but they are still more productive than smaller firms and wages match productivity.

Fourth, firms with foreign ownership are more productive than other firms. One reason for this could be that foreign ownership brings new technology to the firm. However, wages are not higher in firms that are foreign or partly foreign owned.

Fifth, a relatively high number of expatriates employed in a firm are found to be associated with higher wages. This holds for all sectors, though an additional premium exists within woods, metals and textiles.

Sixth, larger firms are more productive and pay higher wages; the former is significantly larger than the latter. Seventh, employees employed in the metal or textile sectors are paid higher wages than their colleagues are in the food sector. Employees in metals are less productive than employees from other sectors. Furthermore, their productivity is lower than their wages. The more expatriates in firms in metals, the more productive the employees are; this may be caused by expatriates bringing knowledge about new technology to the enterprise, spilling over to other employees. Enterprises in metals that purchase foreign licenses are both more productive and pay higher wages than enterprises that do not purchase licenses, the productivity differential is larger than the wage differential. Larger firms in metals are found to be more productive than smaller firms; wages are not significantly higher. Additionally, firms engaged in exporting in the textile sector pay lower wages than other sectors, but employees are also less productive, though less so than reflected in wages. International competition may have caused lower wages as we control for most other firm and individual characteristics.

This finding can be interpreted in the following way. Zimbabwe is a relatively small country or economy and only one or a few firms produce each good, which may imply enterprises gaining monopoly power. Hence, the price paid by consumers is higher than it would be in a competitive market where competition is either arising from other national enterprises or from foreign enterprises. Part of the price is economic rent. If the rent part of the product price is shared between the employer and the employees wages will be higher than in a competitive product market. Increased openness indicates increased competition and, therefore, reduced economic rents. This impacts negatively on wages. The overall effect of increased international trade on welfare depends on the size of the reduced consumer prices, money wages and goods included in workers'

baskets of consumption. One possible outcome of increased competition is that workers are better off because the economic rent part of goods prices is reduced more than the part of wages to which rents contribute. Older firms in textiles pay higher wages but are less productive than firms established more recently.

In this study, also the importance of the size of the firm has been analyzed. We can shortly summarize the findings as follows. Larger firms in textiles are both more productive and pay higher wages and the productivity gap is found to be larger than the wage gap. In woods larger firms are associated with negative wage and productivity gaps, indicating that employees in woods are less productive than in foods. Trained employees receive lower wages in metals and textiles than in other sectors, but they are not less productive. Larger firms engaged in export activities pay lower wages and are a little less productive than firms not or less engaged in these activities. Furthermore, Europeans are being paid more than employees of African origin in larger firms, but are also less productive than these ethnic groups, *ceteris paribus*. Employees working in larger firms in woods and metals are paid less than employees are in smaller firms, but they are not less productive. The labor market in Zimbabwe is not perfectly competitive but rather segmented. For example, the wages of workers with similar skills employed in different sectors are not equal. As a result, we conclude that there exist structural differences across sectors.

The analysis in this paper provides evidence supporting the role of increased openness to international markets; it benefits productivity and to a large extent also wages. The same holds for human capital obtained through training or education. Economic policies aiming at increasing productivity in Zimbabwean enterprises and, hence, long-run economic growth should emphasize training and education of employees and promote openness of the economy towards the international markets via acquisition of knowledge and technology from abroad.

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Appendix A

The prefix **l** indicates that it is the natural logarithm of a variable and **d** that it is a dummy variable, which takes the value one or zero. The suffix **1** indicates it is the first wave of the RPED data and **sq** denotes that it is the square of the variable.

