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Rent-Sharing, Hold-Up, and Manufacturing Wages in Côte d'Ivoire

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Labor costs in Francophone Africa are considered high by the standards of low-income countries, at least in the formal sector. Workers appear to have some bargaining power and, in Côte d'Ivoire, can force renegotiation of labor contracts in response to new investments.

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Summary findings

Labor costs in Francophone Africa are considered high by the standards of low-income countries, at least in the formal sector. Are they a brake on industrialization or the result of successful enterprise development? Are they imposed on firms by powerful unions or government regulations, or a by-product of good firm performance?

Azam and Ris empirically analyze what determines manufacturing wages in Côte d'Ivoire, using an unbalanced panel of individual wages that allows them to control for observable firm-specific effects. They test the rent-sharing and hold-up theories of wage determination, as well as some aspects of efficiency-wage theories.

Their results lean in favor of both rent-sharing and hold-up, suggesting that workers have some bargaining power and that in Côte d'Ivoire workers can force renegotiation of labor contracts in response to new investments.

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Rent-Sharing, Hold Up, and Manufacturing Sector Wages in Côte d'Ivoire

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1. Introduction

Labor costs in Francophone Africa are deemed high by the standards of low-income countries, at least in the formal sector (e.g. Rama, 1996). Are they a brake on industrialization, or the result of successful enterprise development ? Are they imposed on firms by powerful unions or government regulations, or are they a by-product of good firms performance ? The consequences for the industrial development of these countries are completely different depending on the answers given to these questions.

The issue of wage formation in the urban sector of less developed countries is a recurrent theme in the theory of economic development. Ever since Lewis's seminal paper (Lewis, 1954), a widely held view is that labor market dualism is a source of inefficiency and underdevelopment. Lewis assumes that various factors imply that modern sector wages are about 30 % higher than the opportunity wage, reducing the profits on which the development of the capitalist sector feeds its expansion. In reality, the wage gap is usually much higher than Lewis assumed. In the important contribution by Harris and Todaro (1970), the urban wage is fixed institutionally at a high level, which triggers rural-urban migration, and urban unemployment. Hence, excessively high wages in the 'capitalist' (Lewis) or 'urban' (Harris-Todaro) sector are widely regarded as an obstacle to development.

However, the different brands of efficiency-wage theories have suggested that high wages are in fact minimizing labor cost expressed in efficiency units[1], and are thus instrumental in making the firms profitable. More recently, the theory of rent sharing has been developed to suggest that high wages include in fact a share of profits, and are thus only a reflection of the good performances of the firms (Blanchflower, Oswald and Sanfey, 1996). Here again, the question arises whether the profit element present in workers' compensation is captured by them, as a result of insider effects (Nickell and Wadhwani, 1990), or whether the firms engage in profit-sharing as part of their incentive system. The latter assumption has not been discussed in the recent literature, but played an important part in the mid-1980s (Weitzman, 1984). The appendix presents a simple formal treatment of rent-sharing, showing the possible role of the bargaining power of the workers. In a bargaining framework, where the workers have the power to disrupt production, then profit-sharing is a feature of the equilibrium strategy of the firms to ensure a positive level of output, which has no short-run allocative consequences.

In the case of Francophone Africa, at least in the CFA Zone, various complicating factors result from the special institutional features of the two CFA monetary unions, including their privileged relationships with France. Van de Walle (1991) argues that this institutional setting, together with the overvalued currency that resulted from it before the devaluation of the CFA franc in January 1994, resulted in exceedingly high wages in the urban formal sector of these countries, in terms of foreign prices. According to Rama

[1] See Akerlof and Yellen (1986) for a comprehensive collection of the most important papers in this literature.

(1996), a major determinant of these misaligned wages was the high level of wages in the public sector, which play a leading part in the formal sector labor market. This supports the widely held view that a contagion effect from public sector wages to other wages in the formal sector is present, rather than the public employment level effect emphasized by Lindauer (1991). Azam (1995) shows that the average wage of public employees, as a ratio of per capita GDP, was exceedingly high in the West-African monetary union, compared to other African countries, suggesting that the political power of the civil servants and other public employees, unfettered by any democratic control, was at the heart of the problem. In Côte d'Ivoire in particular, in 1988, the average wage of a public sector employee was about ten times larger than GDP per capita.

However, Côte d'Ivoire and Sénégal, two of the high-wage members of the West-African monetary union, are also two of the most industrialized countries in Sub-Saharan Africa, among the top ten performers in terms of their share of manufacturing in GDP in 1995 (World Bank, 1998). Did this happen despite high wage costs, or was it the cause of high wages ? The aim of the present paper is to analyze this issue empirically, with the help of survey data collected in Côte d'Ivoire in 1995 and 1996, and covering the years 1994 and 1995[2]. More than 270 firms were interviewed, most of them twice, and a sample of up to 10 employees were interviewed in each of them. This data set allows for an analysis of wage determination in Côte d'Ivoire, using the type of methods developed elsewhere. There is a wage-earners module, where employees give, beside their wage level, many personal characteristics. This feature makes it possible to combine individual workers' data with some data about the firms in which they work.

The empirical analysis of wage determinants has received a new impetus in the last decade, stimulated by the « rent-sharing » issue. In the 1980s, a lot of attention was devoted to explaining inter-industry differences in wage rates, unaccounted for by workers personal characteristics (Krueger and Summers, 1988). However, it became clear in the 1990s that there are inter-firms differences in wage schedules as well, even after controlling for workers personal characteristics and sectoral effects. Nickell and Wadhwani (1990), Christophides and Oswald (1992), Konings and Walsh (1994), Blanchflower, Oswald and Sanfey (1996), for developed countries, and Morrison (1994) and Teal (1996), for developing countries, are important contributions to this literature on rent sharing, among others. The basic observation emerging from this literature is pretty simple, and well established empirically : wages generally depend on some firms characteristics, like profits per worker, ownership status, etc., beside standard personal characteristics of the workers, like human capital and experience. This raises an interesting puzzle, because the textbook competitive model predicts that this should not happen : workers should be paid their opportunity wage, nothing more. Therefore, this type of empirical result calls for a theoretical interpretation within a new framework.

