# Is There a Glass Ceiling in Morocco?
# Evidence from Matched Worker-Firm Data

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**Abstract:** According to the glass ceiling hypothesis evidenced in developed countries, there exist larger gender pay gaps at the upper tail of the wage distribution. In this paper, we investigate the relevance of a glass ceiling effect in Morocco. Our empirical analysis is based on a matched worker-firm data set of more than 8000 employees and 850 employers. We estimate quantile earnings regressions which account for firm fixed effects and perform a quantile decomposition. We also propose an estimation of the within-firm gender earnings gap using information on the firms' characteristics. Our results show that the gender earnings gap is much higher at the top of the distribution than at the bottom in Morocco. Controlling for firm fixed effects is important. Contrary to European countries, the gender gap is not reduced when capturing the firm effects on earnings differentials. Furthermore, it widens significantly in the upper tail of the earnings distribution, thereby reinforcing the presence of the glass ceiling phenomenon. Our results also suggest that the glass ceiling effect may be reinforced over time in Morocco, as high wage male workers benefit from higher earnings growth than women.

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## 1/ Introduction

Almost every industrialised countries labour market is characterised by a significant gender pay gap (Altonji and Blank, 1999). This is the case for instance in Europe, despite of laws mandating an equal treatment of women and men in the workplace. Not only female and male employees do not receive equal pay for equal work, but it has more recently been shown that the gender wage vary in fact throughout the wage distribution.

The seminal contribution is due to Albrecht *et alii* (2003), who exhibit a sharp acceleration of the gap in the upper tail of the wage distribution in Sweden. This finding is interpreted as a glass ceiling effect which prevents women from reaching high wages and top positions. Very similar conclusions have been evidenced in many European countries (Arulampalam *et alii*, 2004, Gardeazabal and Ugidos, 2005). While there is a consensus on the fact that men outearn women, measuring the gender wage gap across the wage distribution is far from being straightforward. A first difficulty is that many women do not take part in the labour market, so that sample selection issues may be of importance. Secondly, the type of sector or of firm is likely to play a major role in explaining variations in individual earnings. Hence, matched worker-firm data would be needed to study the gender pay gap since such data allows accounting for the firm effect on earnings differentials (Meng, 2004, Meng and Meurs, 2004).

In developing countries, reducing gender inequality is a major subject of concern in the fight against poverty. For instance, under the Poverty Reduction Strategy Paper (PRSP) initiative that concerns over sixty of the world's poorest countries, policies designed to counter gender discrimination are among the most often recommended solutions to combat poverty (see Cling *et alii*, 2003). Futhermore, the third goal of the Millennium Development Goals (MDG) is aimed at reducing gender inequalities. Despite of the policy implications related to gender discrimination, empirical studies which have attempted to measure the gender pay gap in developing countries are not so frequent.

For instance, Appleton *et alii* (1999) note that there is undeniably very little literature on the gender pay gap in Africa. As a matter of fact, drawing on the recent meta-analysis of studies on the gender pay gap (see Weichselbaumer and Winter-Ebmer, 2005), we can evaluate that about 3% of these studies stem from African data out of all the empirical literature on the topic since the 1960s. The situation is even worse when turning to distributional approaches of the gender pay gap. The only exception we are aware of on developing countries is the study of Montenegro (2001) on Chile, but there is no previous study so far on the magnitude of the gender gap across the earnings distribution in Africa.

Investigating the gender wage gap in African countries seems to be a worthwhile issue,

especially from a comparative perspective. Indeed, in African countries, one can suspect gender inequality to be greater than in developed countries, partly because markets do not function efficiently and because public government lack the resources for introducing corrective policies. Very recently, Fafchamps *et alii* (2006) have attempted to fill in the gap by providing evidence of gender effects on wages in African manufacturing. However, the focus of this very interesting comparative study is on the mean values of male and female wages. Then, the purpose of our contribution is to further investigate the gender pay gap in the context of a developing country, but with a focus on the glass ceiling theory.

For that purpose, we use a unique matched employer-employee data set from Morocco. In that country, the progress of labour earnings has remained very limited over the recent period, owing to the poor economic context. Skills of the local labour force remain very limited, especially for women, a phenomenon which is likely to lead to increased gender pay inequalities in the upper part of the earnings distribution. The survey is the Firm Analysis and Competitiveness Survey (FACS) conducted in 2000 by the World Bank and the Moroccan Ministry of Trade and Industry, which includes representative data from 859 manufacturing plants. Most of them are small and medium sized-enterprises. The worker survey collected data from 8 375 workers, 40% of which are women.

We follow different steps to assess the relevance of a glass ceiling effect in these manufacturing firms of Morocco. First, we estimate quantile regressions on the whole sample of workers (male and female), and investigate how the gender pay gap varies across the earnings distribution once we control for individual characteristics. We estimate the same regressions using variables calculated in deviation from their mean values, which produce results similar to those of a within estimator and allows us to account for firm heterogeneity. We also analyse the extent to which returns to exogenous factors differ between men and women. Finally, we perform a counterfactual decomposition of the log gender earnings gap following the method described in Machado and Mata (2005). The difference between the male and female earnings distribution is decomposed into two components, one due to differences in labour market characteristics between men and women and one related to disparities in rewards for these characteristics.

We also provide additional evidence to understand the factors that influence firms to pay different premia for men and women. On the one hand, we focus on the log wage growth within the firm for each worker and examine whether male and female employees receive a similar treatment or whether there exists some kind of discrimination. On the other hand, we go back to the mean values of the wage gap and compute the difference between the male and female firm

fixed effects. Following Meng (2004), this difference in fixed effects allows us to disentangle the determinants of the within-firm gender earnings gap. To the best of our knowledge, all these various analyses are made possible for the first time in the context of an African country, thanks to the availability of the very rich firm-level information.

Several interesting features of wage determination process in manufacturing firms of Morocco are evidenced in the present contribution. First, as shown in most developed countries, there indeed exists a glass ceiling effect in Morocco: the earnings gap is much higher at the top of the distribution than at the bottom. Secondly, according to the results of the decomposition analysis, the gender earnings gap is mainly due to differences in returns to observed characteristics between men and women rather than to differences in these characteristics, at every level of the earnings distribution. Third, it matters to account for firms' characteristics. The gender earnings gap is significantly increased when adding these firm features into the earnings regressions. A noticeable result is that the gender gap widens significantly in the upper tail of the earnings distribution, which reinforces the presence of the glass ceiling phenomenon. Finally, our results suggest that the glass ceiling effect may be reinforced over time in Morocco, as high wage male workers benefit from higher earnings growth than women.

The remainder of our paper is organised as follows. In Section 2, we briefly review the literature on the glass ceiling effect. In Section 3, we present the FACS data and comment on the descriptive statistics of the samples of firms and workers. We present our econometric strategy in section 4, where we also discuss the pooled and segmented quantile regressions estimates along with the counterfactual decomposition at quantiles. In section 5, we provide additional evidence on determinants of the gender pay gap in Morocco, paying close attention to the log wage growth and to the difference in firms fixed effects. Finally, Section 6 concludes.

## 2/ Gender wage gap and glass ceiling effect: A brief review

Drawing on Swedish data from 1998, Albrecht *et alii* (2003) estimate quantile regressions and find that the gender log wage gap accelerates in the upper tail of the wage distribution. A similar pattern is evidenced at the beginning of the 1990s, but not in the prior two decades. According to the data, the wage pattern is mainly due to gender differences in rewards of labour market characteristics, more than to gender differences in the characteristics themselves. Several studies have attempted to replicate these findings in other European countries.

In West Germany, the gender wage gap has narrowed substantially in the lower part of the wage distribution from 1975 to 1995, while this is not the case in its upper part (Fitzenberg and Wunderlich, 2001). In Denmark, the wage gap exhibits an insignificant narrowing at the

bottom of the wage distribution, then a small and significant increase at the mean, finally a large and significant rise at the top (Datta Gupta *et alii*, 2006). In Spain, gender wage differences increase with the quantile index, the gap reaching a maximum at the ninth decile (Gardeazabal and Ugidos, 2005). However, it is strongly affected by education (De la Rica *et alii*, 2005)[1].

A more comparative analysis is proposed in Arulampalam *et alii* (2004), who estimate quantile regressions to investigate how gender affects the shape of the wage distribution in eleven European countries, respectively for the private and public sectors. Their results show that gender pay gaps are larger at the top of the wage distribution in four countries, Denmark, Finland, Italy and the Netherlands, which favours the glass ceiling hypothesis. At the same time, gender pay gaps are wider at the bottom of the wage distribution in Austria, Belgium, France and Spain, but they are all the same larger at the top than at the bottom of the distribution. Also, in contrast to the public sector, the private sector exhibits very large wage gaps.

Taking firm characteristics into account may be relevant when estimating the gender wage gap. Jellal *et alii* (2006) use a French employer-employee matched data set and provide quantile estimates of the magnitude of the glass ceiling effect, with controls of the firms' features in the earnings equations. These authors find that there exists a glass ceiling effect in France with a strong increase in the gender earnings gap above the 75$^{th}$ percentile of the distribution, which is mainly due to differences in the returns to observed characteristics. Importantly, the magnitude of the gender gap is significantly overstated at the top of the distribution when the impact of the firms' qualitative aspects is omitted into the earnings equations.

When turning to the case of developing countries, the lack of empirical evidence on the glass ceiling phenomenon is undoubtedly mainly due to the inexistence of investigation on such issue. So far, we are only aware of the study of Montenegro (2001), which focuses on gender differentials in the returns to human capital in Chile case using a quantile regression approach. The different results show systematic differences in the returns to education and to experience by gender along the conditional wage distribution. More interestingly, this work highlights evidence that the unexplained wage differential is higher in the upper quantiles of the conditional wage distribution, this effect being remarkably stable and consistent across the years 1990 to 1998.

Unfortunately, economists have not really paid attention to the situation of the African countries with respect to the glass ceiling effect. The few studies that have attempted to deal with the gender wage gap in Africa have only focused on its magnitude evaluated at the mean of the

[1] On the one hand, the gap is wider at the top than at the bottom for workers with high education (college or tertiary). Conversely, the gap appears much smaller at the top than at the bottom of the distribution for the group with low education. This glass floor pattern is interpreted as a statistical discrimination exerted by employers.

wage distribution[2]. Among them, however, the study of Fafchamps *et alii* (2006) is particularly interesting since they make use of matched employer-employee data from eleven African countries, including the survey on Morocco we use in this paper.

