Chapter 4

Gender Differences in Pay in African Manufacturing Firms

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Many empirical studies have found that women and men face unequal treatment in the workplace, especially in terms of wages. Almost all developed countries' labor markets are characterized by a significant gender wage gap, the explanations for which may be related to differences in the level of human capital between male and female employees or to discrimination from employers against the female workforce, among other factors (see Blau and Kahn 2000). More recently, several studies using data from France, Spain, and Sweden have shown that the gender wage gap is unlikely to remain constant throughout the wage distribution (Albrecht, Björklund, and Vroman 2003; Barnet-Verzat and Wolff 2008; de la Rica, Dolado, and Llorens 2008; Jellal, Nordman, and Wolff 2008).

In contrast to developed countries, little is known about gender wage differences in developing countries, especially with respect to the possible varying magnitude of the gender gap across the wage distribution. Gender-specific analyses using African data remain scarce, as can be inferred from the meta-analysis of Weichselbaumer and Winter-Ebmer (2005). Results from previous studies on African countries indicate, however, that there is a wide consensus on the presence of substantial wage inequalities between men and women, both among salaried and self-employed workers.[1] This is somewhat worrisome because reducing gender inequality is usually recommended as an efficient tool in the fight against poverty in poor countries. Furthermore, decreasing gender inequality is part of the third United Nations Millennium Development Goal.

Our purpose in this chapter is to add new comparative evidence on the magnitude of the gender wage gap in the African manufacturing sectors. In a context where wages usually remain low, it may be that employers tend to limit

The authors thank Jorge Arbache and several reviewers for their useful comments and Antoine Leblois for valuable research assistance.

the use of discrimination against women. To investigate the potential differences in the gender wage gap more closely, we conduct a comparative analysis of seven African countries using the recent Investment Climate Assessment (ICA) surveys, carried out in the framework of the World Bank's Africa Regional Program on Enterprise Development (RPED).[2] These surveys gather information both on the characteristics of manufacturing firms and on a sample of their workers, meaning that they provide matched employer-employee data.

To study gender inequalities in pay, researchers rely on either household data with information on individual earnings or on such matched employer-employee data. In the former, it is theoretically possible to account for the selectivity issue, since many women do not take part in the labor market and some of them work in informal sector jobs. However, correction of the selectivity issue is often problematic as it raises methodological controversies regarding the choice of the appropriate instruments to identify selection.[3] In addition, in such household surveys, there is usually no detailed description of the respondent's job and workplace. This is a crucial feature when measuring experience, for instance. While numerous studies rely on potential experience, this covariate is likely to be affected by measurement error (Heywood 1988; Nordman and Roubaud 2009). The use of actual experience when it is available in the data, as is the case in this chapter, seems much more appropriate when studying gender wage differences.

Clearly, heterogeneity at the firm level is likely to bias the estimates of the gender wage gap if firms' characteristics influence wages of men and women differently.[4] The use of matched employer-employee data allows estimation of fixed effects models, which controls for both observed and unobserved characteristics of the workplace. Although employer-employee data are not representative of the population of interest at the country level, the matched data may offer more opportunities than household data to analyze gender differences in pay if we consider that the firms' characteristics matter in the wage formation process.[5]

Recent findings from Morocco indicate that it matters to account for firm fixed effects in wage regression when explaining gender differences in pay (Nordman and Wolff 2009a). In African manufacturing, Fafchamps, Söderbom, and Benhassine (2006) note that the gender wage gap may arise as a result of gender-specific sorting of workers across firms that pay different wages. This last explanation relates to the presence of gender segregation across firms. If there are high-paying firms that hire more men than women, and if there are, at the same time, low-paying firms hiring more women than men, then firms' characteristics will deeply influence the gender differences in wages. Controlling for firm heterogeneity, therefore, should reduce the magnitude of the gender wage gap. In the same vein, Hellerstein, Neumark, and Troske (2002) study whether competitive market forces act to reduce discrimination. They

show that, among plants with high levels of product market power, those that employ relatively more women are more profitable, while the relationship is not significant for plants with low levels of market power. This result is consistent with sex discrimination in wages in markets where plants have product market power.

This discussion suggests that, ideally, employer-employee data are needed to study the gender pay gap, since such matched data allow purging the effect of firm heterogeneity on wage differentials (Meng 2004; Meng and Meurs 2004). Having matched data from manufacturing firms in African countries allows the study's empirical work to control for observed and unobserved heterogeneity at the firm level by estimating fixed effect wage models. In so doing, the study shows how controls of the firm wage policies in wage equations affect the estimated magnitude of the gender wage gap.[6] Furthermore, using information at the firm level (for example, the proportion of female employees in each enterprise), the study explicitly accounts for the possibility of gender segregation across firms, which may explain the varying magnitude of the gender gap across countries.

The seven African countries selected for econometric analysis in this study—Benin, Kenya, Madagascar, Mauritius, Morocco, Senegal, and Uganda—are particularly interesting to compare. For instance, while Mauritius is perhaps the most interesting economic development success story of the 1980s,[7] Benin, Kenya, Madagascar, Senegal, and Uganda, by contrast, remain some of the poorest countries in the world. According to the 2007–08 Human Development Index (HDI) ranking of the United Nations Development Programme (UNDP), Mauritius stands 65th, while Benin (163), Kenya (148), Madagascar (143), Senegal (156), and Uganda (154) are far down in the ranking of 177 countries. In this respect, Morocco at 126 is in an intermediate position.

A comparative case study of these countries is worthwhile in order to assess whether gender inequalities in pay are somehow linked to level of economic development. The fact that these countries have distinct economic performances and labor market features may be helpful in understanding the roots of gender wage differences. Empirical analysis for this study first estimates the gender wage gap using ordinary least squares (OLS) earnings regressions and decomposing the gender gap in two components, one taking into account differences in individual labor market characteristics, and the other, the differences in the returns to these characteristics. Then, using quantile regressions, the analysis tests whether the gender gap remains constant across the wage distribution. Finally, the study focuses more closely on the role of firm characteristics and job segregation across firms as potential factors explaining the gender wage gap. The study aims to answer the question: Do firm characteristics matter when explaining wage differences between male and female employees in the African manufacturing sectors?

The remainder of this chapter is organized as follows. The next section describes the ICA surveys and presents descriptive statistics on workers, firms, and wages. Then the study's different econometric results based on OLS and quantile regressions, fixed effect models, and decomposition techniques are presented, followed by an executive summary and concluding comments.

Data and Descriptive Statistics

This section presents the surveys used in this study, describes the different samples of firms and workers, and provides a descriptive analysis of gender wage differences in the seven selected African countries.

The ICA Surveys

The matched employer-employee data for Benin, Kenya, Madagascar, Mauritius, Senegal, and Uganda come from the ICA surveys conducted by the World Bank from to 2003 to 2005 in the framework of the RPED. The data for Morocco come from the Firm Analysis and Competitiveness Survey (FACS) conducted in 2000 by the World Bank and the Moroccan Ministry of Trade and Industry.[8]

The basis for these surveys is the notion that the workplace is the microdata unit where labor supply and labor demand meet. In that spirit, the ICA surveys and FACS collect data on both firm characteristics and a sample of employees in each workplace. The questionnaires addressed to both employers and employees are specifically adapted for each country, but they enable cross-country comparisons because the questions are very similar across countries.

In these countries, the firms were randomly selected among the population of formal establishments using a stratification based on sector, size, and localization. Hence, they are not mainly located in capital cities, but they do represent the various regions of each country. In each firm, up to 10 employees were randomly sampled following Mairesse and Greenan (1999). Some sampling frames at the firm level contained constraints on the size of the firms to be investigated, for instance no firm with less than 10 employees in Kenya, Madagascar, and Morocco, while some did not constrain firm size (Benin, Mauritius, Senegal, and Uganda).[9] Across countries, firms belong to more or less 10 manufacturing sectors[10] that regroup into broadly eight activities: (1) agro industry; (2) chemicals and related products; (3) materials for construction; (4) furniture; (5) metallic products; (6) industry of paper, paper products, and plastics products; (7) textiles and leather; and (8) wood.

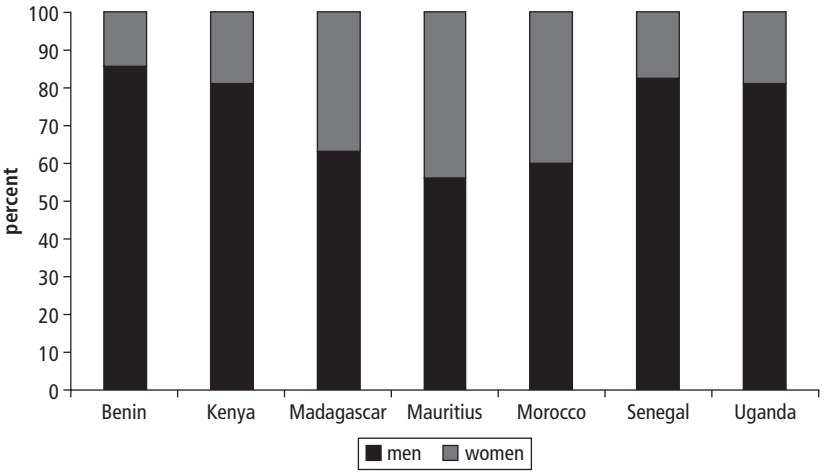
Description of the Samples

The survey questionnaires allow us to construct identical human capital indicators for workers in the selected countries. For each respondent, number of years of completed schooling, number of years of actual experience out of the current firm, and number of years of tenure in the current firm are computed. These different covariates, which provide good controls for the potential productivity advantage in the labor markets, are then introduced into the wage regressions. Also used were two demographic variables, that is, a dummy for gender and a dummy indicating whether the individual is married or not.

Figure 4.1 shows large differences in the sex composition of the various samples. The proportion of women in each sample are: Benin (14.5 percent), Kenya (19 percent), Madagascar (37 percent), Mauritius (44 percent), Morocco (40 percent), Senegal (17.5 percent), and Uganda (19 percent). Then, for Benin, Senegal, Kenya, and Uganda, first, the much lower proportion of female employees should be noted, which indicates the presence of women with unusual observed and unobserved human capital characteristics.