[2] The two-round survey was commissioned by the World Bank within the RPED project, and was conducted under Jean-Paul Azam's direction.

Three, not exclusive, sets of theories have been used for explaining these results. In the competitive paradigm, the main hypothesis liable to explain the observed positive correlation between wages and profitability rests on self-selection : more profitable firms attract workers who are better endowed with unobserved ability, so that profits enter wage equations as a proxy for the latter. Krueger and Summers (1988) dismiss this argument on the grounds that unobserved ability should not matter much, after controlling for human capital, tenure, etc. Teal (1996) controls for such effects by running firm-level panel regressions, with firm-specific random effects, explaining the average wage paid by each firm. The remaining impact of profitability on wages is then regarded as a pure time-series effect, capturing only rent-sharing effects, provided the self-selection effect does not change over time. This argument would be doubtful for a panel covering a long period of time, but is appropriate for panels with a very short time horizon. However, this approach might confuse the impact of the composition of the labor force by skill or by occupation, which affects the average wage, with an impact on the wages themselves, if there is a positive correlation between profitability and the ratio between the numbers of skilled and unskilled workers, or between high-ranking and low-ranking occupations in the sample. We therefore restrict our analysis to individual wages in the following.

Some brands of efficiency-wage theories, but by no means all of them, can also account for a relationship between the wages paid and the firm's characteristics. For example, the Shapiro-Stiglitz shirking model (Shapiro and Stiglitz, 1984), is consistent with firm-specific wage effects, if the monitoring technology is different from one firm to the other. If the more profitable firms are the ones where the workers' level of effort are the most difficult to monitor, e.g. because their technology is more sophisticated, then they should also pay the highest wages in order to provide the right incentives. This can be tested empirically by including on the right-hand side various measurable characteristics of the monitoring technology used in the firm, like the ratio of management and supervisory staff to production workers (Azam and Lesueur, 1997). On the contrary, the nutrition-based efficiency-wage model cannot be used to explain the relationship between wages and firms characteristics, as the wage paid only depends on the worker's personal nutrition-efficiency relationship. Within the efficiency-wage framework, the high wage is, so to speak, imposed on the worker, and the high wages cause the high profits.

On the contrary, many models emphasize the bargaining strength of the workers, not necessarily through union power, to model cases where high wages are imposed on firms. In these cases, the wage actually paid contains a rent-sharing element, in addition to the opportunity wage. Then large profits entail high wages. In fact, the use of the term 'rent' in this context is misleading, as this property holds even in the limiting case where the worker's bargaining power falls to zero, in a principal-agent model[3]. Konings and

[3] Assume that the worker spends a verifiable effort level e_i and produces θ_f per unit of effort. She is paid w_i and gets a utility level $w_i - \frac{1}{2}(e_i)^2$. Her reservation utility is u_i , so that the firm maximizes $\theta_f e_i - w_i$ s.t. $w_i - \frac{1}{2}(e_i)^2 \geq u_i$. Then her equilibrium wage is : $w_i = u_i + \frac{1}{2}(\theta_f)^2$. The term $(\theta_f)^2$, which is increasing in the firm's productivity, could be misinterpreted as a rent-sharing term, although the worker is stuck on her

Walsh (1994) have used the different implications of the efficiency-wage and rent-sharing models to try and disentangle these two effects in the UK. We provide some tests in the same vein in the following.

In addition, we test for the impact of 'hold-up effects', as analyzed theoretically by Grout (1984), and emphasized recently in the 'incomplete contract' literature (see e.g. MacLeod and Malcomson, 1993). This is a test that we have not seen performed empirically before. A theoretical analysis of this problem is provided in the appendix, showing the theoretical impact of the firm's investment level on wages when the bargaining with the workers is open to re-negotiation. Our result suggest that this effect is possibly significant in the case of Côte d'Ivoire, adding to the Lewisian effect mentioned above a new channel of impact whereby the bargaining strength of the urban workers might put a brake on the expansion of the modern sector.

In the case of Côte d'Ivoire, Azam and Lesueur (1997) have tested an extension of the Shapiro-Stiglitz shirking model on some Ivorian data from the formal industrial sector, different from the ones used here, with some success. However, they do not test any rent-sharing effect. Other aspects of the Ivorian labor market have been analyzed empirically in the literature. Levy and Newman (1989) used the data from two Labor Force surveys, performed in 1979 and 1984 to test wage flexibility. They estimate earnings functions for these two years, including some firms' characteristics, and show that the recession of the early 1980s induced a downward shift of the whole earnings schedule, while this flexibility was hidden by the fact that, on average, worker's characteristics improved over the same period, resulting in a higher average wage. Hoddinott (1996) has used the CILSS data[4] to test for a 'wage-curve' effect, à la Blanchflower and Oswald (1995), finding a significant negative impact of the local unemployment rate on wages. We test for similar effects with our data in the following.

The paper is presented as follows. The next section presents briefly the data, and the special econometric problems that they raise. Then, the different possible theories are briefly discussed and tested in turn, by increasing order of complexity. Section 3 presents the tests performed with individual wage levels, using a standard Mincerian earnings function, restricting the right-hand side variables to personal characteristics (Mincer, 1974). Section 4 presents different tests using firm-specific data on the right-hand side, in addition to the personal characteristics of the workers, in order to gauge the likely importance of the rent-sharing and the hold-up effects discussed briefly above, and to test them against efficiency-wage effects.

2. The Data

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participation constraint, with no rent involved (see Salanié, 1997). For example, Van Reenen (1996) emphasizes productivity change as the main source of rent sharing. Hence, the 'rent-sharing' problem may simply be due to the simplistic way of modeling the worker's reservation utility in simple models.

[4] Côte d'Ivoire Living Standard Survey, covering the years 1985-87.

