



HAL
open science

Task Organization, Human Capital and Wages in Moroccan Exporting Firms

Christophe Muller, Christophe J. Nordman

► **To cite this version:**

Christophe Muller, Christophe J. Nordman. Task Organization, Human Capital and Wages in Moroccan Exporting Firms. 2013. halshs-00854522

HAL Id: halshs-00854522

<https://shs.hal.science/halshs-00854522>

Preprint submitted on 27 Aug 2013

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Task Organization, Human Capital and Wages in Moroccan Exporting Firms

Christophe Muller
Christophe J. Nordman

WP 2013 - Nr 41

Task Organization, Human Capital and Wages in Moroccan Exporting Firms

Christophe Muller^{*}

and

Christophe J. Nordman^{**}

August 2013

Abstract

We conduct a case study of the linkages of task organization, human capital accumulation and wages in Morocco, using matched worker-firm data for Electrical-mechanical and Textile-clothing industries. In order to integrate task organization into the interacting processes of workers' training and remunerations, we assume a recursive model, which is not rejected by our estimates: task organization influences on-the-job training that affects wages. Beyond sector and gender determinants, assignment of workers to tasks and on-the-job training is found to depend on former education and work experience in a broad sense. Meanwhile, participation in on-the-job training is stimulated by being assigned to a team, especially of textile sector and for well-educated workers. Finally, task organization and on-the-job training are found to affect wages.

Keywords: Morocco, Wages, On-the-job training, Human capital, Task organization.

JEL Classification: J24, J31, O12

* Corresponding author. Aix-Marseille University (Aix_Marseille School of Economics), CNRS and EHESS, 14 Avenue Jules Ferry, 13621 Aix en Provence Cedex France. E-mail: Christophe.muller@univ-amu.fr.

** IRD, DIAL and IZA. 4 rue d'Enghien 75010, Paris. E-mail: nordman@dial.prd.fr.

1. Introduction

1.1. The issues

In this case study, we examine how task organization and On-the-Job Training (OJT) interact with human capital accumulation and earnings of workers in eight Moroccan firms in the Textile-clothing and Electrical-mechanical industries.

In most human capital theories, wage differentials between individuals are determined by their differences in education, experience and on-the-job training. In this perspective, market forces are often seen as equalizing individuals' earnings, provided human capital endowments are identical. However, how task allocation and OJT affect these mechanisms is generally neglected.

In this paper, we scrutinize the interrelationships between task organization, human capital accumulation, OJT and wages. For this, we use a matched worker-firm dataset that provides detailed information on workers' attributes for a few manufacturing plants. Our analysis should be viewed as a case study since our data may not represent the manufacturing sectors in Morocco perfectly. Case studies in developing countries are appealing as there is a persistent lack of knowledge on how workers' human capital and earnings can be improved in connection with work organization and OJT. Human capital accumulation in firms through OJT should depend on task allocation, as different techniques are used in different posts, and the opportunities of learning from co-workers vary across differently organized groups of workers.

1.2. The literature

Few empirical studies have incorporated task organization within firms when studying how workers benefit from human capital or how wages are determined. Yet,

task organization may be a major transmission channel of human capital across workers.

Lindbeck and Snower (2000) emphasize this (p. 356):

“In the new types of firms emerging nowadays, the traditional separation of roles tends to break down. Workers are often given responsibilities spanning more than one of the traditional groupings. Greater emphasis is now also placed on continuous learning and skill development, all-round knowledge, the potential to acquire multiple skills, and the ability to learn how the experience gained from one skill enhances another skill.”

A few authors report the emerging new forms of work organization in industrialized countries since the mid-1980s, starting from the Japanese flexible company model (OECD, 1999; Osterman, 2000). It is sometimes possible to recognize some prominent features: growing role for team work and job rotation, reduction in the number of management levels, development of workers' versatility and continuous learning, notably through OJT, decentralization of responsibilities within firms, and direct participation of employees in decision making in multiple dimensions. There is no reason why such innovation should not extend to firms in LDCs.

Some authors have explored theoretical macroeconomic explanations on how new work organization emerged. Greenan and Guellec (1994) analyze the impact on growth of ways of processing and communicating information in firms. Thesmar and Thoenig (2000) study the macroeconomic growth implications of the organizational structure of firms. Lindbeck and Snower (2000) examine the forces driving the restructuring process in firms. Caroli, Greenan and Guellec (2001) formalize the link between human capital accumulation and organizational changes. The latter show that, in industrialized countries, the relative increase in skilled workers may impulse the decentralization of work organization. They advocate amplifying the range of workers' skills, in particular through OJT, to yield further decentralization of firm organization.

Those works emphasize the relevance of linking within-firm task organization, human capital accumulation and wages. Nevertheless, to our knowledge, no empirical study has focused on these issues using matched worker-firm data on a developing country.

What are the determinants of within-firm task organization in exporting firms in Morocco? How does work organization influence on-the-job training? How do these two variables affect wages? We explore these questions. We start by discussing the Moroccan labour market in Section 2. We present the data in Section 3 and our model in Section 4. We comment on the estimation results in Section 5. Finally, Section 6 concludes.

2. The Moroccan Labour Market

2.1. The general context

Morocco is a semi-developed economy with a fast evolving working population. During the 1990s, social indicators much improved following public social expenditure and better focus of social policies on rural areas (The World Bank, 2001). In the last decade, Morocco has enjoyed sustained economic growth, with an average annual growth rate of about 5 percent, almost twice its average growth rate in the 1990s (The World Bank, 2012).

Yet, poverty and vulnerability were found to be on the rise at the time of the survey we use. Household surveys in Morocco (LSMS) show that the poor rose from 13.1 percent of the population in 1990/91 to 19 percent in 1998/99. Explanations of these high poverty figures can be found in sluggish GDP growth, drop in agricultural value-added after several droughts, collapse in employment creation and growing inequality in rural areas.

More recent data on poverty and labour market are scarce in Morocco.¹ However, according to the Morocco Household and Youth Survey (MHYS) from 2009/10 (The World Bank, 2012), 49 percent of Moroccan youth are neither in school nor in the workforce. In such circumstances, a crucial question is whether better education and training can lead to large earnings increases as is often the case in developing countries.²

In the following, we refer to figures pertaining to the time period of the survey data we collected for this study, that is the late nineties. About one third of the Moroccans were under 15 years old, while the decreasing fertility rate was still at 3.1 percent in 2000. Moreover, large inter-urban and rural-urban migrations took place. For these reasons, the Moroccan labour market was tight in peri-urban areas where many exporting firms were concentrated. However, although job searchers were abundant, skills were scarce. More than half the adults were illiterate, this proportion being much higher for women. According to census data, illiteracy even averaged 80 percent among rural adults aged 35-49 years in 2004 (The World Bank, 2012).

While half the population worked in agriculture, the Textile industry stood as a major employment sector (42 percent of industrial employment, 60 percent for female labour). Textile production increased by 7.75 percent per year between 1986 and 1998, and contributed to 11 percent of exports (Intermon, 2003). Most garment companies corresponded to small sized families where minimum wage, social security and legal contracts were not enforced. Meanwhile, a few modern firms accounted for the bulk of human capital investment in this sector. We focus on such firms and on electrical-mechanical companies, another pillar of the Moroccan exporting industry.

¹ The forthcoming data on the new household panel data survey conducted by the ONDH of Rabat are likely to relax this constraint.

²See for example Sahn and Alderman (1988) and Behrman (1999).