The low proportion of women in the samples for some countries, which makes them a special case with particular human capital characteristics, is evidence of a selection effect on the labor market. Large inequalities in access to the manufacturing sector are present, and they certainly partly explain the cross-country differences observed in the magnitude of the wage gap. While the study's descriptive statistics suggest that access to manufacturing jobs is

Figure 4.1 Gender Composition of the Employee Samples



Sources: Investment Climate Surveys for Benin (2004), Kenya (2003), Madagascar (2005), Mauritius (2005), Senegal (2003), Uganda (2003); FACS for Morocco (2000); authors' calculations.

much more difficult for women living in Benin, Kenya, Senegal, and Uganda, the use of matched employer-employee data offers no solution to account for this selection effect.

According to Annex table 4A.1, Kenyan, Malagasy, and Ugandan workers are the most educated, with an average of more than 11 years of completed schooling. The least educated workers are those of Benin at 9.5 years and Morocco at 8.6 years, while Mauritian at 10 and Senegalese workers at 10.5 years are in intermediate positions. Given Kenya's, Madagascar's, and Uganda's respective levels of economic development compared to that of Mauritius and Morocco, this ranking is surprising. Indeed, Sub-Saharan African countries are often believed to be less endowed in human capital compared to their North African neighbors, and notably relative to the newly industrialized Mauritius Island.

A first explanation is that an overwhelming proportion of poorly educated individuals actually work in the informal sectors of the countries under consideration.[11] The latter are thus not in the sample design of the ICA surveys, because this study used data stemming from formal manufacturing firms and their workers. The formal private sectors in Benin, Kenya, Madagascar, Senegal, and Uganda are highly selective, thus are reserved for the most educated workers. This is probably less true for Morocco and Mauritius, where uneducated workers are also found in significant proportions in garment firms, for example.[12]

Another interesting pattern of the study samples, which may explain some differences in educational achievement across countries, is the sex distribution of education. While "only" two country samples exhibit a greater ratio of men's years of education to that of women (Mauritius, 103 percent, and Morocco, 103.5 percent), the other samples reveal an education gap in favor of women at the following percentages: Benin (94.6 percent), Kenya (94.8 percent), Madagascar (94.2 percent), Senegal (78.4 percent), and Uganda (95.8 percent). In this respect, the Senegalese case is the most revealing of the specificity of our samples, as female employees in this country benefit on average from almost three more years of education than their male counterparts (12.82. versus 10.05).[13]

In all countries, male workers offset their potential disadvantage in terms of education with greater average number of years of experience in the labor market. This is reflected both by the gender ratios of men's to women's experience in the current job: Benin (115), Kenya (213), Madagascar (155.4), Mauritius (137.7), Morocco (147.6), Senegal (163.2), and Uganda (161.4); and the sex ratios of tenure in the incumbent firm: respectively, 107, 129.4, 109.8, 135.2, 134.8, 124.9, and 107.1 percent. On average, Mauritian workers are the most experienced (15.1 years of total actual experience), followed by Kenyans and Senegalese (about 12.0 years), Malagasies (11.0 years), Beninese (9.5 years), and, finally, Moroccans and Ugandans (8.9 years).

The proportions of workers at the top of the occupational distribution (owners, managers, professionals) are roughly similar across Madagascar and

Mauritius. In Benin, Morocco, and Uganda, greater proportions of workers were observed in higher occupations, while employees in Kenya and Senegal are in intermediate positions. In all cases studied (with the exception of Benin), men, who are more likely to be owners or managers, have better occupations than women. Women, on the contrary, compete well with men in professional occupations (with university degree), which is in concert with the previous finding of a greater education level for women in five out of seven samples. Interestingly, women are always found in greater proportions than men in the category of health, office, and sales workers. Finally, unskilled production workers are prevalent in Madagascar (44 percent), followed by Senegal (32 percent), Morocco and Uganda (about 29 percent), Mauritius (26 percent), Kenya (22 percent), and Benin (20 percent).

Firm samples comprise 194 enterprises for Benin, 248 for Kenya, 281 for Madagascar, 189 for Mauritius, 842 for Morocco, 249 for Senegal, and 264 for Uganda. As shown in Annex table 4A.2, the average total employees in the firm samples ranges from 39 salaried workers in Benin to 227 in Kenya. In firm size, the Beninese sample stands out compared to the other countries, as it contains a significant proportion of small-sized enterprises, 30 percent of the firms having fewer than 11 employees.[14] Similar average proportions of women in each firm are found (about 15 percent) for Benin, Kenya, Senegal, and Uganda, while this share is more than twice as high for Moroccan, Malagasy, and Mauritian firms. More firms are owned by women in Madagascar: 20 percent versus less than 10 percent in the other samples. This may affect the measure of the gender wage gap if female owners are less likely to offer lower wages to women than male ones.

Ugandan firms display a higher share of managers and executives compared to the other countries (28 percent versus 17, 16, and 15 percent, respectively, for Benin, Kenya, and Senegal, and less than 10 percent for the three other firm samples). More generally, these proportions are low compared to those observed in developed countries. The share of exporting firms is important in Mauritius (64 percent), Morocco (57 percent), Kenya (51 percent), and Senegal (50 percent), while it is comparatively low in Madagascar (30 percent), Benin (22 percent), and Uganda (18 percent). Mauritian firms thus are the most concerned with international competition for their product markets. Finally, there are some important differences in the sectoral distribution of firms across countries. The agro-industry sector is prevalent in Kenya, Senegal, and Uganda, while the textile sectors are significant in Morocco, as is the metal products sector in Madagascar. By contrast, firms are less concentrated sectorally in the Beninese sample.[15]

To summarize, the firm samples are different in many respects, with particularly distinct sizes, female proportions, export capacity, and sectors of activity. Thus, it is important to account for firm heterogeneity in the empirical analysis.[16] The study matched employer-employee data to control for both the characteristics of the workers and the firms. There were several ways to

proceed. A first possibility would be to include in the regressions a large set of explanatory variables related to the firm in wage equations. The drawbacks of this method are that many firm characteristics are potentially collinear and this would not account for the unobserved firm heterogeneity component. Thus the preferred strategy is to control for both observed and unobserved heterogeneity at the firm level using fixed effect models, which is easy to implement with linear wage regression. This implementation is also possible in the context of quantile regressions.

How Large Are Gender Wage Differences?

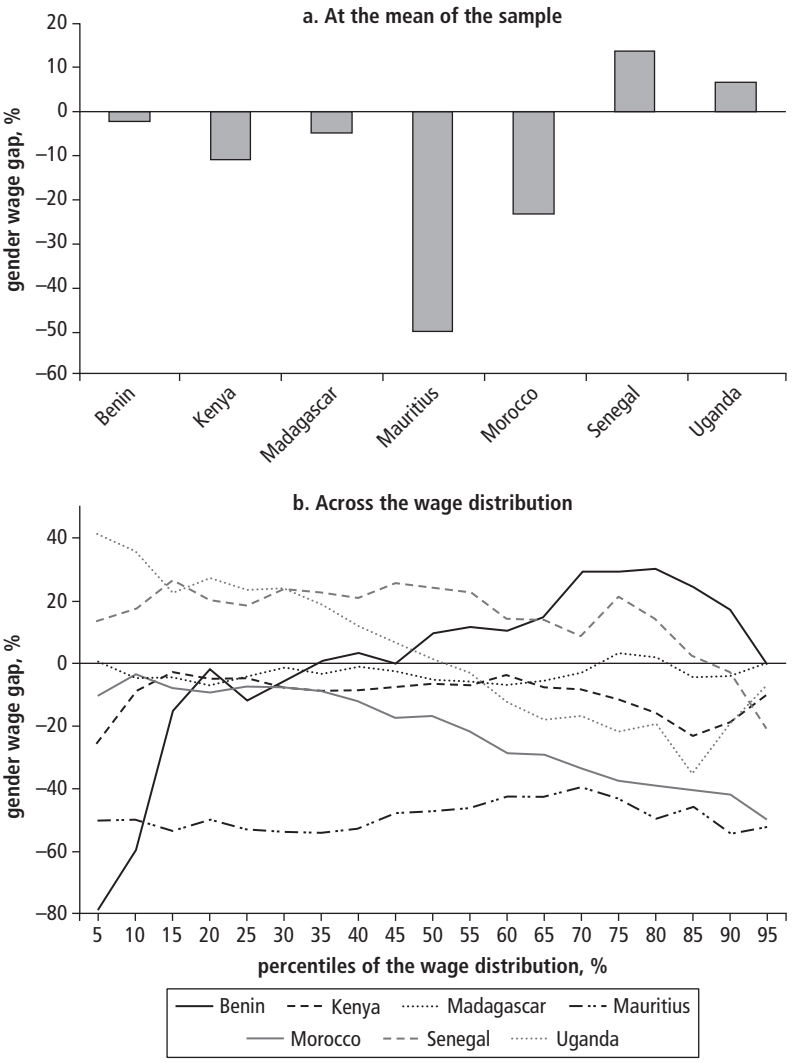
To examine the wage distributions by gender in the different countries, the study measured wages based on hourly earnings (including other monetary advantages and premiums) and thus takes into account the potential heterogeneity in hours worked between men and women. Annex table 4A.1 shows higher mean wages for men in five out of seven countries. The two exceptions are Senegal and Uganda, where women's average wages slightly exceed those of men.

Figure 4.2 shows the magnitude of the gender wage gap at the mean of the sample (panel a) and along the wage distribution (panel b). In all countries, the median wage (50th percentile) is much lower than the mean wage. While in Mauritius the gap is important all along the wage distribution (the difference in log wages between men and women reaches about 50 percentage points of log), the gender gaps are insignificant at the mean point of the sample in Benin, Madagascar, and Uganda. In Kenya, the gap is about 11 percent at the mean (indicating that women earn on average 11 percent less than men), while it reaches 26 percent in Morocco, which is highly significant. In the case of Senegal, as pointed out earlier, the gap is significantly in favor of women (at the 10 percent level) and reaches about 14 percent at the mean point of the sample.

Unfortunately, the data show that calculations at the sample means can hide significant differences in the magnitude of the gaps along the wage distribution. This is particularly true for Benin, Morocco, and Uganda, where the gaps vary significantly depending on the workers' relative position in the wage distribution. In Benin, for instance, the gap is significantly in favor of men in the lower part of the wage distribution, while it favors women in the upper part (from about the median of the distribution). By contrast, the reverse is true for Uganda, where the gap changes sign and is detrimental to women in the upper part of the distribution. In Morocco, the large gap increases steadily all along the wage distribution, thereby revealing the potential existence of a glass ceiling effect against women on top of the distribution (Nordman and Wolff 2009a). These preliminary statistics then justify turning to a distributional approach for a proper view of the magnitude of the gender wage gaps in Africa.