The data set used here comes from a survey of about 270 manufacturing firms in Côte d'Ivoire, most of them being interviewed twice. They only belong to four production sectors (wood, metal, textile and clothing, food and agro-industry). The firms have been selected at random from a sample frame made from different lists of firms, obtained from different fiscal authorities (national and local). The panel is predominantly made of formal sector firms, located in Abidjan, the economic capital city. However, we also have some informal sector firms, and some semi-formal sector firms in the sample, exclusively located in Abidjan. The latter refers to a set of firms, which do not pay national taxes, but lobby the government with a view to obtain various advantages. They are organized in a relatively powerful association. In Côte d'Ivoire, all the firms pay at least the local tax, called 'la patente', but few of them pay the national taxes. This sampling procedure entails a risk of endogenous stratification, insofar as the sampling rate is much larger for bigger firms, that are easier to locate from fiscal sources, than for smaller ones. In what follows, this is taken care of by using weighted least squares, the weights being the inverse of an estimate of the probability of each worker belonging to the sample, itself a function of the probability of its firm being drawn in the sample. Moreover, only the firms from the three cities of greater Abidjan (mainly), Bouaké and San Pedro have been interviewed, while firms in the North of the country have not been visited, in order to reduce the cost of the survey. The firms have been visited in early 1995 and early 1996, for collecting data covering the preceding years. As the CFA franc, the local currency, has been devalued in January 1994, our data refer to a period of recovery, with an unusual rate of inflation by the standards of the West African Economic and Monetary Union, amounting to about 10 % between the two visits. The consumption price index has therefore been used to deflate the wage rates, and the other nominal variables. Table 2 presents the precise definitions and the main features of the variables.

Up to 10 employees have been picked at random in each firm, among the ones present on the premises on the day of our visit. This is also a potential source of endogenous stratification, working in the opposite direction to the one mentioned above. Now, 100 % of the employees of small firms have been interviewed, while the sampling rate decreases with the size of the firm. Only a small fraction of the workforce of the minority of large firms has thus been interviewed, while the latter have been over-sampled. This is taken into account by weighting the data for estimating the equations as explained above. Some experimentation has shown however that the weighted and unweighted regressions were very similar. Nevertheless, we systematically use White's heteroscedasticity consistent t ratios in the following, in order to mitigate any problem of inference due to this issue.

Our panel of workers is unbalanced, as many of them have been observed only once. The firms which have only been interviewed once, either in 1995 or in 1996, have not been excluded from the sample, and their number amounts to less than 10 % of the firms in each round. It has not always been possible to interview twice the same workers in some of the firms. A dummy variable is included to control for the possible selection

bias concerning the workers observed twice (Guillotin and Sevestre, 1994). Moreover, the panel of individual wages does not allow for the inclusion of unobserved firm-specific effects, controlling directly for the type of self-selection problems referred to in the introduction.

This structure of the data allows for the use of random-effect models, in order to account for the unobserved heterogeneity of the workers. The wage equations are estimated by the GLS/IV method, related to Hausman and Taylor (1981), in order to take into account the endogeneity of some right-hand side variables. In the result tables that follow, the instrumented variables are marked with a # superscript. The validity of this approach has been systematically checked using the Hausman test (Hausman, 1978), testing whether the random effects are correlated with the included explanatory variables.

3. The Impact of Personal Characteristics

Since Mincer's classic work (Mincer, 1974), a large share of the applied literature on wage determination has assumed that employers are able to discover the differences in productivity between workers, depending on their level of human capital, experience, etc., and even the innate ability which economists are unable to observe. Earnings are then determined to reflect all these personal determinants. Other observable differences between workers, like their different racial or national origin, are also assumed to play a part. This provides the starting point for the analysis performed below.

In all the equations presented in table 1, the dependent variable is the log of the individual net wage, including bonuses and other benefits. The number of individuals is denoted N, while the number of observations used in each regression is denoted *Nb*, and both numbers are presented at the bottom of the table. The difference between them shows the (relatively small) number of individuals who have been interviewed twice. They vary naturally from one regression to the next, because the missing data differ between questions. Equations (1) and (2) in table 1 are estimates of such standard Mincerian earning functions, as a background against which to interpret the equations that follow. As stated above, the t ratios presented are White's heteroscedasticity consistent ones (White, 1980). Equation (2) differs from equation (1) by the inclusion of 23 dummy variables for capturing the production sector effects, as well as the effects of professional categories (occupation), ranging from unskilled workers to management staff. Inclusion of the latter does not change much the outcome, but improves the $\bar{R}^2$.

We see that the standard human capital variables, education, experience, and its square, have the expected sign, but that the former is only significant at equation (2). The education variable is measured by the number of years spent at school, and is always instrumented in the GLS/IV equations, in order to take due account of the potential endogeneity caused by the simultaneous impact of the worker's unobserved innate ability on both the wage rate and the level of school achievement. This problem is present in all the equations presented, where the GLS/IV equation is systematically preferred by the

Hausman test to a simple GLS approach. Notice that the estimated rate of return is larger and significant after controlling for the professional categories. This probably reflects the fact that the 'filtering-down' process, brought out by Knight and Sabot (1990) in the case of Kenya and Tanzania, is controlled for by the inclusion of the professional categories dummy variables. This process refers to the problem raised by the fact that the same level of education does not open access to the same types of jobs for different cohorts. Just after independence, any secondary education diploma would have opened access to some jobs that require now, for the younger generations, a University degree. This effect is likely to cause an attenuation bias, due to a measurement error, when estimating the rate of return to education without controlling for the filtering-down effect. Nevertheless, the 'education' variable is out-performed in all the subsequent equations, when various firms' characteristics are included.

The effect of the dummy variable 'West-African immigrant' is not significant in these equations, nor in any of the following ones. Hence, it seems that there is no evidence of discrimination against the non Ivorian African workers. This is an important finding, as Côte d'Ivoire is a traditional country of immigration (Azam and Morrisson, 1994). It is estimated that about 50 % of the population of Abidjan, and 25 % of the whole population in the country, is of foreign origin. Most of the migrants come from Burkina Faso and Mali, while there are significant minorities from Ghana, Guinea and Sénégal. We do not either find significant evidence of gender discrimination, as the estimated earnings advantage of males over females is never significant. This negative results do not seem to be due to some correlation between the gender or national origin variables and some firm-specific variables such that, for example, more profitable firms would employ more male labor, as they are robust to the inclusion of the various firm-specific variables that follow.

