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# Task Organization, Human Capital and Wages in Moroccan Exporting Firms

by

**Christophe Muller**
and
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**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 use 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**

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## Outline



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# Introduction

### 1.1. The issues

In this case study, we examine how task organization interacts 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 affects these mechanisms is generally neglected.
In this paper, we scrutinize the interrelationships between task organization, human capital accumulation, on-the-job training and wages. For this, we use a matched worker-firm data set 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. Human capital accumulation in firms 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, 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 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 last decade, social indicators much improved following public social expenditure and better

focus of social policies on rural areas (The World Bank, 2001). Yet, poverty and vulnerability were found to be on the rise. 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. 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 (Sahn and Alderman, 1988; Behrman, 1999).

About one third of the Moroccans are under 15 years old, while the decreasing fertility rate is still at 3.1 percent in 2000. Moreover, large inter-urban and rural-urban migrations take place. For these reasons, the Moroccan labour market is tight in peri-urban areas where many exporting firms are concentrated. However, although job searchers are abundant, skills are scarce. More than half the adults are illiterate, this proportion being much higher for women.
While half the population works in agriculture, the Textile industry stands as a major employment sector (42 percent of industrial employment, 60 percent for female labour). Textile production has increased by 7.75 percent per year between 1986 and 1998, and contributes to 11 percent of exports (Intermon, 2003). Most garment companies correspond to small sized families where minimum wage, social security and legal contracts are not enforced. Meanwhile, a few modern firms account 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.
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 impulsed 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-fiber agreement were simultaneously eliminated. These new threats on the Moroccan textile and other exporting firms had adverse consequences for employment and wages. Just in the textile sector, 75000 jobs were destroyed in 2005 in Morocco, and

many firms shut down. 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 REFERENCE TROP ANCIENNE POUR ETRE VALABLE AUJOURDHUI.

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 comes from industrialists and business associations, with subsequent state engagement.

In this paper, we concentrate on exporting firms, 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).

**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 well 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 Dirhams), 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 more than three times higher in 1995 than those in the Confection Sector. The least remunerative industries had the largest share of job creation during the past decade, which may explain some of the wage stagnation.

**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. Indeed, 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 SMIG. 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 1921 that strongly emphasized job security so that dismissing permanent workers was expensive. 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 capital (Lane et al., 1999). 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 Morocco. 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.

187 individuals were interviewed during summer 1997 (Nordman, 2000). 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 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 sample. 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 from repeated classes (accounting for the observed unsuccessful years of education) in order to avoid overestimating education. 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 dollars, 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' 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, on-the-job training (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 approach works because it assumes that there is no correlation of the errors of the different equations of interest since these equations correspond to (assumed) slightly lagged events.

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 gender, 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 by new recruitments or by allocating former workers to 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 executive. These exclusive possibilities summarize our knowledge about 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.

At a third stage, the firm makes a decision about OJT for each worker, conditionally on their initial characteristics, and the previous task organization decisions.

Finally, at a last stage of the assumed DGP, the worker 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: gender, age, matrimonial situation, number of

dependent children, geographical origin, education (number of years of education, 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 2 and 3, 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 the following truncated regression model for wage equations:

(1) $Y_{1i} = X_{1i}\beta_1 + u_{1i}$ if $Y_{1i} \geq Y_{2i}$, 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. $\beta_1$ and $\beta_2$ are parameter vectors. $X_{1i}$ and $X_{2i}$ are two row-vectors describing worker's observable characteristics. 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. 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.

We assume that $(u_{1i}, u_{2i}) \sim N\left(\begin{pmatrix}0\\0\end{pmatrix}, \begin{bmatrix}\sigma_1^2 & \rho\sigma_1\sigma_2\\ \rho\sigma_1\sigma_2 & \sigma_2^2\end{bmatrix}\right)$.

This model is based on two assumptions driving the identification of the sampling truncation process. First, the error term is assumed to be normal, 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. Second, we assume that the number of dependent children can be used to identify the reservation wage (or alternative wage) of which comparison with the current wage determines the data truncation.