In the selected African manufacturing firms, the profiles among workers are very different. Albeit preliminary, these findings suggest that the gender wage gaps observed in the formal sectors of these countries are quite diverse.

Figure 4.2 Descriptive Statistics of the Gender Wage Gap



Sources: Investment Climate Surveys for Benin (2004), Kenya (2003), Madagascar (2005), Mauritius (2005), Senegal (2003), and Uganda (2003); FACS for Morocco (2000); authors' calculations.

Econometric Results

To further understand the factors that influence the magnitude of this gender gap, we turn in the next section to an econometric analysis using OLS, fixed effects, and quantile regression, relying on decomposition methods to examine

whether the gender wage gap stems from differences in endowments between men and women or from differences in the returns to these characteristics. Finally, the role of job segregation across firms in the magnitude of the gender wage gap is assessed.

Evidence on the Mean Gender Wage Gap

The empirical analysis begins by assessing the magnitude of the gender wage gap in the seven African countries using OLS regressions with the log hourly wage as dependent variable (see Annex 4B). For each country, the linear model is estimated on the pooled sample comprising both male and female employees. The different covariates introduced into the regressions are "marital status," "completed years of education," "years of experience in the firm," and "years of tenure in the firm" (with quadratic profile for the last three variables).[17] Actual experience in the firm was chosen instead of the years of potential experience because the measurement of potential experience may lead to gender-specific measurement errors (errors being more likely for women).[18] As women are more likely to be out of the labor market, a measure of potential experience is expected to systematically overstate the actual experience of women. Note that regional dummies are not included in the various regressions. The geographical differences will implicitly be controlled for in the fixed effects regressions.

The following focuses on the gender coefficient in the earnings equation (Annex table 4A.3, columns 1A–7A). A brief investigation suggests that a distinction must be made between two groups of countries. On one hand, there is no significant difference in male and female earnings in Benin, Kenya, Madagascar, Senegal, and Uganda. On the other hand, earnings are statistically different between men and women both in Mauritius and in Morocco. On average, women earn 12.4 percent less than men in Morocco and 35.3 percent less in Mauritius. Several explanations related to either employees' or firms' characteristics or to the functioning of the labor market may be helpful to understand these differences.

An interesting feature of the study's comparative data is the apparent correlation between the proportion of female employees within firms and the gender wage gap. In the first group of countries (no gap), the share of women in the manufacturing sectors is somewhat low. It amounts to 14.5 percent in Benin, 18.9 percent in Kenya, 17.6 percent in Senegal, and 19.0 percent in Uganda. The situation of Madagascar is different because the proportion of women in the manufacturing sectors is much higher (37 percent), which is not far from the cases of Mauritius and Morocco (43.9 percent and 40 percent, respectively). Therefore, the differences among the seven African countries are certainly a result of some selection effects, that is, the idea of different access of workers

to jobs. As there are few women working in the formal manufacturing sectors in Benin, Kenya, Senegal, and Uganda, the women in these sectors are likely to have unobserved characteristics positively correlated with their productivity. This is expected to strongly reduce differences in earnings between men and women.

Another difference between the selected African countries may lie in the composition of occupations within firms, which are not controlled for in the first columns of each set of country-specific regressions. Nevertheless, a difficulty with occupations is that they may be endogenous if employers discriminate between male and female workers on the basis of the type of job they do (Albrecht, Björklund, and Vroman 2003). Despite this shortcoming, a set of occupational dummies[19] are added in columns 1B–7B. As Annex table 4A.3 shows, this has little effect on the magnitude of the gender wage gap. Again, there is no significant difference in earnings between men and women in Benin, Kenya, Senegal, and Uganda. The gender gap is now slightly higher in Mauritius (39.7 percent instead of 35.3 percent) and slightly lower in Morocco (8.6 percent instead of 12.4 percent), while it is now significant and approximately equal to 10 percent in Madagascar.

As we controlled only for individual characteristics in the previous linear models, this means that heterogeneity at the firm level is not taken into account. This is undoubtedly likely to bias the gender estimated coefficient, because some firms' characteristics may influence wages of men and women in a different way. For example, this would be the case if the gender wage gap rises as a result of gender-specific sorting of workers across firms that pay different wages. Turning to fixed effects models (see Annex 4B), we implicitly assume that the firms' heterogeneity components are correlated with the exogenous explanatory variables. This is very important in the study's context if we (plausibly) assume that there is a sorting of workers across firms, that is, workers self-select or are selected into certain types of firms. In particular, employees (either male or female) with "good" unobservable characteristics are more likely to work in firms paying higher wages.[20]

According to the fixed effect estimates (Annex table 4A.3, columns 1C–7C), the gender wage gap is now only significant in Mauritius and Morocco. Curiously, there is a slight increase in the absolute value of the gender coefficient for Morocco (13.3 percent instead of 12.4 percent), while the gender coefficient is divided by two in Mauritius. This is consistent with the idea that part of the gender gap is a result of firm sorting and that firms' characteristics influence the earnings of men and women differently. Two further comments are in order. First, the gender gap remains insignificant in Benin, Kenya, Madagascar, Senegal, and Uganda. Second, additional controls for occupations in the fixed effects regression substantially reduce the gender gap in Morocco.

Relative Importance of Gender in Wage Determination

Results from OLS regressions suggest that gender matters in understanding differences in individual wages, at least in Mauritius and Morocco, and that firms' effects are important. The following analysis attempts to assess the relative impact of the different explanatory variables introduced in the linear wage regressions. For that purpose, the analysis follows the regression-based decomposition approach proposed in Fields (2004). The idea is to decompose the explained portion of the regression into weights for each of the covariates (the methodology is described in Annex 4B).

When considering the basic specification with no controls for occupations and firm heterogeneity (Annex table 4A.4, rows 1A–7A), we find that the gender variable has very little influence in Benin, Kenya, Madagascar, Senegal, and Uganda. In these countries, the gender dummy explains, at most, 0.5 percent (in Madagascar) of the overall wage differences. The weight of the gender coefficient is much more important in Morocco (5.6 percent), and it is even three times higher in Mauritius (18.6 percent). So, among the selected African countries, the problem of gender inequality in earnings is greatest in Mauritius. The contribution of the gender variable still amounts to 17.5 percent when occupations are taken into account, and to 15.7 percent when both occupations and firm fixed effects are controlled for (rows 4A–4C).

It is interesting, then, to examine the relative contribution of the other covariates. In all countries, wages are mainly explained by years of schooling. The contribution of the education variable is greater than 70 percent in Benin, Madagascar, Morocco, and Uganda, and it exceeds 50 percent in all seven African countries. Years of experience and years of tenure come after, the contribution of seniority being substantially higher than that of experience (except in Kenya and Uganda). Significant changes are observed in the weights once occupations are taken into account (rows 1B–7B). Occupations are very important in Kenya, Madagascar, Morocco, and Uganda, where they explain about one-half of the total wage differences.[21]

A last finding concerns the inclusion of firm fixed effects (rows 1C–7C). The contribution of the firm heterogeneity is substantial, as it exceeds 20 percent in Madagascar and Morocco, up to 30 percent in Benin and Uganda. Furthermore, controlling for the firm effects significantly reduces the contribution of the schooling variable. This may be a result of the sorting of workers, the most productive workers being hired in firms offering higher wages.

Gender Wage Gap Along the Conditional Wage Distribution

According to the ICA surveys, the mean wage level of is significantly different for men and women in both Mauritius and Morocco. However, a gender wage gap not being seen for the other countries using OLS regressions does not necessarily mean that there is no gender wage gap in the manufacturing firms. In the

context of a developed country, Albrecht, Björklund, and Vroman (2003) show that the gender gap is unlikely to remain constant throughout the wage distribution. We thus turn to quantile regressions, further described in Annex 4B, to investigate the magnitude of the gender wage gap along the wage distribution using the male-female pooled samples (Koenker 2005).

We first focus on two countries where men and women receive different mean wages (Annex table 4A.5). On one hand, the gender wage gap does not really vary across the wage distribution in Mauritius; for example, the difference in earnings is 35.9 percent at the 25th percentile, 34.6 percent at the median, and 38.1 percent at the 90th percentile. Thus, there is no sharp increase in the gender gap when considering the upper part of the wage distribution of that country. On the other hand, the gender gap is almost three times higher at the 90th percentile than at the 10th percentile in Morocco (16.8 percent instead of 6.1 percent, respectively).