Table A1

Definitions of variables from or constructed from the RPED labor market survey

Variable name	Definition
mowage	Monthly wages.
educomp	Completed level of education.
asian	1 if the employee is Asian and zero otherwise.
africa	1 if the employee is African and zero otherwise.
europa	1 if the employee is European and zero otherwise.
female	1 if the employee is a female and zero when a male.
married	1 if the employee is married and zero otherwise.
age	The age of an employee.
educfe	Interaction variable which is the series female multiplied by educom.
permem	1 if the employee is permanent and zero otherwise.
mowork	Number of months employed by the firm (tenure).
train	1 if the worker has been trained inside the firm and zero otherwise.
trainou	1 if the worker has been trained outside the firm and zero otherwise.
appr	1 if the worker has been in an apprentice in the firm and zero otherwise.
union	1 if the worker is member of a labor union and zero otherwise.
jobamd	1 if the worker is currently doing administrative or clerical work.
jobcom	1 if the worker is currently doing commercial or sales work.
jobsup	1 if the worker is currently working as a supervisor or foreman.
jobtech	1 if the worker is currently working as a technician.
jobmain	1 if the worker is currently working in maintenance.
jobskpo	1 if employee is currently working as a skilled production worker.
jobotpo	1 if employee is currently working as other production worker.
jobtrai	1 if employee is currently a trainee.
jobsupp	1 if employee is currently working as support staff.
jobman	1 if employee is currently working as a manager.
mowktrai	mowork multiplied by train.
duni	1 if individual has completed university.
dtechi	1 if individual has completed technical or polytechnic.
dvoc	1 if individual has completed vocational education.
dpri	1 if individual has completed primary education.
dsec	1 if individual has completed secondary education.
dnon	1 if individual has no completed education.
Harare	1 if individual is working in a firm in Harare.
Bulawayo	1 if individual is working in a firm in Bulawayo.
Other	1 if individual is working in a firm in another location.

Table A1 Continued

Definitions of variables from or constructed from the RPED labor market survey

Variable name	Definition
metal	1 if individual is working in the metal sector
textile	1 if individual is working in the textile sector
food	1 if individual is working in the food sector
wood	1 if individual is working in the wood sector
rd	Amount of money spend on research and experimental development
forownsp	foreign owners or joint local and foreign owners.
foreigli	Dummy variable that takes value one if the firm holds foreign licenses.
valad	Value added: Total value of sales minus costs of raw material inputs and indirect costs (electricity etc.).
exportsh	Export share in produced output.
valfem	Productivity*female.
numexpat	Number of expatriates in the firm.
femtex	female*textile.
empl	Number of employees in the firm.
foodexp	food*exportsh
woodexp	wood*exportsh
metalexp	metal*exportsh
found	year the business is founded - 1902
textiexp	textile*exportsh
agetrao	age*dtraiou
permtrao	dpermem*dtraiou
apprtrao	dappr*dtraiou
uniotrao	dunion*dtraiou
eurotrao	europa*dtraiou
asiatrao	asian*dtraiou
metatrao	metal*dtraiou
texttrao	textile*dtraiou
woodtrao	wood*dtraiou
valatrao	Productivity*dtraiou
fowntrao	forownsp*dtraiou
nexptrao	numexpat*dtraiou
empltrao	lemp*dtraiou
fountrao	found*dtraiou
ageunio	age*dunion
permunio	dpermem*dunion
apprunio	dappr*dunion
eurounio	europa*dunion
asiaunio	asian*dunion
metaunio	metal*dunion
textunio	textile*dunion

Table A1 Continued

Definitions of variables from or constructed from the RPED labor market survey

Variable name	Definition
woodunio	wood*dunion
valaunio	Productivity*dunion
fownunio	forownsp*dunion
nexpunio	numexpat*dunion
emplunio	lemp1*dunion
foununio	found*dunion
expunio	exportsh*dunion
rdunio	rd*dunion
foliunio	foreigli*dunion
ageeuro	age* dtraiou
permeuro	dpermem*europa
appreuro	dappr*europa
unioeuro	dunion*europa
euroeuro	europa*europa
asiaeuro	asian*europa
metaeuro	metal*europa
texteuro	textile*europa
woodeuro	wood*europa
valaeuro	Productivity*europa
fowneuro	forownsp*europa
nexpeuro	numexpat*europa
empleuro	lemp1*europa
founeuro	found*europa
expeuro	exportsh*europa
rdeuro	rd*europa
folieuro	foreigli*europa
apprmeta	dappr*metal
uniometa	dunion*metal
valameta	Productivity*metal
fownmeta	forownsp*metal
nexpmeta	numexpat*metal
emplmeta	lemp1*metal
founmeta	found*metal
expmeta	exportsh*metal
rdmeta	rd*metal
folimeta	foreigli*metal
apprtext	dappr*textile
uniotext	dunion*textile
valatext	Productivity*textile
fowntext	forownsp*textile

