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**Unequal Rent-Sharing and Wage Determination
in the Formal Ivoirian Economy**

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Unequal Rent-Sharing and Wage Determination in the Formal Ivoirian Economy

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Abstract: In this paper we provide an empirical analysis of wage determination in Côte d'Ivoire, using a new data set covering 98 firms with individual data on each employee in each firm. We test the rent-sharing theory of wage determination. The results highlight the importance of rent-sharing. This suggests that employees have some bargaining power. Some puzzling results come out of the study, in particular the fact that most unskilled employees lose from rent-sharing, however. This result leans in favor of unequal rent-sharing benefit among different types of employees.

JEL Classification: C81 - J31 - J42 - J5 - O1.

Keywords: Côte d'Ivoire, Skilled and Unskilled Wage Gap, Rent-Sharing, Wage Distribution.

1 Introduction

There is a wide agreement on the fact that wage inequality across different employees' categories is larger in developing countries than in developed ones. Taking a look at the case of Côte d'Ivoire reveals some stylized facts regarding the current situation of employees' remuneration in 2002.

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In our data set the median remuneration of a top director (for instance, a human resources director) is equivalent to 32 times that of a middle class unskilled employee (for instance, an electrician). In comparison Hewitt Associates¹ find a ratio of 6 between comparable types of employees in their 1999 study of the French labor market.

At the same time, looking at the remunerations' distribution, we find that 50% of the total remuneration is earned by 83 % of the total workforce (the least paid), hence 17% of the workforce (the most paid) earns the 50% remaining. In 2002, workers in the first decile of the distribution are paid on average 13 times less than the last decile. This ratio between first and last decile was about 3 in France (see, Rasolofoarison and Seroussi (2002)). To summarize, remuneration is concentrated at the top of the distribution. This concentration obviously benefits directors and management staff to the detriment of less skilled employees. Overall, wage differentials between different types of employees are expressly large relative to developed countries.

Another motivation to analyse more deeply this particular type of wage gap accross firms is that it has been increasing over time. Note from the following table that on the one hand Directors have experienced an increase in their purchasing power while on the other hand, other less skilled workers, namely unskilled employees, have seen their labor incomes increase less than their cost of living.

2000/2002 Variations	Net Remuneration	Cost of Living	Purchasing Power
Directors	+11.2%	+4.3%	+6.9%
Management	+4.3%	+4.3%	+0%
Skilled Workers	+3.1%	+3.6%	-0.5%
Unskilled Employees	+2.3%	+3.6%	-1.3%
Unskilled Workers	+3.7%	+3.6%	+0.1%

Sources: Munéris 2000, 2002.²

It should be noted that Côte d'Ivoire, one of the high wage members of the West African monetary union, is also one of the most industrialized countries in Sub-Saharan Africa, ranking among the top ten performers in terms of its share of manufacturing in GDP in 1995 (see, World Bank Report

¹Hewitt Associates (1999): "Guide des Politiques de Rémunération en France".

²JPR-Consulting has runned three surveys (Munéris 1999, Munéris 2000 and Munéris 2002) on formal firms' remuneration schemes in Côte d'Ivoire for the years 1999, 2000 and 2002. Data sets are confidential and only accessible to participating firms. However we have total access to the last survey and partial informations concerning past ones.

(1998)). Did this happen despite high wage costs and the huge wage gap between different categories of employees, or was it the cause of high wages and increasing inequality? The aim of the paper is to analyze this issue empirically, with the help of survey data collected in Côte d'Ivoire in 2002 and a sample of 98 firms with individual data on every employee in each firm. This feature allows individual employees' data to be combined with data about firms in which they work.

More precisely, we investigate the determination of the wage gap between skilled and unskilled employees across firms. It is worth noting that wages are set solely by firms in the period, as no general increase has been imposed by the government at a national level since 1995. Theory suggests two basic possible answers that can be given to this question.

On the one hand, the efficiency-wage theory predicts that firms decide to increase employees' labor income in order to develop incentives for increasing effort and productivity (see, Shapiro and Stiglitz (1984)). From this standpoint, high wages in fact minimize labor cost expressed in efficiency units, and are thus instrumental in making the firms profitable. The explanation of that huge inequality in income would be that firms can decide not to pay high wages to all kind of employees, considering that only some types of employees have to be motivated to increase firms' profitability.

On the other hand, the rent-sharing theory predicts that some groups of employees have the ability to impose higher remuneration on firms through unions or lobbies. This theory has been developed to suggest that high wages include *de facto* a share of profits, and thus only reflect the good performances of firms (see, Blanchflower, Oswald and Sanfey (1996)). Here again, the question arises whether the profit element present in employees' compensation is captured by them, as a result of insider effects (see, Nickell and Wadhvani (1990)), or whether the firms engage in profit-sharing as part of their incentive system.

This paper focuses on the second theory because we are interested in unionization and lobbying group in developed countries.³ Therefore we present a model of rent-sharing, showing the possible effect of the bargaining power of certain types of employees on wage inequality. In our bargaining framework, skilled employees have the exclusive power to disrupt production. As a result, profit-sharing is a feature of the equilibrium strategy of the firms to ensure a positive level of output. As a result, this model allows us to analyze the wage gap between skilled and unskilled employees.

³In the last Section, we check the robustness of that choice by focusing on efficiency-wage theory.

Note that neither rent-sharing nor efficiency-wage theory are really able to explain the recent increase in the skill premium. Presently, increasing wage inequality between different employees endowed with different skills is only one of our motivations to analyze the determination of this particular gap across firms in one given year. To understand and analyze seriously the evolution of skill premium one should rather consider demand and supply changes than rent-sharing or efficiency-wage theory. The relative supply of skilled labor may have changed because of the increasing education level. The relative demand for skilled labor may also have changed because of the impact of technological changes due to globalization. In the paper, we consider technology, labor demand and labor supply as given. Hence, we cannot say anything about skill premium evolution. Rather, we focus on the determination of the wage inequality across firm at a certain point of time.

This paper is organized as follows. Section 2 proposes a simple theoretical model where a monopsonistic firm bargains with skilled employees over their wage, their employment level and that of unskilled employees. In Section 3 we review the data, and the specific econometric problems that they raise. Section 4 reports the test performed with individual wage levels including some firm specific data in order to gauge the likely importance of the rent-sharing effects discussed above. We test the theoretical implication of unequal rent-sharing on unskilled employee's wages, therefore. In Section 5 we control for the robustness of our results by testing them against efficiency-wage effects. Section 6 offers some concluding remarks.