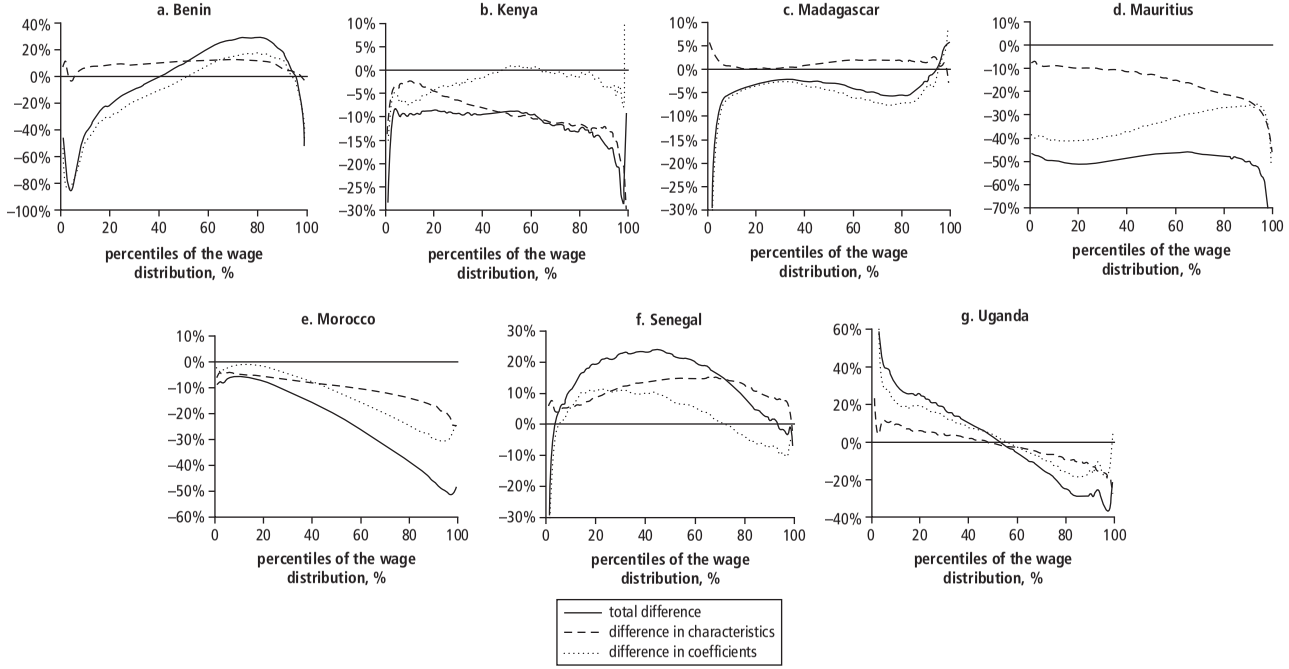
The quantile estimates for the five other countries show that the shape of the gender wage gap is really country-specific. In Benin, differences in earnings between men and women are now significant in the lower part of the wage distribution. Women receive much lower wages than men at the 10th and 25th percentiles, respectively, 30.8 percent and 9.3 percent. The opposite pattern holds true in Uganda. Women out-earn men in the lower part of the wage distribution, with a female wage premium exceeding 20 percent. However, women receive significantly lower wages at the 90th percentile. Finally, there is no clear variation across the distribution in Kenya, Madagascar, and Senegal. Accounting for occupations also affects the magnitude of the gender gap, which is significant, in particular, at the 25th and 75th percentiles in Madagascar when controlling for occupations in the quantile regressions.[22]

Quantile Decomposition of Differences in Distributions

A very restrictive assumption in the previous regressions is the fact that the returns to individual characteristics must be the same for men and women. Unfortunately, this hypothesis of equal returns is unlikely to hold if there are strong selection effects of female employees, for example, resulting from sorting of firms and workers. It is straightforward to decompose the total difference in earnings between men and women into two components, one due to differences in labor market characteristics and one due to differences in the returns to these characteristics (see Annex 4B). For each country, figure 4.3 shows the plot of the magnitude of the gender wage gap across the earnings distribution calculated from gender-specific regressions. The relative contribution of the differences in characteristics and in coefficients are also indicated.

The analysis first focuses on Mauritius and Morocco, two countries where gender differences are large. While the gender wage gap remains fairly flat in

Figure 4.3 Quantile Decompositions of the Gender Wage Gap, by Country



Sources: Investment Climate Surveys for Benin (2004), Kenya (2003), Madagascar (2005), Mauritius (2005), Senegal (2003), and Uganda (2003); FACS for Morocco (2000); authors' calculations.

the former country, it is strongly increasing in absolute value in the latter. In Mauritius, the role of differences in characteristics is higher in the upper part of the distribution (above the 90th percentile), while differences of returns to these characteristics matter more in the lower part. For example, differences in coefficients are about four times higher than differences in characteristics until the median earnings. An opposite pattern holds in Morocco. The role of labor market returns is increasing along the distribution, and the weight of differences in coefficients exceeds the weight of differences in characteristics above the 40th percentile.

Regarding the other countries, the contribution of differences in coefficients, when explaining earnings inequality between men and women, strongly varies across the wage distribution. In Benin and Senegal, women would receive higher wages than men if they were paid on the same basis for their individual characteristics. In Kenya, the gender wage gap essentially results from the fact that men and women working in the manufacturing sectors have different individual characteristics, as can be seen in the curves of total difference and difference in endowments, which are almost merged, especially above the median. Conversely, in Madagascar and Uganda, the gender wage gap essentially stems from differences in returns to the disadvantage of women.

The Role of Firm Characteristics

From the previous discussion, it is clear that wage policies settled by firms are likely to influence gender earnings differentials. An interesting question, then, is to discover whether firms' characteristics tend to increase or reduce the gender earnings gap. For that purpose, the previous Oaxaca-Blinder decomposition was extended following Meng (2004) to account for the role of the firm fixed effects (see Annex 4B). The total earnings differential is given by the sum of three terms: one related to differences in individual characteristics, one related to differences in the returns to these characteristics, and one related to difference in the firm's premium paid to male and female employees. When this last term is negative, it means that the firm tends to narrow the gender wage gap, in which case the gap would have been higher without the role of the firm's wage policy.

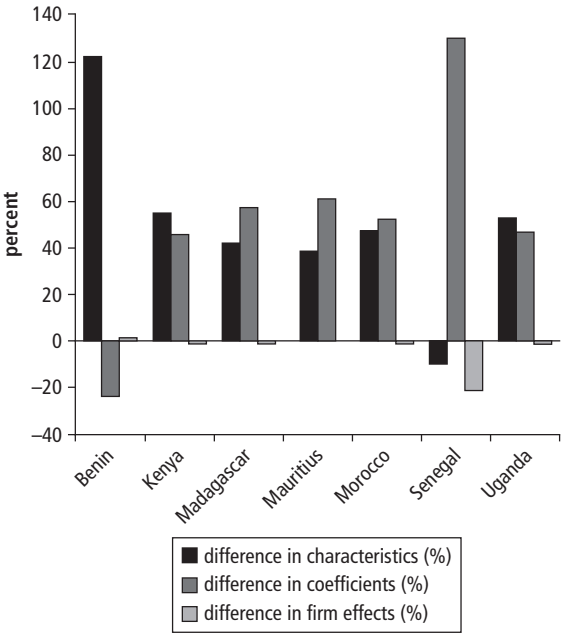
As Meng (2004) points out, the above decomposition does not account for the possibility of gender segregation across firms. The first step to controlling for the role of gender segregation is to estimate gender-specific wage equations, including both individual and firm explanatory variables, and add into the list of covariates the proportion of female employees measured at the firm level. This allows inclusion of the effect of the gender employment ratio on earnings. In the second step, these estimates are used to compute for each employee the predicted value of earnings, which is now net of gender segregation across

firms.[23] Finally, the fixed effects decomposition is performed using the adjusted wage as dependent variable.

Estimating gender-specific fixed-effect regressions implies that the sample is now restricted to firms with at least two male and two female employees. This significantly reduces the size of the selected samples, especially in countries like Benin, Kenya, Senegal, and Uganda, where the proportion of female employees is somewhat low in the formal manufacturing sectors. As a consequence, we note that the total difference in earnings between men and women is substantially higher with the new sample selection in Kenya and Uganda, for example.

As shown in Annex table 4A.6 and figure 4.4, the main conclusion from the decomposition of the fixed effects model is that firms do not really influence the magnitude of the gender earnings gap in the African labor markets, except in Senegal. In Benin, the positive sign for the component of the firm effects indicates that the firm wage policies are associated with a rise in the gender earnings gap,

Figure 4.4 Decomposition of Gender Earnings Differentials Accounting for Gender Segregation Across Firms



Sources: Investment Climate Surveys for Benin (2004), Kenya (2003), Madagascar (2005), Mauritius (2005), Senegal (2003), and Uganda (2003); FACS for Morocco (2000); authors' calculations.

but the corresponding impact remains very limited (1.5 percent). An opposite pattern is found in Kenya, with a decrease of 0.9 percent of the gender gap, while the variation is even smaller in Madagascar, Mauritius, Morocco, and Uganda. The negative coefficient is larger in Senegal, indicating that firms pay a higher wage premium to their female employees than to their male employees.[24] On the whole, the study findings thus suggest that African manufacturing firms do not really attempt to narrow gender differences in pay.

Conclusions

This study makes use of matched employer-employee data collected in seven African countries (Benin, Kenya, Madagascar, Mauritius, Morocco, Senegal, and Uganda) to shed light on the magnitude of the gender wage gap in the manufacturing sector. With such data, it is possible to account for the effect of the firm's wage policy on gender earnings differentials. This is crucial if firms tend to pay men and women differently. Taking into account the employer's effect on wages is also a way to reduce the bias in the gender wage gap estimates that can be present if the workers sort across firms offering different wages. Such analysis would not be feasible using only household surveys, where there is generally no information on the respondent's employer.

The various empirical analyses conducted in this study lead to the following conclusions. First, preliminary statistics justify taking a distributional approach to obtain a proper view of the magnitude of the gender wage gaps in Africa. Indeed, raw gender gaps calculated at the mean of the samples tend to hide significant differences in the magnitude of the gaps along the wage distribution. This is particularly true in the cases of Benin, Morocco, and Uganda, where the raw gaps vary significantly depending on the workers' relative position in the wage distribution. In Benin, for instance, the raw gap is significantly in favor of men in the lower part of the wage distribution, while it favors women in its upper part. By contrast, the reverse holds true for Uganda, where the gap reverses sign and is detrimental to women in the upper part of the distribution. In Morocco, the significant gap increases steadily all along the wage distribution, thereby revealing the potential existence of a glass ceiling effect against women at the top of the distribution (Nordman and Wolff 2009a).

Second, wage regressions were estimated controlling for workers' human capital and job characteristics and for heterogeneity at the firm level. This investigation suggests that a distinction should be made between two groups of countries. In the first group, Benin, Kenya, Madagascar, Senegal, and Uganda, there is no significant evidence of difference in male and female earnings once worker, job, and firm characteristics are accounted for. In the second group,

Mauritius and Morocco, earnings are found to be statistically different between men and women.

We then investigated the belief that differences among the seven African countries might be a result of the presence of selectivity effects, through gender differences in access to jobs. Indeed, since there are few women working in the formal manufacturing sectors in Benin, Kenya, Senegal, and Uganda, these women are likely to have unobserved characteristics positively correlated with their productivity. This is expected to strongly reduce differences in earnings between men and women. Unfortunately, not much can be done to correct selectivity effects with such datasets, which is a shortcoming of the present study.

The study then performed a regression-based decomposition of the explained portion of the individual wage differentials into weights for each of the considered covariates (including gender, workers' human capital, and firm effects). In Benin, Kenya, Madagascar, Senegal, and Uganda, the gender dummy explains at most 0.5 percent of the overall wage difference, while the weight of gender is much more important in Morocco (5.6 percent), and even three times higher in Mauritius (18.6 percent). Thus, among the selected African manufacturing sectors, gender inequality in earnings is of greatest concern in Mauritius. By contrast, the contribution of education in this decomposition is much more important since it exceeds 50 percent in the seven African countries. The weight of firm heterogeneity in earnings differentials is also important, with contributions of about 20 percent in Madagascar and Morocco, up to 30 percent in Benin and Uganda.