In Morocco, human capital and labour remuneration issues are stimulated by the intensifying international competition in the exporting sectors. The export-oriented restructuring of the Moroccan economy was initiated during the 1983 adjustment programme (Morrisson, 1991). Foreign trade liberalisation was fostered as early as 1986, culminating with several association agreements with the European Union (1995), the free trade agreement with the US (2004) and the building of a new industrial port in Tanger in 2005. Moreover, from 1989, a large privatisation programme of public firms went under way. In 2005, China entered the WTO, which generated fierce competition for Moroccan products in Europe, especially since the quotas of the multi-fibre agreement were simultaneously eliminated. These new threats on the Moroccan textile and other exporting firms had adverse consequences for employment and wages. In the textile sector, 75000 jobs were destroyed in 2005 in Morocco, and many firms shut down³. Only firms producing small series and luxury goods seem to be able to stand the Chinese competition, in the absence of modernisation. In 2006, Moroccan exports fell down to below six billions Euros. Although aggregate wages do not seem to have much suffered, wages in exporting firms have dropped.

In this situation, upgrading skills and human capital appears as one way of generating the required productivity gains in order to face competition. Cammett (2007) shows how upgrading in the apparel sector largely originates from industrialists and business associations, with subsequent state engagement.

In this paper, we concentrate on exporting firms, which are believed to be amongst the most efficient firms. As a matter of fact, inefficient firms cannot compete on international markets (Clerides, Lach and Tybout, 1998).

³ Nevertheless, the (controversial) official statistics show a drop in the general unemployment rate from 11 percent to 7.7 percent between 2005 and 2006.

2.2. Wage formation

In Morocco, the labour legislation underpins the level of wages. Unions enjoy a strong influence. Although the minimum wage (SMIG, *Salaire minimum interprofessionnel garanti*) is not enforced in the informal sector of the economy, it is much better implemented throughout the industrialised and unionized sectors. These workers are generally paid between 13 and 16 salary months per year, including bonuses.

The SMIG did not much affect wages during the 1980s, when real wages of the Moroccan manufacturing sector declined, while the real SMIG increased by about 25 percent. During the 1990s, the SMIG increments shadowed the shifts in the mean urban wage more than proportionally (The World Bank, 1994). Thus, the partial vanishing of the differential between mean urban wage and SMIG contributed to reducing wage dispersion. Besides, the 52 percent SMIG hike between 1989 and 1994 cannot be explained by the sole change in the cost of living (35 percent over this period). The monthly SMIG (1659 Dirhams⁴), which had not been updated since 1996, was raised by 10 percent in 2000.

A few authors studied the functioning of the labour market in Morocco. Lane, Hakim and Miranda (1999) underline the stagnation of the average wage in the manufacturing sector over the 1990s. They show that considerable gaps in average wages persist across sectors. The least remunerative industrial sectors are those of Leather and Confection, while the sectors of Drinks and Tobacco correspond to the higher mean wages which is more than three times higher in 1995 than those in the Confection Sector⁵. The least remunerative industries had the largest share of job creation during the past decade, which is believed to explain much of the wage stagnation.

⁴ 147 US dollars of 2001.

⁵ In the industrial sector, the annual average wage - ratio of mass salary to permanent employment - amounted in 1995 to 34 963 Dirhams, that is 2 914 monthly Dirhams.

2.3. Labour laws

Skills of the labour force and competition largely explain wage disparities across sectors (as in Clerides et al., 1998). Our data confirm this while other factors intervene, notably labour laws. Legally, the minimum wage is not applied to certain types of employees, such as young workers below 18 years old, temporary workers or trainees. Furthermore, in 1986, at least half the firms of the Moroccan private manufacturing sector and 40 percent of large companies over 100 employees pay unskilled workers an average wage below the SMIG⁶. Meanwhile, only 3 percent of firms in this sector pay skilled workers below the minimum wage.

The statutory frame of the Moroccan labour market is stiff. Until recently, working relations were governed by laws dating back to 1921 that strongly emphasized job security so that dismissing permanent workers was expensive⁷. The law provided for a 48-hours maximum workweek with no more than 10 hours a day, premium pay for overtime, paid public and annual holidays, and minimum conditions for health and safety, including prohibition of night work for women and minors.

The former labour code, combined with the slow pace of the law, contributed to making human resources management more expensive in Morocco (The World Bank, 1999). However, the recently adopted labour code (July 2003) encourages flexibility and conciliation. The new code reflects international conventions regarding the protection of children, women, handicapped people, workers and unions' rights.

Temporary workers bring flexibility to the Moroccan labour market, although this is acquired at the cost of employment stability and accompanying investment in human

⁶ See the World Bank (1994). Females are more likely than males to be paid a wage below the SMIG.

⁷ Workers are considered permanent when they can justify more than a year of job seniority.

capital (Lane et al., 1999)⁸. Job precariousness not only diminishes the worker's personal interest in her training in the firm, but also deters human capital investment from employers. Statistics from the *Direction de la Statistique* on the creation of industrial employment in 1995 exhibit the prominence of seasonal jobs at a rate of 80 percent. These jobs, contributing for 19 percent to total employment in the transformation industries, grew by 8 percent compared to 1994, while permanent jobs increased only by 1 percent. Moreover, many workers access the labour market through informal networks, frequently relying on family or personal links (El Aoufi, 1997; Lenoir, 2003). We now discuss the data used in the estimation.

3. The Moroccan matched worker-firm data

A survey at the employee's workplace was conducted to produce a sample of matched worker-firm data in Morocco⁹. The data include information on each worker in the surveyed firms: individual characteristics (matrimonial status, number of dependent children, geographic origin), wages, educational investment (years of schooling at the primary, secondary and upper levels, university or vocational degrees), post-school training (apprenticeship, internships, formal training within the current firm), experience in the labour market and occupation in the current firm. The data combine these workers' characteristics with the characteristics of the firms in which they work.

A sample of 187 individuals was interviewed during summer 1997 (Nordman, 2000). Year 1997 was an exceptionally good agricultural year, which stimulated the whole economy. The survey was completed in January 2000 when the employees of an additional

⁸ High welfare costs in the formal private sector (from 21.7 to 35 percent of gross wage) increased the cost of permanent workers and deterred firms of the informal sector of joining the formal economy.

⁹ The methodology of the Moroccan survey is further described in Nordman (2000) and Destré and Nordman (2002). Definitions and descriptive statistics of the variables used in this paper are in Tables 1 and 2 of the Appendix.

firm were included in the sample, which now amounts to 203 individuals matched with 8 firms. The firms were selected on criteria of size (not less than 50 employees), activity, vocation to export and capital ownership. Firms not exporting their production or foreign owned were not retained in the sample¹⁰. Employers have been asked about their firm's characteristics, including: workforce composition, work organization, training and communication practices, organizational or technical innovations, competitiveness. The observed occupational structure within each firm was used to constitute representative sub-samples of their workers. These surveyed workers were randomly chosen within each occupation strata and not less than 10 percent of the manpower was interviewed.

In these data, four firms belong to the Textile-clothing sector located in the Tanger area and four firms to the Mechanics, Metallurgical, Electrical and Electronics Industries (IMMEE or Electrical-Mechanical industries to shorten) in the Casablanca area. We therefore conduct a case study. However, a few summary statistics show that these firms exhibit relevant characteristics. The average size of the surveyed establishments is 230 employees. 54.1 percent of the employees work in the Textile sector and 45.9 percent in the IMMEE. The proportion of female in the overall worker sample amounts to 49.8 percent.

Tables 1 and 2 in the Appendix report descriptive statistics on the workers' characteristics and monthly wages. The mean schooling year is 9.8 years (standard deviation 9.7). It is calculated from the workers' questionnaires, using the available information on the highest level of education reached by the workers. When this variable is calculated from the age at the end of school, from which we deduct 6 years, the average number of years of schooling is close to 13 years. The education variable we use is net

¹⁰ The survey was designed to concentrate on Moroccan exporting firms, i.e firms belonging to the formal manufacturing sector of the Moroccan economy. The survey purpose was to investigate the conditions under which employees' workplace learning occurs and its association with the firms' organizational features. Therefore, firms with too few salaries were excluded from the investigation.

from repeated classes (accounting for the observed unsuccessful years of education¹¹) in order to avoid overestimating education¹². 5.4 percent of the workers have had no schooling, 16.7 percent have completed only primary education (1 to 5 years), 65.5 percent have reached an educational level of 6 to 12 years (secondary school) and 11.8 percent have completed studies in higher education. 33 percent of employees have a vocational diploma related to their current job.