2 The Model

In this section we develop a simple model of rent-sharing that emphasizes the impact of the bargaining power of skilled employees on wage inequality. The representative firm has a well-behaved production function $F(S, N)$, using only skilled (S) and unskilled labor (N) as inputs. The function F is continuously differentiable, strictly increasing in its arguments and strictly concave. We suppose for convenience that $F_{NS} > 0$, *i.e.* both types of labor are complements.

A key assumption is that the firm has some monopsony power over its unskilled employment pool but none over its skilled employment pool. Note that nothing changes when several firms are considered in an oligopsony situation.

Formally, the representative firm faces a “wage curve” for unskilled employees (see, Blanchflower and Oswald (1994) and Hoddinott (1996)), which is represented by an inverse unskilled labor supply function $w_N(N, \bar{w}_N)$, that is increasing in the level of unskilled employment N , and in the level of unskilled alternative wage \bar{w}_N .

A monopsonistic firm chooses the lowest possible unskilled wage such that it can employ the number of workers required to reach its target production level while minimizing its costs. In these circumstances, when the firm decides to pay an unskilled wage $w_N(N, \bar{w}_N)$, it knows that the level of unskilled employment will reach the value N . Given a wage w_S for skilled employees and normalizing the output price to one, the firms profit is given by:

$$\pi = F(S, N) - w_S S - w_N(N, \bar{w}_N)N. \quad (1)$$

Clearly, the existence of monopsony power over unskilled labor supposes some limited mobility of workers and some barriers to entry that prevent other firms from competing with the incumbent firm (see, Burdett and Mortensen (1998) and Cahuc and Zylberberg (2001)).

This monopsony feature fits well with the particular case of Côte d’Ivoire as barriers to entry in the specific employment pool are significant. Indeed, creating a new firm in the Ivoirian formal sector usually involves large sunk costs, as assets may be unproductive, confiscated or even destroyed during periods of political instability such as those experienced by Côte d’Ivoire since 1999. As a result, very few investors are ready to commit funds to new firms.

The mobility constraints of unskilled labor suppliers can be viewed from two different angles. Admittedly, an unskilled worker can always leave his formal job to return to the informal labor market. But as informal wages are significantly lower than formal ones, this outside option is of low value to him. Second, an unskilled worker can move to another formal firm, but will incur significant costs in doing so. For instance, he will lose his long-service award, which is the main premium received by unskilled workers. This imperfection in the labor market allows firms to discriminate between different categories of employees without being evicted from the market.

In Côte d’Ivoire, virtually all skilled and unskilled employees are unionized in what are usually described as “Collaborative Unions”. These unions emanate from the ruling party for political reasons—namely to keep the employees under control (see, Touré (1986)). If those unions had a significant impact on wages, which is unclear, this would not affect the wage gap between skilled and unskilled employees, as both types of labor would benefit

from comparable wage increases. To simplify, we will assume in what follows that this kind of union does not affect the wages paid by the firms.

In contrast with unskilled workers, we shall assume that skilled employees are able to organize themselves into an informal union or lobbying group, with an utilitarian objective function:

$$U = w_S S + (M - S)\bar{w}_S,$$

where \bar{w}_S is the skilled employee' alternative wage or outside option, S the skilled workforce in the firm, supposed to be all members of the lobbying group, and M the total number of members, including those who are not going to get a job in the firm. The outside option of all skilled employees is to work in the outside labor market, and earn $\bar{w}_S M$.

Only skilled employees have bargaining power and participate in the negotiation process with the firm. In particular, skilled employees are able to negotiate over their wage, their employment level and that of unskilled employees. A key assumption in this bargaining context is that the wage curve $w_N(N, \bar{w}_N)$ is common knowledge between the firm and skilled employees. This may be justified by the fact that a human resources director is part of the skilled workforce which negotiates with the firm.

2.1 The Generalized Nash Bargaining Setting

In the case of binding contracts, *i.e.* in absence of renegotiation, the firm's outside option is to produce nothing and hence to get zero profit. Therefore, the equilibrium values of w_S , S and N are determined by assuming that the generalized Nash bargaining solution prevails. Denoting $0 \leq \alpha \leq 1$ the exogenous bargaining power of the skilled employees, the Nash bargaining problem is:

$$\max_{w_S, S, N} [(w_S - \bar{w}_S) S]^\alpha \pi^{1-\alpha}.$$

The first-order conditions can be arranged to read:

$$F_S(S, N) = \bar{w}_S, \tag{2}$$

and,

$$F_N(S, N) = w_N(N, \bar{w}_N)(1 + \eta_{w_N}), \tag{3}$$

where,

$$\eta_{w_N} = w'_N(N, \bar{w}_N)N/w_N(N, \bar{w}_N),$$

and,

$$w_S = \bar{w}_S + \frac{\alpha}{1 - \alpha} \frac{\pi}{S}. \quad (4)$$

Rearranging, we obtain:

$$w_S = (1 - \alpha)\bar{w}_S + \alpha \frac{F(S, N)}{S} - \alpha \frac{w_N(N, \bar{w}_N)N}{S}. \quad (5)$$

Condition (2) shows that the skilled employees' employment level only depends on their alternative wage and the unskilled employees' employment level, but is independent of the wage actually paid by the firm. The parameter η_{w_N} corresponds to the elasticity of the unskilled wage with respect to the level of unskilled employment N . Equation (3) sets up the standard equality between the marginal productivity of labor and the marginal cost of the factor. In an oligopsony situation, this marginal cost is larger than the wage rate since η_{w_N} is positive. So, the firm pays the marginal unskilled employee a wage rate below his marginal productivity.

As the firm pays unskilled wages lower than the competitive wage, it is able to get positive profits which will be shared with skilled employees. Condition (4) gives the skilled wage equation, where the second term on the right-hand side of equation (4) is the rent-sharing term. Notice that it falls to zero if the bargaining power of the skilled employees falls to $\alpha = 0$.