An additional step in the analysis is to investigate the pattern of the adjusted gender wage gaps along the wage distribution using quantile regressions. Indeed, not observing an adjusted gender gap using regressions at the means (OLS regressions) does not necessarily signify that there is no unfair earnings treatment in the investigated manufacturing firms. We find that the adjusted gender gap does not really vary across the wage distribution in Mauritius. By contrast, the adjusted gender gap is almost three times higher at the ninth decile than at the first decile in Morocco. The quantile estimates for the other countries show that the shape of the adjusted gender gap is country-specific. For example, in Benin, unexplained differences in earnings between men and women hold only in the lower part of the wage distribution, while the opposite pattern is found in Uganda. In addition, there is no clear variation across the distribution in Kenya, Madagascar, and Senegal.

Next, earnings decompositions at quantiles were performed, which separate the total difference in earnings between men and women into two components: one resulting from differences in individuals' labor market characteristics and the other resulting from differences in the returns to these characteristics. In Mauritius, the role of differences in characteristics is higher in the upper part

of the distribution, while differences of returns to these characteristics matter more in its lower part. An opposite pattern holds in Morocco, where the role of labor market returns is increasing along the distribution and the weight of differences in coefficients exceeds the weight of differences in characteristics above the fourth decile. Results are mixed for the other countries, where the contribution of differences in returns in explaining earnings inequality between men and women was found to vary strongly along the wage distribution. For instance, in Benin and Senegal, female employees would receive higher wages than their male counterparts if they were paid on the same basis for their individual characteristics.

An interesting question is whether the firms' characteristics tend to increase or reduce the gender earnings gap. Thus, a third term was added to the preceding decompositions: the difference in the firm's premium paid to male and female employees. A negative third term would indicate that the firm tends to narrow the gender wage gap. In addition, we account for the possible firm sorting by adjusting wages using the proportion of female employees in each firm. This is a way to correct for the potential bias in the gender wage gap estimates resulting from the sorting of males and females across firms offering different wages. The main conclusion from these last decompositions is that firms do not really influence the magnitude of the gender earnings gap in the African labor markets, except in Senegal. This suggests that African manufacturing firms do not really attempt to narrow gender wage inequalities.

This last result is in contrast to findings in developed countries, where the impact of the firm effects on the magnitude of the gender wage gap appears more substantial. In Australia and France, for example, Meng (2004) and Meng and Meurs (2004) show that firm wage policies are associated with a significant narrowing of the gender earnings gaps, especially in the former. Nevertheless, it is not possible to provide comparison points with other developing countries because, to the best of our knowledge, this study of the gender wage gaps with matched data on African countries is the first of its kind. Nevertheless, it is likely that the nature of the data used in this study—that is, collected in relatively homogenous manufacturing sectors, while those used in developed countries usually include service industries (Meng and Meurs 2004)—hides the possible existence of more influential firm wage strategies in Africa, in particular in large firms.

A few caveats should be noted when interpreting these results. First, focusing on the manufacturing sectors only means the nature of the samples is highly specific. It would then be worthwhile to expand the availability of matched data for further studies in other formal sectors, not only in the study countries but also in other African countries. A second shortcoming is the impossibility of further examining the selection effect resulting from unequal access to job opportunities among men and women. As shown in our empirical analysis, the

very low proportion of women employed in some countries suggests that access to jobs in the manufacturing sector may be very selective.

It would then be of interest to better understand why countries such as Mauritius and Morocco have so many more women hired than the other countries in the study. It could be a result of different sectoral composition of the economy, but might also stem from the labor markets functioning in different ways. Clearly, more information is needed to understand the factors behind access to jobs, especially for women. A complementary analysis based on cross-sectional data, with information on both working and non-working people, would allow for an analysis of the factors explaining the probability that a woman would have a job and for an estimate of selectivity-corrected wage regressions. The drawback with such household data is the lack of firm characteristics for those who have jobs, which is certainly needed as our analysis has highlighted the necessity to account for the firms' characteristics (either observed or unobserved).

While understanding the driving forces behind hiring is a task left for future research, institutional and economic policies that might be pursued to encourage equal hiring in different countries with different industrial profiles are strongly recommended to reduce the magnitude of earnings differences between men and women. To reduce the gender gap, policies aimed at promoting women's access to quality jobs in high-paying firms in the formal sector, as well as policies intended to foster equal pay for equal jobs, would be needed. As it stands, our empirical analysis sheds light on the necessity of further examining the gender wage gap in all African countries and of assessing the role of gender-specific access to jobs on this gap. For that purpose, additional quantitative findings along with qualitative analysis would be helpful.

Annex 4A Tables

Table 4A.1 Descriptive Statistics on the Workforce

	Benin			Kenya			Madagascar			Mauritius		
	Men	Women	All	Men	Women	All	Men	Women	All	Men	Women	All
Log hourly earnings	5.68	5.65	5.67	4.14	4.03	4.12	8.03	7.98	8.01	4.46	3.96	4.24
Female	0	1	0.14	0	1	0.19	0	1	0.37	0	1	0.44
Married	0.69	0.65	0.69	n.a.	n.a.	n.a.	0.79	0.65	0.74	0.70	0.70	0.70
Years of completed schooling	9.50	10.04	9.58	11.63	12.27	11.75	11.63	12.34	11.89	10.15	9.85	10.02
Years of experience off the firm	3.67	3.19	3.60	4.43	2.08	3.99	5.75	3.70	4.99	7.12	5.17	6.26
Years of tenure in the current firm	5.96	5.57	5.90	9.25	7.15	8.85	6.26	5.70	6.05	9.99	7.39	8.85
Occupations												
Owners (as managers)	0.07	0.04	0.06	0.02	0	0.02	0.01	0.01	0.01	0.02	0.01	0.01
Employed managers	0.06	0.15	0.07	0.09	0.06	0.08	0.02	0.02	0.02	0.05	0.01	0.04
Professionals (university degree)	0.10	0.12	0.10	0.06	0.06	0.06	0.07	0.09	0.08	0.07	0.06	0.06
Technicians (with diploma or other formal qualification)	0.21	0.06	0.19	0.14	0.07	0.12	0.07	0.04	0.06	0.10	0.02	0.06
Skilled foremen and supervisors	0.05	0.04	0.05	0.13	0.05	0.11	0.08	0.08	0.08	0.14	0.08	0.11
Skilled machine maintenance and repair workers	0.03	0.01	0.03	0.16	0.01	0.13	0.07	0.02	0.05	0.15	0.07	0.11
Unskilled production workers	0.20	0.16	0.20	0.23	0.20	0.22	0.47	0.40	0.44	0.24	0.29	0.26
Health workers, office and sales workers	0.07	0.35	0.11	0.11	0.46	0.17	0.06	0.22	0.12	0.12	0.33	0.21
Service workers (cleaners, guards)	0.21	0.07	0.19	0.07	0.08	0.08	0.15	0.13	0.14	0.12	0.14	0.13
Number of observations	1,346	228	1,574	1,522	354	1,876	1,093	641	1,734	764	599	1,363

continued

Table 4A.1 Descriptive Statistics on the Workforce *continued*

	Morocco			Senegal			Uganda		
	Men	Women	All	Men	Women	All	Men	Women	All
Log hourly earnings	2.68	2.45	2.59	6.57	6.71	6.60	6.75	6.82	6.76
Female	0	1.00	0.40	0	1.00	0.18	0	1.00	0.19
Married	0.64	0.33	0.51	0.68	0.59	0.67	n.a.	n.a.	n.a.
Years of completed schooling	8.81	8.51	8.69	10.05	12.82	10.53	11.56	12.07	11.66
Years of experience off the firm	1.86	1.26	1.62	4.75	2.91	4.42	4.02	2.49	3.73
Years of tenure in the current firm	8.14	6.04	7.30	8.52	6.82	8.22	5.29	4.94	5.22
Occupations									
Owners (as managers)	0.07	0.02	0.05	0.02	0	0.02	0.11	0.06	0.10
Employed managers	0.11	0.07	0.10	0.04	0.07	0.05	0.14	0.04	0.12
Professionals (university degree)				0.12	0.11	0.12	0.08	0.12	0.09
Technicians (with diploma or other formal qualification)	0.40[a]	0.39[a]	0.40[a]	0.14	0.07	0.12	0.07	0.03	0.06
Skilled foremen and supervisors				0.06	0.02	0.05	0.12	0.06	0.11
Skilled machine maintenance and repair workers				0.10	0.01	0.08	0.07	0.02	0.06
Unskilled production workers	0.27	0.33	0.29	0.35	0.14	0.32	0.29	0.24	0.28
Health workers, office and sales workers	0.15[b]	0.18[b]	0.16[b]	0.06	0.51	0.14	0.04	0.26	0.08
Service workers (cleaners, guards)	0[c]	0.01[c]	0[c]	0.11	0.06	0.10	0.07	0.16	0.09
Number of observations	4,686	3,120	7,806	1,112	237	1,349	1,058	248	1,306

Sources: Investment Climate Surveys for Benin (2004), Kenya (2003), Madagascar (2005), Mauritius (2005), Senegal (2003), and Uganda (2003); FACS for Morocco (2000).
Note: For Morocco, the occupations correspond to different regroupings: a. skilled workers and technicians; b. nonproduction employees; and c. apprentices.