In this model, the first two truncated centred moments for the first equation can be written as

$E(Y_{1i} \mid i \text{ unobserved}) = X_{1i}\beta_1 + \rho\sigma_1\varphi(X_{2i}b_2/\sigma_2)/\Phi(X_{2i}b_2/\sigma_2)$ and

$V(Y_{1i} \mid i \text{ unobserved}) = \sigma_1^2 + (\rho\sigma_1)^2[-X_{2i}c_2\,\varphi(X_{2i}c_2)/\Phi(X_{2i}c_2)-(\varphi(X_{2i}c_2)/\Phi(X_{2i}c_2))^2]$,

where $c_2 = b_2/\sigma_2$. Clearly, the generalised inverse Mills ratio ($\varphi/\Phi$) 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. Indeed, the role of ENFT in determining the generalised inverse Mills ratio can be approximated by a polynomial in ENFT. To allow for sufficient approximation, we use a polynomial of degree 5. Powers of ENFT of order 1 to 5 are thus added to the estimated equations and Fisher tests of their joint significance are implemented from the results of quasi-generalised least-squares estimation, which are shown in Section 5.3. We now move to the estimation results.

# 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 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 workstation.

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

On the other hand, the 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 and team work show lower human capital than workers assigned to other heterogeneous tasks that mostly require higher intellectual capacities in these firms. Even unemployment spells seem to allow workers to keep workers out of these tasks characterised by boredom and strenuousness, perhaps because these spells are the sign of some past experience even of mediocre quality. Family circumstances do not seem to affect much task allocation.

The relative probability of being assigned to supervision tasks is significantly negatively associated with unemployment spells; and significantly positively to 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 necessary to occupy 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 as compared to 228 on average), which also diminishes supervision needs. Finally, they display the smallest proportions of employees allocated to production line, a task system that requires close supervision.

The MNL 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 the educational and training characteristics of workers. Particularly, former internship or apprenticeship would allow the worker to access jobs with higher skill intensity than posts 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 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 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 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, 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 the 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 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, hard to reconcile with harmonious family life (Bourquia, 1999). In that sense, single workers may be more available for additional training.

Two types of task organization significantly influence OJT probability 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 and production lines. The education threshold is notably important for production line workers who have lower probability of OJT participation than average, when they are not educated. By contrast, workers assigned to supervision task do not generally receive OJT, perhaps because they are already sufficiently skilled and knowledgeable. On the whole, there is evidence, consistently with our recursive approach, that work organization affects OJT.

These results suggest that the government could co-ordinate long run general education policies with policies addressing vocational training if both OJT and education affect wages. 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.

**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 compelling evidence of selectivity bias in these data. 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 the firms 1, 2 and 3 have significant coefficients, substantially changes the estimates of the coefficients of tenure, and of some organization and training variables. 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 massively and positively affect wages. The impact of relative tenure is decreasing with the tenure duration. However, the small sample size prevent implementing instrumentation of these human capital variables. In columns (3) and (5), we thus report estimates excluding relative tenure. We find that while the estimated coefficient on the education variable diminishes without information on 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 wage levels in specifications (2) to (5). However, neither former internship, nor former apprenticeship significantly affects wages in these data. Other worker characteristics influence wage levels. Female workers are significantly (at 10 percent level) less paid than male workers. On the contrary, the proximity to minimum wage does not seem to affect wage levels.

Let us now turn to the task organization variables: team, production line and supervision dummies. 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 less important than that of human capital characteristics.

## 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 supported by a 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 probability models of being involved 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 appears to be constrained by three conditions: a relevant industrial location (textile firms require little formal OJT owing to task simplicity); a minimal human capital (in the form of education, tenure and off firm experience); and an appropriate family situation (single workers can adapt more easily to the additional time constraints brought by OJT). Moreover, we find that task organization exerts differentiated effects on the probability to receive OJT 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, workers already occupying supervision positions do not generally participate in OJT.