A surprising result is that married workers seem to earn less than single ones, in most of the equations presented. This is at variance with the hypothesis discussed by Mazumdar (1983), who argues that married workers, being more stable in their job, should earn more. A potential explanation for our unexpected result would follow another efficiency wage argument : married workers consume a smaller fraction of their income than single ones, as they have to share with their family. Hence, if there exists a consumption-efficiency relationship, as analyzed in Azam (1997), then single workers should display a steeper wage-efficiency trade-off, inducing the firms to pay them more. Moreover, this sign seems to be robust to the inclusion of various firm-specific variables, as shown below.

The 'training' variable, which captures vocational training, turns out to be significant, with a positive sign, in most of the equations that follow, thus outperforming the 'education' variable discussed above. The 'apprentice' variable indicates if the worker has been an apprentice before in the same sector or the same firm, and it has a surprising negative impact, which is however almost never significant, except at equations (8) and in the final model (14). This suggests that some social stigma might follow from learning one's job as an apprentice, rather than, probably, as a family helper or at school. The

number of hours worked during the week does not seem to have a consistent and significant impact. Lastly, the fact of having a good track record, as captured by the information that the worker has never been fired before, has a significant positive impact.

We now turn our attention to the incremental impact of different firm-specific variables, in order to capture rent-sharing or efficiency-wage effects, as well of the potential impact of recent investments by the firm, the latter aiming at capturing some hold-up effect.

4. The Impact of Firm-Specific Variables

Equation (3) starts the sequence of tests of the impact of firm-specific variables on individual wages. Most of the comments made above carry over to this equation, as far as the effects of personal characteristics are concerned. Notice however that the coefficient of the education variable looses significance. This suggests that this variable is correlated with some of the firm-specific variables included, in particular its age and its location in Abidjan. This comment extends to most of the subsequent equations. We see that the age of the firm seems to have a positive and significant impact, as does the Abidjan dummy variable. It does not seem to matter whether a share of the capital is owned by the state, as the 'public' dummy is not significant. However, this is not very robust, as shown by some of the results that follow. Hence, among the firms characteristics included in this equation, only the dummy indicating if there is some foreign capital in the firm is significant, with a positive sign. This is a predictable effect, which can be rationalized in different ways (e.g. Teal, 1996). But is not robust either. Nevertheless, some firm-specific variable always turn out significant in these equations, suggesting that a purely competitive model is unable to explain wage determination in the Ivorian manufacturing sector, as the latter would not allow for any firm-specific explanatory variable. We now try to identify more precisely the channels of impact of these firm-specific variables.

The Rent-Sharing Effect

Equation (4) is an attempt at capturing more directly the rent-sharing effect, by taking into account both the level of competition that the firm faces in the market for its main product, measured simply by the declared number of competitors, and the level of profit per worker[5]. The latter turns out to be significant, while the former is not[6]. Moreover, the 'profit per employee' variable is significant even after controlling for the state of competition faced by the firms in their product markets, suggesting that the latter does not play a crucial part in determining the outcome. However, this does not answer the question about the source of this rent-sharing effect raised in the introduction : is it

[5] The appendix presents a theoretical model of rent-sharing with or without re-negotiation, which spells out analytically the verbal discussion in the text.

[6] The small numerical value of this coefficient is not a source of worry, as the sample mean of profit per worker is 0.24 E+07 (see table 2).

imposed on the firms by the bargaining power of the workers, or is it part of the firm's incentive system ?

In order to provide some indirect evidence on this issue, equation (5) drops the profit variable, with a view to disentangle to some extent, in a reduced form way, the impacts of internal and external pressures. Internal pressures are represented by a dummy variable taking the value one if there is at least one union in the firm, by the share of tenured staff in the workforce ('permanent'), and by the seniority variable, which measures the number of years spent by the worker in the current job. The latter two variables should capture 'insider effects', à la Nickell-Wadhwani. Both the presence of the union and the seniority effects are significant, suggesting that the bargaining power of the workers matters. External pressures are represented by two variables at equation (6), the 'alternative wage' variable, which is the average wage paid by the firms in the same sector of activity, and the 'employment change' variable, which is the average number of firings effected by the firms in the same sector of activity. The latter variable is used as a proxy for the tension on the relevant labor market, with a view to capture indirectly some kind of 'wage curve' à la Blanchflower-Oswald. The alternative wage variable seems to be the main effect, while the employment change variable seems to be an unsatisfactory proxy for the wage-curve effect, as it does not reproduce the significant impact found by Hoddinott (1996), and comes here with the wrong sign. This suggests that wages are higher in sectors where firings are more frequent, capturing probably some differences in manpower management strategy across sectors. This might also capture some counter-cyclical 'labor hoarding' effect, whereby firms provide some job protection when the workers have few outside opportunities, and feel less moral pressure to keep them when the market is more tense, firing them only when their chances of finding an equivalent job are higher. When comparing the impact of the internal and external pressures variables, at equation (7), it is pretty clear that they are jointly significant. Hence, the bargaining power of the workers, if any, derives both from their outside opportunities offered by the market, and from institutional features or unionization.

Equation (8) encompasses the four previous ones, by including both the rent-sharing effects and the internal and external pressures. It turns out that both the profit variable and the internal and external pressure variables are significant, as could be expected from the rent-sharing theory[7]. Moreover, the estimate of the coefficient of the profit variable is basically unchanged between equation (4) and equation (8), suggesting that the profit variable itself is not significantly correlated with the included internal and external pressures variables.

These results suggest that the bargaining power of the workers should be taken seriously, and is plausibly slowing down the development of the manufacturing sector in Côte d'Ivoire. The next set of tests gives a chance to the opposing view, that high wages are the result of the firm's choice to enhance efficiency by paying high wages.

[7] The theoretical model presented in the appendix spells out why we expect to find both the profit per worker term and the outside wage effect included in a wage model based on bargaining.