Table 4A.2 Descriptive Statistics on the Firms

	Benin		Kenya		Madagascar		Mauritius	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Total number of employees	38.90	74.03	227.27	443.59	191.91	446.07	174.19	424.89
Share of female employees	0.13	0.18	0.14	0.14	0.33	0.31	0.38	0.30
Principal owner is female (1 if yes)			0.03	0.18	0.20	0.40	0.10	0.30
Share of managers/executives in the permanent employees	0.17	0.14	0.16	0.17	0.06	0.05	0.10	0.17
Share of executives in the permanent employees	0.09	0.13	0.05	0.09	0.06	0.07	0.03	0.05
Exporting firm (1 if yes)	0.22	0.41	0.51	0.50	0.30	0.46	0.64	0.48
Sector dummies								
Agro industry	0.20	0.40	0.29	0.45	0.11	0.31		
Chemicals and related products	0.05	0.21	0.09	0.28	0.04	0.20		
Materials for construction	0.05	0.22	0.06	0.23	0.06	0.24		
Furniture	0.19	0.39	0.03	0.18	0.13	0.34		
Metallic products	0.11	0.32	0.15	0.36	0.29	0.46		
Industry of paper, paper products and plastics products	0.24	0.43	0.15	0.36	0.02	0.14		
Textiles and leather	0.02	0.14	0.18	0.39	0.23	0.42		
Wood	0.13	0.34	0.04	0.21	0.02	0.16		
Other	0.01	0.07	0	0	0.09	0.28		
Number of observations	194		248		281		189	

continued

Table 4A.2 Descriptive Statistics on the Firms *continued*

	Morocco		Senegal		Uganda	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Total number of employees	123.46	198.95	123.26	411.11	144.35	617.29
Share of female employees	0.56	2.13	0.11	0.14	0.17	0.18
Principal owner is female (1 if yes)	0.05	0.21	0.05	0.22	0.05	0.21
Share of managers/executives in the permanent employees	0.05	0.07	0.15	0.19	0.28	0.29
Share of executives in the permanent employees	0.04	0.06	0.07	0.09	0.08	0.14
Exporting firm (1 if yes)	0.57	0.50	0.50	0.50	0.18	0.39
Sector dummies						
Agro industry/Food for Morocco	0.10	0.30	0.36	0.48	0.40	0.49
Chemicals and related products/Chemicals only for Morocco	0.09	0.28	0.13	0.34	0.06	0.25
Materials for construction/Textile for Morocco	0.24	0.42	0.07	0.25	0.14	0.34
Furniture/Garments for Morocco	0.37	0.48	0.02	0.15	0.15	0.36
Metallic products/Electrical for Morocco	0.05	0.21	0.10	0.30	0.07	0.26
Industry of paper, paper products, and plastics products/Plastics products only for Morocco	0.09	0.28	0.19	0.40	0.10	0.30
Textiles and leather/Leather only for Morocco	0.08	0.27	0.09	0.29	0.05	0.22
Wood	0	0	0.04	0.19	0.02	0.14
Other						
Number of observations	842		249		264	

Sources: Investment Climate Surveys for Benin (2004), Kenya (2003), Madagascar (2005), Mauritius (2005), Senegal (2003), and Uganda (2003); FACS for Morocco (2000).

Table 4A.3 Linear Regression of the Log Hourly Wages

	Benin				Kenya				Madagascar				Mauritius			
	(1A)	(1B)	(1C)	(1D)	(2A)	(2B)	(2C)	(2D)	(3A)	(3B)	(3C)	(3D)	(4A)	(4B)	(4C)	(4D)
Female	–0.101	–0.085	–0.005	–0.036	–0.010	–0.064	–0.011	–0.036	–0.056	–0.098**	0.011	–0.047	–0.353***	–0.397***	–0.227***	–0.223***
	(0.97)	(0.82)	(0.10)	(0.72)	(0.18)	(1.29)	(0.25)	(0.87)	(1.29)	(2.19)	(0.32)	(1.33)	(7.98)	(9.26)	(6.37)	(6.25)
Married	0.188***	0.180***	0.108*	0.070					0.094**	0.118***	0.040	0.052	0.084**	0.070*	0.125***	0.107***
	(2.81)	(2.76)	(1.94)	(1.39)					(2.21)	(2.82)	(1.07)	(1.55)	(1.98)	(1.74)	(3.97)	(3.57)
Years of completed schooling	0.044	0.043	–0.030	–0.036*	0.188***	0.093***	0.149***	0.048***	0.047**	0.028*	0.041**	0.015	–0.033*	–0.054***	–0.009	–0.027
	(1.22)	(1.34)	(1.45)	(1.67)	(7.43)	(4.71)	(6.31)	(2.64)	(2.18)	(1.67)	(2.57)	(1.27)	(1.72)	(3.28)	(0.42)	(1.51)
(Years of completed schooling)^2/10	0.037**	0.027*	0.056***	0.038***	–0.032***	–0.016***	–0.034***	–0.012	0.010	0.005	0.009	0.006	0.062***	0.049***	0.050***	0.036***
	(2.29)	(1.83)	(5.50)	(3.78)	(4.70)	(3.15)	(3.25)	(1.64)	(1.12)	(0.73)	(1.35)	(1.40)	(6.03)	(5.67)	(4.40)	(4.08)
Years of experience off the firm	0.014	0.013	0.055***	0.043***	0.077***	0.049***	0.079***	0.049***	0.003	0.005	0.004	0.004	0.028***	0.020**	0.017**	0.010
	(0.99)	(0.92)	(4.78)	(3.76)	(8.28)	(5.92)	(9.58)	(6.85)	(0.36)	(0.76)	(0.61)	(0.63)	(3.26)	(2.46)	(2.31)	(1.44)
(Years of experience off the firm)^2/100	0.003	0.006	–0.111**	–0.118***	–0.183***	–0.118***	–0.171***	–0.108***	0.030	0.010	0.028	0.017	–0.052	–0.038	–0.005	0.002
	(0.04)	(0.11)	(2.53)	(2.72)	(4.74)	(3.65)	(5.11)	(4.12)	(0.93)	(0.34)	(0.93)	(0.58)	(1.46)	(1.10)	(0.14)	(0.05)
Years of tenure in the current firm	0.041***	0.040**	0.027**	0.008	0.057***	0.055***	0.041***	0.040***	0.034***	0.031***	0.033***	0.027***	0.056***	0.050***	0.056***	0.048***
	(2.68)	(2.57)	(2.04)	(0.74)	(5.41)	(5.89)	(3.86)	(4.65)	(3.11)	(2.87)	(3.57)	(3.00)	(7.25)	(6.90)	(8.03)	(7.38)
(Years of tenure in the current firm)^2/100	–0.041	–0.054	0.003	0.007	–0.071**	–0.096***	–0.041	–0.071**	–0.064	–0.072**	–0.056**	–0.059**	–0.091***	–0.084***	–0.098***	–0.089***
	(0.77)	(1.03)	(0.07)	(0.17)	(2.14)	(3.21)	(1.10)	(2.36)	(1.62)	(1.98)	(2.01)	(2.19)	(3.72)	(3.72)	(4.75)	(4.66)
Constant	4.451***	4.648***	4.931***	5.353***	1.802***	3.993***	2.372***	4.074***	7.065***	7.925***	7.158***	8.356***	3.461***	4.563***	3.319***	4.455***
	(22.74)	(21.10)	(43.68)	(37.83)	(7.61)	(15.20)	(13.61)	(23.68)	(52.47)	(30.77)	(69.56)	(35.43)	(32.29)	(14.49)	(28.66)	(32.19)
Dummies for occupation	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Firm fixed effects	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Observations	1574	1574	1574	1574	1876	1876	1876	1876	1734	1734	1734	1734	1363	1363	1363	1363
R-squared	0.35	0.37	0.69	0.73	0.24	0.45	0.61	0.75	0.21	0.32	0.66	0.73	0.36	0.43	0.70	0.75

Table 4A.3 Linear Regression of the Log Hourly Wages *continued*

	Morocco				Senegal				Uganda			
	(5A)	(5B)	(5C)	(5D)	(6A)	(6B)	(6C)	(6D)	(7A)	(7B)	(7C)	(7D)
Female	–0.124***	–0.086***	–0.133***	–0.075***	0.037	–0.063	0.024	–0.042	0.075	0.109	–0.128	–0.005
	(8.27)	(6.20)	(10.07)	(6.32)	(0.69)	(1.00)	(0.49)	(0.81)	(0.84)	(1.27)	(1.26)	(0.05)
Married	0.129***	0.081***	0.110***	0.070***	0.239***	0.196***	0.099**	0.071*				
	(8.84)	(6.20)	(9.64)	(7.04)	(5.47)	(4.69)	(2.13)	(1.70)				
Years of completed schooling	–0.043***	–0.014**	–0.046***	–0.011***	0.026**	0.013	0.016	0.005	0.174***	0.069	0.094**	0.021
	(5.26)	(2.50)	(7.66)	(2.60)	(2.22)	(1.24)	(1.49)	(0.57)	(3.48)	(1.60)	(2.31)	(0.58)
(Years of completed schooling)^2/10	6.001***	2.718***	5.926***	1.892***	0.028***	0.017***	0.025***	0.013***	–0.025	–0.003	0.001	0.004
	(10.36)	(6.38)	(13.73)	(6.26)	(4.83)	(3.41)	(4.57)	(2.86)	(1.13)	(0.16)	(0.04)	(0.26)
Years of experience off the firm	0.030***	0.020***	0.030***	0.019***	0.034***	0.027***	0.032***	0.027***	0.084***	0.056***	0.066***	0.031**
	(7.99)	(5.78)	(9.62)	(6.75)	(4.13)	(3.26)	(4.18)	(3.70)	(3.55)	(2.71)	(3.57)	(2.22)
(Years of experience off the firm)^2/100	–0.063***	–0.044***	–0.049***	–0.034***	–0.063*	–0.060*	–0.034	–0.041	–0.174*	–0.121	–0.121	–0.067
	(6.63)	(4.62)	(7.82)	(5.24)	(1.85)	(1.75)	(1.07)	(1.41)	(1.68)	(1.30)	(1.54)	(1.11)
Years of tenure in the current firm	0.022***	0.017***	0.033***	0.019***	0.054***	0.049***	0.041***	0.034***	0.056***	0.030	0.074***	0.026*
	(6.31)	(5.23)	(9.44)	(5.74)	(5.56)	(5.34)	(3.85)	(3.35)	(3.16)	(1.51)	(4.35)	(1.79)
(Years of tenure in the current firm)^2/100	–0.886	0.040	–4.686***	–2.312**	–0.066**	–0.063**	–0.056*	–0.051	–0.134**	–0.084	–0.156***	–0.073
	(0.73)	(0.03)	(3.94)	(2.07)	(2.03)	(1.98)	(1.69)	(1.57)	(2.34)	(1.29)	(3.10)	(1.35)
Constant	2.120***	3.019***	2.125***	3.164***	5.276***	6.102***	5.608***	6.643***	4.656***	5.853***	5.185***	5.936***
	(78.80)	(53.15)	(88.24)	(63.26)	(61.03)	(36.91)	(68.17)	(52.84)	(14.51)	(18.52)	(17.32)	(24.19)
Dummies for occupation	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Firm fixed effects	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Observations	7,806	7,806	7,806	7,806	1,349	1,349	1,349	1,349	1,306	1,306	1,306	1,306
R-squared	0.33	0.44	0.65	0.74	0.39	0.46	0.70	0.75	0.18	0.27	0.70	0.77

Sources: Investment Climate Surveys for Benin (2004), Kenya (2003), Madagascar (2005), Mauritius (2005), Senegal (2003), and Uganda (2003); FACS for Morocco (2000); authors' calculations.
Note: Standard errors are robust to clustering at the firm level.
*** = significant at 1%, ** = significant at 5%, * = significant at 10%.