2.2 Unskilled loss from profit-sharing

Our model suggests therefore that the more profitable is the firm, the larger will be the skilled wage rate. This is consistent with the relatively high level of remuneration of skilled employees. Intuitively this bargaining contest imply also that the unskilled will suffer from better firm's results, because the firm's profit comes from its monopsony position over the unskilled employment pool. One can think about it in terms of externality. The fact that bargaining takes place between the firm and the skilled workforce creates an externality over unskilled employees. Hence, the more monopsony power the firm has, the more profit it makes and the less unskilled employees are paid.⁴

⁴Following the referee's comments we try to generalize our theoretical model. Considering at the same time that all type of employees are allowed to bargain with the firm, and that skilled and unskilled employees have separate wage curves. Such generalization implies that the effect of profit on skilled and unskilled wages cannot go in opposite direction. It is shown that depending on the relative sizes of bargaining power parameters of the skilled and unskilled, and on the elasticities of wages with respect to employment; firm's profit can increase (or decrease) more one type's of employee's wage than the other. But

This is confirmed by the following proposition:

Proposition 1 *Bargaining between an informal union protecting only the skilled employees and a monopsonistic firm makes unskilled wages a decreasing function of the firm's profit.*

Proof. We first write the total differential of equation (3) assuming that the elasticity of the unskilled labor supply remains constant:

$$F_{NN}dN + F_{NS}dS = dw_N(1 + \eta_{w_N}). \quad (6)$$

Then, considering (1) and (3) we know that:

$$\frac{\partial \pi}{\partial N} = 0.$$

Equivalently from (1) and (4) we get

$$\frac{\partial \pi}{\partial S} = F_S - w_S = \frac{-\alpha}{1 - \alpha} \frac{\pi}{S}.$$

So we can express dS as a function of $d\pi$:

$$dS = \frac{-(1 - \alpha)}{\alpha} \frac{S}{\pi} d\pi. \quad (7)$$

Replacing (7) in (6) we obtain

$$F_{NN}dN - F_{NS}\left(\frac{(1 - \alpha)}{\alpha} \frac{S}{\pi} d\pi\right) = dw_N(1 + \eta_{w_N}). \quad (8)$$

Finally, we know that the supply of unskilled labor verifies

$$\frac{dw_N(N, \bar{w}_N)}{dN} = w'_N(N, \bar{w}_N). \quad (9)$$

Note that this derivative is positive and in the limit can also be zero if we face an inelastic unskilled labour supply. Substituting (9) in equation (8), we obtain:

$$F_{NN} \frac{dw_N}{w'_N(N, \bar{w}_N)} - dw_N(1 + \eta_{w_N}) = \left[\frac{(1 - \alpha)}{\alpha} \frac{S}{\pi} d\pi \right] F_{NS},$$

it is never the case that profit can increase one type of employee's wage and decrease the other at the same time. This generalization underlines the fact that our assumptions are crucial to reach a situation where firm's profit can increase skilled employees' wage and at the same time deter unskilled employees condition. The generalization of the theoretical model is available upon request.

which can be easily arranged as follows:

$$\frac{dw_N}{d\pi} = \frac{1 - \alpha}{\alpha} \times \frac{S}{\pi} \times \frac{F_{NS} \times w'_N(N, \bar{w}_N)}{F_{NN} - (1 + \eta_{w_N})w'_N(N, \bar{w}_N)}.$$

Obviously this expression is negative, since $F_{NN} < 0$ and⁵ $F_{NS} > 0$. ■

Thus, the presence of an informal union protecting only the skilled employees, and the monopsony power of firms over their unskilled workforce make the unskilled wage depend negatively on the firm's profit. Intuitively, the positive rent shared between the firm and the skilled employees originates in the unskilled employees' low wage. Generally speaking, the more profitable the firm is, the less its unskilled workforce is paid.

3 The Data

Several empirical studies have been already performed on the Ivoirian economy, most notably the LSMS (Living Standards Measurement Study), undertaken by the World Bank from 1985 to 1988, and the RPED (Regional Programme for Enterprise Development), performed by the World Bank in 1995 and 1996.

The first survey is an income survey at the household level. The second one focuses more on the manufacturing sector, interviewing in each firm of the sample 10 randomly selected employees. Our data survey differs from both as it is concerned with all the main formal economic sectors, and contains one year of observations. A key feature of this original data set is that it involves all employees in each firm.

The data used here result from a survey (Mun eris 2002) of ninety eight firms in C ote d'Ivoire for the year 2002. They belong to ten different economic sectors (Services, Transport, Mines & Energy, General Industry, Food Industry, Distribution & Trade, Banks, Other Industry, Wood & Agriculture and Non Sectored firms such as the Red Cross and other institutions).

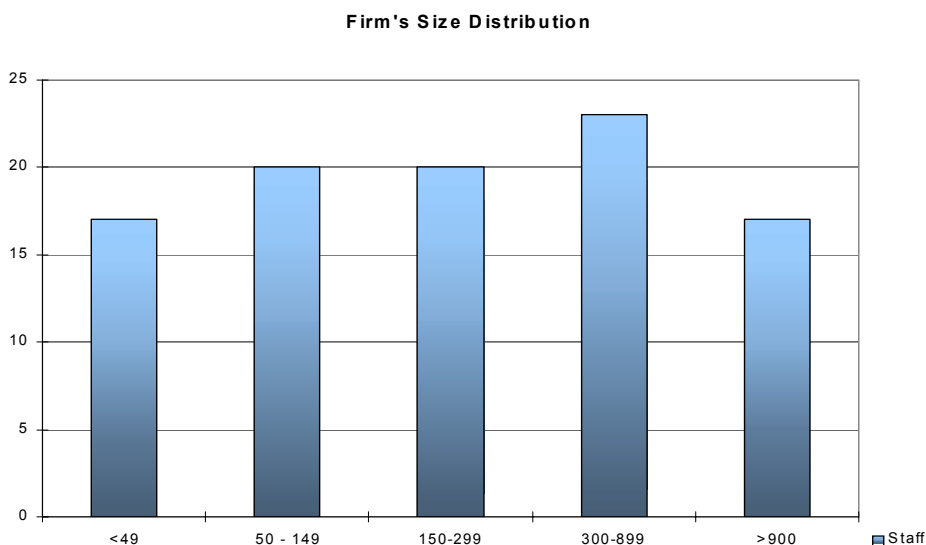
Unlike most empirical studies, firms are not randomly selected. In fact, each firm must pay a fee to participate in the survey performed by JPR-Consulting. This survey is proposed to all formal Ivoirian firms to study the different remuneration policies across the market. Each participant firm is informed about the way its own remuneration policy compares with other firms in similar sectors.