Table A1 Continued**Definitions of variables from or constructed from the RPED labor market survey**

Variable name	Definition
nexptext	numexpat*textile
empltext	lemp1*textile
fountext	found*textile
exptext	exportsh*textile
rdtext	rd*textile
folitext	foreigli*textile
apprwood	dappr*wood
uniowood	dunion*wood
valawood	Productivity*wood
fownwood	forownsp*wood
nexpwood	numexpat*wood
emplwood	lemp1*wood
founwood	found*wood
expwood	exportsh*wood
rdwood	rd*wood
foliwood	foreigli*wood
apprvala	dappr*Productivity
uniovala	dunion*Productivity
fownvala	forownsp*Productivity
nexpvala	numexpat*Productivity
emplvala	lemp1*Productivity
founvala	found*Productivity
expvala	exportsh*Productivity
rdvala	rd*Productivity
folivala	foreigli*Productivity

Appendix B

Table B1

Simultaneous estimation of wages and productivity

	Productivity				Wages			
	Coef.	Std. Err.	t	P> t	Coef.	Std. Err.	t	P> t
dfemale	-0.019	0.082	-0.232	0.817	-0.127	0.040	-3.182	0.001
age	0.056	0.016	3.535	0.000	0.056	0.008	7.313	0.000
dpermem	-0.245	0.098	-2.500	0.013	0.118	0.048	2.468	0.014
dtrain	-0.136	0.230	-0.593	0.554	0.420	0.112	3.747	0.000
dtraiou	0.332	0.103	3.208	0.001	0.075	0.050	1.490	0.137
dappr	-0.064	0.121	-0.531	0.596	0.282	0.059	4.780	0.000
dunion	0.141	0.063	2.222	0.026	-0.172	0.031	-5.585	0.000
europa	1.839	0.729	2.523	0.012	-0.116	0.355	-0.326	0.744
agesq	-0.001	0.000	-3.000	0.003	-0.001	0.000	-5.979	0.000
jobman	-0.194	0.141	-1.382	0.167	1.112	0.069	16.229	0.000
jobamd	0.060	0.110	0.548	0.584	0.687	0.053	12.858	0.000
jobcom	-0.092	0.156	-0.588	0.557	0.390	0.076	5.138	0.000
jobsup	0.040	0.104	0.384	0.701	0.499	0.051	9.847	0.000
jobtech	0.105	0.215	0.487	0.626	0.882	0.105	8.410	0.000
duni	-0.088	0.261	-0.340	0.734	0.501	0.127	3.944	0.000
dvoc	0.125	0.244	0.512	0.609	0.232	0.119	1.949	0.052
dsec	0.126	0.070	1.786	0.074	0.172	0.034	5.023	0.000
Harare	0.794	0.104	7.612	0.000	0.293	0.051	5.761	0.000
Bulawayo	0.441	0.111	3.992	0.000	0.191	0.054	3.541	0.000
metal	-0.232	0.077	-3.026	0.003	0.069	0.037	1.840	0.066
textile	-0.921	0.375	-2.454	0.014	-0.358	0.183	-1.957	0.051
exportsh	0.021	0.006	3.414	0.001	0.006	0.003	1.943	0.052
lemp	1.366	0.036	37.775	0.000	0.186	0.018	10.577	0.000
forownsp	0.540	0.095	5.670	0.000	0.070	0.046	1.501	0.134
numexpat	-0.115	0.070	-1.656	0.098	0.064	0.034	1.875	0.061
trainexp	0.009	0.006	1.591	0.112	0.006	0.003	2.079	0.038
textiexp	-0.015	0.004	-4.139	0.000	-0.006	0.002	-3.226	0.001
forowexp	-0.019	0.004	-4.943	0.000	0.000	0.002	0.063	0.950
emplexp	-0.003	0.001	-2.672	0.008	-0.001	0.001	-1.986	0.047
metatrai	-0.024	0.076	-0.313	0.754	-0.120	0.037	-3.245	0.001
texttrai	0.118	0.299	0.395	0.693	-0.484	0.146	-3.324	0.001
woodtrai	-0.083	0.469	-0.178	0.859	-0.454	0.229	-1.987	0.047
nexptrao	-0.115	0.094	-1.218	0.223	-0.168	0.046	-3.664	0.000
empleuro	-0.253	0.137	-1.841	0.066	0.152	0.067	2.273	0.023
textasia	1.725	0.536	3.216	0.001	1.045	0.261	4.000	0.000