For all the studied countries[3], these authors highlight a significant gender wage gap. Nevertheless, once controls for firm heterogeneity are introduced, the magnitude and significance of the gender dummy in earnings equations fall in most countries. This suggests that the gender wage gap is due in large part to sorting among firms. While on average the return to education is higher for women, the difference is not significant in seven of the eleven countries. In three of the remaining countries, women get paid less than men on average, but the gap is lower for educated women and it even disappears for women with ten to twelve years of education. Then, Fafchamps *et alii* (2006) conclude that "women must be better educated in order to compete with men for better paid jobs, perhaps because of statistical discrimination". This seems at odd with the glass ceiling phenomenon observed in industrialised countries.

Still drawing on the study of Fafchamps *et alii* (2006), Morocco tells a somewhat different story as compared to the ten other African countries. The return to education is significantly higher for males, while the gender dummy is positive for women with very little education. At higher levels of education (above three years of schooling), women get paid less than men. Furthermore, the authors find that the gender difference in the education coefficient is no longer significant once controls for occupation and firm heterogeneity are introduced. In their study, however, possible nonlinearities in the returns to education are not considered. The focus is also on the mean values of male and female pays, whereas a distributional approach is certainly needed to disentangle the various forces at work in the earnings determination process across sexes.

## 3/ Description of the data

*3.1/ The Moroccan context*

Morocco is a semi-developed economy characterised by a rapidly evolving working population. Indeed, about one third of the Moroccans are under 15 years old, while the decreasing fertility rate was still at 3.1% in 2000. During the last decade, social indicators substantially improved due to growth in public social expenditure and focus on rural areas (World Bank, 2001). Yet, poverty and vulnerability were found to be on the rise. The incidence of

[2] See Nordman and Roubaud (2005) for a review.
[3] These different countries are Algeria, Burundi, Cameroon, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Morocco, Tanzania, Zambia, and Zimbabwe.

poverty was 13.1% in 1990/91, but 19% in 1998/99. Explanations of these high poverty figures can be found in sluggish GDP growth, drop in agricultural value-added partly caused by a series of droughts, collapse in employment creation and growing inequality in rural areas. This morose economic context hampered the progress of labour earnings (see the discussion in Muller and Nordman, 2006). While the job seekers are abundant, the qualification of Moroccan labour force is limited: more than 50% of adults are illiterate, this proportion being much higher for women.

The labour legislation underpins the level of wages in Morocco. Unions have a strong influence and there exists an official minimum wage, the so-called SMIG (*Salaire Minimum Interprofessionnel Garanti*). The latter has played a crucial role for the formation of wages in the recent period. This has not always been the case since real wages of the Moroccan manufacturing sector declined, while the real SMIG increased by about 25% during the 1980s. During the 1990s, the distribution of wages roughly stuck to the evolution of the SMIG. More precisely, the SMIG adjustments over time rather followed the evolutions of the mean urban wage more than proportionally (World Bank, 1994). If the minimum wage is not effectively enforced in the informal sector of the economy, it is well implemented throughout the industrialised and unionised sectors in which most workers' earnings stand above the minimum wage. These workers are generally paid between 13 and 16 months salary, including bonuses, each year.

Despite the importance of this country in the Mediterranean region, only few articles deal with the functioning of the labour market in Morocco. Undoubtedly, this occurs because of the lack of appropriate data. A noticeable exception is the study of Lane *et alii* (1999), who underline the stagnation of the average wage in the manufacturing sector over the 1990s. Considerable gaps in average wages persist across sectors. The least remunerative industrial sectors are those of leather and confection, while the most profitable are the sectors of drinks and tobacco. In 1995, the average wage in the latter sectors was more than three times higher than that of the confection sector. Also, the bulk of women is working in low paying sectors, such as textiles and leather. The stagnation of wages may be partly explained by the fact that the least remunerative industries have had the biggest part of job creation during the past decade. Skills of the workforce and exposure to competition explain wage disparities across sectors (Clerides *et alii*, 1998)[4].

Until recently, working relations were governed by a legislation dating 1921, with emphasis on job security. It was in particular very expensive to dismiss permanent workers. The

[4] Other factors may play a role, as the employment duration, the seasonal features of jobs and on-the-job training. Legally, the minimum wage is not applied for certain types of employees, such as young workers below 18 years old, temporary workers or trainees. Also, in 1986, at least half of the firms of the Moroccan private manufacturing sector and 40% of large companies were paying unskilled workers an average wage lower than the SMIG.

law provided for a 48-hours maximum workweek with no more than 10 hours any single day, premium pay for overtime, paid public and annual holidays, and minimum conditions for health and safety, including the prohibition of night work for women and minors. However, these are not universally observed in the informal sector. Nowadays, the labour market may benefit from the recently adopted labour code (July 2003), which encourages flexibility and contains procedures for conciliation. The new code also reflects international conventions regarding the protection of children, women, handicapped people, workers and unions' rights.

In such circumstances, it is worth assessing the gender wage gap in Morocco using detailed data on both firms and workers. This allows us to control for the specific sector and firm wage policies. Also, the use of a distributional approach sheds light on differences in gender inequality between low wage and high wage workers.

*3.2/ The FAC Survey*

The objective of the Firm Analysis and Competitiveness Survey (FACS hereafter) was to strengthen capacity in the Moroccan Ministry of Trade and Industry to systematically collect and analyse data from manufacturing firms using a wide ranging questionnaire. More specifically, the FACS was designed to providing the Government with a quantitative tool to monitor industry performance, providing firms with a checklist of competitive practices and benchmark indicators, and fostering Business-Government dialogue by measuring the impact of reforms and refocusing agenda on most relevant and pressing concerns.

The scope of the survey is comprehensive. The data collected can be used to analyse a variety of issues directly or indirectly related to public policy, such as export incentives and performance, technological improvement, upgrading of human capital and functioning of the labour market, government-business relations, or pricing and quality of public services for industry. The availability of a worker-level data provides an opportunity to investigate the link between firm-level response to macro policies and economic fortunes/misfortunes of workers.

The FACS-Morocco is based on the notion that the workplace is the microdata unit where labour supply and demand is resolved. For this reason, FACS-Morocco collected data both on establishment characteristics and on a sample of employees in each workplace. The survey instrument was a written questionnaire. The Moroccan Census of Manufactures, which is organised yearly by the Ministry of Trade and Industry since 1985, was used as the establishment sampling frame. The investigators, i.e. the Moroccan Ministry of Trade and Industry and the World Bank, decided to focus on the population of formal establishments with 10 or more

employees in seven industries: Electronics, Textiles, Garments, Processed Food Products, Pharmaceuticals, Leather and Shoes products, and Plastic Products.

Conducted between October 2000 and February 2001, the FACS-Morocco collects data from 859 plants, 78% of them being small and medium sized-firms[5]. Some descriptive statistics of the firm characteristics are shown in Table 1. 60% of the sampled firms are located in and around Casablanca, and 60% of plants are in Textile and Garments. 57% of the firms are limited liability companies (SARL) and 36% are corporations (SA). About 20% of the surveyed firms have some foreign ownership; 15% have a majority foreign ownership – mostly by foreign individuals. Some 5% of surveyed firms can be described as 'multinationals'. 56% of the surveyed manufacturing firms export all or part of their output, and exporting firms export on average 43% of their output. Note that 62% of the firms are profitable.

Let us have a look at the firms' labour force. About 13% of the surveyed employers declared having unionised employees while the share of these unionised workers reaches, on average, about 10% of the total manpower. It is interesting to note that only two firms have implemented piece-rate pay systems for non-qualified employees. Besides, highly labour intensive firms with labour costs being superior to 75% of the total costs represent only a small proportion of the firm sample (5%), while the firms with skilled production employees being the dominant occupation (among four other worker categories such as managers and executives, admin, unskilled production employees, and off-production employees) represent 31% of the surveyed establishments. Moreover, 12% of the firms display a share of managers higher than 10% of the total employees. These figures are indicative of a somewhat decent representation of firms with highly skilled workers in our sample which is crucial in order to assess the relevance of the glass ceiling hypothesis.

*Insert Table 1 about here*

*3.3/Description of gender wage gap*

The employee survey provides information on 8365 workers, 40% of them being women. The average age of sampled workers is about 34 years old. The average worker interviewed has completed primary school, the number of years of completed schooling being equal to 8.7.

In Table 2, we describe the main variables that we use in our analysis. We note that men have a slightly higher level of education (8.81 years of schooling instead of 8.53), and their

[5] A random sample of 1000 establishments and a replacement sample of 500 were drawn by industry, the choice of regions being dictated by the geographical concentration of firms in the selected industries.

potential experience is much higher, with a gap of about 5 years. A similar pattern is observed for tenure in the current firm, which is equal to 8.15 years for men instead of 5.99 for women. Also, men are more likely to have experienced previous jobs, while women report a lower number of children than men. This may be because having children strongly reduces the labour force participation of women.

*Insert Table 2 about here*

As male employees have more experience than female employees, gender differences in earnings are expected in the FACS data. In Table 2, we compute the log monthly earnings both for men and women and report the corresponding values for various points of the earnings distribution[6]. Albeit preliminary, as individual characteristics are not controlled for, these results lead to several interesting conclusions. First, at the mean of the sample, the magnitude of the gender earnings gap is equal to 24% (7.96-7.72=0.24), which seems to be quite large. Second, the gender gap is not constant across the earnings distribution.

For instance, at the 5$^{th}$ percentile, the gender earnings gap is only equal to 14% and it is even lower at the first decile (10%). The profile remains flat till the 25$^{th}$ percentile (11%), but it then suddenly increases. Differences between male and female earnings are approximately equal to 20% at the median value, which is still less than the mean gender gap. The gap is much higher on the top of the earnings distribution. It is equal to 44% at the 75$^{th}$ percentile, 49% at the 9$^{th}$ decile, and finally 51% at the 95$^{th}$ percentile. In Figure 1, we represent the evolution of the log gender earnings gap along the earnings distribution and add confidence bands measured at the 95% level. We observe that the gender gap is relatively constant until the 3$^{rd}$ decile, but sharply drops after that point. Furthermore, this increasing profile is monotonic till higher levels of wage.

*Insert Figure 1 about here*

Hence, these preliminary findings suggest that it matters to assess the magnitude of the gender earnings gap not only at the mean of the samples, and also that there may exist a glass ceiling in Morocco (at least in the manufacturing sector) as in other more developed countries.

## 4/ Econometric evidence on the glass ceiling effect

*4.1/ Pooled quantile regressions*

To investigate the magnitude of the gender earnings gap within an econometric framework, we rely on the quantile regressions described in Koenker and Bassett (1978) and Buchinsky (1998). This technique allows us to focus on specific parts of the conditional

[6] Note than earnings declared in hours, days or weeks have been converted into monthly earnings using the available

distribution of the dependent variable. In our case, we want to estimate the marginal effect of any covariates on the log earnings at various points in the distribution. Quantile regressions then provide estimates of the effect of gender, education or experience on log earnings at the bottom of the income distribution, at the median, and at the top of the distribution[7].