The average tenure in the current firm is 6 years (4.3 years for females, 7.4 years for males). Total professional experience is on average 8.7 years (10 years for males, 6 years for females). Previous experience off the current job is on average 2.7 years (1.2 years for females, 3.9 years for males). 14 percent of the employees have worked in their firm for at least three years without any previous work experience. The large overall ratio of tenure to overall work experience, equal to 69 percent, is due to the presence of numerous young workers. Indeed, the average age of workers is 30 years, with six workers observed under 17 years old and none under 15 years old. 17 individuals are paid under the SMIG of 1996: 1659 Dirhams. Then, studied firms do not massively employ under age or pay below the SMIG, as sometimes mentioned for Morocco (Intermon, 2003).

Let us look at a few wage characteristics. The average monthly wage of the surveyed employees is 228 US dollars¹³, 1.3 times greater in the IMMEE. Moreover, the average male wage is 1.5 times higher than that of females. It has been claimed that training and experience are similarly remunerated across genders in the export textile industry (Bourquia, 1999). In general, differences in human capital endowments across gender and sector may contribute to explaining wage differentials. Indeed, the workers'

¹¹ Angrist and Lavy (1997) estimate the number of repeated classes at 2 to 3 years in Morocco. In our survey, this number is about 4 years and is calculated from the highest school certificate or diploma and the age at the end of studies.

¹² See on this point Behrman and Birdsall (1983).

¹³ The average monthly wage corresponds to 1.6 times the minimum wage (SMIG). The declared monthly wages are those of May and March 1997 for 90 percent of the sample and of December 1999 for the rest.

average education in the textile sector is 11.1 years against 15 years in the IMMEE. Given that the clothing sector is the lowest wage manufacturing sector in Morocco, the inter-industry wage differential could explain part of the gender wage gap. However, the proportion of female workers in the two sectors is similar. This reinforces the suspicion of wage discrimination against females even if female workers are generally less experienced.

4. The Model

Our estimation strategy is to use a simple recursive model in order to guide the data analysis, particularly in terms of the correlations between classical human capital accumulation, task organization, OJT and wage determination. We shall check that the estimated correlations are consistent with the expected signs according to our model. Another approach would have been to estimate a simultaneous model of task allocation, OJT and wage determination, relying on instrumental variables to ensure the identification of the effect of explanatory variables. Unfortunately, this approach, which we tried and rejected, is not possible with the small sample size and without exceptional instruments. In these conditions, using a recursive model is a tractable alternative approach. The recursive setting is assumed under the untestable assumption that there is no correlation of the errors of the different equations of interest since these equations correspond to (assumed) slightly lagged events. We work under this hypothesis, which constitutes a convenient device for extracting meaningful insight from limited data. Alternatively, instead of causal inferences, the results may be seen as reflecting mere correlations between variables, which is still of interest.

We model the data generating process (DGP) as resulting from four stages. First, we state some ‘initial conditions’ for firms and workers: education and other classical human capital endowments (i.e. former experience and tenure), industry (textile-clothing or IMMEE), worker’s sex, family situation (notably marital status and number of children). These conditions are permanent or long-term characteristics of the studied sample of workers and firms.

In a second stage, we consider that the firm chooses its task organization and its labour inputs, the latter either through recruitment or by allocating former workers to either former or new posts. These choices are likely to be heavily determined by the technology used in each industry. Only a few dimensions of these work organization decisions have been observed: whether each observed worker works in a production line, whether each observed worker performs her/his tasks in a team, whether each observed worker is a supervisor or an executive. These exclusive possibilities summarize our knowledge about the work organization in the firm. It is interesting to consider them at an early stage of the DGP as they are likely to determine the OJT that should be related to the worker’s role in the firm’s task organization, and therefore to the worker’s productivity and remuneration in this role.

In a third stage, the firm makes decisions about OJT for each worker, conditionally on their initial characteristics, and on the previous task organization decisions. Finally, at a last stage of the assumed DGP, each worker’s remuneration, observed as her/his wage, is determined as a function of: the initial conditions, its place in the firm’s work organization and the previous or actual OJT of the worker.

This recursive model provides us with an interpretation grid to deal with a topic not addressed in the literature: how work organization and OJT interact in the workplace and both contribute to salary determination?

In particular, we shall be able to:

- (1) Estimate the determinants of task organization and OJT, instead of considering them as predetermined;
- (2) Test if there is a role for task organization and OJT in wage determination, as opposed to the usual specification of wage equations where these aspects are implicitly assumed to have been ‘ironed out’ by the labour market.

However, since we deal with a one-period case study, we shall not be able to say much about precise causal relationship, sample selection and endogeneity problems – admittedly important issues – but beyond the reach of these data.

Let us turn with more details to the variables to include as correlates of the dependent variables at each stage of the model. Clearly, what we defined as ‘initial conditions’ may affect each of the stages as these variables describe the main characteristics of firms and markets. They include for each worker: sex, age, matrimonial situation, number of dependent children, geographical origin, education (number of years of schooling, Koranic school, illiterate, job-related – or not – vocational degree), former apprenticeship, former internship (relevant or not for the present job), tenure, off-firm experience, unemployment spells; and for the firm: firm dummy and activity sector. We avail of these variables to investigate the determination of stages two and three, i.e. task organization and OJT.

Finally, the wage equation cumulates most available explanatory variables, either as direct determinants, such as for the typical introduction of education, experience and tenure, or indirectly through task organization and OJT variables.

Although, we deal with a case study, one may wonder if the observed firms, more modern and export-oriented than many Moroccan firms, select or attract workers of higher

unobserved productivity or more motivated workers. We investigate the issue of sample selectivity by using a truncated regression model for wage equations.

$$(1) Y_{1i} = X_{1i}\beta_1 + u_{1i} \text{ if } Y_{1i} \geq Y_{2i}, \text{ and unobserved otherwise;}$$

$$(2) Y_{2i} = X_{2i}\beta_2 + u_{2i},$$

where Y_{1i} is the logarithm of the observed wage of each worker i while Y_{2i} denotes her unobserved logarithm of reservation wage.¹⁴ β_1 and β_2 are parameter vectors. X_{1i} and X_{2i} are two row-vectors describing worker's observable characteristics.

In our case, the number of dependent children allows us to identify the possible selectivity since some female workers with many children may choose not to work or to avoid modern firms with tight time schedule in order to instead take care of their children.¹⁵

We now move to the estimation results.

¹⁴ See Bougroum and Ibourk (1998) for discussions related to the reservation wage in Morocco.

¹⁵ While X_{1i} contains the usual covariates present in Mincer-type wage regressions, such as education, experience and training variables, X_{2i} also includes socio-demographic characteristics not present in X_{1i} (for example, the number of dependent children, marital status, and geographic origin such as rural or urban) that can be used to identify the reservation wage. As usual, we assume that $(u_{1i}, u_{2i}) \sim$

$$N\left(\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{bmatrix} \sigma_1^2 & \rho\sigma_1\sigma_2 \\ \rho\sigma_1\sigma_2 & \sigma_2^2 \end{bmatrix}\right).$$

Gaussian errors is a usual assumption shared with many methods for correction of self-selection in wage equations. The credibility of this assumption is enhanced by the introduction of a dummy for the proximity to the minimum wage that contributes to redressing irregularities in the lower tail of the error distribution. In this model, the first two truncated centred moments for the first equation can be written as $E(Y_{1i} | i \text{ unobserved}) = X_{1i}\beta_1 + \rho\sigma_1\varphi(X_{2i}b_2/\sigma_2)/\Phi(X_{2i}b_2/\sigma_2)$ and $V(Y_{1i} | i \text{ unobserved}) = \sigma_1^2 + (\rho\sigma_1)^2[-X_{2i}c_2\varphi(X_{2i}c_2)/\Phi(X_{2i}c_2) - (\varphi(X_{2i}c_2)/\Phi(X_{2i}c_2))^2]$, where $c_2 = b_2/\sigma_2$. Clearly, the generalised inverse Mills ratio (φ/Φ) in the first moment equation cannot be

exactly estimated since the non-participants are not observed in our data. However, since X_{2i} includes the number of dependent children (ENFT), we can use this variable to detect if selectivity affects wage estimation.