⁵Using translog analyses, we have verified that assuming unskilled and skilled labor to be complements (*i.e.*, $F_{NS} > 0$) is supported by the data.

We are aware of the fact that non random selection of firms can entail a selection bias. On the other hand, the fact that firms pay to participate to the survey may ensure us it will supply information truthfully. Of course we are not sure that no firm at all plays strategically the game, giving false information to the market while benefiting from market's informations. But generally speaking, as firms are given their position compared to the median position of the market, lying may change that median and then give no valid information to the free-riding firm.

The following figure shows our firms' sample in terms of size. We see that big firms are over-represented in our sample, as a typical firm size distribution is usually left-skewed. This is certainly due to the fee that the firms have to pay to participate in the survey.

Despite the advantage of covering all the main formal Ivoirian economic sectors, our data set is surely biased toward big and remunerative firms. We have to keep this fact in mind when we come to general conclusions about skill premium determination.



The data is collected as follows. Firms provide paylists of all their employees, including managers and directors. This information about directors' remuneration is quite difficult to obtain as it is usually kept secret by firms. Indeed, because of the huge wage gap between directors and unskilled employees, revealing this information may cause some serious social tensions within the firms. Firms also provide general information about themselves, which give us the possibility to build up an employee-firm matched data set.

The size and precision of our data set is quite unusual in the labor eco-

conomic literature, especially concerning a developing country. In fact we have 41,207 employees' paylists matched with 98 firms' specific information. However, we have no information about the capital stocks owned by firms and the rate of unionization within the firms in our survey. Concerning unionization, we know from RPED surveys that almost 85% of the employees belong to UGTCI (General Worker's Union of Côte d'Ivoire) which is typically what we call "Collaborative Unions" in the previous section.

Concerning employees, our data cover age, experience, conventional wages, "over-wages", all different premia and payments in kind. Experience is defined as the number of years each employee has spent in the same firm whatever his occupational status. Hence, experience is not tenure (*i.e.*, number of years spent practicing a specific job in any firms), and there is no reason for it to be strongly correlated with employee's age. The "over-wage" is what the employers add to employees' conventional wage to form the real monthly wage, so it has nothing to do with premium or benefit. Moreover we can value all payments in kind such as professional car, house, free products or servants, as the firms tell us the real cost of each employee. We also know each employee's occupation within the firm. Thus, we can classify each employee according to his job and his level of responsibility. For example we can distinguish between a foreman working in the production division of the firm, and one employed in the maintenance division.

A drawback of our data set is the poor quality of personal information as it is composed of totally anonymous paylists. In particular, we have no information about gender and nationality and we have access to the education level of only a few employees. As a result, we have data on education level for only 7324 employees over 41 207. To solve this problem, we proxy the education level by including occupation dummies (*i.e.*, four categories: Director, Management Staff, Skilled Worker and Unskilled Worker).

One can argue that occupation has nothing to do with education as a low educated worker can climb the hierarchical ladder of the firm to reach a top Director position after spending a certain amount of time working in the firm. In fact, in formal Ivoirian firms an employee's diploma determine almost always his status in the firm. Experience and employee's ability determine afterwards his/her progression inside his/her category. But jumping from one category to another without any additional training is very rare. We are however aware that occupation dummies do not perfectly proxy employees' education level.

Concerning information about firms themselves, we know the economic sector, the firm's type (international firm, local firm, public firm...), the firm's location and the firm's nationality. We have at our disposal the date

of creation, profit, annual turnover and value added of all firms. In addition to this basic information, we know the level of training expenditures made by each firm, which essentially consists of training sessions abroad or local special courses. The level of social expenditures is also known and concerns all expenditures that are not imposed on the firms by Ivoirian law. In other words, those expenditures can be used to build a restaurant, a day nursery inside the firm or to purchase buses to transport employees to their working place. At the same time, social expenditures can be small amounts of money given to sick employees or industrial injury victims

Finally, firms reveal the amount of loans granted to their employees. Those loans are not a source of profit for the firms because the corresponding interest rate is quite often zero even though this is forbidden by Ivoirian law. So, this expenditure can be considered as a “social service” provided by firms to their employees. For example, loans to low skilled employees are usually small annual amounts of money to pay school fees for their children. Loans granted to high skilled employees usually concern car or house purchase.

Recall that the panel is exclusively made of formal sector firms. We must keep in mind when we come to further general conclusions that the informal sector pays much lower wages to workers and accounts for a large part of the Ivoirian economy.

Despite significant limitations (small number of firms, no information about employees education, firms’ selectivity problems and no panel dimension), the data set used here is preferred to RPED. The first reason is that many political changes have occurred since RPED was runned (1995 and 1996). Côte d’Ivoire faced a military dictatorship from 1999 to 2000 followed by great social and political instabilities until 2004. This may have changed the economic behavior of the formal sector as well as the functioning of the labor market. That is why having at our disposal data from year 2002, may increase the realism of our analysis.

The second reason comes from the employees’ data selection process in RPED. As it covers more than 250 firms, the survey interviewed only 10 employees in each firm. RPED’s authors agree on the fact that they were not perfectly randomly selected as firms’ directors often command certain employees to be present or not the day the interview occurs. At the same time, top directors often hide information about personal advantages such as cars or houses offered by the firm.

For those reasons, and because we focus on the remunerations of all employees, the present data is preferred to RPED, even if we admit that our survey is far from being perfect especially concerning firm’s selectivity problems and the poverty of the education level information.

4 Econometric Results

4.1 Simple Rent-Sharing

To highlight empirically the rent-sharing effect in the determination of wages, we first estimate a simple wage equation, in which we regress individual wages on firm-specific and employee-specific variables.

In all the equations presented in the paper, the dependent variable is the log of the individual gross wage (before state's taxation on labor revenue), including all bonuses and other in kind benefits. The number of observations used in each regression is denoted N_b . We can only use 35,927 observations upon 41,207 because of 5,280 missing values concerning employees' age or experience.

Concerning employee-specific variables we use the log of employee's age, its square and the log of the time spent by the employee in one given firm (Experience). We include also dummies for employee's occupation status (Director, Manager, Skilled Worker, Unskilled Worker). Those occupation dummies may capture some of the education level of the employees, as explained in the data presentation.