Task allocations affect workers wage level mostly because supervision tasks are much better remunerated than other tasks. However, the impact of task organization on wages may also be present through its influence on OJT that much affects wage levels.

Overall, OJT is found to largely improve worker remunerations and seems often to be determined by previous task allocation. Therefore, the Moroccan government could use OJT to promote workers productivity and wages, notably for workers employed in teams or production lines. In that way, OJT may contribute to firm response 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. In these conditions, what is really needed is a joint policy of education and OJT promotion. This would involve coordination of policies currently led separately by the Ministry of education and the OFPPT in Morocco (*Office de la Formation Professionnelle et de la Promotion du Travail*).

Our results exhibit the dependence of task organization and on-the-job training on the general education process. On the other hand, there has been 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 fast 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 practices. This paper is a first step in the exploration of these issues.

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# APPENDIX

**Table 1. Descriptive statistics of the workers' characteristics**

| *Number of observations* | ***203*** | | | |
|---|---|---|---|---|
| | ***Mean*** | ***Std dev.*** | ***min*** | ***max*** |
| 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 |
| *Firms' fixed effects* | | | | |
| 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 |

203 observations

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

| *Number of observations* | ***203*** | | | |
|---|---|---|---|---|
| | ***Mean*** | ***Std dev.*** | ***min*** | ***max*** |
| Monthly wage | 2689 | 2019 | 750 | 20000 |
| Monthly wage in IMMEE | 3101 | 1930 | 750 | 12000 |
| Monthly wage in Textile-clothing | 2281 | 2030 | 750 | 20000 |
| *Mean wage in:* | | | | |
| 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*** | 0.1751 | 1.0783*** | 2.5532** | 0.3464 | -0.5753 |
| | (3.42) | (0.15) | (2.70) | (2.36) | (0.55) | (0.58) |
| Matrimonial situation (MARI) | -0.2004 | -2.0739 | -0.0505 | 0.0039 | -1.3103 | 0.0652 |
| | (0.20) | (1.58) | (0.07) | (0.00) | (1.48) | (0.07) |
| Number of dependent children (ENFT) | -0.3144 | -0.0477 | 0.0269 | -0.1883 | -0.0872 | 0.3919 |
| | (0.88) | (0.15) | (0.10) | (0.97) | (0.40) | (1.15) |
| Years of completed schooling (EDUCATION) | -0.4726*** | -0.3611*** | 0.1289 | -0.5295*** | -0.1307 | 0.3061* |
| | (4.21) | (4.05) | (0.97) | (4.67) | (1.55) | (1.85) |
| Former apprenticeship (APPRENTI) | -2.0650*** | -1.2744 | 0.0786 | -1.8628*** | -1.1117 | 0.5021 |
| | (3.37) | (1.18) | (0.13) | (2.99) | (1.23) | (0.68) |
| Job related vocational degree (ETUTPA) | -0.0340 | -0.2763 | 0.7889 | 0.6207 | -0.2479 | 0.7231 |
| | (0.04) | (0.21) | (1.10) | (0.71) | (0.23) | (0.72) |
| Former work-relevant internship (STAGA) | -1.6934*** | 0.5823 | 1.1472* | -1.7786*** | 0.6490 | 2.0645** |
| | (2.61) | (1.05) | (1.82) | (3.59) | (1.04) | (2.11) |
| Unemployment spells (CHOMA) | -0.1863 | 0.0113 | -0.2343*** | -0.2241** | -0.0927 | -0.2924*** |
| | (1.17) | (0.05) | (3.02) | (2.14) | (0.53) | (3.14) |
| Relative tenure (TENURE / firm age = PANCIE) | -1.0276 | -2.5563*** | 1.5297** | -1.5825* | -1.4458** | 3.7510*** |
| | (1.29) | (3.80) | (2.17) | (1.68) | (2.25) | (3.50) |
| Off firm experience (EXPERIENCE) | -0.0370 | -0.0394 | 0.0465 | -0.0513 | -0.0014 | 0.1090 |
| | (0.65) | (0.38) | (0.96) | (1.11) | (0.02) | (1.54) |
| Dummy for Textile-clothing | 0.7555 | -3.9145*** | 0.1473 | | | |
| | (0.73) | (3.56) | (0.15) | | | |
| Firm 2 | | | | 3.1253*** | 1.7655** | 4.9771*** |
| | | | | (3.13) | (1.99) | (3.13) |
| Firm 3 | | | | -0.1492 | 1.7127** | 3.8358*** |
| | | | | (0.22) | (1.97) | (4.12) |
| Firm 5 | | | | 1.8706*** | -0.0963 | 4.1890*** |
| | | | | (3.03) | (0.15) | (7.24) |
| Firm 6 | | | | 0.8583 | -0.4784 | 5.2357*** |
| | | | | (1.57) | (0.57) | (3.81) |
| Constant | 4.7260*** | 6.4747*** | -3.3188*** | 5.4494*** | 1.6590 | -9.2027*** |
| | (2.60) | (5.50) | (2.63) | (3.89) | (1.25) | (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 individuals working neither in production lines, nor in work teams, nor as supervisor or executive (23% of the sample). Estimates are weighted by the inverse probability that workers are selected within firms.