The role of ENFT in determining the generalised inverse Mills ratio is approximated by a polynomial of degree 5 in ENFT. Fisher tests of the joint significance of Powers of ENFT of order 1 to 5 are implemented from the results of quasi-generalised least-squares estimation, which are shown in Section 5.3.

5. The Results

5.1. Task organization

As mentioned before, better understanding of workers remuneration may be obtained by analysing organization inside the firm. We examine three exclusive tasks: work in production line, team work and supervision. An individual is considered as working in a team when he/she stated performing his/her tasks in collaboration with at least two other workers to be performing complementary tasks. Workers in production lines are attached to standalone workstation and are fully restricted by the rhythm of the production process on this workstation¹⁶.

Columns 1 to 6 of Table 3 present the estimation results of a multinomial logit model (MNL) where the base alternative is ‘working neither in production lines, nor in work teams, nor as a supervisor’. The estimated coefficients inform on the relative probabilities of the three considered types of task organization with respect to any other type. Hausman test results indicate that the hypothesis of independence of irrelevant alternatives is not rejected, which suggests that the MNL specification is appropriate. We show estimates with and without firm dummies (with a sector dummy instead, which is significant). However, we mostly comment the results with firm dummies. Indeed, introducing them much improves the model determination.

The relative probability of working in production lines is positively associated (significantly at the five percent level) with being female worker or belonging to firms 2

¹⁶ Another possible specification could have been to specify an ordered probit by considering that the tasks are ordered according to increasing skills: production line, then work team, then supervisor. However, this is not the chosen approach for two reasons. First, there is no necessary ordering between these tasks. For example, some team work, such as cleaning jobs in a factory, are not more skill-intensive than production line works. Second, the multinomial specification we use should broadly encompass an ordered specification. In that case, the ordered structure would somewhat be captured by the estimated coefficients of the multinomial model, which does not occur in our estimates. In particular, an ordered model would lead to rejection of the hypothesis of the independence of irrelevant alternatives, which is not the case in these data, as we discuss below.

and 3. It is significantly negatively associated with former relevant internship, apprenticeship, education years, and (at the 10 percent level) relative tenure (the ratio of tenure to firm age).

On the other hand, participation in team work is always significantly negatively related to relative tenure. It is also negatively related to working in the Textile-clothing sector when the corresponding dummy is included in the model. Finally, it is positively associated with belonging to firms 2 and 3.

On the whole, workers assigned to production lines or team work have lower human capital than workers assigned to other heterogeneous tasks, which generally require higher intellectual capacities in these firms. Unemployment spells seem to keep workers out of production line and team work, although it is unclear why. Perhaps higher unemployment rates exist in the corresponding occupations. Family circumstances do not seem to affect much the task allocation.

The relative probability of being assigned to supervision tasks is significantly negatively associated with unemployment spells; and significantly positively associated with former internships, relative tenure, education (at 10 percent level) and belonging to firms 2, 3, 5 and 6. These results are consistent with the substantial human capital required to fill these positions. Work supervision has been found more efficient in Morocco than in some Sub-Saharan countries, perhaps due to higher human capital of supervisors in Morocco (Fafchamps and Söderbom, 2006). Firms 1, 4 and 8 are associated with a significantly smaller probability of being executive or supervisor, everything else equal. These three firms are older than the average with, respectively, 46, 20 and 18 years of existence, while the sample mean is 17.6 years. Their workers are older and have more total experience than the workers in the other firms, perhaps justifying that they require less supervision. These firms have also fewer employees than the other firms of the sample

(respectively 104, 100 and 50 employees compared to 228 on average), which also diminishes supervision needs. Finally, they display the smallest proportions of employees allocated to production lines, which require close supervision.

These multinomial logit estimates reveal diverse determinants of task allocation. First, the technology used in the firm matters. Production lines are used in textile industry because the treated fibres need to be transformed in successive stages to obtain the final products. In this industry, each worker is responsible for a precisely delimited task and working in a team is rare. Meanwhile, the estimates elicit the role of workers' general education and vocational training. Particularly, former internship or apprenticeship would allow the workers to access jobs with higher skill intensity than jobs in production lines or teams. By contrast, low education workers have a greater probability of working in production lines. Also, in the considered sectors in Morocco, uneducated workers (often female) are typically employed in production lines. While these jobs are seen as little attractive, many workers are confined to them because of strict gender roles in the Moroccan labour context. Finally, having spent a relatively long time in the firm where the worker is observed seems to allow her to integrate work teams and to access supervision positions more easily.

5.2. On-the-Job Training

Promoting on-the-job training (OJT) seems to be a promising policy in Morocco. Indeed, investment in OJT allows the labour force to adjust to new international market demands faster than general education. This is important because trade liberalisation in Morocco may deplete wages in the traded good sector (Arbache, Dickerson and Green, 2004).

To investigate how OJT takes place, in the next stage of our recursive model, we estimate: (1) a Probit model of participation in OJT, and (2) a Tobit model of OJT duration. The independent variables include demographic characteristics associated with workers' preferences and family constraints, former education variables, which are again related to preferences while also to the worker's capability to attend additional training, relative tenure, experience off the firm, unemployment spells, and the previously analysed types of tasks (production line, team, supervisor) that may affect his/her selection for training in the firm. Firm dummies are not included in the probit models because a few firms use too little OJT to make firm-specific estimation reasonable. However, it remains possible to include firm dummies in the Tobit model. The results are reported in columns 1 to 3 of Table 4. In column 2, the workstation variables are crossed with the two main human capital variables (education and relative tenure) to test for differentiated effects across human capital levels.

The estimates presented in these three columns show that most included socio-demographic characteristics (age – not even included in the final specification, number of children and gender) and some labour market personal characteristics (internship, unemployment, relative tenure, being supervisor, proximity to SMIG – now omitted) have non-significant coefficients.

Working in the Textile-clothing sector appears to be clearly detrimental to OJT participation and OJT duration, while general education is positively correlated with OJT participation and duration. Indeed, Textile-clothing is little capital intensive, while unskilled labour intensive. Moroccan garment companies were very few to provide formal OJT in 1997. By contrast, the IMMEE sector is relatively human capital intensive, especially its electronics branch. It is therefore more prone to provide OJT, at a time when new technologies are being introduced.

Workers with large off-firm experience have fewer chances of being selected for OJT, and when they are, they benefit from a shorter training duration. It may be that only workers relatively new in the labour force are worth training. Experienced workers often already know the skills of the trade, or may have revealed mediocre learning capacity.

Interestingly, being married is negatively associated with OJT participation (at 10 percent level), while it has no significant effect on OJT duration. This result may come from the additional stress on time use caused by OJT sessions, which is hard to reconcile with an harmonious family life (Bourquia, 1999). In that sense, single workers may be more available for additional training.¹⁷

Two types of task organization significantly influence the OJT likelihood and duration: production line and team work. However, the impact of work organization (in column 2) on the OJT probability becomes really salient when it is allowed to vary according to the worker's education and relative tenure. Workers attached to work teams have more chances than average workers to receive OJT when their education level is high. On the other hand, more educated and tenured workers in production lines have more chances to receive OJT than other workers. So, what seems to matter for OJT selection is a minimal human capital threshold, associated with tasks involving co-workers in teams as well as tasks within production lines. By contrast, workers assigned to supervision tasks do not generally receive OJT, perhaps because they are already sufficiently skilled and knowledgeable¹⁸. On the whole, there is evidence, consistently with our recursive approach, that work organization affects OJT.