Efficiency-Wage Effects

Equation (9) starts a sequence of equations that turn to the analysis of efficiency-wage effects, with a view to test whether the correlation between wages and profitability results from the reverse causation from high wages on high profits, via the effect of the former on productivity, in a reduced-form way. The strong information symmetry assumption implicit in the Mincerian model is dropped first, in order to test an aspect of the Shapiro-Stiglitz shirking model. In this model, firms use high wages as a means to increase the value of the threat of firing, in a setting where the probability of being caught shirking is less than one. However, in the original version of this model, the monitoring technology is assumed exogenously given. Azam and Lesueur (1997), following in particular Eaton and White (1983), have extended this model by making monitoring endogenous. Assuming that the probability of being caught shirking is positively correlated with the ratio of the management and supervisory staff to the number of production workers, called the hierarchy ratio, they show in their theoretical model that the latter affects negatively the wages paid by a firm, as firms trade-off between pay and supervision. In equation (9), this variable is borderline significant, with the wrong sign. Another interesting proxy for the difficult observation of the workers' effort is provided by the variable 'complexity of production' used at equations (10) and (11). This is a dummy variable taking the value one if the firm uses a foreign license, or uses some technical assistance. Within the 'shirking' paradigm, one expects this variable to have a positive impact, as the firm is induced to pay higher wages, the more difficult it is to observe the worker's effort level (see Esfahani and Salehi-Isfahani, 1989). This variable is strongly significant, with the expected positive sign, in equations (10) and (12), although it is included in the latter along with the hierarchy ratio. Another candidate among the efficiency wage theories is tested at equation (12), namely the turnover-cost approach (Salop, 1979). Here, the turnover rate is represented by the ratio of the number of workers fired, hired, or quitting, over the total workforce of the firm. It is not significant in this equation, in which all the variables representing the different efficiency-wage theories are jointly included, and only the 'complexity' variable survives. Notice that in this equation, some of the control variables have seen their effect changed, like the 'married' dummy, which gets a positive sign, as expected from Mazumdar (1983). Hence, the efficiency-wage approach, of the shirking type, is not definitely rejected, although the results are somehow mixed.

Before performing an encompassing test of these different approaches, we now provide a test of the hold up effect, which we have not seen tested empirically in the literature. It captures another aspect of the bargaining power of the workers, in addition to the rent-sharing effect discussed in the references cited above.

Holdup Theory

Equation (13) is an attempt at testing the 'hold up' theory, which has not been given so far the attention it deserves in the empirical literature on labor economics (Grout, 1984, MacLeod and Malcomson, 1993). This theory plays potentially a crucial part in providing some finer foundations for the widely accepted use of bargaining models in the theory of wage determination. The rent-sharing theory assumes that bargaining occurs because of the power of the insiders or of the trade unions to impose a credible threat of reducing the firm's profits to zero, by stopping production. Then, the bargaining equilibrium may be assumed either efficient (McDonald and Solow, 1981), or inefficient as in the 'right to manage' model (Nickell and Wadhwani, 1990). In the former case, the contract between the firm and the representative worker is assumed complete, and not open to re-negotiation. In the latter case, i.e. the 'right to manage' model, the firm is assumed to be unable to pre-commit to any level of employment agreed in advance with the union, so that a credibility constraint is imposed on the choices open to bargaining, holding firms 'on their demand curve'. However, once agreed, the wage rate is not supposed to be open to re-negotiation. This model only leads to a more complicated rent-sharing effect, without yielding any significantly different testable prediction.

In the hold-up framework, the possibility of re-negotiation of both the wage and employment levels is at the center of the stage, as presented more rigorously in the appendix. The test case in this framework is what happens after the firm has invested in a new specific asset. Were complete contracts possible, then the firm would negotiate *ex ante* some labor contracts with the workers, and the wage rate would not be affected by the subsequent investment outlay. However, if contracts are incomplete, then the new investment opens the possibility for workers to re-negotiate the wage agreement, and get a share of the investment-induced surplus, depending on their bargaining power. Obviously, this possibility of re-negotiating depends crucially on the investment being reversible only at a high cost, otherwise the workers could not capture any part of the incremental profit. In our data set, we have some information on the most recent investment outlay done by the firms. We can distinguish between equipment and buildings. Assuming that the latter are less specific than the former, i.e. that the second-hand market for equipment is much less developed in Côte d'Ivoire than the second-hand building market, as seems plausible, we can thus use the amount invested in the former as a test variable. This is done in isolation in equation (13), and it is seen to be insignificant in this case[8]. However, the next test suggests that this failure is due to the fact that this test variable should rather be included alongside the rent-sharing effect, where it becomes highly significant.

[8] Boucq (1998) performs a similar test with the same data, using a different specification of the wage equation, and finds a significant hold-up effect, like we do in the next equation presented.

The Encompassing Equation

Equation (14) is an 'eclectic' equation, encompassing all the different theories tested here. In this equation, we find that many standard personal characteristics variables discussed above are significant with the expected sign, with the exception of education, while 'married' has the unexpected sign discussed above. Notice that gender is again not significant. Then we have institutional variables like age of the firm and foreign share of capital, which both have a positive impact. All the 'efficiency-wage' variables are significant, but 'supervision' has the wrong sign, relative to the prediction of a 'shirking' model. The profit per employee variable is still present, supporting the rent-sharing approach, although with a lower significance level. In this eclectic equation, the only internal pressures variable that remains significant is the 'insider' effect, contrary to what was found before, while the external pressures variables, previously significant, loose here most of their significance, with the employment change effect keeping the unexpected sign discussed above. However, the union variable becomes insignificant. Maybe, this is a reflection of the actual role of the Ivorian unions, sometimes described as 'collaborative unions', emanating from the (then) ruling party for keeping the workers under control (Touré, 1986). However, this may also be a statistical artifact, due to the 'eclectic' character of this equation, as it was significant at equations (5), (7) and (8). The most drastic change in this equation is that the hold-up variable becomes strongly significant. Hence, the encompassing equation provides a pretty unexpected picture, which accommodates both some efficiency-wage effects, although 'supervision' has the wrong sign, and some effects of the bargaining power of the workers, including both a rent-sharing and a hold-up effects. Of course, one must exert some caution when interpreting the results of this equation, because of its 'eclectic' nature, including many explanatory variables that might entail some multi-collinearity problems. Nevertheless, it seems to confirm that the rent-sharing and hold-up approaches are robust to the inclusion of efficiency-wage effects, and it thus provides some support to the view that urban-sector workers have some bargaining power that might retard development, somehow in the Lewis tradition, but with an additional contract-incompleteness effect.