We now briefly describe the underlying econometric specification. Let $w_{ij}$ be the log earnings of individual $i$ working in firm $j$, and $x_{ij}$ a vector of explanatory variables excluding gender. We denote by $f_{ij}$ a dummy variable which is equal to one when the employee is a woman, and is zero otherwise. Assuming that the relevant model is linear, the equation that we seek to estimate is given by:

$$q_\theta(w_{ij}|x_{ij}) = x_{ij}'\beta(\theta) + f_{ij}\gamma(\theta) \quad (1)$$

where $q_\theta(w_{ij}|x_{ij})$ is the $\theta^{\text{th}}$ conditional quantile of $w_{ij}$. It is well known that in a quantile regression, the distribution of the error term is left unspecified (Koenker and Bassett, 1978). The set of coefficients $\beta(\theta)$ provides the estimated rates of return to the different covariates (gender being excluded) at the $\theta^{\text{th}}$ quantile of the log earnings distribution, while the coefficient $\gamma(\theta)$ measures the intercept shift due to gender differences.

When turning to the data, we begin by estimating the magnitude of the gender earnings gap on the whole sample, which includes both male and female employees. In so doing, we rely on two important, restrictive assumptions. First, by pooling the data, we suppose that the returns to the labour market characteristics are the same at various quantiles for men and women. As this assumption does not necessarily hold, we will relax it latter on. Secondly, we do not take into account the role of firm effects. This is damageable as the FACS allows the structure of earnings to be modelled with controls for firm-specific characteristics.

Besides, we only have a cross-sectional data set at disposal, so that we cannot model unobserved individual heterogeneity in the way of Abowd and Kramarz (1999). In order to pick up the role of firm heterogeneity, the natural attempt is to estimate firm fixed effects models including firm-specific dummies. Nevertheless, this technique is not really appropriate in our context owing to the large number of establishments. As recently evidenced in Koenker (2005), estimating fixed effects quantile regressions is not a problem in itself, but the burden of

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information on the usual number of hours worked per week in the questionnaire.

[7] This technique can be interpreted as using the error distribution in the earnings equation for the definition of different earnings categories, i.e. quantiles, instead of the observed earnings differentials. This method provides robust estimates, particularly for misspecification errors related to non-normality and heteroskedasticity.

calculation is excessively cumbersome[8]. As we have a large number of observations, we choose to rely on a slightly different method, inspired by the definition of the within estimator in linear panel data models.

As the fixed effect estimator provides information on differences with respect to the means, we decide to estimate the different models in deviations from the firm mean. Each variable, including the dependent one, is included in the regression in deviation from the mean of the workers' sub-sample in each firm. In so doing, we get results which are similar to those obtained in a fixed effects model, and we apply the quantile regression technique in a standard way. The various quantile regressions are performed conditional on a set of observed worker's labour market characteristics. With the pooled sample, the gender dummy in the quantile regressions may be interpreted as the effect of gender on log earnings at the various percentiles once one controls for any differences in these labour market characteristics between genders. The corresponding pooled estimates are described in Table 3.

*Insert Table 3 about here*

Let us first focus on the gender dummy variable. When drawing on a simple OLS model, we find that the gap is about 12%. This gap is much lower at the bottom of the earnings distribution. Conditional on the set of explanatory variables, we find that the gap goes from less than 7% at the bottom of the earnings distribution to about 15% at the top of this distribution ($95^{th}$ percentile). Interestingly, it is around 8% at the $50^{th}$ percentile and the mean estimated gap is similar to the gap estimated at the $3^{rd}$ quartile. This increasing profile has to be evidenced as a glass ceiling effect which in Morocco prevents women from receiving higher wages. Moreover, we observe that the estimated gap is strongly reduced when comparing it to the rough gender gap described in Figure 1. An interpretation is that part of the gender gap stems from gender differences in observed characteristics.

As we do not account for firm characteristics in the previous set of estimates, we now turn to within quantile regressions, all the variables being calculated in deviation from the firm mean. In Table 4, we present the quantile regressions which take account of firm-specific effect on earnings differentials. It may be that the gender wage gap arises as a result of the sorting of workers across firms that pay different wages. If this is true, one would expect the coefficient on the gender dummy to be insignificant once firm fixed effects are controlled for. In other words, the gender wage gap should be non-existent within firms if the gender pay gap is only linked to

[8] Koenker (2005) suggests more advanced method to estimating fixed effects quantile regressions with a large number of fixed effects.

sorting. Interestingly, this prediction is not borne out by the Moroccan data.

*Insert Table 4 about here*

According to the results reported in Table 4, we find that estimating within regressions leads to an increase of both the value and significance of the gender dummy coefficient all along the earnings distribution. So, not only the gender gap is not reduced with firm fixed effects, but it widens significantly in the upper tail of the earnings distribution. When relying on a fixed effects linear model, the magnitude of the gender gap is about 13.5%, while it was equal to 12% without fixed effects. At the median of the sample, the within quantile regression gives an estimated gap of 11.2% instead of 8%. The difference between the quantile and within-quantile estimates is much larger at the 95$^{th}$ percentile of the earnings distribution, the gap being equal to 23% instead of 15.5%. Thus, we find that controlling for firm heterogeneity matters when estimating the magnitude of the glass ceiling phenomenon[9].

So far, we have neglected the role of occupational status in the earnings equation. It could be argued that part of the female dummy variable picks up these occupational effects, thereby leading to an ovestimated gender effect. As emphasised in Albrecht *et alii* (2003), the problem is that occupational assignment may be an outcome of employer practices rather than an outcome of productivity differences or individual choice. This would occur for instance if employers differentiate between men and women through their tendency to hire into certain occupations. Thus, we perform the same regressions as before (quantiles and within quantiles) including six dummies for occupational status (described in Table 2), but do not report the results to save space.

When comparing quantile regressions without firm effects, we find that the magnitude of the gender wage gap is slightly reduced at the upper part of the distribution. For instance, the median wage gap is now equal to 6.2% once properly controlling for occupational status, instead of 8%. The difference between both measures is still around 2 points of percentage at the 75$^{th}$ percentile (12.4% instead of 14.7%), while it is much higher at the 95$^{th}$ percentile (10.2% instead of 15.5%). The pattern is slightly different once we account for firm heterogeneity. According to the within quantile estimates, we find that the gap is significantly reduced with controls for occupational status. The estimated gap at the 50$^{th}$ percentile is now equal to 6.3% instead of 11.2%. The difference is about 7.6 points of percentage at the 90$^{th}$ percentile.

Nevertheless, we still observe an increasing gender earnings gap throughout the income

[9] We also note that the earnings equations with firm fixed effects have a better goodness-of-fit than the standard Mincerian earnings functions. A Fisher test of the constrained model (without the firm's fixed effect) against the unconstrained model (fixed effects) shows that we cannot reject the unconstrained model at the 1% level.

distribution. Drawing on within quantile regressions, the gap goes from 6.5% at the 1st quartile to 10.2% at the 3rd quartile, the maximum gap of 12.1% being reached at the 95th percentile. So, this means that there is indeed a glass ceiling effect in Moroccan manufacturing firms. While we find that the pay gap is reduced with controls of occupational status, it seems difficult to know whether differences in occupational status are clearly related to a form of gender discrimination on the labour market.

*4.2/Gender-differentiated returns to individual characteristics*

Under the assumption that the returns to individual characteristics are the same at various quantiles for men and women, we find a convex profile for years of education. Also, the rewards for each additional year of education are much higher in the upper part of the earnings distribution, especially above the 3rd quartile. A concave profile is found for potential experience, and again the marginal benefit of each additional year of experience is higher for higher levels of conditional earnings. This is consistent with findings from Portugal in Machado and Mata (2001), where all aspects of human capital are more valued specifically for high paying jobs. Conversely, the marginal effect of tenure in the current firm does not really vary throughout the earnings distribution. Finally, the level of income is an increasing function of the number of preceding jobs, especially in the upper part of the distribution. It is also higher when the worker has received formal training in the previous job.

A problem with the pooling assumption is that it does not seem realistic *a priori*. Indeed, in Morocco, the objective of an equal treatment of men and women in the labour market is far from being achieved. To investigate the relevance of this assumption, we introduce into the previous earnings functions the same covariates crossed with the gender dummy. If the set of estimates associated to the different crossed variables is significantly different from zero, this means that one must reject the assumption of equal rewards of individual characteristics for male and female employees. In Table 5, we report the corresponding within quantile estimates. Specifically, we rely on a Wald test to assess the joint significativeness of the crossed variables along the earnings distribution.

*Insert Table 5 about here*

Clearly, the values of the statistics at each considered percentile show that the hypothesis of joint nullity of the crossed variables has to be rejected at the 1% level. Also, Table 5 is indicative of which return of the introduced labour market characteristics significantly differs across genders at each considered quantile. For instance, at the median value of the earnings distribution, gender differences in the rewards of observable characteristics stem from education

and formal training in the previous job. In the lower part of the distribution, differences between men and women are mainly linked to education, tenure in the current firm and number of preceding jobs. Conversely, for the various quantile regressions, there is never significant gender difference in the returns to potential experience.

As the pooling assumption has to be rejected according to the data, we estimate specific equations for both men and women. Again, we rely on within quantile regressions in order to pick up unobserved heterogeneity entailed by firm effects. These gender-specific regressions are described in Table 6. We note that the returns to education are slightly higher for men than for women, and this occurs throughout the whole earnings distribution. Also, each additional year of experience in the current firm has a much higher return for men than for women. For females, a rise in the number of previous jobs before the current one increases by about 3% the level of income, at least till the 50$^{th}$ percentile. Finally, the rewards of formal training are higher for men in the lower part of the conditional income distribution, but slightly higher for women above the 90$^{th}$ percentile.

*Insert Table 6 about here*

*4.3/ A quantile decomposition analysis*

We now perform a quantile decomposition of the gender pay gap. The underlying idea is to decompose the difference between the male and female log earnings distributions into two components. The first one is due to differences in labour market characteristics between male and female employees. The second is related to differences in the rewards that both men and women receive for their observable characteristics. Instead of relying on the usual Oaxaca-Blinder decomposition technique whose purpose is to identify the sources of differences between the means of two distributions, we implement the decomposition at each quantile of the earnings distribution. For that purpose, we follow the approach developed by Machado and Mata (2005).