¹⁷ Because of the small sample size we avoid interacting the gender dummy with other coefficients in order to preserve degrees of freedom. Besides, we checked that incorporating many interacted terms only yielded more insignificant coefficients.

¹⁸ Note that crossed effects of human capital with task organization variables are insignificant in the Tobit model of OJT duration. Then, while OJT probability varies according to the workers' human capital and assigned task, their OJT duration does not.

5.3. Wages

We are now ready to comment the wage equation results, starting with a few words on selectivity tests discussed in Section 4. The added polynomial terms in the variable ‘number of children’, introduced to test selectivity, are found non-significantly different from zero (the P-values of the tests are respectively 0.125, 0.227 and 0.115 for the above-mentioned augmented equations corresponding to equations (1) to (5) in Table 5). Similar tests based on Weighed Least-Squares estimates to account for the possible presence of the variable ‘number of children’ in the variance of the truncated sample still yield stronger non-rejection of the hypothesis of no selectivity. These results suggest that there is no obvious evidence of selectivity bias in these data, provided fertility can be considered as sufficiently disconnected to human capital accumulation. We now comment the OLS estimates of the wage equations, omitting insignificant selectivity terms. These equations include OJT and task organization variables.

Column (1) reports the coefficient estimates obtained with a wage regression including a sector dummy while specifications (2) to (5) use firm dummies in lieu of the sector indicator. Introducing firm dummies, of which that of Firms 1, 2 and 3 have significant coefficients, substantially changes the estimates of the coefficients of tenure, and of some organization and training variables. This suggests that other coefficients may not be constant across firms, although such non-constant effects cannot be estimated with the small sample size. Then, the firm dummies model is our preferred specification.

One issue in OLS estimates is that human capital and training variables may be endogenous, yielding inconsistent estimates. Unfortunately, we do not avail of instrumental variables (IV) to deal with this problem. Besides, because of the small sample size, our attempts at estimating 2SLS versions of the OLS estimates produced altogether

insignificant results, useless for any inference purpose. There is just not enough information to use IV estimators in these data.

In the case of human capital variables, there is nothing that can be done to alleviate the endogeneity problem. However, how serious this problem is, remains unclear. Some authors end up suggesting that OLS estimates may often be superior to IV estimators in the absence of exceptional instruments that are very rarely found in empirical work (Card, 1999). We follow Card's approach.

Education, off-firm experience and relative tenure all positively affect wages. Though, the impact of relative tenure is decreasing with the tenure duration. The estimated effect is only 3-4% increase in wages with every year of education and 2.8% with one more year of off-firm experience. The returns to human capital seems to be a bit low regarding education, while high for off-firm experience. For example, four years of college would add between 12 to 16 percent to a worker's wage, not much more than working for four years prior to getting a job (4 time 2 to 3 percent).¹⁹ In columns (3) and (5), we report estimates excluding relative tenure since tenure cannot be well instrumented in these data. We find that while the estimated coefficient on the education variable diminishes when omitting tenure, the qualitative aspect of our main results – especially the coefficients on the OJT and task organization variables – remains unchanged. In particular, the duration of OJT has a strong positive impact on wages in specifications (2) to (5). However, neither former internship, nor former apprenticeship significantly affects wages in these data. Other worker characteristics influence wages. Female workers are significantly less paid than male workers (at the 10 percent level)²⁰. On the contrary, the proximity to the minimum wage does not seem to affect wage levels.

¹⁹ We also considered introducing years of schooling and off-firm experience in a non-linear fashion (adding squared terms) but obtained insignificant results.

²⁰ See Nordman (2004) for gender issues with these data and more broadly Nordman and Wolff (2009) for gender issues in the Moroccan manufacturing sector.

Let us now turn to the task organization variables. Working in a team or in a production line does not much affect remunerations, even when these variables are crossed by education level (specifications 4 and 5). By contrast, executives or supervisors are much better paid, as expected. On the whole, the impact of task organization variables on worker remuneration remains much less important than that of human capital characteristics in these data.

6. Conclusion

In this paper, we conduct a case study of the linkages of task organization, human capital accumulation and wages in Morocco using a matched worker-firm data of eight exporting firms in two industrial sectors. The interpretation of the results is carried through an hypothesized recursive model, representing task organization, on-the-job training (OJT) and remunerations as consequences of successive joint decisions of firms and workers.

The estimates of models of involvement in production lines, in team work, or in supervision tasks – our variables describing work organization in the firm – exhibit clear interactions of human capital accumulation with these occupation characteristics. Low human capital workers and workers without former internship and apprenticeship are more often confined to production lines than other workers. By contrast, high education, tenure, off-firm experience, former internship and the absence of unemployment spells are important factors to access executive or supervisor positions, characterized by high earnings levels.

OJT involvement appears to be constrained by three conditions: a relevant industrial location (textile firms require little formal OJT owing to task simplicity); minimal human capital (in the form of education, tenure or off-firm experience); and an appropriate family situation (single workers may adapt more easily to the time constraints

associated with OJT). Moreover, we find that task organization exerts differentiated effects on OJT participation, depending on the workers' schooling level. More educated and tenured workers in production lines or work teams have more chances to receive OJT than their poorly educated counterparts. In these data, the workers already occupying supervision positions do not generally participate in OJT.

Task allocations affect worker wages mostly because supervision tasks are much better remunerated than other tasks. However, the impact of task organization on wages may also take place through its influence on OJT, which contributes to raising wages. Overall, OJT is found to largely improve worker remunerations and seems often to be determined by previous task allocation. As a consequence, the Moroccan government could subsidize OJT to promote workers productivity and wages, notably for workers employed in teams or in production lines. In that way, OJT may contribute to firm responses to the new international competition. However, what our estimates show is that OJT participation and assignment to tasks liable to require OJT is somewhat conditional on the workers already reaching a minimum human capital level, whether in terms of professional experience or education.

Our results suggest policy implications, although caution should be taken not to extrapolate results for a few firms to the whole Moroccan manufacturing or more broadly. It has been observed that in Morocco of the 1990s the stagnation of earnings was attributable to the growth of the low-paying sector of the economy, and this may still be valid nowadays. On the other hand, at this period, only four percent of the Moroccan firms engaged in formal training, whereas earnings and productivity in such firms were much higher.

Technical change and intensifying competition due to trade liberalization imply more advanced skills and higher productivity from workers. Skills upgrade is also

important for social policy so as to enhance the earnings of destitute populations in Morocco, who are increasingly politically active as recent unrest has shown.

In these conditions, the private sector may crucially contribute to overhauling the labour force skills through OJT programmes. This is important because the public educational system is not adequately responding to the needs of the productive system, as emphasized in Achy (2005). We also found that OJT is partly determined by a minimum education level of the trained workers. Sustainable OJT programmes should be supported by the public education system, e.g. through vocational and technical institutes. Subsidies to stimulate within-firm OJT programmes may also be useful if they lead firms to substantially raise their training initiatives.

The government could co-ordinate long-run general education policies with policies addressing vocational training since both OJT and education affect wages that are closely related to productivity. What seems to be needed is therefore a joint policy of education and OJT promotion. This would involve better coordination of labour training policies, which are currently led separately by the Ministry of education and the OFPPT in Morocco (*Office de la Formation Professionnelle et de la Promotion du Travail*).

Public aid to OJT could benefit from being designed so that it answers genuine industrial needs in a way that accounts for the relevant technological and family constraints. For example, training female workers may be efficient if those workers can be relieved from some of their domestic tasks and if mentalities about gender roles can evolve.