Table B1 Continued
Simultaneous estimation of wages and productivity

	Productivity				Wages			
	Coef.	Std. Err.	t	P> t	Coef.	Std. Err.	t	P> t
woodasia	0.812	0.665	1.222	0.222	0.753	0.324	2.327	0.020
emplasia	-0.179	0.080	-2.224	0.026	-0.059	0.039	-1.503	0.133
apprmeta	0.027	0.056	0.478	0.633	0.107	0.027	3.939	0.000
nexpmeta	0.152	0.039	3.874	0.000	0.078	0.019	4.061	0.000
emplmeta	0.042	0.016	2.565	0.010	-0.009	0.008	-1.083	0.279
folimeta	0.328	0.058	5.674	0.000	0.110	0.028	3.897	0.000
nexptext	0.100	0.092	1.092	0.275	0.074	0.045	1.642	0.101
emplttext	0.240	0.055	4.397	0.000	0.045	0.027	1.706	0.088
fountext	-0.016	0.003	-5.038	0.000	0.003	0.002	2.071	0.039
nexpwood	-0.496	0.286	-1.733	0.083	0.405	0.139	2.909	0.004
emplwood	-0.122	0.026	-4.783	0.000	-0.032	0.012	-2.545	0.011
rdexp	0.000	0.000	-7.357	0.000	0.000	0.000	-6.294	0.000
_cons	6.576	0.341	19.295	0.000	3.732	0.166	22.481	0.000
		R ² 0.84				R ² 0.84		
		F 157.1	P0.00		F 54.3	P0.00		

Table B2
(Including education as a continuous variable)