Let us briefly describe how we implement the quantile decomposition. We denote by $\beta^m$ and $\beta^f$ men and women's returns to labour market characteristics $x^m$ and $x^f$ respectively. Then, we express the decomposition of the difference between the male and female earnings densities as:

$$x^m\beta^m(\theta)-x^f\beta^f(\theta)=x^m(\beta^m(\theta)-\beta^f(\theta))+(x^m-x^f)\beta^f(\theta) \qquad (2)$$

In the above equation, the first term on the right hand side indicates the magnitude of the gap which is due to differences in the rewards to these characteristics. The second term indicates the magnitude of the gap which is due to dissimilarities in labour market characteristics. As two counterfactual densities may be constructed, we choose to generate the density that would arise if

women were endowed on the basis of men's labour market characteristics and were paid like women. In the absence of discrimination, wages should be equal for men and for these fictitious women.

To construct the counterfactual density, we rely on the three following steps (see the further discussion in Machado and Mata, 2005). First, we draw a random sample of 150 numbers from a standard uniform distribution. Second, using these different numbers denoted by $\theta_j$ with $j = 1,...,150$, we estimate the quantile regressions coefficient vectors $\beta^f(\theta_j)$ for the various $j$ using the female subsample. Third, we take a draw $j$ times with replacement from the male data set and generate the predicted earnings $x^m \beta^f(\theta_j)$. In so doing, we obtain a counterfactual female log wage density, namely what men would have earned if they were paid like women. We replicate the whole procedure exactly 50 times in order to get standard errors for the counterfactual density.

In Table 7, we indicate the results from the decomposition and compare the observed gender gap with the counterfactual gap. We make the comparison at respectively the 5$^{th}$, 10$^{th}$, 25$^{th}$, 50$^{th}$, 75$^{th}$, 90$^{th}$ and 95$^{th}$ percentile of the distribution. Using women's returns and assuming that these females have the male distribution of labour market characteristics, we find that the counterfactual gender earnings gap is much lower than the observed pay gap. For instance, at the median of the distribution, the counterfactual gap is equal to 14% instead of 19.6%.

Interestingly, the difference is even higher in the upper part of the distribution. The observed gap obtained at the 90$^{th}$ percentile is equal to 48.6% when relying on simple descriptive statistics, while the counterfactual gap is only 16.9%. Hence, a first conclusion of the quantile decomposition is that gender differences in labour market characteristics do really explain the larger gap observed at the top of the distribution. This result is at odd with empirical findings in industrialised countries, in particular those of Albrecht *et alii* (2003). In Sweden as well as in other European countries, the bulk of the gender pay gap is mainly due to differences in the rewards of individual characteristics.

*Insert Table 7 about here*

However, the decomposition analysis still shows that there is a glass ceiling effect in Moroccan firms. For instance, the counterfactual gender gap is equal to 7% at the 10$^{th}$ percentile, 14% at the median and 18.6% at the 75$^{th}$ percentile, but it slightly decreases above. Differences in individual characteristics are much more pregnant on the top of the earnings distribution[10]. According to Table 7, we also note that introducing the firm fixed effects in the decomposition

increases the gender gap at the top of the distribution, while it has the opposite effect at the bottom of the distribution. This suggests that within firms where women and men have identical labour market characteristics, females are less rewarded for their observed endowments than males are and this is all the more true when they reach top positions.

## 5/ Additional issues

*5.1/Wage growth and the gender gap*

The different econometric results evidenced in the context of Morocco show that the gender gap is increasing throughout the earnings distribution. This result holds whatever the specification, albeit the control for firm unobserved heterogeneity leads to a rise in the gender pay gap at the top of the distribution. A limitation of our study so far is that we have only examined the earnings level in 1999. As we have also information on the earnings level in 1998, we now get one step further by focusing on the role of gender in the log wage growth.

A priori, the focus on the log wage growth allows us to control for individual heterogeneity. Suppose that there exists a worker fixed effect $\phi_i$ which is constant over time and unobserved by the econometrician. We can express the earnings levels for the two periods as $w_{ij}^{98} = x_{ij}^{98}{}'\beta^{98} + \phi_i + \varepsilon_{ij}^{98}$ and $w_{ij}^{99} = x_{ij}^{99}{}'\beta^{99} + \phi_i + \varepsilon_{ij}^{99}$. Then, relying on the first-difference, we get:

$$w_{ij}^{99} - w_{ij}^{98} = x_{ij}^{99}{}'\beta^{99} - x_{ij}^{98}{}'\beta^{98} + \varepsilon_{ij}^{99} - \varepsilon_{ij}^{98} \quad (3)$$

so that the individual fixed component is removed. A difficulty with the difference approach in this context is that many covariates introduced into the earnings equation are fixed over time, so that they should no longer be included as explanatory variables. Another problem stems from the fact that, for many workers, there is no earnings variation between 1998 and 1999. Hence, a quantile approach would not make sense.

Then, we choose to estimate simple linear regression models by gender, as in the recent contribution of Manning and Swaffield (2005). The idea is then to compare the predicted wage growth by gender, depending on a set of covariates. However, unlike these authors who only focus on the mean of the log wage growth, we are interested in knowing whether there exist gender differences in the earnings growth depending on the workers' relative position across the earnings distribution. For that purpose, we choose to perform our estimations conditional on the

[10] The gender gap at the 95th percentile (-12.5%) is not different from that between the 25th and 50th percentile.

initial position in the distribution. Specifically, we compute the predicted log earnings growth for four subsamples, which are given by the belonging to the various quartiles of earnings in 1998[11].

We begin by calculating the means of the log earnings growth for men and women, with no explanatory variables (see Table 8). Interestingly, there exist some slight differences by gender. Among those who were in the lowest quartile in 1998, the mean rise in income is about 1 point of percentage higher for women. A different pattern is found for the three remaining quartiles since the wage growth is now more important for men, but the differences are not significant (about 0.30 percentage point). Then, we introduce potential experience alone in a quadratic form in the regressions. This clearly affects the previous results. For the lowest quartile, we still find a higher growth for women, but the magnitude of the growth gap is now reduced. Conversely, for the third and fourth quartiles of incomes, we obtain a much higher positive value for the gender difference in wage growth.

*Insert Table 8 about here*

Then, our results suggest that the glass ceiling effect may be reinforced over time in manufacturing firms of Morocco, as high wage male workers benefit from higher increase in earnings than women. Again, a focus on mean values for wage growth would lead to misleading conclusions. As evidenced in Table 8, comparing the male and female wage growth at the mean leads to an insignificant gap of 0.03%. Finally, we have estimated two additional specifications, with more control variables. We get two additional results. First, accounting for a full set of explanatory variables leads to more pregnant gender differences. In the lowest quartile, women benefit from more generous increase in income, while the mean growth is about 2% higher for men in the highest quartile. Second, differences in log earnings growth are not really affected by the inclusion of occupation status, the male excess gap ranging from -1.2% for the first quartile till +2.1% for the upper one.

*5.2/ The within-firm gender earnings gap*

We have also sought to further investigate the factors that influence firms to pay different premia for men and women. In our previous regressions, firm unobserved heterogeneity was controlled for by estimating within quantile regressions. However, in so doing, we were unable to include variables measuring firms' characteristics (as they are by definition constant for a given

[11] Note that we loose 8% and 11% of the sub-samples of men and women respectively due to missing data on the level of earnings in 1998. Except a lower average years of tenure in the current firm (1.3 instead of 8 years), these individuals have no other noticeable differentiated human capital characteristics as compared to the individuals for whom earnings in 1998 are available.

firm). Thus, we choose to focus on the difference between the male and female firm fixed effects stemming from the following regressions:

$$w_{ij}^m = x_{ij}^m{}'\beta^m + \phi_j^m + \varepsilon_{ij}^m \quad (4)$$

$$w_{ij}^f = x_{ij}^f{}'\beta^f + \phi_j^f + \varepsilon_{ij}^f \quad (5)$$

Both fixed effect models are estimated on the sample of firms which have at least two male and two female observations[12]. This allows us to retrieve for a given firm the fixed effects respectively for men and women. Then, following Meng (2004), we compute the difference in gender-specific fixed effect ($\hat{\phi}_j^m - \hat{\phi}_j^f$) which may be seen as an estimate of the within-firm gender earnings gap.

From an empirical perspective, we first get the heterogeneity components from the male and female fixed effects regressions. These regressions are respectively estimated on 3006 male workers and 2005 female workers, and the fit of both regressions is quite high, with a $R^2$ of about 0.7. A *F*-test indicates that both sets of fixed components $\hat{\phi}_j^m$ and $\hat{\phi}_j^f$ are significantly different from each other. Then, we compute the difference in fixed effects $\hat{\phi}_j^m - \hat{\phi}_j^f$. As expected, the Moroccan data exhibit that this difference is highly correlated to the difference in firm-mean earnings by gender, the $R^2$ being equal to 0.55 with a simple linear model.

To explain the within-firm gender earnings gap, we introduce explanatory variables related to observable firm characteristics. The difference in fixed effects is estimated using simple OLS regressions, and the corresponding estimates are shown in Table 9. We perform two sets of estimates, as we present the determinants of the within-firm gender earnings gap obtained alternatively with and without dummies for individual occupation in the first step earnings regressions[13]. According to the data, explaining the within-firm gender earnings gap remains rather difficult, as the $R^2$ is around 0.10. Meng and Meurs (2004) also find that respectively less than 4% of the variation of the within-firm gender earnings gap is explained by observable firm characteristics in France and about 7% in Australia.

*Insert Table 9 about here*

A few sectoral dummies are statistically significant in the regressions, at least with

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[12] This reduces by less than one third our initial sample of firms. For comparisons, summary statistics of the firms' characteristics for the restricted and unrestricted samples of firms are reported in Table 1. Let us note that the sample restriction hardly changed anything with regard to the sectoral distribution and other firm characteristics. As a matter of fact, the only noticeable changes between the two samples are quite expected and concern the share of female employees and the proportion of garment firms in the sample (which are highly female intensive in Morocco).

[13] Again, it is debatable whether job characteristics or occupation should be taken into account. If employers differentiate between men and women through their tendency to hire into certain occupations, then occupational assignment is an outcome of employer practices rather than an outcome of individual choice or productivity differences (Altonji and Blank, 1999). Conversely, it could be argued that analyses omitting occupation may underestimate the importance of background and choice-based characteristics on labour market outcomes.

controls for the effect of occupation on earnings. Compared to garment companies, the within-firm gender gap is significantly higher in the electrical and leather sectors. Also, the firm gender pay gap is an increasing function of the firm size, which may be due to more opportunities for large firms to discriminate between their male and female workers. Moreover, the data indicate that firms which are mainly foreign-owned operate more discrimination with respect to female workers than other firms. These results may be explained by the fact that, under strong product market competition, firms may not be able to afford to discriminate and will therefore try to reduce the level of discrimination (Arrow, 1973). By contrast, firms with more market power, such as foreign-owned or large firms in our case, may be more likely to discriminate against women (Hellerstein *et alii*, 2002)[14].