Our results exhibit the dependence of task organization and on-the-job training on the general education process. There is also a growing interest in workplace learning processes, described as ‘informal’ in the literature. Several studies show that the impact of

training is greater on the firm performances when training takes place in connection with changes in work organization and employment structures (Black and Lynch, 1996; Fleisher, Dong and Liu, 1996). In a Moroccan context of swift opening to international competition, exporting Moroccan firms would gain from better knowledge of the simultaneous determinants of classical human capital accumulation, OJT and task organization practices²¹. This paper is a first step in the exploration of these complex issues, which would require the constitution of large databases covering all these dimensions.

²¹ As in Bresnahan, Brynjolfsson and Hitt (2002).

References

- Abowd, J.M. and F. Kramarz (1999), "The Analysis of Labor Markets Using Matched Employer-Employee Data," in Ashenfelter O. and Card D. (eds), *Handbook of Labor Economics*, vol. 3B, Elsevier Science Publishers BV, Netherlands, pp. 2629-2710.
- Achy, L. (2005), "Labor Market and Growth in Morocco," Working Paper Labor and Demography 05122007, EconWPA.
- Aitken, B. and A. Harrison (1999), "Are There Positive Spillovers from Direct Foreign Investment?: Evidence from Panel Data for Morocco," *American Economic Review*, 42, pp. 51-74.
- Angrist, J. D. and V. Lavy (1997), "The Effect of a Change in Language of Instruction on the Returns to Schooling in Morocco," *Journal of Labor Economics*, 15(1), pp. S48-S76.
- Arbache, J. S., A. Dickerson and F. Green (2004), "Trade Liberalisation and Wages in Developing Countries," *The Economic Journal*, 114, F73-F96, February.
- Benhayoun, G. and S. Bazen (1995), "Salaire-éducation au Maroc," *Région et Développement*, 1, pp. 123-137.
- Behrman, J. R. and N. Birdsall (1983), "The Quality of Schooling: Quantity Alone Is Misleading," *American Economic Review*, 73(5), pp. 928-946.
- Behrman, J.R. (1999), "Labor Markets in Developing Countries," Chapter 43 in O. Ashenfelter and D. Card (eds.), *Handbook of Labor Economics*, Elsevier.
- Black, S. and L. Lynch (1996), "Human Capital Investments and Productivity," *American Economic Review*, 86(2), pp. 263-267.
- Boughzala, M. (1997), "Les effets du libre-échange sur la main-d'œuvre : le cas de la Tunisie et du Maroc," *Revue Internationale du Travail*, 136(3), pp. 413-437.
- Bougroum, M. and A. Ibourk (1998), "La pertinence du salaire de réserve comme facteur explicatif d'accès à l'emploi : une application à des données longitudinales marocaines," *Annales Marocaines d'Économie*, 22-23, pp. 241-257.
- Bourquia, R. (1999), "Genre et emploi dans l'industrie textile marocaine," Paper No. 11, Programme Area : The Social Effects of Globalization, United Nations Research Institute for Social Development.
- Bresnahan, T.F., E. Brynjolfsson and L.M. Hitt (2002), "Information Technology, Workplace Organization, and the Demand for Skilled Labor: Firm-Level Evidence," *Quarterly Journal of Economics*, 339-376, February.
- Cammett, M. (2007), "Business-Government Relations and Industrial Change: The Politics of Upgrading in Morocco and Tunisia," *World Development*, Vol. 35, No. 11, 1889-1903.
- Card, D. (1999), "The Causal Effect of Education on Earnings," in Ashenfelter O. and Card D. (eds), *Handbook of Labor Economics: Volume 3*, Amsterdam: Elsevier.
- Caroli, E., Greenan, N., and Guellec, D. (2001), "Organizational Change and Skill Accumulation," *Industrial and Corporate Change*, 10(2), pp. 481-506.

- Clerides, S.K., S. Lach and Tybout J.R. (1998), "Is Learning by Exporting Important? Micro-Dynamic Evidence from Columbia, Mexico, and Morocco," *The Quarterly Journal of Economics*, 113(3), pp. 903-947.
- Currie, J. and A. Harrison (1997), "Sharing the Costs: The Impact of Trade Reform on Capital and Labor in Morocco," *Journal of Labor Economics*, 15(3), pp. S44-S70.
- Destré, G. and C. Nordman (2002), "Les effets de la formation informelle sur les gains : une comparaison sur données appariées françaises, marocaines et tunisiennes," *L'Actualité Économique*, 78(2), pp. 179-205.
- El Aoufi, N. (1997), "Les configurations sociales de l'entreprise marocaine : dilemme de l'emploi ou dilemme de l'entreprise ?," *Annales Marocaines d'Économie*, 18-19, pp. 13-38.
- Fafchamps, M. and M. Söderbom (2006), "Wages and Labor Management in African Manufacturing," *Journal of Human Resources*, 41(2), pp. 346-379.
- Fleisher, B.M., K. Dong and Y. Liu (1996), "Education, Enterprise Organization and Productivity in the Chinese Paper Industry," *Economic Development and Cultural Change*, 44(3), pp. 571-587.
- Greenan, N. and Guellec, D. (1994), "Coordination Within the Firm and Endogenous Growth," *Industrial and Corporate Change*, 3(1), pp. 173-198.
- Haddad, M. (1993), "The Link Between Trade Liberalization and Multi-Factor Productivity: The Case of Morocco," World Bank Discussion Paper No. 4, World Bank, Washington, D.C.
- Intermon (2003), "Working Conditions in Morocco", Internet document, May.
- Lane, J., G. Hakim and J. Miranda (1999), "Labor Market Analysis and Public Policy: The Case of Morocco," *The World Bank Economic Review*, 13(3), pp. 561-578.
- Lenoir, M. (2003), "L'insertion professionnelle des diplômés marocains : le cas de la Faculté Hassan II Ain Chock," in Henri Regnault (ed.), *Intégration euro-méditerranéenne et stratégies économiques*, Harmattan, Paris.
- Lindbeck, A. and Snower D. J. (2000), "Multitask Learning and the Reorganization of Work: From Tayloristic to Holistic Organization", *Journal of Labor Economics*, 18(3), pp. 353-376.
- Martins, P.S. and P.T. Pereira (2004), "Does Education Reduce Wage Inequality? Quantile Regression Evidence from 16 Countries," *Labour Economics*, 11, pp. 355-371.
- Morrisson, C. (1991), "Adjustment, Incomes and Poverty in Morocco," *World Development*, Vol. 19, No. 11, 1633-1651.
- Nordman, C. (2000), "La formation sur le tas par diffusion du savoir : estimations sur données marocaines et mauriciennes," *Revue d'Économie du Développement*, 4, pp. 79-103.
- Nordman, C. (2004), "Discrimination salariale, capital humain et structure des tâches selon le genre : l'apport de données liées employeurs-employés au Maroc et en Tunisie," in Laufer J., Marry C., Maruani M., Meulders D., Sofer C. et al. (eds), *Marché du travail et genre : Maghreb-Europe*, Chapter 2, Brussels Economic Series, Editions du Dulbéa, Brussels.