5. Conclusion

In this paper, we have analyzed the determinants of wages in the manufacturing sector of Côte d'Ivoire, with a view to identify whether the high wages paid in this sector, by the standards of low-income countries, are a hindrance to industrial development, or the result of the relatively good performances of the local firms. After controlling for standard Mincerian personal characteristics, we find that several firm-specific variables are significant. The rent-sharing effect of profit per worker turns out to be significant and robust. 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, computed as the average wage per production sector, seems to exert a relatively robust external pressure on wages. This is consistent both with a competitive model, and with a

bargaining model, insofar as this is a measure of the outside options open to the worker. On the contrary, we have been unable to capture the kind of wage-curve effect found by Hoddinott (1996), using as a proxy the average number of firings taking place in the same sector. This does not seem to affect manufacturing wages in Côte d'Ivoire in the expected way.

Although the shirking model of efficiency wage is not entirely rejected by our data, as the complexity of the production process is significant in some equations, it does not seem to be as robust as the rent-sharing theory. Moreover, this variable might also find an interpretation within a bargaining framework, if the complexity of the production technology turns out to enhance the bargaining power of the workers. The other brand of efficiency-wage model tested here, the turnover model, is not rejected in the most encompassing equation.

Hence, our results seem to lean cautiously in favor of the rent-sharing interpretation of wage determination in the Ivorian manufacturing sector, in particular because the 'supervision effect' seems to work in the wrong way. The bargaining power of the workers seems to come from standard insider or union effects, although the direct inclusion of the rent-sharing and hold-up effects seem to out-perform these explanatory variables. Moreover, the bargaining power of the workers seems to reach the point where they are able to impose some *ex-post* re-negotiation of the wage agreements in response to new investment by the firm, as the test of the hold-up theory turns out to be significant in the encompassing equation. This may be regarded as an additional and independent result in the literature that points at institutional weaknesses as an important brake on industrial development in poor countries, as illustrated by Knack and Keefer (1997) and Brunetti, Kisunko and Weder (1998). Improving the institutional framework, with a view to better protect the returns to investment, might thus be the most pressing policy challenge to be faced in Côte d'Ivoire, and probably also in other poor countries, in order to speed up the development of the manufacturing sector.

Table 1 : Individual Wage Equations

	(1)	(2)	(3)	(4)
Intercept	0. 319	0.283	0.236	0.285
	(2.86)***	(12.88)***	(8.52)***	(10.24)***
Education#	0.086	0.112	0.051	0.028
	(0.40)	(3.04)***	(1.02)	(0.69)
Experience	0.090	0.068	0.076	0.092
	(6.20)***	(2.10)**	(2.30)**	(2.79)***
Experience²	-0.002	-0.001	-0.001	-0.002
	(6.31)***	(1.88)*	(1.52)	(2.65)***
West African immigrant	-0.066	-0.059	0.121	0.140
	(0.09)	(0.13)	(0.19)	(0.28)
Gender	0.237	0.343	0.181	0.317
	(0.51)	(1.34)	(0.61)	(1.06)
Married	-0.082	-0.109	-0.081	-0.083
	(4.42)***	(3.47)***	(2.28)**	(2.66)***
Apprentice#	-0.148	0.610	-0.990	-1.077
	(0.05)	(0.63)	(1.02)	(1.43)
Weekly hours worked	-0.009	-0.005	-0.004	-0.011
	(0.42)	(1.47)	(1.03)	(2.63)***
Training	0.117	0.066	0.074	0.061
	(2.44)***	(2.33)**	(2.03)**	(1.99)**
Not fired#	0.070	0.161	0.149	0.156
	(1.53)	(2.96)***	(2.57)***	(2.74)***
Sector and occupation Dummy variables	*no*	*yes*	*yes*	*yes*
Firms Characteristics				
Age	-	-	0.010	0.009
			(2.08)**	(1.86)*
Foreign	-	-	0.305	0.491
			(1.17)	(1.88)*
Public	-	-	0.074	0.333
			(0.719)	(2.62)***
Abidjan	-	-	0.890	1.230
			(1.71)*	(2.48)***
Product Market Effects				
Competition	-	-	-	0.242
				(3.09)***
Profit / n#	-	-	-	1.98E-08
				(3.11)***
N	909	909	878	793
Nb of observations	1135	1135	1100	956
$\bar{R}^2$	0.06	0.59	0.62	0.66

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

	(5)	(6)	(7)	(8)
Intercept	0.188	0.039	0.261	0.359
	(5.94)***	(0.25)	(1.73)*	(1.99)**
Education#	0.065	0.072	0.040	0.038
	(0.80)	(2.21)**	(0.89)	(1.18)
Experience	0.083	0.038	-0.040	-0.079
	(2.62)***	(1.19)	(1.26)	(2.66)***
Experience²	-0.002	-0.006	-0.001	-0.002
	(2.35)***	(0.74)	(1.26)	(2.64)***
West African immigrant	0.150	-0.257	-0.240	-0.139
	(0.26)	(0.94)	(0.81)	(0.53)
Gender	0.002	0.204	0.128	0.232
	(0.04)	(1.16)	(0.51)	(0.96)
Married	-0.045	-0.020	-0.026	-0.032
	(1.18)	(0.56)	(0.67)	(0.89)
Apprentice#	-0.240	-0.114	-1.087	-1.109
	(0.24)	(0.20)	(1.42)	(1.93)**
Weekly hours worked	0.006	-0.009	0.007	0.013
	(0.14)	(2.18)**	(1.77)*	(3.03)***
Training	0.084	0.063	0.095	0.082
	(1.62)*	(1.59)*	(1.50)	(1.34)
Not fired#	0.172	0.129	0.179	0.121
	(3.21)***	(1.83)*	(2.62)***	(1.69)*
Firms Characteristics				
Age	0.002	0.001	0.007	0.005
	(0.59)	(0.28)	(1.69)*	(1.35)
Foreign	0.479	0.152	0.137	0.052
	(1.45)	(0.92)	(0.57)	(0.24)
Public	-0.031	0.271	0.290	0.486
	(0.30)	(2.67)***	(2.64)***	(3.78)***
Abidjan	1.014	0.518	0.268	0.373
	(1.84)*	(1.74)*	(0.77)	(1.28)
Product Market Effects				
Competition	-	-	-	0.207
				(3.15)***
Profit / n#	-	-	-	1.73E-08
				(4.60)***
Internal Pressures				
Union in firm	0.470	-	0.365	0.345
	(3.33)***		(3.08)***	(2.66)***
Permanent	-0.579	-	-0.349	-0.295
	(1.24)		(1.08)	(0.92)
Seniority#	0.043	-	0.029	0.029
	(2.78)***		(2.12)**	(2.29)**
External Pressures				
Log alternative wage	-	0.749	0.469	0.443
		(3.35)***	(2.02)**	(2.11)**
Log employment change	-	0.247	0.234	0.200
		(3.70)***	(3.72)***	(3.37)***
N	748	878	748	676
Nb of observations	915	1100	915	795
$\overline{R}^2$	0.71	0.62	0.67	0.70