We include also an alternative wage variable (Min Alter Wage) for each employee's category (Director, Manager, Skilled Worker, Unskilled Worker). This variable is calculated as the log of the minimum wage available in the economic sector for each category, multiplied by the employee's occupation dummy. Here we assume that an employee who loses his/her job will be worse off than the average employed person. In fact we assume that a fired employee will lose his/her seniority premium by changing job and will restart at the bottom of his/her category in the new firm.

This assumption could also reflect the presence of some unemployment in the economy: a fired employee will be ready to accept lower wage than in the previous firm to avoid staying unemployed. Note that our results do not change if we use the average wage available in the sector for each employee's category to capture the alternative wage.

Concerning firm-specific variables, we control for the log of firm's age, its location, its type and its nationality. Note that we do not include economic sector dummies in our regression as they are already taken into account in our alternative wage variable. Finally, we introduce in regression (I) and (II) the key variable to test the presence of some rent-sharing effect in the wage determination (Profit/n). The profit per employee variable is the log of the ratio of firm's value added minus firm's total wage bill over the total number of employees in the firm.

First, we run a simple Ordinary Least Squares (OLS, hereafter) regression (Column 1). Notice that all variables are strongly significant. Our human capital variables, occupation, experience, age and its square have the expected sign. Note that the age of the firm seems to have a negative and significant impact on wages. This result differs from the main studies on Côte d'Ivoire (see, Azam and Ris (2001)) in which the authors highlight a positive and significant effect of firm's age on wages. This is due to the fact that they restrict their work to the manufacturing sector in 1995, while our data set covers also other sectors such as agriculture, services, banks, distribution and trade. Running our regression on the manufacturing sector only, we find that the firm's age increase employee's wage, thus confirming their results for this smaller sample.

All firm-specific variables are significant in this equation. Thus, a purely competitive model would not explain wage determination in the Ivorian economic market, as the latter would not allow for any firm-specific explanatory variable.

Regression (I) is an attempt to capture directly the rent-sharing effect, by taking into account the log of profit per employee. Hausman test for endogeneity reveals that an endogeneity problem between the wage and the profit per employee arises in our regression, and that profit per employee must be instrumented. Specifically, we use two different sets of instruments to capture profit's endogeneity problems.

The first set (Column 2) consists of the log of firm's value added per employee and the log of firm's annual turnover per employee, which captures firm's ability to make money and firm's total production. The second set (Column 3) consists of the log of firm's total social expenditures, the log of firm's total amount of loans granted to employees and the log of firm's training expenditure which captures firm's cash availability. All instruments are highly correlated with the log of profit per employee and are likely to be uncorrelated with the OLS error term.

Concerning occupation dummies which may capture employee's education level, we see that they are all positive and significant. Moreover, when instrumenting profit per employee, they display decreasing values along the hierarchical scale of the firm.

Profit per employee is significant and positive with OLS method and both sets of instruments, suggesting that the rent-sharing effect plays an important role in Ivorian wage determination. This implies that employees are able to impose high wages on firms using their bargaining power.

The firm may also face some external pressures, as it is competing with other firms in the same economic sector. These external pressures are represented in regression (I) by the “alternative wage” variables. We do not detail alternative wage variables but they are positive and strongly significant. This variable has a major impact on wage determination: as firms want to preclude their employees moving to other competing firms, they try to pay comparable or higher wages depending on the category.

REGRESSION (I): RENT-SHARING EFFECT

	OLS	2SLS Set1	2SLS Set2
Intercept	1.967 (18.72)***	2.944 (22.56)***	2.529 (21.2)***
Employees Characteristics			
Age	0.042 (22.2)***	0.049 (21.32)***	0.046 (22.46)***
Age ²	-0.0004 (19.57)***	-0.0005 (19.26)***	-0.0005 (20.1)***
Experience	0.011 (33.8)***	0.010 (26.28)***	0.010 (30.4)***
Director	8.533 (9.46)***	9.150 (8.30)***	8.889 (9.14)***
Manager	10.75 (35.68)***	6.536 (17.13)***	8.328 (22.97)***
Skilled Worker	4.782 (28.97)***	2.922 (14.15)***	3.712 (19.38)***
Min Alter Wage D, M, S, U	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Firms Characteristics			
Location	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Nationality	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Firms Types	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Profit / n	0.007 (15.42)***	0.073 (44.35)***	0.045 (17.79)***
Firm's Age	-0.083 (31.35)***	-0.115 (34.56)***	-0.101 (32.66)***
\tilde{R}^2	0.85	0.79	0.83
N_b	35927	35927	35927
Hausman Test $\chi^2(23)$		1735	227.8

Note: Significance levels: ***: 1%; **: 5%; *: 10%.

Numbers between brackets are absolute values of the t-ratio.

When running wage regression it is not really plausible to assume the residuals to be uncorrelated within firms, and so the conventional estimator of the covariance matrix is almost certainly biased.

With common group error the t-statistics in these kinds of micro equations tend to be artificially large. Moreover this estimation is likely to be unreliable because of so-called group (here, firms) effects (see, Moulton (1986)).

One way of correcting the standard errors is to ‘cluster’ on firms. Following Moulton (1986), we compress the data into a table of cell means, that is taking average values of wages for each firm. Moulton’s condition on that point is that the level of aggregation should be the same on both sides of the regression equation.

Regression (II) is an attempt to correct for firms’ grouping effect. The dependent variable is then the log of the average wage in the firm regressed on the log of the average level in the firm of employee’s age, its square and employee’s experience. To control for external pressures we insert the average minimum wage in the economic sector. Obviously we still have the log of firm’s age and the log of profit per employee.

To take into account education level of the average employee, we include the number of directors, managers, skilled workers and unskilled workers in each firm. Moreover, we compute average years of schooling for each employee’s category from the data we have at our disposal (7324 employees). Then we construct a new variable (Schooling) by computing the weighted average of years of schooling in each firm. Note that this new variable is never significant when we run regressions on the whole sample.

Testing for endogeneity of profit per employee on the average employee’s wage, we do not reject the exogeneity assumption with the Hausman Test. Thus, the OLS method is preferred to the Two Stage Least Squares method (2SLS, hereafter) with both sets of instruments.

As Moulton (1986) suggests, the t-statistics are well below those reported in regression (I). As a consequence very few variables are now significant. External pressures still increase average wage paid by the firm. Our proxies for education are significant and display the expected signs. Note that the number of Director and Manager pushes average wage up, while the number of skilled and unskilled workers decreases it.