- Nordman, C. and F-C. Wolff (2009), "Is There a Glass Ceiling in Morocco? Evidence from Matched Worker-Firm Data," *Journal of African Economies*, 18(4), pp. 592-633.
- OECD (1999), "New Enterprise Work Practices and their Labour Market Implications," *Employment Outlook*, Chapter 4, June, Paris.
- Osterman, P. (2000), "Work Reorganization in an Area of Restructuring: Trends in Diffusion and Effects on Employee Welfare," *Industrial and Labor Relations Review*, 53(2), pp. 179-196.
- Royaume du Maroc (2004), Ministère de l'Industrie, du Commerce, de l'Energie et des Mines, "Le Secteur Manufacturier Marocain à l'Aube du 21^{ème} Siècle," Rabat.
- Sahn, D.E. and Alderman H. (1988), "The Effects of Human Capital on Wages and the Determinants of Labor Supply in a Developing Country," *Journal of Development Economics*, 29, pp. 157-183.
- Thesmar, D. and Thoenig, M. (2000), "Creative Destruction and Firm Organization Choice," *Quarterly Journal of Economics*, 115(4), pp. 1201-1237.
- The World Bank (1994), *Royaume du Maroc vers le 21^e siècle : renforcement du secteur privé au Maroc*, Report #11894-MOR, Washington D.C.
- The World Bank (1996), *Une croissance plus forte, des opportunités d'emploi : des choix à faire pour le Maroc*, Études Économiques de la Banque Mondiale sur le Moyen-Orient et l'Afrique du Nord, Washington D.C.
- The World Bank (1999), *Private Sector Assessment Update: Fulfilling the Promise of Private Sector-Led Growth*, Report n°19975-MOR, Washington D.C.
- The World Bank (2001), *Kingdom of Morocco: Poverty Update*, Vol. I: Main Report, Report No. 215-MOR, March 30.
- The World Bank (2012), *Kingdom of Morocco: Promoting Youth Opportunities and Participation*, Report No. 68731-MOR, June.

APPENDIX

Table 1. Descriptive statistics of the workers' characteristics

<i>Number of observations</i>	203			
	<i>Mean</i>	<i>Std dev.</i>	<i>min</i>	<i>max</i>
Age of individual (AGE)	30.41	8.23	16	59
Sex (FEMALE, 1: female; 0 male; conversely for MALE)	0.46	0.50	0	1
Geographical origin (PROVE, 1: rural area; 0 otherwise)	0.82	0.37	0	1
Matrimonial status (MARI, 1: if married; 0 if divorced, widowed or single)	0.42	0.49	0	1
Number of dependent children (ENFT)	0.79	1.36	0	7
Individual never went to school (ANALPHA, 1: yes; 0 otherwise)	0.05	0.22	0	1
Individual went to Koranic school only (KORAN, 1: yes; 0 otherwise)	0.10	0.30	0	1
Years of completed schooling (EDUCATION)	9.78	9.78	0	18
Previous apprenticeship in a firm (APPRENTI, 1: yes; 0 otherwise)	0.18	0.38	0	1
Years of internship related to the current job (STAGA)	0.14	0.33	0	2
Years of internship not related to the current job (STAGAN)	0.06	0.29	0	2
Vocational degree related to the current job (ETUTPA; 1: yes; 0 otherwise)	0.33	0.47	0	1
Vocational degree not related to the current job (ETUTP; 1: yes; 0 otherwise)	0.13	0.34	0	1
Unemployment spells (in years, CHOMA)	1.53	2.28	0	10
Previous relevant experience (EMSIM, 1: yes; 0 otherwise)	0.46	0.50	0	1
Previous off firm potential professional experience (EXPERIENCE, in years)	5.49	7.12	0	49.08
Starting date in the current firm (ENTREE)	1990.69	5.11	1975	1998
Tenure in the current firm (TENURE, in years)	6.00	5.30	0	21.25
Formal On-the-Job Training in the current firm (FORMAD ; 1: yes; 0 otherwise)	0.30	0.45	0	1
Formal On-the-Job Training in the current firm (FORMAA, in years)	0.12	0.249	0	2
Work in team (EQUIPE, 1: yes; 0 otherwise)	0.41	0.49	0	1
Work in production lines (LINE, 1: yes; 0 otherwise)	0.15	0.36	0	1
Executive or supervisor (ENCADR, 1: yes; 0 otherwise)	0.24	0.42	0	1
Proximity to the minimum wage (SMIG, 1: if 1600<=SAL<=1700; 0 otherwise)	0.17	0.37	0	1
<i>Firms' fixed effects</i>				
Firm 1	0.079	0.270	0	1
Firm 2	0.197	0.399	0	1
Firm 3	0.143	0.351	0	1
Firm 4	0.133	0.340	0	1
Firm 5	0.167	0.374	0	1
Firm 6	0.099	0.299	0	1
Firm 7	0.103	0.305	0	1
Firm 8	0.079	0.270	0	1

Table 2. Descriptive statistics of monthly wages (in dirhams)

<i>Number of observations</i>	203			
	<i>Mean</i>	<i>Std dev.</i>	<i>min</i>	<i>max</i>
Monthly wage	2689	2019	750	20000
Monthly wage in IMMEE	3101	1930	750	12000
Monthly wage in Textile-clothing	2281	2030	750	20000
<i>Mean wage in:</i>				
Firm 1 (IMMEE)	4586	3237	2200	12000
Firm 2 (IMMEE)	2337	1120	750	7500
Firm 3 (IMMEE)	3398	1791	1700	9000
Firm 4 (Textile-clothing)	2192	761	1150	5000
Firm 5 (Textile-clothing)	1974	813	750	5000
Firm 6 (Textile-clothing)	1888	519	1500	3500
Firm 7 (Textile-clothing)	3267	4168	1040	20000
Firm 8 (IMMEE)	2984	1015	1250	4500

Table 3. Multinomial Logit Models of Task Allocation

Dependent variable: POSTE (production line=1; work team=2; exe./super.=3)

	with sector dummy			with firm dummies		
	(1) production line	(2) work team	(3) executive /super.	(4) production line	(5) work team	(6) executive /super.
Dummy for female	3.9485*** (3.42)	0.1751 (0.15)	1.0783*** (2.70)	2.5532** (2.36)	0.3464 (0.55)	-0.5753 (0.58)
Matrimonial situation (MARI)	-0.2004 (0.20)	-2.0739 (1.58)	-0.0505 (0.07)	0.0039 (0.00)	-1.3103 (1.48)	0.0652 (0.07)
Number of dependent children (ENFT)	-0.3144 (0.88)	-0.0477 (0.15)	0.0269 (0.10)	-0.1883 (0.97)	-0.0872 (0.40)	0.3919 (1.15)
Years of completed schooling (EDUCATION)	-0.4726*** (4.21)	-0.3611*** (4.05)	0.1289 (0.97)	-0.5295*** (4.67)	-0.1307 (1.55)	0.3061* (1.85)
Former apprenticeship (APPRENTI)	-2.0650*** (3.37)	-1.2744 (1.18)	0.0786 (0.13)	-1.8628*** (2.99)	-1.1117 (1.23)	0.5021 (0.68)
Job related vocational degree (ETUTPA)	-0.0340 (0.04)	-0.2763 (0.21)	0.7889 (1.10)	0.6207 (0.71)	-0.2479 (0.23)	0.7231 (0.72)
Former work-relevant internship (STAGA)	-1.6934*** (2.61)	0.5823 (1.05)	1.1472* (1.82)	-1.7786*** (3.59)	0.6490 (1.04)	2.0645** (2.11)
Unemployment spells (CHOMA)	-0.1863 (1.17)	0.0113 (0.05)	-0.2343*** (3.02)	-0.2241** (2.14)	-0.0927 (0.53)	-0.2924*** (3.14)
Relative tenure (TENURE / firm age = PANCIE)	-1.0276 (1.29)	-2.5563*** (3.80)	1.5297** (2.17)	-1.5825* (1.68)	-1.4458** (2.25)	3.7510*** (3.50)
Off firm experience (EXPERIENCE)	-0.0370 (0.65)	-0.0394 (0.38)	0.0465 (0.96)	-0.0513 (1.11)	-0.0014 (0.02)	0.1090 (1.54)
Dummy for Textile-clothing	0.7555 (0.73)	-3.9145*** (3.56)	0.1473 (0.15)			
Firm 2				3.1253*** (3.13)	1.7655** (1.99)	4.9771*** (3.13)
Firm 3				-0.1492 (0.22)	1.7127** (1.97)	3.8358*** (4.12)
Firm 5				1.8706*** (3.03)	-0.0963 (0.15)	4.1890*** (7.24)
Firm 6				0.8583 (1.57)	-0.4784 (0.57)	5.2357*** (3.81)
Constant	4.7260*** (2.60)	6.4747*** (5.50)	-3.3188*** (2.63)	5.4494*** (3.89)	1.6590 (1.25)	-9.2027*** (3.73)
Observations	195	195	195	195	195	195
Log likelihood		-156.2			-147.1	
Pseudo R-squared		0.40			0.45	
Hausman tests of IIA: H ₀ "Odds are independent of other alternatives" (chi2)	1.52	0.39	1.64	2.69	-1.30	0.99
Observations		203			203	

Absolute values of robust z statistics to firm clustering are in parenthesis. *, ** and *** mean significant at 10%, 5% and 1% respectively. In the MNL model, the reference group is made of individuals working neither in production lines, nor in work teams, nor as supervisor or executive (23% of the sample). The estimates are weighted by the inverse probability that workers are surveyed within each firm.