Table 4A.4 Decomposition Using Fields of the Log Hourly Wages

	Explanatory variables							
Country	Gender (%)	Marital status (%)	Years of schooling (%)	Years of experience (%)	Years of tenure (%)	Occupation (%)	Firm effects (%)	Total (%)
Benin								
(1A) Basic	0.09	4.66	83.78	2.40	9.07	—	—	100.00
(1B) Basic + occupations	0.05	4.15	64.09	2.26	7.25	22.19	—	100.00
(1C) Basic + occ. + fixed effects	0.00	3.77	39.92	2.22	4.65	16.52	32.92	100.00
Kenya								
(2A) Basic	0.04	n.a.	65.25	18.46	16.25	—	—	100.00
(2B) Basic + occupations	0.22	n.a.	17.35	6.25	6.94	69.24	—	100.00
(2C) Basic + occ. + fixed effects	0.14	n.a.	15.89	6.04	5.92	55.94	16.08	100.00
Madagascar								
(3A) Basic	0.52	2.32	83.98	1.33	11.85	—	—	100.00
(3B) Basic + occupations	0.59	1.93	31.50	0.62	6.06	59.30	—	100.00
(3C) Basic + occ. + fixed effects	0.56	1.30	20.58	0.41	4.70	48.78	23.68	100.00
Mauritius								
(4A) Basic	18.52	1.71	51.84	3.40	24.52	—	—	100.00
(4B) Basic + occupations	17.46	1.18	23.63	2.13	17.97	37.64	—	100.00
(4C) Basic + occ. + fixed effects	15.75	1.08	20.85	1.81	15.49	33.62	11.40	100.00
Morocco								
(5A) Basic	5.56	6.17	72.42	3.47	12.37	—	—	100.00
(5B) Basic + occupations	2.88	2.91	28.42	1.63	8.08	56.07	—	100.00
(5C) Basic + occ. + fixed effects	2.33	2.31	17.84	1.29	5.44	48.86	21.91	100.00
Senegal								
(6A) Basic	0.23	8.14	64.70	6.27	20.67	—	—	100.00
(6B) Basic + occupations	–0.33	5.71	31.95	3.81	15.52	43.34	—	100.00
(6C) Basic + occ. + fixed effects	–0.06	5.09	26.38	3.84	10.53	38.50	15.72	100.00
Uganda								
(7A) Basic	0.17	n.a.	71.60	23.12	5.12	—	—	100.00
(7B) Basic + occupations	0.18	n.a.	24.51	9.76	1.68	63.87	—	100.00
(7C) Basic + occ. + fixed effects	–0.08	n.a.	15.33	3.76	0.69	44.72	35.59	100.00

Sources: Investment Climate Surveys for Benin (2004), Kenya (2003), Madagascar (2005), Mauritius (2005), Senegal (2003), and Uganda (2003); FACS for Morocco (2000); authors' calculations.
Note: occ. = occupation.

Table 4A.5 Gender Estimates from Quantile Regressions of the Log Hourly Wages

	Percentile					
Country	**10th**	**25th**	**50th**	**75th**	**90th**	**Mean**
Benin						
Basic	–0.308***	–0.093*	–0.012	–0.015	0.049	–0.101
	(4.73)	(1.73)	(0.21)	(0.24)	(0.44)	(0.97)
Basic + occupations	–0.196**	–0.139***	–0.085	0.014	0.129	–0.085
	(2.32)	(2.86)	(1.38)	(0.18)	(1.27)	(0.82)
Basic + occupation + fixed effects	0.001	–0.001	–0.032	–0.031	–0.052	–0.036
	(0.02)	(0.02)	(0.52)	(0.61)	(0.89)	(0.72)
Kenya						
Basic	–0.005	–0.030	0.019	–0.020	–0.041	–0.010
	(0.09)	(0.85)	(0.35)	(0.25)	(0.37)	(0.18)
Basic + occupations	–0.086*	–0.068	–0.063	–0.080	–0.221*	–0.064
	(1.70)	(1.48)	(1.28)	(1.21)	(1.86)	(1.29)
Basic + occupation + fixed effects	–0.000	–0.028	–0.080*	–0.075	–0.022	–0.036
	(0.01)	(0.88)	(1.77)	(1.45)	(0.40)	(0.87)
Madagascar						
Basic	–0.048	–0.036	–0.004	–0.061	0.014	–0.056
	(1.51)	(0.93)	(0.10)	(1.20)	(0.16)	(1.29)
Basic + occupations	–0.049	–0.080***	–0.054	–0.124***	–0.130	–0.098**
	(1.19)	(2.58)	(1.44)	(2.68)	(1.59)	(2.19)
Basic + occupation + fixed effects	–0.043	–0.039	–0.036	–0.038	–0.046	–0.047
	(1.49)	(1.56)	(1.57)	(1.17)	(1.29)	(1.33)
Mauritius						
Basic	–0.320***	–0.359***	–0.346***	–0.368***	–0.381***	–0.353***
	(5.90)	(8.22)	(8.18)	(7.73)	(5.64)	(7.98)
Basic + occupations	–0.342***	–0.365***	–0.406***	–0.430***	–0.478***	–0.397***
	(4.98)	(9.09)	(9.78)	(10.20)	(7.12)	(9.26)
Basic + occupation + fixed effects	–0.195***	–0.253***	–0.237***	–0.235***	–0.275***	–0.223***
	(5.18)	(9.40)	(8.12)	(7.95)	(7.58)	(6.25)

Morocco						
Basic	–0.061***	–0.069***	–0.095***	–0.137***	–0.168***	–0.124***
	(4.89)	(7.22)	(8.65)	(10.07)	(7.33)	(8.27)
Basic + occupations	–0.053***	–0.057***	–0.066***	–0.102***	–0.135***	–0.086***
	(3.78)	(7.10)	(7.26)	(8.27)	(7.54)	(6.20)
Basic + occupation + fixed effects	–0.022**	–0.036***	–0.044***	–0.067***	–0.091***	–0.075***
	(1.99)	(28.62)	(17.59)	(6.83)	(79.57)	(6.32)
Senegal						
Basic	0.113	0.014	0.025	0.037	0.026	0.037
	(1.14)	(0.25)	(0.53)	(0.51)	(0.25)	(0.69)
Basic + occupations	0.066	–0.035	–0.060	–0.058	–0.118	–0.063
	(0.52)	(0.52)	(1.02)	(0.80)	(1.22)	(1.00)
Basic + occupation + fixed effects	0.057	–0.001	–0.074	–0.085*	–0.082	–0.042
	(1.24)	(0.03)	(1.62)	(1.95)	(1.25)	(0.81)
Uganda						
Basic	0.224*	0.243***	0.050	–0.157	–0.360**	0.075
	(1.76)	(2.61)	(0.53)	(1.26)	(2.41)	(0.84)
Basic + occupations	0.279**	0.113	0.055	–0.073	–0.191	0.109
	(2.52)	(1.15)	(0.73)	(0.57)	(1.20)	(1.27)
Basic + occupation + fixed effects	0.088	0.038	–0.015	–0.145	–0.322*	–0.067
	(0.61)	(0.43)	(0.17)	(0.98)	(1.79)	(0.78)

Sources: Investment Climate Surveys for Benin (2004), Kenya (2003), Madagascar (2005), Mauritius (2005), Senegal (2003), and Uganda (2003); FACS for Morocco (2000); authors' calculations.
*** significant at 1%, ** significant at 5%, * significant at 10%.

Table 4A.6 Decomposition of the Gender Earnings Differentials Accounting for Gender Segregation Across Firms

Country		Benin	Kenya	Madagascar	Mauritius	Morocco	Senegal	Uganda
Difference in characteristics	Value	0.1002	0.1172	0.0271	0.1629	0.1254	–0.0011	0.2516
	%	122.0	55.0	42.3	38.7	47.6	–9.5	53.2
Difference in coefficients	Value	–0.0193	0.0979	0.0369	0.2574	0.1384	0.0148	0.2208
	%	–23.5	45.9	57.4	61.2	52.6	130.0	46.7
Difference in firm effects	Value	0.0012	–0.0018	0.0002	0.0000	–0.0005	–0.0023	0.0002
	%	1.5	–0.9	0.3	0.0	–0.2	–20.5	0.1
Total difference	Value	0.0821	0.2132	0.0642	0.4203	0.2633	0.0114	0.4727
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Sources: Investment Climate Surveys for Benin (2004), Kenya (2003), Madagascar (2005), Mauritius (2005), Senegal (2003), and Uganda (2003); FACS for Morocco (2000); authors' calculations.

Annex 4B Methodology

Regression Analysis

OLS regressions are used to account for gender differences at the mean wage level. We control for several individual characteristics (like age, education, etc) and include in the list of controls a gender dummy variable, so that the model estimated is (with *i* and *j* as subscripts, respectively, for the employee and the firm):

$$\ln w_{ji} = \beta X_{ji} + \gamma F_{ji} + \varepsilon_{ji} \tag{4A.1}$$

with $\ln w_{ji}$ the log hourly wage, X_{ji} the set of covariates, F_{ji} the gender dummy, β and γ parameters to be estimated, and ε_{ji} a residual supposed to be normally distributed. With completed questionnaires for several employees per firm, we calculate robust standard errors (using a clustering procedure) because the different workers within a firm will certainly have correlated characteristics. By accounting for both male and female workers when estimating (equation 4A.1), the underlying assumption is that the returns to the different explanatory variables are not gender-specific.