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

| | Probit of participation in past or current OJT (FORMAD) | Probit of participation in past or current OJT (FORMAD) | Tobit of duration of past or current OJT (FORMAA) |
|---|---|---|---|
| | (1) | (2) | (3) |
| Dummy for female | 0.0981 | 0.1528 | -0.0219 |
| | (0.27) | (0.40) | (020) |
| Matrimonial situation (MARI) | -0.6877* | -0.7424* | -0.2559 |
| | (1.90) | (1.76) | (1.51) |
| Number of dependent children (ENFT) | 0.1007 | 0.0814 | 0.0917 |
| | (0.63) | (0.55) | (1.35) |
| EDUCATION | 0.2888*** | 0.1258** | 0.0635** |
| | (6.26) | (2.42) | (2.35) |
| Job related vocational degree (ETUTPA) | -0.3930 | -0.2680 | -0.1380* |
| | (0.85) | (0.60) | (1.97) |
| Former work-relevant internship (STAGA) | 0.1856 | 0.3914 | 0.1963 |
| | (0.37) | (0.91) | (0.60) |
| Unemployment spells (CHOMA) | 0.1141 | 0.1240 | 0.0550 |
| | (0.94) | (1.44) | (1.04) |
| TENURE / firm age (PANCIE) | 0.5365 | 0.3477 | 0.0148 |
| | (1.15) | (0.55) | (0.08) |
| Off firm experience (EXPERIENCE) | -0.0928*** | -0.0805*** | -0.0649** |
| | (3.22) | (3.21) | (2.48) |
| Dummy for Textile-clothing | -1.5673*** | -1.5265*** | |
| | (3.65) | (3.52) | |
| Dummy for executive/supervisor (ENCADR) | 0.3646 | 0.6325 | 0.1896 |
| | (1.10) | (1.57) | (1.34) |
| Dummy for production line (CHAINE) | 0.9105** | -4.0310*** | 0.0775** |
| | (2.23) | (3.72) | (2.10) |
| Dummy for work team (EQUIPE) | 0.6569 | -1.4552 | 0.1377 |
| | (1.47) | (1.08) | (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*** | -1.6583** | -0.9757** |
| | (3.99) | (1.99) | (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. 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* | -0.1494 | -0.1672** | -0.1568* | -0.1704** |
| | (-2.35) | (-1.88) | (-3.02) | (-2.02) | (-3.16) |
| EDUCATION | 0.0251 | 0.0385*** | 0.0262* | 0.0455*** | 0.0320* |
| | (1.87) | (4.45) | (2.27) | (3.56) | (2.00) |
| Former work-relevant internship (STAGA) | 0.1622 | 0.1589 | 0.1504 | 0.1584 | 0.1428 |
| | (1.37) | (1.25) | (1.09) | (1.28) | (1.06) |
| Former apprenticeship (APPRENTI) | 0.0481 | 0.0636 | 0.0592 | 0.0764 | 0.0698 |
| | (0.56) | (0.78) | (0.80) | (0.90) | (0.90) |
| Proximity to the minimum wage (SMIG) | -0.0098 | 0.0533 | -0.0248 | 0.0472 | -0.0268 |
| | (-0.11) | (0.94) | (-0.32) | (0.80) | (-0.33) |