Table 4. Participation and Duration in On-the-Job Training

	Probit of participation in past or current OJT (FORMAD) (1)	Probit of participation in past or current OJT (FORMAD) (2)	Tobit of duration of past or current OJT (FORMAA) (3)
Dummy for female	0.0981 (0.27)	0.1528 (0.40)	-0.0219 (0.20)
Matrimonial situation (MARI)	-0.6877* (1.90)	-0.7424* (1.76)	-0.2559 (1.51)
Number of dependent children (ENFT)	0.1007 (0.63)	0.0814 (0.55)	0.0917 (1.35)
EDUCATION	0.2888*** (6.26)	0.1258** (2.42)	0.0635** (2.35)
Job related vocational degree (ETUTPA)	-0.3930 (0.85)	-0.2680 (0.60)	-0.1380* (1.97)
Former work-relevant internship (STAGA)	0.1856 (0.37)	0.3914 (0.91)	0.1963 (0.60)
Unemployment spells (CHOMA)	0.1141 (0.94)	0.1240 (1.44)	0.0550 (1.04)
TENURE / firm age (PANCIE)	0.5365 (1.15)	0.3477 (0.55)	0.0148 (0.08)
Off firm experience (EXPERIENCE)	-0.0928*** (3.22)	-0.0805*** (3.21)	-0.0649*** (2.48)
Dummy for Textile-clothing	-1.5673*** (3.65)	-1.5265*** (3.52)	
Dummy for executive/supervisor (ENCADR)	0.3646 (1.10)	0.6325 (1.57)	0.1896 (1.34)
Dummy for production line (CHAINE)	0.9105** (2.23)	-4.0310*** (3.72)	0.0775** (2.10)
Dummy for work team (EQUIPE)	0.6569 (1.47)	-1.4552 (1.08)	0.1377 (1.09)
EDUCATION*CHAINE		0.3852*** (4.59)	
PANCIE*CHAINE		1.5989** (2.32)	
EDUCATION*EQUIPE		0.1902** (2.35)	
PANCIE*EQUIPE		-1.3221 (1.41)	
Firm 1			0.6980*** (4.35)
Firm 2			0.4858*** (3.63)
Firm 7			0.0325 (0.25)
Constant	-3.6454*** (3.99)	-1.6583** (1.99)	-0.9757** (2.33)
Observations	203	203	203
Pseudo R-squared	0.55	0.58	0.52

Absolute values of robust z statistics to firm clustering are in parentheses. *, ** and *** mean significant at 10%, 5% and 1% respectively. In column (3), there are three firm dummies included because only four firms provide OJT. The estimates are weighted by the inverse probability that workers are selected within firms. APPRENTI dropped because no apprentices received OJT.

Table 5. Log Monthly Wage Equations

	OLS with sector dummy	OLS with firm dummies	OLS with firm dummies	OLS with firm dummies	OLS with firm dummies
	(1)	(2)	(3)	(4)	(5)
Dummy for female	-0.2275* (-2.35)	-0.1494 (-1.88)	-0.1672** (-3.02)	-0.1568* (-2.02)	-0.1704** (-3.16)
EDUCATION	0.0251 (1.87)	0.0385*** (4.45)	0.0262* (2.27)	0.0455*** (3.56)	0.0320* (2.00)
Former work-relevant internship (STAGA)	0.1622 (1.37)	0.1589 (1.25)	0.1504 (1.09)	0.1584 (1.28)	0.1428 (1.06)
Former apprenticeship (APPRENTI)	0.0481 (0.56)	0.0636 (0.78)	0.0592 (0.80)	0.0764 (0.90)	0.0698 (0.90)
Proximity to the minimum wage (SMIG)	-0.0098 (-0.11)	0.0533 (0.94)	-0.0248 (-0.32)	0.0472 (0.80)	-0.0268 (-0.33)
Unemployment spells (CHOMA)	-0.0281** (-2.57)	-0.0242* (-1.92)	-0.0207 (-1.53)	-0.0240* (-2.07)	-0.0209 (-1.64)
TENURE / firm age (PANCIE)	0.4660*** (4.99)	0.7279*** (5.31)		0.7203*** (5.11)	
PANCIE squared	-0.2120*** (-3.77)	-0.2814*** (-3.66)		-0.2668** (-3.29)	
Off firm experience (EXPERIENCE)	0.0284** (3.36)	0.0282** (3.25)	0.0280** (3.20)	0.0292** (3.20)	0.0282** (3.06)
EXPERIENCE squared	-0.0004* (-1.92)	-0.0003 (-1.51)	-0.0004* (-1.99)	-0.0004 (-1.48)	-0.0004 (-1.75)
Dummy for executive/supervisor (ENCADR)	0.3157*** (4.08)	0.3334*** (3.74)	0.3935*** (4.35)	0.3148** (3.29)	0.3845*** (4.00)
Dummy for production line (CHAINE)	-0.0495 (-1.25)	0.0087 (0.14)	-0.0185 (-0.25)	0.1353 (0.84)	0.0644 (0.37)
Dummy for work team (EQUIPE)	-0.0111 (-0.14)	-0.0796 (-1.23)	-0.1459 (-1.83)	0.0309 (0.13)	0.0913 (0.32)
EDUCATION*CHAINE				-0.0138 (-1.08)	-0.0087 (-0.61)
EDUCATION*EQUIPE				-0.0098 (-0.52)	-0.0209 (-0.97)
On-the-Job Training duration (FORMAA)	0.2190 (1.28)	0.2643*** (6.25)	0.3040*** (5.18)	0.2693*** (6.05)	0.3018*** (5.13)
Dummy for Textile-clothing	-0.1522 (-1.28)				
Firm 1		0.3667*** (7.64)	0.4022*** (6.98)	0.3584*** (8.25)	0.4163*** (6.92)
Firm 2		-0.1885*** (-6.07)	-0.0131 (-0.36)	-0.1732*** (-6.45)	-0.0004 (-0.01)
Firm 3		0.3749*** (14.05)	0.4600*** (21.80)	0.3681*** (14.02)	0.4549*** (20.10)
Firm 4		-0.0276 (-0.45)	0.0566 (0.95)	-0.0323 (-0.54)	0.0624 (1.06)
Firm 5		0.0023 (0.08)	0.0396 (1.36)	-0.0008 (-0.03)	0.0423 (1.35)
Firm 7		-0.0576 (-1.17)	0.1081** (2.73)	-0.0697 (-1.33)	0.1090** (2.60)
Firm 8		0.0439 (0.86)	0.2591*** (5.27)	0.0382 (0.72)	0.2565*** (5.06)
Constant	7.3702*** (26.66)	6.9527*** (42.65)	7.2174*** (38.71)	6.8801*** (34.83)	7.1542*** (30.39)

Observations	203	203	203	203	203
R-squared	0.59	0.71	0.65	0.71	0.65

Absolute values of robust t statistics to firm clustering are in parentheses. *, ** and *** mean significant at 10%, 5% and 1% respectively.