Another argument that explains why some firms may be more likely to discriminate than others concerns the availability of information on workers' productivity. We find that a piece rate pay system strongly reduces the within-firm gender gap. This is not a surprising result as observing individual productivity reduces uncertainty on workers. Once firms rely on an objective measure of performance, there are fewer places to discriminate earnings by gender. In the same vein, the dummy for a high share of managers in the firms is negative in Table 9. Firms with high supervision have a priori more information on worker's productivity. Also, highly labour intensive firms, where productivity can less easily be observed, discriminate more than other firms.

Finally, another interesting result concerns the firms' promotion policy: Firms with high share of promoted executives the last considered year are characterised by higher within-firm gender gap. This may be a sign that promotion is essentially reserved to males in this type of firms. These gender-differentiated promotions are one of the sources of the glass ceiling effect and are fully consistent with our previous results on wage growth.

## 6/ Conclusion

In this paper, we investigate the relevance of the glass ceiling hypothesis in Morocco, according to which, in industrialised countries, there exist larger gender wage gaps at the upper tail of the wage distribution. Using a matched worker-firm data set of more than 8000 employees and 850 employers, we estimate quantile regressions and perform counterfactual gender earnings gap decompositions at different quantiles while taking account of firms' fixed effects on earnings differentials. We then propose estimates of the within-firm earnings growth by gender as well as

[14] Note that the variable indicating the firm's market share is significant in column 2 only (at the 10% level), but

estimates of the determinants of the within-firm gender earnings gap using our information on the firms' characteristics.

Our estimates lead to the following results. As in many developed countries, there exists a glass ceiling effect in manufacturing firms of Morocco, the earnings gap being much higher at the top of the distribution than at the bottom. According to the results of the counterfactual density without firm effects, the gender earnings gap seems to be mainly due to differences in observed characteristics between men and women at every level of the earnings distribution. This suggests that gender differences in labour market characteristics do explain the larger gap observed at the top of the distribution. This result is at odd with empirical findings in industrialised countries, in particular those in Sweden by Albrecht *et alii* (2003), where the bulk of the gender pay gap is mainly due to differences in the returns to individual characteristics.

The previous authors having evidenced the presence of the glass ceiling phenomenon did not make use of matched worker-firm data. Moreover, our study is the first one of this kind being applied on a developing country. Our findings then suggest that it matters to account for firms' characteristics, the gender earnings gap being significantly increased when adding these firm factors in the earnings regressions. Indeed, controlling for firm-specific effects increases the value and significance of the gender dummy coefficient along the earnings distribution. A noticeable result is that the gender gap is not reduced when capturing the firm effects on earnings differentials. Moreover, it widens significantly in the upper tail of the earnings distribution, thereby reinforcing the presence of the glass ceiling phenomenon.

Results of counterfactual decompositions with firm effects also emphasise that, within firms where women and men have identical labour market characteristics, females are less rewarded for their observed endowments than males are and this is all the more true when they reach top positions. Hence, empirical results on the log gender pay gap which would not control for the firm effects may also *understate* the earnings differences between men and women. In that sense, our results evidenced for a developing country like Morocco are different from those observed in European countries where the gender wage gap is often observed to be *overstated* when controls for firm heterogeneity are missing.

Our study goes a step further by comparing the wage growth by gender along the earnings distribution. Our results suggest that the glass ceiling effect might be reinforced over time in Morocco, as high wage male workers benefit from higher increase in earnings than women.

Finally, thanks to the availability of rich firm-level information, we are able to disentangle

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exerts a positive effect on the within-firm gender gap indeed.

the various forces at work in the formation of the within-firm gender earnings gap. Among other results, we find that observing individual productivity and getting information on workers may reduce employers' uncertainty, which in turn may leave fewer places to gender earnings discrimination.

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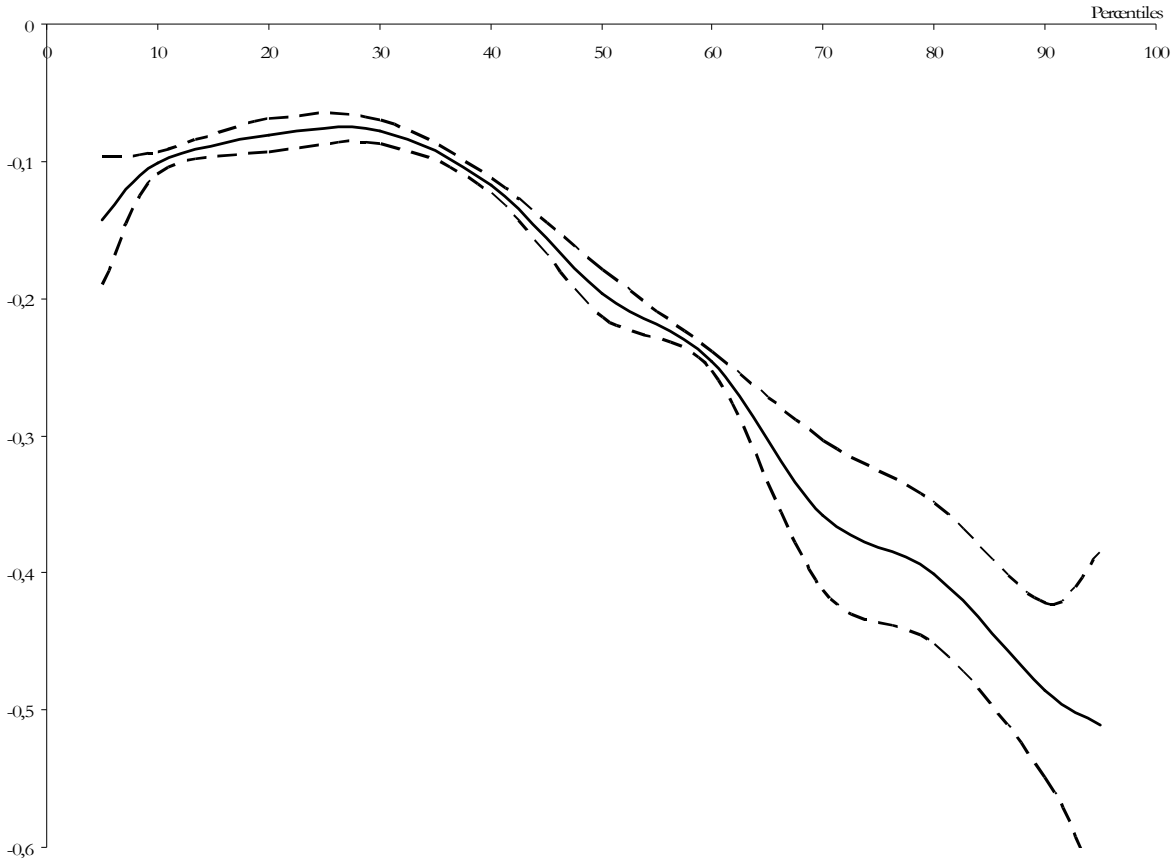
**Figure 1. The log gender earnings gap in Morocco, with 95% confidence intervals**




Source: FACS Morocco 2000

**Table 1. Descriptive statistics of the firm characteristics**

| Variables | Mean | Standard deviation | Mean | Standard deviation |
|---|---|---|---|---|
| | Unrestricted sample | | Restricted sample | |
| *Dummies for sector of affiliation* | | | | |
| Garment | 0.368 | | 0.429 | |
| Food | 0.097 | | 0.088 | |
| Textile | 0.233 | | 0.236 | |
| Leather | 0.079 | | 0.064 | |
| Electrical | 0.044 | | 0.034 | |
| Chemicals | 0.090 | | 0.078 | |
| Plastics | 0.090 | | 0.071 | |
| *Firm characteristics* | | | | |
| Primarily exporting firms (1 if yes) | 0.565 | | 0.655 | |
| Number of local competitors for the principal product | 160.845 | 401.775 | 176.442 | 405.925 |
| Market share | 11.283 | 19.719 | 11.484 | 19.994 |
| Share of female employees | 0.557 | 2.116 | 0.675 | 2.522 |
| Firm size (1: <50 employees, 2: 50<employees<150, 3: employees>150) | 1.800 | 0.776 | 1.883 | 0.787 |
| Are the employees unionised? (1 if yes) | 0.133 | | 0.111 | |
| Share of unionised employees | 0.098 | 0.272 | 0.084 | 0.253 |
| Share of piece-rate pay for non-qualified employees | 0.005 | 0.066 | 0.001 | 0.016 |
| Qualified employees being dominant occupation (1 if yes) | 0.319 | | 0.336 | |
| Share of managers higher than 10% of the total employees (1 if yes) | 0.120 | | 0.100 | |
| Highly labour intensive firms in 1998 (1 if labour costs > 75% total costs) | 0.050 | 0.218 | 0.052 | 0.223 |
| Firms with more than 75% foreign owned (1 if yes) | 0.041 | | 0.049 | |
| Profitable firms (1 if yes) | 0.623 | | 0.632 | |
| Share of days lost due to absenteeism | 0.023 | 0.056 | 0.024 | 0.056 |
| Share of days lost due to strike | 0.002 | 0.024 | 0.002 | 0.028 |
| Share of sales lost due to theft | 0.003 | 0.011 | 0.003 | 0.012 |
| Share of executives promoted in 1999 | 0.014 | 0.119 | 0.005 | 0.040 |
| Number of on-the-job day-trainees in 1999 | 124.26 | 1883.17 | 161.78 | 2260.57 |
| Number of observations | 859 | | 592 | |

Source: FACS Morocco 2000
The unrestricted sample includes all the firms of the FACS, while in the restricted sample, firms which do not have at least two male and two female employees are excluded.