The interesting feature of regression (II) is that even if we restrict ourself to 98 data points to take into account firm’s group effects, the log of profit per employee is still significant and increases the average wage paid by the firm. Moreover, the Hausman Test indicates that the endogeneity between the wage and the profit per employee pointed out in regression (I) does not seem to come from a specific firm’s effect, but from differences between employees.

Regressions (I) and (II) include both the rent-sharing effects and the external pressures. Both the profit variable and the external pressures variables are jointly significant. A rent-sharing effect exists, but these first results suggest that firms share profit with employees to deal with external pressures. To keep its employees, the firm must increase their wage. This seems to contradict the monopsonistic firm assumption made in the theoretical model.

REGRESSION (II): RENT-SHARING EFFECT

	OLS	
Intercept	4.675	
	(1.57)*	
Employees Characteristics		
Age	0.129	
	(0.87)	
Age ²	-0.002	
	(0.85)	
Experience	0.008	
	(0.97)	
Schooling	1.487	
	(3.60)***	
Min Alter Wage	0.22	
	(3.97)***	
Firms Characteristics		
Number Director	0.083	
	(2.00)***	
Number Manager	0.187	
	(3.86)***	
Number Skilled Worker	-0.149	
	(3.48)***	
Number Unskilled Worker	-0.069	
	(1.18)	
Location	Yes	
Nationality	Yes	
Firms Types	Yes	
Profit / n	0.015	
	(1.54)*	
Firm's Age	-0.047	
	(1.41)	
\tilde{R}^2	0.88	
N_b	98	
Hausman Test $\chi^2(22)$	2.22	2.39
	Set1	Set2

Note: Significance levels: ***: 1%; **: 5%; *: 15%.

Numbers between brackets are absolute values of the t-ratio.

However, regression (I) considers that every kind of employee benefits in the same way from rent-sharing. This is quite far from our theoretical framework, where only skilled employees bargain with the firm. That is why, in the next regression, we try to capture the fact that each group of employees has a different bargaining power depending on their skills. For the moment, the presence of a rent-sharing effect has been shown. But this does not answer the questions about the stylized facts exposed in the introduction: How can we explain some of the great wage gap between employees endowed with different skills? Is it because profits are shared in a non egalitarian way between different kinds of employees?

4.2 Unequal Rent-Sharing

To answer this questions we decompose the rent-sharing variable into four different ones. Multiplying the profit per employee by a dummy concerning the employee's professional or occupation status (Director, Management Staff, Skilled Worker and Unskilled Worker) we create four new rent-sharing variables. We introduce those new variables in regression (III).

Note that at this point, introducing the four occupation dummies, prevents us from using Moulton's cell means method to take into account firm's group effect in the wage determination. On one hand, taking the average wage in each firm cancels the employee's status dimension. On the other hand, introducing average wage of each category does not solve the group effect problem. Note also that introducing a firm's group effect in regression (III) adds a new variable which is perfectly correlated with firm's profit per employee. Doing that allow us only to determine differences between the coefficients related with the new rent-sharing variables. As we are mainly concerned about the values and signs of those coefficients, it is quite hard to take into account group effect in regression (III). This is not of great importance at that point, as we have already shown that rent-sharing also takes place when we control for group effect.

We have to deal with four endogenous variables, meaning that we have to increase the number of instruments to get rid of endogeneity between wages and profit per employees variables. We use two different sets of instruments. The first set (Column 2) uses the log of firm's annual turnover per employee and the supervision ratio multiplied by occupation dummies. To construct the supervision ratio we use the precise informations contained in our data set about occupation status of each employee. First, we consider any employee of any skills, whose specific job is to monitor others—namely, all employees involved in a task in the quality control department, the auditing department

and the financial department of the firm. Then, the supervision ratio divides the number of employees described above by the total firm's workforce. This ratio tends to control for technological differences between firms, as the more supervisors the firm employs, the more likely it displays a complex and modern production process. This first set of instruments tends to control for both technological differences between firms through supervision ratios and firm's abilities to make money through annual turnover.

REGRESSION (III): UNEQUAL RENT-SHARING EFFECT.

	OLS	2SLS Set1	2SLS Set2
Intercept	1.833 (17.52)***	-0.654 (3.06)***	0.341 (9.46)***
Employees Characteristics			
Age	0.040 (21.70)***	0.035 (10.88)***	0.033 (13.26)***
Age ²	-0.0004 (19.06)***	-0.0004 (9.33)***	-0.0003 (11.33)***
Experience	0.011 (34.2)***	0.010 (18.44)***	0.011 (25.64)***
Director	8.619 (9.63)***	13.22 (6.66)***	13.17 (8.53)***
Manager	10.45 (34.25)***	-1.855 (2.31)***	7.055 (9.57)***
Skilled Worker	5.034 (30.73)***	5.490 (18.41)***	6.343 (26.52)***
Min Alter Wage D, M, S, U	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Firms Characteristics			
Location/Nationality/Types	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Firm's Age	-0.087 (33.14)***	-0.126 (26.59)***	-0.099 (25.10)***
Unequal Rent-Sharing			
(Profit / n)*Director	0.014 (2.94)***	0.416 (4.09)***	0.382 (4.82)***
(Profit / n)*Manager	0.011 (12.69)***	0.157 (21.23)***	0.047 (6.07)***
(Profit / n)*Skilled Worker	0.018 (25.77)***	0.041 (9.19)***	0.028 (7.88)***
(Profit / n)*Unskilled Worker	-0.006 (8.76)***	-0.123 (20.8)***	-0.100 (25.79)***
\tilde{R}^2	0.85	0.67	0.77
N_b	35927	35927	35927
Hausman Test $\chi^2(26)$		688.8	729.8

Note: Significance levels: ***: 1%; **: 5%; *: 10%.

Numbers between brackets are absolute values of the t-ratio.

The second set of instruments (Column 3) consists of the log of social expenditures and once again the supervision ratio multiplied by occupational dummies. As in the previous section, the second set of instruments controls for firm's cash availability through the amount of social expenditure, combined with technological differences.

As in the first regression Hausman test statistics imposes 2SLS method to be preferred to OLS one. As expected, we see that the four coefficients differ and have decreasing value along the hierarchical scale of the firm. This suggests that directors can extract more rent from profit sharing than the management staff and that the latter benefit more from the rent-sharing than the skilled workers.