	(9)	(10)	(12)	(13)
Intercept	0.231	0.223	0.215	0.306
	(8.18)***	(9.33)***	(8.90)***	(4.18)***
Education#	0.040	0.051	0.059	0.098
	(0.75)	(1.09)	(1.25)	(1.39)
Experience	0.618	0.041	0.040	0.123
	(0.04)	(1.28)	(1.29)	(1.90)**
Experience²	-0.001	-0.004	-0.004	-0.003
	(1.22)	(0.49)	(0.49)	(1.75)*
West African immigrant	0.077	0.394	0.341	0.142
	(0.12)	(1.15)	(0.99)	(0.27)
Gender	0.232	0.032	0.015	0.253
	(0.78)	(0.10)	(0.05)	(0.57)
Married	-0.083	-0.070	0.059	-0.123
	(2.31)**	(2.01)**	(1.82)*	(2.90)***
Apprentice#	-1.057	-0.077	0.142	0.750
	(1.04)	(0.09)	(0.18)	(0.49)
Weekly hours worked	-0.005	4.78E-05	0.008	-0.009
	(1.15)	(0.01)	(0.21)	(0.18)
Training	0.075	0.070	0.060	0.131
	(1.91)**	(2.01)	(1.76)*	(1.22)
Not fired#	0.149	0.083	0.075	0.233
	(2.66)***	(1.57)*	(1.46)	(3.47)***
Firms Characteristics				
Age	0.010	0.006	0.002	0.014
	(1.94)**	(0.17)	(0.05)	(1.45)
Foreign	0.273	0.092	0.110	-0.618
	(0.95)	(0.39)	(0.64)	(1.05)
Public	0.074	0.036	-0.061	0.188
	(0.70)	(0.38)	(0.66)	(0.78)
Abidjan	0.827	0.677	0.683	0.137
	(1.49)	(1.42)	(1.43)	(0.19)
Efficiency Wage Theories				
Supervision	0.059	0.047	0.050	-
	(1.66)*	(1.35)	(1.43)	
Complexity of production technology	-	0.875	0.854	-
		(4.07)***	(4.02)***	
turnover	-	-	-0.089	-
			(0.81)	
Hold up Theory				
Specific investment	-	-	-	5.12E-11
				(0.77)
N	878	866	866	663
Nb of observations	1100	1082	1082	772
$\overline{R}^2$	0.63	0.71	0.71	0.67

	(14) Encompassing Model	
Intercept	0.456	(4.30)***
Education#	0.007	(0.26)
Experience	0.106	(3.70)***
Experience²	-0.003	(4.06)***
West African immigrant	-0.137	(0.47)
Gender	0.315	(1.10)
Married	-0.075	(1.91)**
Apprentice#	-1.573	(1.91)**
Weekly hours worked	-0.004	(1.13)
Training	0.134	(2.09)**
Not fired#	0.203	(2.83)***
Firms Characteristics		
Age	0.009	(1.66)*
Foreign	0.415	(1.91)**
Public	0.057	(0.44)
Abidjan	0.457	(1.30)
Efficiency Wage Theories		
Supervision	0.126	(2.12)**
Complexity of production technology	0.885	(5.20)***
turnover	-0.361	(2.49)***
Product Market Effects		
Competition	0.063	(1.32)
Profit / n#	4.43E-09	(1.86)*
Internal Pressures		
Union in firm	0.082	(0.81)
Permanent	0.166	(2.16)**
Seniority#	0.003	(0.28)
External Pressures		
Log alternative wage	0.160	(0.91)
Log employment change	0.107	(1.74)*
Hold up Theory		
Specific investment	1.17E-10	(3.38)***
N	481	
Nb of observations	538	
$\overline{R}^2$	0.83	

Table 2 : Definitions and Sample Characteristics of the Variables

Name	*definition*	μ	σ	*Nb*
Individual Variables				
log-wage	logarithm of the net wage, bonuses and benefits included, before deduction of loan repayments	11.37	0.83	1,568
gender	= 1 if the employee is a male	0.90	0.29	1,613
West African	= 1 if the employee is coming from a West African country, except Côte d'Ivoire	0.18	0.39	1,613
experience	working experience, measured as the current age minus the school-leaving age and the duration of any unemployment spell	16.36	8.49	1,208
exp2	square of experience	339.9	329.9	1,208
education	school-leaving age minus 6 years	12.77	4.98	1,202
apprentice	= 1 if the employee has been an apprentice in the same sector or firm	0.27	0.44	1,609
married	= 1 if the employee is married	0.31	0.46	1,613
permanent	=1 if the employee is a permanent employee	0.97	0.15	1,605
training	= 1 if the employee gets some on-the-job training	0.034	0.18	1,592
fired	= 1 if the employee has never been fired	0.24	0.42	1,572
seniority	Number of years spent in the current job	7.65	6.73	1,613
sector experience	= 1 if the employee has worked before in another firm in the same sector	0.38	0.48	1,613
Firm-specific variables				
competition	Number of competitors of the firm for its first product	3.69	1.40	426
supervision	ratio of the number of management and supervisory staff to total workforce	0.15	0.14	247
turnover	ratio of the sum of the numbers of hired, fired or quitting employees during the last year to total workforce	0.32	0.46	271
complexity of production technology	=1 if the firm holds a foreign license or uses technical assistance	0.14	0.34	419
permanent	share of permanent staff in total workforce	0.87	0.24	427
union	= 1, if there is at least one union in the firm	0.43	0.49	387
alternative wage	logarithm of the average wage paid by the firms in the sample belonging to the same sector of production	11.36	0.32	373
employment change	average number of firings during the preceding year in the sample firms belonging to the same production sector	2.77	1.53	348
profit / n	gross profit, before depreciation and taxes, divided by the number of employees	0.24^{E+07}	0.81^{E+07}	272
human capital	average human capital in the firm = mean of the education level in the firm	2.00	1.03	348
specific investment	value of the most recent investment in material and equipment	0.18^{E+09}	0.68^{E+09}	272
age	Number of year of existence of the firm	15.6	13.67	424
foreign	= 1, if the capital of the firm is more than 50% foreign	0.57	0.49	464
public	= 1, if the firm has some public capital	0.02	0.14	464
Abidjan	= 1 if the firm is based in Abidjan	0.87	0.32	464