**Table 2. Descriptive statistics of the worker characteristics**

| Variables | Male | Female | All |
|---|---|---|---|
| *Earnings* | | | |
| Log monthly earnings – mean | 7.96 | 7.72 | 7.87 |
| Log monthly earnings – 5th percentile | 7.31 | 7.17 | 7.24 |
| Log monthly earnings – 10th percentile | 7.41 | 7.31 | 7.38 |
| Log monthly earnings – 25th percentile | 7.56 | 7.45 | 7.51 |
| Log monthly earnings – 50th percentile | 7.80 | 7.60 | 7.69 |
| Log monthly earnings – 75th percentile | 8.26 | 7.82 | 8.10 |
| Log monthly earnings – 90th percentile | 8.78 | 8.29 | 8.63 |
| Log monthly earnins – 95th percentile | 9.21 | 8.70 | 9.05 |
| *Other characteristics* | | | |
| Dummy for being female | 0.00 | 1.00 | 0.40 |
| Dummy for managers | 0.06 | 0.02 | 0.05 |
| Dummy for executives | 0.11 | 0.07 | 0.09 |
| Dummy for skilled workers/technicians | 0.40 | 0.39 | 0.40 |
| Dummy for unskilled production workers | 0.27 | 0.34 | 0.30 |
| Dummy non-production employees | 0.15 | 0.18 | 0.16 |
| Dummy for apprentices | 0.004 | 0.006 | 0.005 |
| Number of children | 1.81 | 0.65 | 1.32 |
| Years of completed schooling | 8.81 | 8.53 | 8.70 |
| Years of potential experience (age – schooling – 6) | 22.07 | 16.93 | 20.02 |
| Years of tenure in the current firm | 8.15 | 5.99 | 7.29 |
| Number of preceding jobs | 1.32 | 0.98 | 1.15 |
| Dummy for received formal training in the previous job | 0.03 | 0.02 | 0.02 |
| Years of previous unemployment between the two previous jobs | 0.18 | 0.17 | 0.17 |
| Observations | 5 032 | 3 333 | 8 365 |

Source: FACS Morocco 2000

**Table 3. Quantile regressions of the log monthly earnings**

| Variables | Quantile regressions | | | | | | | OLS |
|---|---|---|---|---|---|---|---|---|
| | 0.05 | 0.10 | 0.25 | 0.50 | 0.75 | 0.90 | 0.95 | mean |
| Constant | 6.938*** | 7.065*** | 7.108*** | 7.121*** | 7.170*** | 7.242*** | 7.269*** | 7.031*** |
| | (130.84) | (191.93) | (285.55) | (271.59) | (203.22) | (115.86) | (91.00) | (235.71) |
| Dummy for being female | -0.065*** | -0.068*** | -0.063*** | -0.080*** | -0.125*** | -0.147*** | -0.155*** | -0.120*** |
| (FEMALE) | (3.38) | (5.08) | (6.65) | (8.06) | (10.04) | (6.79) | (5.62) | (10.68) |
| Number of children | -0.003 | -0.003 | 0.004 | 0.008** | 0.011*** | 0.016** | 0.006 | 0.005 |
| (CHILDREN) | (0.44) | (0.57) | (1.23) | (2.29) | (2.60) | (2.27) | (0.68) | (1.18) |
| Years of completed schooling | -0.012* | -0.009** | -0.016*** | -0.031*** | -0.037*** | -0.042*** | -0.031*** | -0.030*** |
| (EDUCATION) | (1.77) | (2.03) | (5.29) | (10.02) | (8.99) | (5.96) | (3.41) | (8.48) |
| (Years of completed schooling )$^2$/100 | 0.215*** | 0.202*** | 0.301*** | 0.512*** | 0.701*** | 0.879*** | 0.883*** | 0.579*** |
| | (5.43) | (8.02) | (17.58) | (28.42) | (29.35) | (20.67) | (16.50) | (28.22) |
| Years of potential experience | 0.010*** | 0.010*** | 0.019*** | 0.028*** | 0.033*** | 0.037*** | 0.041*** | 0.031*** |
| (EXPERIENCE) | (2.73) | (4.15) | (11.62) | (16.06) | (14.82) | (9.43) | (8.01) | (15.68) |
| (Years of potential experience)$^2$ /100 | -0.016** | -0.015*** | -0.031*** | -0.046*** | -0.048*** | -0.047*** | -0.046*** | -0.044*** |
| | (2.52) | (3.33) | (10.52) | (14.15) | (11.42) | (6.32) | (4.89) | (11.81) |
| Years of tenure in the current firm | 0.022*** | 0.015*** | 0.010*** | 0.010*** | 0.011*** | 0.016*** | 0.023*** | 0.015*** |
| (TENURE) | (5.55) | (5.51) | (5.15) | (4.84) | (4.19) | (3.52) | (3.92) | (6.50) |
| (Years of tenure in the current firm)$^2$/100 | -0.023* | -0.013 | 0.006 | 0.023*** | 0.024** | 0.020 | -0.004 | 0.001 |
| | (1.95) | (1.50) | (0.96) | (3.17) | (2.50) | (1.22) | (0.20) | (0.16) |
| Number of preceding jobs | 0.014* | 0.013** | 0.017*** | 0.024*** | 0.028*** | 0.041*** | 0.035*** | 0.023*** |
| (NBPREJOBS) | (1.73) | (2.44) | (5.64) | (8.34) | (8.02) | (6.99) | (4.71) | (7.01) |
| Dummy for received formal training in | 0.134** | 0.104** | 0.141*** | 0.392*** | 0.416*** | 0.314*** | 0.361*** | 0.310*** |
| the previous job (PRETRAINING) | (2.26) | (2.45) | (4.72) | (12.49) | (10.42) | (4.59) | (4.17) | (8.66) |
| Years of previous unemployment between | -0.054*** | -0.029*** | -0.029*** | -0.027*** | -0.025*** | -0.042* | -0.032 | -0.038*** |
| the two previous jobs | (5.52) | (4.03) | (5.35) | (4.15) | (2.64) | (1.93) | (1.15) | (5.02) |
| (PREUNEMPLOYMENT) | | | | | | | | |
| Observations | 7816 | 7816 | 7816 | 7816 | 7816 | 7816 | 7816 | 7816 |
| Pseudo $R^2$ / $R^2$ | 0.085 | 0.075 | 0.100 | 0.191 | 0.292 | 0.345 | 0.370 | 0.387 |

Source: FACS Morocco 2000

Absolute values of *t* statistics are in parentheses. ***, ** and * mean respectively significant at the 1%, 5% and 10% levels.

**Table 4. Within quantile regressions of the log monthly earnings**

| Variables | Within quantile regressions | | | | | | | Fixed effects |
|---|---|---|---|---|---|---|---|---|
| | 0.05 | 0.10 | 0.25 | 0.50 | 0.75 | 0.90 | 0.95 | Mean |
| Constant | -0.481*** | -0.367*** | -0.194*** | -0.024*** | 0.164*** | 0.405*** | 0.598*** | 0.003 |
| | (68.04) | (63.86) | (49.67) | (7.77) | (39.72) | (48.73) | (50.23) | (0.71) |
| FEMALE | -0.084*** | -0.100*** | -0.106*** | -0.112*** | -0.144*** | -0.178*** | -0.230*** | -0.135*** |
| | (4.45) | (6.51) | (10.37) | (14.01) | (13.57) | (8.07) | (7.24) | (12.75) |
| CHILDREN | 0.011* | -0.001 | -0.001 | 0.008*** | 0.008** | 0.014** | 0.020** | 0.007* |
| | (1.90) | (0.20) | (0.18) | (3.00) | (2.43) | (2.03) | (2.05) | (1.84) |
| EDUCATION | -0.024*** | -0.022*** | -0.032*** | -0.037*** | -0.036*** | -0.024*** | -0.026** | -0.030*** |
| | (3.71) | (4.25) | (9.57) | (14.12) | (10.00) | (3.10) | (2.26) | (8.70) |
| EDUCATION$^2$ / 100 | 0.387*** | 0.369*** | 0.463*** | 0.536*** | 0.651*** | 0.700*** | 0.757*** | 0.564*** |
| | (9.22) | (11.55) | (23.15) | (34.89) | (30.06) | (14.66) | (10.32) | (27.74) |
| EXPERIENCE | 0.022*** | 0.022*** | 0.025*** | 0.025*** | 0.032*** | 0.044*** | 0.046*** | 0.031*** |
| | (6.97) | (8.42) | (14.56) | (17.98) | (17.07) | (11.07) | (8.36) | (16.96) |
| EXPERIENCE$^2$ / 100 | -0.039*** | -0.034*** | -0.038*** | -0.037*** | -0.040*** | -0.049*** | -0.050*** | -0.041*** |
| | (7.24) | (7.48) | (12.29) | (14.74) | (12.11) | (7.00) | (4.91) | (12.22) |
| TENURE | 0.024*** | 0.021*** | 0.019*** | 0.017*** | 0.019*** | 0.020*** | 0.031*** | 0.023*** |
| | (5.52) | (6.02) | (8.04) | (8.96) | (7.04) | (3.32) | (3.21) | (9.15) |
| TENURE$^2$ / 100 | -0.026* | -0.018 | -0.020** | -0.010 | -0.010 | -0.014 | -0.053 | -0.029*** |
| | (1.94) | (1.54) | (2.51) | (1.50) | (1.15) | (0.66) | (1.39) | (3.40) |
| NBPREJOBS | 0.018** | 0.021*** | 0.013*** | 0.011*** | 0.013*** | 0.017** | 0.009 | 0.011*** |
| | (2.50) | (3.89) | (4.41) | (4.69) | (4.21) | (2.44) | (1.01) | (3.47) |
| PRETRAINING | 0.251*** | 0.238*** | 0.262*** | 0.291*** | 0.338*** | 0.278*** | 0.377*** | 0.321*** |
| | (3.63) | (4.47) | (8.11) | (11.93) | (9.88) | (3.61) | (3.31) | (9.91) |
| PREUNEMPLOYMENT | -0.031*** | -0.028*** | -0.029*** | -0.020*** | -0.027*** | -0.026 | -0.018 | -0.030*** |
| | (3.31) | (3.31) | (5.00) | (3.88) | (3.22) | (1.45) | (1.33) | (4.38) |
| Observations | 7816 | 7816 | 7816 | 7816 | 7816 | 7816 | 7816 | 7816 |
| Pseudo $R^2$ / $R^2$ | 0.125 | 0.135 | 0.152 | 0.181 | 0.258 | 0.307 | 0.308 | 0.370 |

Absolute values of *t* statistics are in parentheses. ***, ** and * mean respectively significant at the 1%, 5% and 10% levels.