With repeated information for several employees per firm, we can control for observed and unobserved heterogeneity at the firm level using fixed effects models. Again, we rely on a linear specification of the form:

$$\ln w_{ji} = \beta X_{ji} + \gamma F_{ji} + \delta_j + \varepsilon_{ji} \tag{4A.2}$$

where δ_j is a firm fixed effect. The model is estimated by adding a set of firm dummy variables in the OLS regressions. The firms' heterogeneity component δ_j is supposed to be correlated with the covariates X_{ji}. Since the workplace is the same for all the workers belonging to a given firm, all the firm characteristics are picked up by the fixed effect.

Fields Decomposition

The decomposition suggested by Fields (2004) may be implemented in the following way. Omitting the different subscripts for simplicity, we consider the linear regression $\ln w = \beta X + \gamma F + \varepsilon$ and assume that there are K exogenous regressors in X indexed by k (with $k = 1,\ldots, K$). Then, the variance of the dependent variable $\ln w$ can be expressed as:

$$\text{var}(\ln w) = \sum_k \text{cov}(\beta_k X_k, \ln w) + \text{cov}(\gamma F, \ln w) + \text{cov}(\varepsilon, \ln w) \cdot \tag{4A.3}$$

Let us define $s(X_k) = \text{cov}(\beta_k X_k, \ln w)/\text{var}(\ln w)$, $s(F) = \text{cov}(\gamma F, \ln w)/\text{var}(\ln w)$ and $s(\varepsilon) = \text{cov}(\varepsilon, \ln w)/\text{var}(\ln w)$. Using Fields (2004), it follows that:

$$\sum_k s(X_k) + s(F) + s(\varepsilon) = 100\% \tag{4A.4}$$

which indicates the relative contribution of the various covariates and the residual. The first two terms on the left-hand side of equation 4A.4 sum exactly to the R-squared, so that $s(F)$ and $s(X_k)$ provide, respectively, the weight of gender and the weight of each regressor k.

Quantile Regressions

Quantile wage regressions consider specific parts of the conditional distribution of the hourly wage and indicate the influence of the different explanatory variables on wages, respectively, at the bottom, at the median, and at the top of the log hourly wage distribution. Using our previous notation, the model that we seek to estimate is:

$$q_\theta(\ln w_{ji}) = \beta(\theta)X_{ji} + \gamma(\theta)F_{ji} \tag{4A.5}$$

where $q_\theta(\ln w_{ji})$ is the θ^{th} conditional quantile of the log hourly wage. The set of coefficients $\beta(\theta)$ provides the estimated rates of return to the different covariates (gender being excluded) at the θ^{th} quantile of the log wage distribution, and the coefficient $\gamma(\theta)$ measures the part of the wage gap that is due to gender differences. In a quantile regression, the distribution of the error term is left unspecified. The quantile regression method provides robust estimates, particularly for misspecification errors related to non-normality and heteroskedasticity.

Mean and Quantile Decompositions

For the presentation, let $\ln w^H$ and $\ln w^F$ be the log hourly wage of men and women, respectively. From separate regressions, $\ln w^H = \beta^H X^H + \varepsilon^H$ and $\ln w^F = \beta^F X^F + \varepsilon^F$, performed on the male and female subsamples, we deduce that the gender wage gap is $\ln w^H - \ln w^F = \beta^H X^H - \beta^F X^F + \varepsilon^H - \varepsilon^F$. This gap can be decomposed as follows (Oaxaca and Ramson 1994):

$$\ln w^H - \ln w^F = \beta^H (X^H - X^F) + (\beta^H - \beta^F) X^F + (\varepsilon^H - \varepsilon^F) \tag{4A.6}$$

In equation 4A.6, the first term on the right-hand side $\beta^H (X^H - X^F)$ is the explained part of the gender wage gap, which is a result of differences in individual characteristics between men and women (endowment effects). The second term, $(\beta^H - \beta^F) X^F$, is a result of the difference in the price the market pays to male and female workers for their personal characteristics.

As shown in Machado and Mata (2005), this decomposition may be implemented at the various quantiles of the earnings distribution. The distribution of earnings conditional on individual characteristics is first estimated using linear quantile regressions, then the conditional distribution is approximated by estimating a large number of quantile regressions, and the conditional distribution of earnings is finally integrated over the covariates to obtain the unconditional distribution.

Finally, a similar decomposition may be done in the presence of fixed effects. Using the same notation, we first estimate fixed effects regressions, respectively, for the subsamples of men and women. From $\ln w^H = \beta^H X^H + \delta^H + \varepsilon^H$ and $\ln w^F = \beta^F X^F + \delta^F + \varepsilon^F$ and recalling that δ^H and δ^F are firm fixed effects, it follows that:

$$\ln w^H - \ln w^F = \beta^H (X^H - X^F) + (\beta^H - \beta^F) X^F + (\delta^H - \delta^F) + (\varepsilon^H - \varepsilon^F) \quad (4A.7)$$

According to equation 4A.7, the total earnings differential may be expressed as a sum of three terms. The first one, $\beta^H (X^H - X^F)$, is related to differences in personal characteristics between men and women. The second one, $(\beta^H - \beta^F) X^F$, is a result of differences in the returns to these individual characteristics. Finally, the term $(\delta^H - \delta^F)$ is the difference in the firm's premium, which is paid to male and female employees.

Notes

1. Studies on the gender wage gap in Africa include Glewwe (1990) for Ghana; Cohen and House (1993) for Sudan; Milne and Neitzert (1994) and Agesa (1999) for Kenya; Glick and Sahn (1997) for Guinea; Lachaud (1997) for Burkina Faso and Cameroon; Armitage and Sabot (1991) for Kenya and Tanzania; Appleton, Hoddinott, and Krishnan (1999) for Côte d'Ivoire, Ethiopia, and Uganda; Isemonger and Roberts (1999) for South Africa; Siphambe and Thokweng-Bakwena (2001) for Botswana; Kabubo-Mariara (2003) for Kenya; Temesgen (2006) for Ethiopia; Nordman, Robilliard, and Roubaud (2010) for seven West African capitals using household data; Kolev and Suárez Robles (2010) for Ethiopia; Nordman, Rakotomanana, and Robilliard (2010), and Nordman and Roubaud (2009) for Madagascar; Nordman and Wolff (2009a) for Morocco; and Nordman and Wolff (2009b) for a comparison between the formal sectors of Madagascar and Mauritius.
2. The Africa Regional Program on Enterprise Development is an ongoing research project whose overall purpose is generating business knowledge and policy advice useful to private-sector manufacturing development in Sub-Saharan Africa. For further details, see http://www.worldbank.org/rped.
3. Some studies using household data even end up relying essentially on estimates without selectivity correction to avoid this difficulty (Appleton, Hoddinott, and Krishnan 1999; Nordman, Robilliard, and Roubaud 2010; Nordman and Roubaud 2009).
4. For instance, there may be differences in the wage levels offered to female workers by female and male employers. Neglecting the sex of the managers thus will affect the various returns to individual characteristics when estimating wage regressions.
5. There is thus a trade-off between accounting for selectivity in labor market entry with the use of household data and controlling for jobs and firms' heterogeneity with matched worker-firm data. In the absence of definite theoretical argument, the question remains unsettled.

6. Unfortunately, limitations of the study made it impossible to disentangle the determinants of the within-firm wage gap across countries, as in Nordman and Wolff (2009a) in Morocco. For a within-firm analysis, one would need larger datasets, including a large number of firms with interviews of at least two male and two female employees per firm.
7. Its GDP per capita ($13,240 in 2005 at purchasing power parity) places the Mauritius Island in the category of "newly industrialized country."
8. After observations with missing values are deleted, the sizes of the worker samples are, respectively, 1,574 for Benin, 1,876 for Kenya, 1,734 for Madagascar, 1,363 for Mauritius, 7,806 for Morocco, 1,349 for Senegal, and 1,306 for Uganda.
9. For further details, see the RPED Web site, www.worldbank.org/rped.
10. In the Moroccan FACS, there are seven sectors: electronics, textiles, garments, food, pharmaceuticals, leather and shoe products, and plastics.
11. For the Malagasy case, see Nordman et al. (2010); for the other countries, see DIAL (2007).
12. Among other possible explanations, note that Madagascar has been one of the few low-income countries to recognize the early the importance of developing its educational system and has made rapid progress in the development of public primary schools. Madagascar is also one of the few African countries to have achieved equal access to schooling between boys and girls, at least at low levels of the education system (World Bank 2001).
13. Using representative household surveys from seven West African capitals (including those of Benin and Senegal), Kuepie, Nordman, and Roubaud (2009) show that the education gap is always largely in favor of men for paid-work participants.
14. Note that, even if many Beninese firms are small, they still belong to the formal sector, as defined by international standards of informal activities, because, to be included in the sampling frame, they are necessarily registered businesses.
15. In Mauritius, the data do not allow clear identification of the different sectors. This is not an important drawback as we can control for the firms' observed and unobserved characteristics thanks to the matching employer-employee nature of the data.
16. However, as we only have cross-sectional data, controlling for unobserved heterogeneity at the worker level is impossible.
17. For the purpose of comparability of the covariates, the marital status variable is approximated in the case of Morocco, where, as in Kenya and Uganda, the marital status was not collected from the workers. Instead, we use the fact of having declared children where information on children is available. In Africa, it is reasonable to assume that all individuals who have declared children are (or have been) married because of the social norms in force.
18. See the results of using potential versus actual experience in Nordman and Roubaud (2009) for the case of Madagascar. In the case of Morocco, the actual experience variable concerns experience accumulated in the preceding job only.
19. Specifically, we introduce nine occupational dummy variables related to occupations in six countries of our sample, while there are six occupations in the Moroccan data.
20. We implement statistical tests to test the relevance of our econometric specification. For the seven African countries, we find that the fixed effects specification is the most appropriate one.

21. In addition, including occupations strongly affects the relative contributions of the other covariates, in particular education. For instance, in Kenya, the weight associated with years of schooling is 65.2 percent without controls for occupations, but it amounts to 17.4 percent once occupations are included in the list of regressors.
22. We have also estimated fixed effects quantile regressions following Koenker (2005). As in the linear regression, the gender quantile coefficients are much lower with the fixed effects specifications in Mauritius and in Morocco.
23. Our empirical analysis does not account for the possibility that the effect of gender segregation across firms depends on the type of occupation within the firms.
24. However, this result has to be interpreted with caution, given the limited size of the Senegalese sample once the latter is restricted to firms comprising at least two male and two female employees.

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