	Productivity				Wages			
	Coef.	Std. Err.	t	P> t	Coef.	Std. Err.	t	P> t
dfemale	-0.03	0.08	-0.34	0.73	-0.13	0.04	-3.21	0.00
age	0.05	0.02	3.35	0.00	0.05	0.01	7.11	0.00
dpermem	-0.25	0.10	-2.51	0.01	0.12	0.05	2.49	0.01
dtrain	-0.13	0.23	-0.58	0.56	0.42	0.11	3.76	0.00
dtraiou	0.33	0.10	3.22	0.00	0.08	0.05	1.60	0.11
dappr	-0.05	0.12	-0.44	0.66	0.27	0.06	4.66	0.00
dunion	0.15	0.06	2.33	0.02	-0.18	0.03	-5.87	0.00
europa	1.79	0.72	2.48	0.01	-0.15	0.35	-0.42	0.67
agesq	0.00	0.00	-2.80	0.01	0.00	0.00	-5.64	0.00
jobman	-0.25	0.14	-1.80	0.07	1.10	0.07	16.23	0.00
jobamd	0.07	0.11	0.61	0.54	0.68	0.05	12.82	0.00
jobcom	-0.10	0.16	-0.64	0.52	0.38	0.08	4.99	0.00
jobsup	0.04	0.10	0.38	0.70	0.49	0.05	9.73	0.00
jobtech	0.07	0.22	0.33	0.74	0.87	0.10	8.32	0.00
leducom	0.23	0.14	1.65	0.10	0.40	0.07	5.99	0.00
Harare	0.78	0.10	7.48	0.00	0.29	0.05	5.63	0.00
Bulawayo	0.44	0.11	3.95	0.00	0.19	0.05	3.48	0.00
metal	-0.25	0.08	-3.19	0.00	0.07	0.04	1.98	0.05
textile	-0.96	0.37	-2.55	0.01	-0.35	0.18	-1.94	0.05
exportsh	0.02	0.01	3.47	0.00	0.01	0.00	1.92	0.06
lemp	1.36	0.04	37.51	0.00	0.19	0.02	10.48	0.00
forownsp	0.54	0.09	5.72	0.00	0.07	0.05	1.48	0.14
numexpat	-0.12	0.07	-1.65	0.10	0.08	0.03	2.26	0.02
trainexp	0.01	0.01	1.65	0.10	0.01	0.00	2.22	0.03
textiexp	-0.01	0.00	-4.19	0.00	-0.01	0.00	-3.19	0.00
forowexp	-0.02	0.00	-4.96	0.00	0.00	0.00	0.06	0.95
emplexp	0.00	0.00	-2.72	0.01	0.00	0.00	-1.99	0.05
metatrai	-0.02	0.08	-0.30	0.77	-0.12	0.04	-3.29	0.00
texttra	0.12	0.30	0.39	0.69	-0.50	0.15	-3.42	0.00
woodtra	-0.09	0.47	-0.19	0.85	-0.50	0.23	-2.18	0.03
nexptrao	-0.12	0.09	-1.28	0.20	-0.17	0.05	-3.70	0.00
empleuro	-0.24	0.14	-1.77	0.08	0.16	0.07	2.33	0.02
textasia	1.82	0.53	3.42	0.00	1.03	0.26	3.98	0.00
woodasia	0.93	0.66	1.41	0.16	0.74	0.32	2.29	0.02
emplasia	-0.20	0.08	-2.50	0.01	-0.06	0.04	-1.45	0.15
apprmeta	0.03	0.06	0.47	0.64	0.11	0.03	3.94	0.00
nexpmeta	0.15	0.04	3.90	0.00	0.08	0.02	3.95	0.00
emplmeta	0.04	0.02	2.71	0.01	-0.01	0.01	-1.20	0.23
folimeta	0.33	0.06	5.68	0.00	0.11	0.03	3.88	0.00

Table B2 Continued
(Including education as a continuous variable)

	Productivity				Wages			
	Coef.	Std. Err.	t	P> t	Coef.	Std. Err.	t	P> t
emplmeta	0.04	0.02	2.71	0.01	-0.01	0.01	-1.20	0.23
folimeta	0.33	0.06	5.68	0.00	0.11	0.03	3.88	0.00
nexptext	0.10	0.09	1.10	0.27	0.06	0.04	1.36	0.17
empltext	0.24	0.05	4.48	0.00	0.05	0.03	1.75	0.08
fountext	-0.02	0.00	-4.99	0.00	0.00	0.00	2.01	0.05
nexpwood	-0.50	0.29	-1.73	0.08	0.38	0.14	2.75	0.01
emplwood	-0.12	0.03	-4.81	0.00	-0.03	0.01	-2.46	0.01
rdexp	0.00	0.00	-7.36	0.00	0.00	0.00	-6.27	0.00
_cons	6.53	0.36	17.91	0.00	3.50	0.18	19.72	0.00

Table B3
(Including primary education)