**Table 5. Within quantile regressions of the log monthly earnings, with crossed effects**

| Variables | Within quantile regressions | | | | | | | | | | | | | | Fixed effects | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.05 | | 0.1 | | 0.25 | | 0.5 | | 0.75 | | 0.9 | | 0.95 | | Mean | |
| | X | X*Female | X | X*Female | X | X*Female | X | X*Female | X | X*Female | X | X*Female | X | X*Female | X | X*Female |
| Constant | 7.252*** | | 7.383*** | | 7.543*** | | 7.756*** | | 8.119*** | | 8.539*** | | 8.857*** | | 6.930*** | |
| | (660.99) | | (1113.03) | | (2009.79) | | (1615.95) | | (842.81) | | (539.37) | | (455.14) | | (197.39) | |
| FEMALE | -0.064** | | -0.076*** | | -0.058*** | | -0.123*** | | -0.180*** | | -0.191*** | | -0.154*** | | 0.082 | |
| | (2.42) | | (4.73) | | (6.33) | | (10.33) | | (7.33) | | (4.57) | | (3.02) | | (1.58) | |
| CHILDREN | -0.008 | -0.052** | -0.009* | -0.026* | 0.003 | 0.002 | 0.004 | -0.002 | 0.008 | 0.024 | 0.010 | 0.052 | 0.025 | 0.018 | -0.002 | 0.034*** |
| | (0.92) | (2.40) | (1.78) | (1.91) | (1.11) | (0.29) | (1.10) | (0.15) | (1.02) | (1.14) | (0.78) | (1.57) | (1.61) | (0.44) | (0.52) | (4.15) |
| EDUCATION | -0.005 | 0.056*** | -0.001 | 0.034*** | -0.009*** | 0.024*** | -0.016*** | 0.018* | -0.021*** | 0.054*** | -0.016 | 0.050 | -0.020 | 0.076* | -0.031*** | 0.013** |
| | (0.52) | (2.63) | (0.27) | (2.59) | (3.12) | (3.25) | (4.18) | (1.92) | (2.62) | (2.80) | (1.19) | (1.46) | (1.14) | (1.74) | (7.24) | (1.98) |
| EDUCATION² / 100 | 0.184*** | -0.337*** | 0.139*** | -0.231*** | 0.215*** | -0.221*** | 0.402*** | -0.272*** | 0.585*** | -0.460*** | 0.709*** | -0.434** | 0.801*** | -0.521* | 0.611*** | -0.194*** |
| | (3.78) | (3.02) | (4.86) | (3.38) | (13.05) | (5.60) | (17.72) | (4.94) | (11.95) | (3.96) | (7.86) | (1.99) | (6.62) | (1.80) | (25.01) | (5.08) |
| EXPERIENCE | 0.014*** | 0.005 | 0.012*** | -0.003 | 0.014*** | -0.002 | 0.024*** | -0.005 | 0.036*** | 0.006 | 0.045*** | -0.009 | 0.042*** | 0.011 | 0.032*** | -0.003 |
| | (3.11) | (0.50) | (4.23) | (0.46) | (8.46) | (0.64) | (11.83) | (0.95) | (8.83) | (0.64) | (7.01) | (0.55) | (5.67) | (0.61) | (13.59) | (0.70) |
| EXPERIENCE² / 100 | -0.022*** | -0.003 | -0.017*** | 0.003 | -0.020*** | -0.003 | -0.031*** | -0.006 | -0.040*** | -0.028 | -0.045*** | 0.010 | -0.038*** | -0.020 | -0.038*** | -0.007 |
| | (2.72) | (0.18) | (3.29) | (0.20) | (6.76) | (0.35) | (8.23) | (0.58) | (5.44) | (1.49) | (3.86) | (0.31) | (2.98) | (0.62) | (9.13) | (0.95) |
| TENURE | 0.022*** | 0.036*** | 0.018*** | 0.028*** | 0.016*** | 0.013*** | 0.020*** | -0.006 | 0.025*** | -0.018 | 0.023** | -0.008 | 0.030** | -0.005 | 0.030*** | -0.017*** |
| | (4.24) | (2.65) | (5.15) | (3.16) | (7.61) | (2.60) | (7.16) | (0.78) | (4.01) | (1.11) | (2.14) | (0.30) | (2.15) | (0.14) | (9.98) | (3.86) |
| TENURE² / 100 | -0.028** | -0.122*** | -0.022** | -0.113*** | -0.019*** | -0.044*** | -0.031*** | 0.006 | -0.040* | 0.040 | -0.029 | 0.030 | -0.033 | 0.027 | -0.051*** | 0.066*** |
| | (2.00) | (2.91) | (2.26) | (3.98) | (3.04) | (2.59) | (3.33) | (0.24) | (1.72) | (0.61) | (0.70) | (0.26) | (0.56) | (0.16) | (5.20) | (3.96) |
| NBPREJOBS | 0.017** | 0.056*** | 0.014*** | 0.047*** | 0.009*** | 0.022*** | 0.007** | -0.002 | 0.011 | 0.010 | 0.021* | -0.011 | 0.026** | -0.030 | 0.011*** | 0.001 |
| | (2.29) | (3.37) | (2.81) | (4.69) | (3.15) | (3.13) | (2.04) | (0.27) | (1.47) | (0.62) | (1.82) | (0.43) | (2.09) | (1.07) | (3.08) | (0.16) |
| PRETRAINING | 0.197*** | 0.020 | 0.094*** | -0.145 | 0.122*** | -0.202*** | 0.186*** | -0.210*** | 0.350*** | -0.223 | 0.378** | -0.070 | 0.521*** | -0.294 | 0.349*** | -0.134* |
| | (3.64) | (0.11) | (2.78) | (1.55) | (5.20) | (3.86) | (5.14) | (2.67) | (4.01) | (1.25) | (2.39) | (0.24) | (2.89) | (1.11) | (9.23) | (1.96) |
| PREUNEMPLOYMENT | -0.023 | 0.046 | -0.010 | -0.013 | -0.007 | -0.025* | -0.014* | 0.005 | -0.032** | 0.007 | -0.044 | 0.017 | -0.008 | 0.137** | -0.034*** | 0.007 |
| | (1.44) | (1.01) | (1.00) | (0.52) | (1.28) | (1.83) | (1.91) | (0.30) | (2.20) | (0.22) | (1.55) | (0.36) | (0.36) | (2.12) | (3.69) | (0.54) |
| Joint test : value ; prob | 3.61 ; 0.000 | | 6.85 ; 0.000 | | 10.90 ; 0.000 | | 10.27 ; 0.000 | | 3.31 ; 0.000 | | 0.85 ; 0.000 | | 1.14 ; 0.000 | | 12.2 ; 0.000 | |
| Observations | 7816 | | 7816 | | 7816 | | 7816 | | 7816 | | 7816 | | 7816 | | 7816 | |
| Pseudo $R^2$ / $R^2$ | 0.048 | | 0.034 | | 0.044 | | 0.088 | | 0.151 | | 0.181 | | 0.193 | | 0.394 | |

Absolute values of *t* statistics are in parentheses. ***, ** and * mean respectively significant at the 1%, 5% and 10% levels.

**Table 6. Gender-specific within quantile regressions of the log monthly earnings**

| Variables | Within quantile regressions | | | | | | | | | | | | | | Fixed effects | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.05 | | 0.1 | | 0.25 | | 0.5 | | 0.75 | | 0.9 | | 0.95 | | Mean | |
| | Men | Women | Men | Women | Men | Women | Men | Women | Men | Women | Men | Women | Men | Women | Men | Women |
| CHILDREN | 0.016** | 0.012 | 0.001 | 0.021** | -0.001 | 0.028*** | 0.016** | 0.012 | 0.001 | 0.024*** | 0.011 | 0.036*** | 0.014 | 0.038* | -0.001 | 0.029*** |
| | (2.22) | (0.80) | (0.15) | (2.30) | (0.27) | (4.46) | (2.22) | (0.80) | (0.23) | (4.03) | (1.17) | (3.09) | (1.01) | (1.89) | (0.19) | (4.36) |
| EDUCATION | -0.028*** | -0.011 | -0.033*** | -0.006 | -0.034*** | -0.021*** | -0.028*** | -0.011 | -0.033*** | -0.028*** | -0.016 | -0.014 | -0.016 | -0.019 | -0.032*** | -0.021*** |
| | (3.02) | (0.89) | (3.89) | (0.77) | (7.50) | (4.08) | (3.02) | (0.89) | (6.08) | (5.85) | (1.40) | (1.42) | (0.91) | (1.00) | (6.40) | (4.08) |
| EDUCATION$^2$ / 100 | 0.415*** | 0.302*** | 0.453*** | 0.267*** | 0.512*** | 0.359*** | 0.415*** | 0.302*** | 0.713*** | 0.469*** | 0.718*** | 0.519*** | 0.742*** | 0.635*** | 0.622*** | 0.422*** |
| | (7.05) | (3.62) | (8.92) | (5.53) | (19.11) | (11.08) | (7.05) | (3.62) | (22.25) | (15.92) | (10.45) | (8.46) | (6.80) | (5.01) | (21.65) | (13.27) |
| EXPERIENCE | 0.019*** | 0.029*** | 0.020*** | 0.028*** | 0.025*** | 0.028*** | 0.019*** | 0.029*** | 0.035*** | 0.022*** | 0.043*** | 0.040*** | 0.042*** | 0.050*** | 0.031*** | 0.029*** |
| | (4.24) | (4.46) | (4.66) | (7.42) | (10.72) | (10.26) | (4.24) | (4.46) | (12.52) | (8.37) | (7.37) | (7.58) | (5.02) | (5.23) | (11.53) | (10.04) |
| EXPERIENCE$^2$ / 100 | -0.033*** | -0.052*** | -0.030*** | -0.049*** | -0.035*** | -0.049*** | -0.033*** | -0.052*** | -0.037*** | -0.034*** | -0.039*** | -0.055*** | -0.036** | -0.070*** | -0.036*** | -0.048*** |
| | (4.57) | (4.35) | (4.12) | (7.04) | (8.61) | (9.19) | (4.57) | (4.35) | (7.62) | (6.43) | (3.91) | (5.42) | (2.44) | (4.26) | (7.77) | (8.27) |
| TENURE | 0.022*** | 0.016* | 0.025*** | 0.011** | 0.021*** | 0.009** | 0.022*** | 0.016* | 0.026*** | 0.008** | 0.036*** | 0.007 | 0.051*** | 0.016 | 0.032*** | 0.010** |
| | (3.64) | (1.91) | (4.45) | (2.14) | (6.47) | (2.34) | (3.64) | (1.91) | (6.96) | (2.12) | (4.41) | (1.06) | (4.36) | (1.16) | (8.92) | (2.49) |
| TENURE$^2$ / 100 | -0.026 | 0.023 | -0.040** | 0.032** | -0.032*** | 0.027** | -0.026 | 0.023 | -0.038*** | 0.033** | -0.075*** | 0.028 | -0.110*** | 0.006 | -0.057*** | 0.032** |
| | (1.33) | (0.85) | (2.11) | (1.99) | (2.99) | (2.15) | (1.33) | (0.85) | (3.11) | (2.24) | (2.62) | (1.23) | (2.77) | (0.14) | (5.05) | (2.26) |
| NBPREJOBS | 0.006 | 0.032* | 0.011 | 0.033*** | 0.011*** | 0.025*** | 0.006 | 0.032* | 0.011** | 0.013*** | 0.014 | 0.010 | 0.029** | 0.006 | 0.012*** | 0.015*** |
| | (1.01) | (1.75) | (1.33) | (3.48) | (2.79) | (4.59) | (1.01) | (1.75) | (2.55) | (2.68) | (1.52) | (1.01) | (2.20) | (0.36) | (2.76) | (2.83) |
| PRETRAINING | 0.355*** | 0.148 | 0.246*** | 0.162* | 0.264*** | 0.224*** | 0.355*** | 0.148 | 0.393*** | 0.263*** | 0.271** | 0.289*** | 0.376** | 0.455** | 0.364*** | 0.245*** |
| | (3.87) | (1.03) | (3.03) | (1.83) | (6.52) | (3.87) | (3.87) | (1.03) | (8.19) | (5.26) | (2.53) | (3.07) | (2.16) | (2.46) | (8.36) | (4.33) |
| PREUNEMPLOYMENT | -0.049*** | -0.023 | -0.032** | -0.036*** | -0.022*** | -0.040*** | -0.049*** | -0.023 | -0.037*** | -0.012 | -0.058* | -0.002 | -0.048 | -0.007 | -0.038*** | -0.017** |
| | (3.68) | (1.43) | (2.31) | (3.54) | (2.65) | (6.05) | (3.68) | (1.43) | (2.58) | (1.62) | (1.68) | (0.18) | (0.78) | (0.34) | (3.59) | (2.02) |
| Constant | -0.471*** | -0.493*** | -0.344*** | -0.388*** | -0.173*** | -0.221*** | -0.471*** | -0.493*** | 0.214*** | 0.079*** | 0.482*** | 0.288*** | 0.671*** | 0.445*** | 0.041*** | -0.052*** |
| | (45.49) | (37.05) | (34.65) | (45.19) | (31.16) | (35.38) | (45.49) | (37.05) | (33.69) | (13.49) | (37.97) | (25.90) | (34.86) | (21.70) | (7.00) | (8.82) |
| Observations | 4692 | 3124 | 4692 | 3124 | 4692 | 3124 | 4692 | 3124 | 4692 | 3124 | 4692 | 3124 | 4692 | 3124 | 4692 | 3124 |
| Pseudo $R^2$ / $R^2$ | 0.121 | 0.132 | 0.128 | 0.134 | 0.157 | 0.132 | 0.121 | 0.132 | 0.281 | 0.173 | 0.304 | 0.242 | 0.297 | 0.250 | 0.383 | 0.289 |