What is interesting is the negative sign of the variable concerning unskilled workers even in the first column of regression (III). This confirms the theoretical results of the model. *A priori* one would expect the coefficient for very unskilled employees to be very small or even zero, because unskilled employees are not supposed to participate in the profit sharing phenomenon. Moreover, this sign implies that the more profitable the firm is, the lower the wage of unskilled workers. In fact we can conclude that rent-sharing deteriorates the most unskilled employees' condition. This fits quite well the conclusion of the theoretical part developed in Section 2.

Note that splitting the profit per employee variable in four categories affects neither the significance, nor the coefficients' signs of the individual specific variables. Looking at firm specific variables, firms' age is still negative and significant. The external pressures variables are still positive and significant, suggesting that firms must meet the wage competition of other firms. With the second set of instruments, occupation dummies alone display positive and decreasing coefficient along the hierarchical scale of the firm

Hence, the bargaining power of the employees, if any, derives both from their outside opportunities offered by the market, and from the occupation status they have inside the firm. When we do not take into account capital in the production function of a monopsonistic firm, and when this firm is able to commit to the outcome of the negotiation process with skilled employees, profits and unskilled wages move in opposite directions whereas increasing profits raises the rent of skilled employees and hence their wages.

4.3 Skilled wage equation

So far, our empirical findings are in line with our theoretical conclusions. However, this does not confirm that our theoretical model is totally supported by the data. Rent-sharing effects exist and reduce unskilled workers'

remuneration while they improve that of skilled employees. Moreover, these original rent-sharing effects come from both external pressures on the firm and employee's occupation status. This raises the question of which factors force firms to share profit with a particular group of employees? Is it imposed by skilled employees through their bargaining power, or is it decided by firms as part of their incentive schemes? These explanations are explored in this section and the next.

To know if bargaining power plays some role in wage determination, we empirically estimate the wage equation (5) of the theoretical model. Since this equation is the final result of our particular bargaining model, the bargaining assumption will be reinforced if data support the estimation.

To reflect the fact that each category of employee has different bargaining power, we focus on the extreme case where only skilled employees have some bargaining power. So, they are the only employees' type to bargain over their wage, their employment level and even unskilled employees' employment level. In this setting the only production factor is labor, both skilled and unskilled. We suppose that skilled employees organised in an informal union are able to influence the firm's decision as a lobby and to force it to negotiate with this particular group.

We estimate empirically the wage equation (5) in regression (IV) which concerns only skilled employees. Every type of employee who gains from rent-sharing according to regression (III) (namely, directors, management staff and skilled workers) is considered in this section as skilled. Hence we run regression (IV) on 15699 observations. Note that unskilled employees, who are not taken into account here, are not only men and women with no skills at all. Of course many are agricultural workers who require no specific skill except physical strength, but a large part of them are also mechanics, electricians, truck drivers or metal-workers. We still control for the firm's type, location, nationality, its age, and individual specific variables are also taken into account. As in previous sections, we control for employee's education level by introducing occupation dummies.

The new variables are those in the right-hand side of equation (5). Production per skilled worker is proxied by the log of annual turnover per skilled employee. There is no need to instrument any variables in regression (IV) as neither the log of turnover per skilled employee nor the log of unskilled wage bill per skilled employee are endogenous.

The alternative wage for skilled employees is calculated as the log of the minimum wage in the same economic sector for each occupation status. Note that the coefficients of alternative wage for skilled employees, as well as the coefficient of annual turnover per skilled workers are positive and

significant. Unskilled wage bill per skilled employee influences negatively the skilled employees' wage. So, the empirical estimation of the skilled wage equation gives the expected signs to all three terms in the right-hand side of equation (5). Note that the coefficient of annual turnover per skilled and the coefficient of unskilled wage bill per skilled employee should be the same except for the sign. The difference between both coefficients comes probably from the fact that annual turnover is not a perfect proxy for the amount produced by the firm.

REGRESSION (IV): SKILLED WAGE EQUATION.

	OLS
Intercept	5.161 (24.78) ^{***}
Skilled Employees Characteristics	
Age	0.028 (8.33) ^{***}
Age ²	-0.0002 (6.26) ^{***}
Experience	0.002 (4.65) ^{***}
Director	1.819 (2.1) ^{***}
Manager	4.242 (13.17) ^{***}
Firms Characteristics	
Location/Nationality/Types	<i>Yes</i>
Firm's Age	-0.031 (6.51) ^{***}
Skilled Wage Equation	
Min Alter Wage, Director	0.471 (7.75) ^{***}
Min Alter Wage, Manager	0.261 (10.95) ^{***}
Min Alter Wage, Skilled Worker	0.554 (35.03) ^{***}
Turnover / Skilled Employees	0.044 (13.44) ^{***}
Unskilled Wage Bill / Skilled Employees	-0.009 (3.48) ^{***}
\tilde{R}^2	0.72
N_b	15699

Note: Significance levels: ***: 1%; **: 5%; *: 10%.

Numbers between brackets are absolute values of the t-ratio.

These results suggest that our theoretical bargaining model is supported by the data. Firms share their profit with a restricted group of skilled employ-

ees, through some negotiation process. This small group of skilled employees is able to extract part of the profit thanks to its bargaining power.

This bargaining process is not the only explanation for the presence of a rent-sharing effect in wage determination. The rent for skilled employees could also be the result of firms' decisions to attract and motivate skilled employees. This is the effect that we test in the last section.

5 Robustness: Efficiency-Wage Effects

In this section we return to the whole sample and test an alternative theory: that high wages are the result of the firms' choice to enhance efficiency by paying high wages. Specifically, regression (V) turns to the analysis of efficiency-wage theory, with a view to testing whether the correlation between wages and profitability results from the reverse causation from high wages towards high profits, *via* the effect of wages on productivity. The strong assumption concerning information symmetry between employers and employees implicit in our model is dropped first.

The idea is to test an aspect of the Shapiro-Stiglitz shirking model (see, Shapiro and Stiglitz (1984)) where firms use high wages as a means of increasing the value of the threat of being fired, in a setting where the probability of being caught shirking is less than one.