Appendix : Rent-Sharing with or without Re-Negotiation

Assume that the workers are risk neutral, and are represented by a formal or informal union, with a utilitarian objective function :

$$U = w\,L + (M - L)\,\bar{w}, \tag{A.1}$$

where w is the wage rate paid by the firm, $\bar{w}$ the alternative wage, L the workforce in the firm, supposed to be all members of the union, and M the total number of members, including those who are going not to get a job in the firm. The outside option of all the workers is to work in the outside labor market, and earn $\bar{w}\,M$.

Denoting r the rental rate of capital, and K the capital stock invested, define :

$$\pi = F(K, L) - w\,L - r\,K \tag{A.2}$$

as the profit of the firm when production takes place, where $F(K, L)$ is a well-behaved production function, with decreasing returns to scale. In the absence of re-negotiation, the firm's outside option is zero profit.

The Case of Binding Labor Contracts

In the case of binding contracts, the equilibrium triple $\{w, L, K\}$ is determined by assuming that the generalized Nash bargaining solution prevails. Denote $0 \leq \alpha \leq 1$ the bargaining power of the workers. Then the equilibrium solves :

$$\max_{w,K,L} \; [(w - \bar{w})\,L]^{\alpha}\,\pi^{(1-\alpha)}. \tag{A.3}$$

The first-order conditions can be arranged to read :

$$F_L(K, L) = \bar{w}\,, \tag{A.4}$$

$$F_K(K, L) = r, \tag{A.5}$$

and

$$w = \bar{w} + \frac{\alpha}{1-\alpha}\frac{\pi}{L}. \tag{A.6}$$

Condition (A.4) shows that the level of employment will only depend on the alternative wage and the capital stock, and not on the wage actually paid in the firm. Condition (A.5) is the standard equality between the marginal product of capital and the

rental rate. Hence, in the absence of re-negotiation, the assumed bargaining power of the workers does not distort allocative efficiency, for given $\bar{w}$ and r. Condition (A.6) gives the wage equation, where the second term on the RHS of equation (A.6) is the rent-sharing term. It falls to zero if the bargaining power of the workers falls to $\alpha = 0$.

The Case of Re-Negotiation

The outcome is different if the labor contract is re-negotiable after the investment is made by the firm. Assume now that K is specific enough, so that it cannot be re-sold instantly, and that the rental cost $r\,K$ must be paid in any case, independently of the output level. Then, the equilibrium triple $\{w, L, K\}$ is determined in two steps.

First, the firm chooses its capital stock K such that :

$$\max_{K} F(K, L^N) - w^N L^N - r\,K, \tag{A.7}$$

where $\{ w^N, L^N \}$ is determined in a second stage such that :

$$\{ w^N, L^N \} = \arg\max_{w,\,L} \; [(w - \bar{w})\,L]^{\alpha}\,[\pi + r\,K]^{(1-\alpha)}. \tag{A.8}$$

The first-order conditions can then be arranged to read :

$$F_L(K^R, L^N) = \bar{w}\,, \tag{A.9}$$

$$F_K(K^R, L^N) = \frac{1}{1-\alpha}\,r\,, \tag{A.10}$$

and :

$$w^N = \bar{w} + \frac{\alpha}{1-\alpha}\frac{\pi}{L^N} + \frac{\alpha\,r}{1-\alpha}\frac{K^R}{L^N}. \tag{A.11}$$

Hence, the possibility of re-negotiation introduces a term in K^R/L^N in the wage equation, provided $\alpha\,r > 0$.

Notice that equation (A.10) shows that the marginal product of capital is higher than the rental rate. If returns to scale are decreasing, this entails a lower level of capital under re-negotiation, for a given rental rate. This is the hold-up effect proper, which is a major cause of inefficiency, as it deters investment. However, under constant returns to scale, this would entail that the rental rate would be lower in equilibrium under re-negotiation than under binding contracts, if the alternative wage was the same.

Alternatively, the wage equation can be written as :

$$w = (1-\alpha)\bar{w} + \alpha\left[\frac{F(K^R, L^N)}{L^N}\right]. \qquad (A.12)$$

Therefore, the rent-sharing approach, under re-negotiation, is also consistent with a wage equation, which expresses the wage rate as a linear combination of the outside wage and the average product of labor. The latter effect can be interpreted as a 'productivity clause', entailing that a given share of any increase in productivity must be passed on to the workers. This is quite a common clause in labor contracts, even in the developing world, at least in the formal sector.

In the case of binding labor contracts, the equivalent of equation (A.12) is :

$$w = (1-\alpha)\bar{w} + \alpha\left[\frac{F(K^R, L^N)}{L^N}\right] - \alpha r\frac{K^R}{L^N}. \qquad (A.13)$$

In this case, the 'productivity clause' does not include the share of capital. Therefore, an alternative approach to testing the absence of re-negotiation is to add a term in K^R/L^N to a wage equation expressing the wage rate as a linear combination of the outside wage and the average product of labor, like (A.12), assuming that the rental rate of capital is significantly different from zero.

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