| Unemployment spells (CHOMA) | -0.0281** | -0.0242* | -0.0207 | -0.0240* | -0.0209 |
| | (-2.57) | (-1.92) | (-1.53) | (-2.07) | (-1.64) |
| TENURE / firm age (PANCIE) | 0.4660*** | 0.7279*** | | 0.7203*** | |
| | (4.99) | (5.31) | | (5.11) | |
| PANCIE squared | -0.2120*** | -0.2814*** | | -0.2668** | |
| | (-3.77) | (-3.66) | | (-3.29) | |
| Off firm experience (EXPERIENCE) | 0.0284** | 0.0282** | 0.0280** | 0.0292** | 0.0282** |
| | (3.36) | (3.25) | (3.20) | (3.20) | (3.06) |
| EXPERIENCE squared | -0.0004* | -0.0003 | -0.0004* | -0.0004 | -0.0004 |
| | (-1.92) | (-1.51) | (-1.99) | (-1.48) | (-1.75) |
| Dummy for executive/supervisor (ENCADR) | 0.3157*** | 0.3334*** | 0.3935*** | 0.3148** | 0.3845*** |
| | (4.08) | (3.74) | (4.35) | (3.29) | (4.00) |
| Dummy for production line (CHAINE) | -0.0495 | 0.0087 | -0.0185 | 0.1353 | 0.0644 |
| | (-1.25) | (0.14) | (-0.25) | (0.84) | (0.37) |
| Dummy for work team (EQUIPE) | -0.0111 | -0.0796 | -0.1459 | 0.0309 | 0.0913 |
| | (-0.14) | (-1.23) | (-1.83) | (0.13) | (0.32) |
| EDUCATION*CHAINE | | | | -0.0138 | -0.0087 |
| | | | | (-1.08) | (-0.61) |
| EDUCATION*EQUIPE | | | | -0.0098 | -0.0209 |
| | | | | (-0.52) | (-0.97) |
| On-the-Job Training duration (FORMAA) | 0.2190 | 0.2643*** | 0.3040*** | 0.2693*** | 0.3018*** |
| | (1.28) | (6.25) | (5.18) | (6.05) | (5.13) |
| Dummy for Textile-clothing | -0.1522 | | | | |
| | (-1.28) | | | | |
| Firm 1 | | 0.3667*** | 0.4022*** | 0.3584*** | 0.4163*** |
| | | (7.64) | (6.98) | (8.25) | (6.92) |
| Firm 2 | | -0.1885*** | -0.0131 | -0.1732*** | -0.0004 |
| | | (-6.07) | (-0.36) | (-6.45) | (-0.01) |
| Firm 3 | | 0.3749*** | 0.4600*** | 0.3681*** | 0.4549*** |
| | | (14.05) | (21.80) | (14.02) | (20.10) |
| Firm 4 | | -0.0276 | 0.0566 | -0.0323 | 0.0624 |
| | | (-0.45) | (0.95) | (-0.54) | (1.06) |
| Firm 5 | | 0.0023 | 0.0396 | -0.0008 | 0.0423 |
| | | (0.08) | (1.36) | (-0.03) | (1.35) |
| Firm 7 | | -0.0576 | 0.1081** | -0.0697 | 0.1090** |
| | | (-1.17) | (2.73) | (-1.33) | (2.60) |
| Firm 8 | | 0.0439 | 0.2591*** | 0.0382 | 0.2565*** |
| | | (0.86) | (5.27) | (0.72) | (5.06) |
| Constant | 7.3702*** | 6.9527*** | 7.2174*** | 6.8801*** | 7.1542*** |
| | (26.66) | (42.65) | (38.71) | (34.83) | (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.