More specifically, we consider an extension of this model (see, Eaton and White (1983) and Azam and Lesueur (1997)), in which the monitoring technology is endogenous as the probability of being caught shirking is positively correlated with the hierarchy ratio (*i.e.*, the ratio of the skilled workforce—Directors, Managers and Skilled workers—, to the number of unskilled workers). It can be shown that the hierarchy ratio affects negatively the wage paid by the firm. In fact, firms trade-off between paying high wages and supervision.

Note that the hierarchy ratio is more general than the supervision ratio used in Section 4.2. The main difference between both is that all hierarchical superiors have the power to monitor and to punish any shirking employees whatever the complexity of the production process.

On the other hand, an unskilled worker whose task for example, in the quality control department, is to count and separate faulty components do not have the ability to designate and punish any employees. But the presence of this type of employee in the firm indicates that the technology used is quite complex.

The monitoring technology is introduced in regression (V) through the hierarchy ratio variable. Rent-sharing and external pressures variables are also present in regression (V) to see if the introduction of some efficiency-wage effect alters previous results. Note that we still control for the endogeneity by instrumenting profit per employee with the two same set of instruments as in regression (III).

REGRESSION (V): CONTROL FOR EFFICIENCY-WAGE EFFECT.

	OLS	2SLS Set1	2SLS Set2
Intercept	3.659 (33.95) ^{***}	0.861 (3.68) ^{***}	2.034 (11.30) ^{***}
Employees Characteristics			
Age	0.036 (19.97) ^{***}	0.036 (14.44) ^{***}	0.032 (14.94) ^{***}
Age ²	-0.0004 (17.50) ^{***}	-0.0004 (12.54) ^{***}	-0.0003 (28.42) ^{***}
Experience	0.009 (32.48) ^{***}	0.009 (23.05) ^{***}	0.010 (28.42) ^{***}
Director	9.352 (10.80) ^{***}	12.58 (8.01) ^{***}	12.27 (9.28) ^{***}
Manager	10.77 (36.47) ^{***}	1.805 (2.59) ^{***}	9.034 (14.69) ^{***}
Skilled Worker	5.195 (32.76) ^{***}	5.100 (21.68) ^{***}	6.173 (30.25) ^{***}
Min Alter Wage D, M, S, U	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Firms Characteristics			
Location/Nationality/Types	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Firm's Age	-0.084 (33.33) ^{***}	-0.112 (28.31) ^{***}	-0.087 (25.51) ^{***}
Hierarchy Ratio	0.078 (49.34) ^{***}	0.028 (7.00) ^{***}	0.055 (17.29) ^{***}
Unequal Rent-Sharing			
(Profit / n)*Director	0.009 (2.14) ^{***}	0.334 (4.12) ^{***}	0.262 (3.83) ^{***}
(Profit / n)*Manager	0.006 (6.58) ^{***}	0.114 (16.59) ^{***}	0.021 (3.35) ^{***}
(Profit / n)*Skilled Worker	0.014 (20.90) ^{***}	0.026 (6.76) ^{***}	0.008 (2.47) ^{***}
(Profit / n)*Unskilled Worker	-0.003 (4.10) ^{***}	-0.073 (12.86) ^{***}	-0.071 (18.04) ^{***}
\tilde{R}^2	0.86	0.77	0.82
N_b	35927	35927	35927
Hausman Test $\chi^2(27)$		314.3	623.9

Note: Significance levels: ***: 1%; **: 5%; *: 10%. Numbers between brackets are absolute values of the t-ratio.

The hierarchy ratio turns out to be strongly significant, but with the wrong sign. According to the endogenous monitoring theory, increasing the number of directors, management staff or superiors may decrease wages paid by the representative firm. Indeed, the more superiors the firm hire, the more likely the worker is to be caught shirking and thus fired. Hence, as the firing threat becomes more and more credible, the incentive to work increases, and firms may rely on lower wages to incite workers' effort.

Instead, we notice here the opposite effect that increasing monitoring technology also increases wages. The monitoring technology does not seem to be a means of reducing wages and by extension high wages are not paid by firms to ensure good productivity and less shirking. The upshot is that firms do not trade-off between paying high wages and monitoring.

In fact, the introduction of the hierarchy ratio changes almost nothing compared to regression (III). The hierarchy ratio is strongly significant and positive, and the impact of rent-sharing and external pressures remains the same. Regression (V) presents the same decreasing effect of the profit per employees along the hierarchical scale of firms. At the same time, occupation dummies which may capture employee's education level are still positive, significant and decreasing (Column 3) So, the higher skills employees have, the higher their wage are, and the larger the share of profits they succeed in obtaining.

Even controlling for some monitoring effects, the unequal rent-sharing effect is still apparent. Furthermore, increasing firms' profits still deteriorates the most unskilled employees' condition.

6 Conclusion

In this paper, we analyse the determinants of wages in the Ivoirian economy, in order to identify whether the high wages paid in the formal sectors are set by firms to improve employees' productivity, or are imposed on firms by unionized employees. Furthermore, distinguishing between skilled and unskilled employees, we explore the determination of the wage gap in Côte d'Ivoire. Controlling for personal characteristics, we find that several firm-specific variables are significant. The rent-sharing effect of profit per employee turns out to be significant and robust to the inclusion of firms' group effect.

We have tried a large number of combinations of included explanatory variables, finding that the profit term is always significant when included. The alternative wage, which measures the outside options open to the em-

ployee, seems to exert a relatively robust external pressure on wages. This is consistent both with a competitive model and with a bargaining model. By contrast, the data do not support the efficiency-wage theory as the “monitoring effect” works in the wrong way.

Our results seem to lean in favor of the rent-sharing theory. The employees’ bargaining power seems to come from a union or lobby effect. But different types of employees do not benefit in the same way from profit sharing. This suggests that employees’ position in the firms’ hierarchy influences their bargaining power and so the share of the profit they will appropriate.

Moreover, the most unskilled employees lose from rent sharing. This fact is consistent with a theoretical model in which only the skilled employees have some bargaining power over their wage, their employment and that of unskilled employees. In this framework, increasing firms’ profit reduces unskilled workers’ wage.

This may be regarded as an additional and independent result in the literature that points at the weaknesses of unions defending unskilled workers and the strengths of those protecting only skilled employees in the developing world. The unskilled may believe that some bargaining with the firm, even performed by skilled employees only, will always make them better off. But this belief turns out to be an illusion as skilled employees and firms grow richer at the expense of unskilled employees through rent-sharing.

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