	Productivity				Wages			
	Coef.	Std. Err.	t	P> t	Coef.	Std. Err.	t	P> t
dfemale	-0.02	0.08	-0.24	0.81	-0.13	0.04	-3.20	0.00
age	0.06	0.02	3.50	0.00	0.06	0.01	7.24	0.00
dpermem	-0.25	0.10	-2.51	0.01	0.12	0.05	2.44	0.02
dtrain	-0.13	0.23	-0.58	0.56	0.42	0.11	3.78	0.00
dtraiou	0.33	0.10	3.22	0.00	0.08	0.05	1.51	0.13
dappr	-0.06	0.12	-0.51	0.61	0.28	0.06	4.81	0.00
dunion	0.14	0.06	2.22	0.03	-0.17	0.03	-5.57	0.00
europa	1.83	0.73	2.52	0.01	-0.12	0.36	-0.34	0.73
agesq	0.00	0.00	-3.01	0.00	0.00	0.00	-6.03	0.00
jobman	-0.19	0.14	-1.34	0.18	1.12	0.07	16.28	0.00
jobamd	0.07	0.11	0.62	0.54	0.70	0.05	13.03	0.00
jobcom	-0.09	0.16	-0.56	0.58	0.40	0.08	5.21	0.00
jobsup	0.04	0.10	0.43	0.67	0.50	0.05	9.96	0.00
jobtech	0.11	0.22	0.50	0.62	0.89	0.11	8.42	0.00
duni	-0.21	0.25	-0.81	0.42	0.34	0.12	2.74	0.01
dvoc	0.01	0.24	0.03	0.98	0.07	0.12	0.59	0.56
dpri	-0.10	0.07	-1.50	0.13	-0.15	0.03	-4.36	0.00
Harare	0.80	0.10	7.66	0.00	0.30	0.05	5.86	0.00
Bulawayo	0.44	0.11	4.02	0.00	0.19	0.05	3.61	0.00
metal	-0.23	0.08	-3.05	0.00	0.07	0.04	1.77	0.08
textile	-0.92	0.38	-2.46	0.01	-0.36	0.18	-1.98	0.05
exportsh	0.02	0.01	3.43	0.00	0.01	0.00	1.99	0.05
lemp	1.37	0.04	37.76	0.00	0.19	0.02	10.56	0.00
forownsp	0.54	0.10	5.67	0.00	0.07	0.05	1.49	0.14
numexpat	-0.12	0.07	-1.75	0.08	0.05	0.03	1.61	0.11
trainexp	0.01	0.01	1.60	0.11	0.01	0.00	2.09	0.04
textiexp	-0.01	0.00	-4.16	0.00	-0.01	0.00	-3.29	0.00
forowexp	-0.02	0.00	-4.93	0.00	0.00	0.00	0.09	0.93
emplexp	0.00	0.00	-2.68	0.01	0.00	0.00	-2.01	0.05
metatrai	-0.02	0.08	-0.33	0.75	-0.12	0.04	-3.27	0.00
texttrai	0.11	0.30	0.38	0.70	-0.49	0.15	-3.34	0.00
woodtra	-0.09	0.47	-0.20	0.84	-0.47	0.23	-2.05	0.04
nexptrao	-0.11	0.09	-1.21	0.23	-0.17	0.05	-3.62	0.00
empleuro	-0.25	0.14	-1.83	0.07	0.15	0.07	2.29	0.02
textasia	1.73	0.54	3.22	0.00	1.05	0.26	4.00	0.00
woodasia	0.83	0.66	1.25	0.21	0.77	0.32	2.38	0.02
emplasia	-0.18	0.08	-2.23	0.03	-0.06	0.04	-1.51	0.13
apprmeta	0.03	0.06	0.50	0.62	0.11	0.03	3.99	0.00
nexpmeta	0.15	0.04	3.91	0.00	0.08	0.02	4.16	0.00

Table B3 Continued
(Including primary education)

	Productivity				Wages			
	Coef.	Std. Err.	t	P> t	Coef.	Std. Err.	t	P> t
emplmeta	0.04	0.02	2.58	0.01	-0.01	0.01	-1.03	0.30
folimeta	0.33	0.06	5.67	0.00	0.11	0.03	3.89	0.00
nexptext	0.11	0.09	1.16	0.25	0.08	0.04	1.84	0.07
empltext	0.24	0.05	4.41	0.00	0.05	0.03	1.74	0.08
fountext	-0.02	0.00	-5.03	0.00	0.00	0.00	2.07	0.04
nexpwood	-0.48	0.29	-1.68	0.09	0.43	0.14	3.05	0.00
emplwood	-0.12	0.03	-4.81	0.00	-0.03	0.01	-2.62	0.01
rdexp	0.00	0.00	-7.37	0.00	0.00	0.00	-6.30	0.00
_cons	6.70	0.33	20.48	0.00	3.90	0.16	24.43	0.00

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