Absolute values of *t* statistics are in parentheses. ***, ** and * mean respectively significant at the 1%, 5% and 10% levels.

**Table 7. Quantile decomposition and counterfactual gender earnings gap**

| Percentile | Observed gender gap | Counterfactual gender gap | |
|---|---|---|---|
| | | With no firms' effects | With firm effects |
| 5th percentile | -0.143 | -0.065 | -0.020 |
| | | (0.012) | (0.011) |
| 10th percentile | -0.101 | -0.070 | -0.031 |
| | | (0.008) | (0.010) |
| 25th percentile | -0.103 | -0.097 | -0.046 |
| | | (0.009) | (0.003) |
| 50th percentile | -0.196 | -0.140 | -0.068 |
| | | (0.007) | (0.009) |
| 75th percentile | -0.432 | -0.186 | -0.139 |
| | | (0.008) | (0.011) |
| 90th percentile | -0.486 | -0.169 | -0.204 |
| | | (0.020) | (0.017) |
| 95th percentile | -0.511 | -0.125 | -0.226 |
| | | (0.022) | (0.013) |

Counterfactuals are constructed using the characteristics of male employees and returns to these characteristics of female employees. Standard errors in parentheses are obtained with 50 replications of the decomposition.

**Table 8. Predicted earnings growth and gender effect**

| Dependent variable : Log earnings 1999 – Log earnings 1998 | Quartile of earnings in 1998 | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | Mean value |
| (1) No control variables | | | | | |
| Men (*n*=4302) | 4.31 | 2.43 | 3.52 | 2.59 | 3.17 |
| Women (*n*=2759) | 5.27 | 2.23 | 3.13 | 2.23 | 3.47 |
| Difference | *-0.96* | *0.20* | *0.39* | *0.36* | *-0.30* |
| (2) Control variables: potential experience, potential experience squared | | | | | |
| Men | 4.53 | 2.53 | 4.00 | 2.70 | 3.38 |
| Women | 4.76 | 2.36 | 2.66 | 1.96 | 3.23 |
| Difference | *-0.23* | *0.17* | *1.34* | *0.74* | *0.15* |
| (3) Control variables: same as (2) + number of children, years of schooling, tenure in the current firm, number of preceding jobs, formal training in the previous job, years of previous unemployment between the two previous jobs | | | | | |
| Men | 4.81 | 3.07 | 4.11 | 3.03 | 3.41 |
| Women | 5.55 | 2.81 | 3.05 | 0.93 | 3.38 |
| Difference | *-0.74* | *0.26* | *1.06* | *2.1* | *0.03* |
| (4) Control variables: same as (3) + occupational status | | | | | |
| Men | 5.69 | 3.63 | 4.18 | 2.86 | 3.40 |
| Women | 6.86 | 3.30 | 3.01 | 0.76 | 3.37 |
| Difference | *-1.17* | *0.33* | *1.17* | *2.1* | *0.03* |

**Table 9. Effects of firm characteristics on the within-firm gender earnings gap**

| Variables | | Control for the effect of occupation on earnings | | No control for the effect of occupation on earnings | |
|---|---|---|---|---|---|
| | | (1) | (2) | (3) | (4) |
| Sectoral dummies (Ref: Garment firms) | Food | 0.025 | -0.007 | -0.008 | -0.039 |
| | | (0.63) | (0.15) | (0.18) | (0.68) |
| | Textile | 0.068** | 0.071* | 0.043 | 0.042 |
| | | (2.15) | (1.88) | (1.17) | (0.94) |
| | Leather | 0.032 | 0.036 | -0.003 | 0.011 |
| | | (0.80) | (0.69) | (0.07) | (0.20) |
| | Electrical | 0.190*** | 0.189** | 0.131* | 0.121 |
| | | (2.73) | (2.54) | (1.67) | (1.41) |
| | Chemicals | -0.048 | -0.078 | -0.092 | -0.130* |
| | | (0.95) | (1.33) | (1.59) | (1.85) |
| | Plastics | 0.018 | 0.018 | -0.032 | -0.040 |
| | | (0.33) | (0.28) | (0.48) | (0.48) |
| Primarily exporting firms | | -0.032 | -0.017 | -0.043 | -0.029 |
| | | (1.09) | (0.48) | (1.27) | (0.67) |
| Number of local competitors for the principal product | | 0.000 | 0.000 | 0.000 | 0.000 |
| | | (0.27) | (0.30) | (0.94) | (0.97) |
| Market share | | 0.001 | 0.001* | 0.001 | 0.001 |
| | | (1.29) | (1.84) | (1.07) | (1.12) |
| Share of female employees | | 0.001 | 0.002 | 0.001 | 0.001 |
| | | (0.91) | (1.19) | (0.45) | (0.34) |
| Firm size | | 0.045*** | 0.039** | 0.020 | 0.012 |
| (1: <50 employees, 2: 50<employees<150, 3: employees>150) | | (2.61) | (1.97) | (1.05) | (0.52) |
| Are the employees unionised? (1 if yes) | | 0.017 | 0.046 | -0.024 | 0.017 |
| | | (0.32) | (0.82) | (0.31) | (0.20) |
| Share of unionised employees | | -0.071 | -0.069 | -0.047 | -0.066 |
| | | (1.14) | (1.20) | (0.52) | (0.70) |
| Share of piece-rate pay for non-qualified employees | | -11.680*** | -11.330*** | -11.761*** | -11.538*** |
| | | (9.17) | (7.05) | (7.78) | (5.79) |
| Qualified employees being dominant occupation (1 if yes) | | -0.029 | -0.040 | -0.015 | -0.039 |
| | | (1.14) | (1.31) | (0.52) | (1.15) |
| Share of managers higher than 10% of the total employees | | -0.071 | -0.079 | -0.145*** | -0.176*** |
| (1 if yes) | | (1.64) | (1.46) | (2.87) | (2.60) |
| Highly labour intensive firms in 1998 | | 0.064 | 0.082 | 0.093* | 0.110* |
| (1 if labour costs > 75% total costs) | | (1.40) | (1.42) | (1.77) | (1.72) |
| Firms with more than 75% foreign owned (1 if yes) | | 0.172** | 0.153** | 0.156* | 0.137* |
| | | (2.28) | (2.00) | (1.87) | (1.65) |
| Profitable firms (1 if yes) | | -0.030 | -0.016 | -0.024 | -0.030 |
| | | (1.12) | (0.52) | (0.83) | (0.86) |
| Share of days lost due to absenteeism | | | -0.775* | | -0.903** |
| | | | (1.87) | | (2.16) |
| Share of days lost due to strike [i] | | | 1.261* | | 1.148* |
| | | | (1.91) | | (1.91) |
| Share of sales lost due to theft [i] | | | 8.944*** | | 9.620*** |
| | | | (3.35) | | (3.83) |
| Share of executives promoted in 1999 | | | 0.829** | | 0.774 |
| | | | (2.35) | | (1.43) |
| Number of on-the-job day-trainees in 1999 | | | -0.000 | | -0.000 |
| | | | (1.19) | | (0.16) |
| Constant | | -0.103** | -0.110* | -0.019 | 0.008 |
| | | (2.36) | (1.86) | (0.39) | (0.12) |
| Observations | | 442 | 338 | 442 | 338 |
| R-squared | | 0.0998 | 0.1576 | 0.0813 | 0.1315 |

The dependent variable is the difference in fixed effects $\hat{\phi}_j^m - \hat{\phi}_j^f$ in 1999. Robust t statistics are in parentheses. ***, ** and * mean respectively significant at the 1%, 5% and 10% levels.

(*i*) Because of the large number of missing values for these firm variables (about 20% of the firm sample), we use the modified zero-order regression method described in Maddala (1977). Observations with missing information are set to zero and we include in the regression a dummy variable for the missing observations.