



Wages and On-the-Job Training in Tunisia

Christophe Muller, Christophe J. Nordman

► To cite this version:

Christophe Muller, Christophe J. Nordman. Wages and On-the-Job Training in Tunisia. 2015. halshs-00793383v2

HAL Id: halshs-00793383

<https://shs.hal.science/halshs-00793383v2>

Preprint submitted on 5 May 2015 (v2), last revised 10 Apr 2017 (v3)

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.

Wages and On-the-Job Training in Tunisia

Christophe Muller
Christophe J. Nordman

Wages and On-the-Job Training in Tunisia

Christophe Muller^{*} and Christophe J. Nordman^{**}

May 2015

Abstract:

Training costs may hamper intra-firm human capital accumulation. As a consequence, firms may be tempted to having workers paying for their -the-job training (OJT). In this paper, we analyse the links of OJT and worker remuneration in the area of Tunis, using a case study data of eight firms. We find that the duration of former OJT negatively influences starting wages, while there is no anticipated effect of future training on wages at the firm entry. In contrast, current wages are positively affected by former OJT but negatively affected by ongoing OJT. These results provide very rare empirical support in LDCs for classical human capital theories and cost sharing theories applied to OJT.

Keywords: Wages, On-the-job training, Tunisia.

JEL Classification: J24, J31, O12.

This work has been carried out thanks to the support of the A*MIDEX project (No. ANR-11-IDEX-0001-02) funded by the "Investissements d'Avenir" French Government program, managed by the French National Research Agency (ANR).

^{*} 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, Paris, France. 4 rue d'Enghien 75010, Paris. Email: nordman@dial.prd.fr.

1. Introduction

On-the-job training (OJT) involves training provided by the firm. It may occur under very diverse forms such as examples shown by co-workers, formal courses or practical exercises. However, OJT is distinct from mere imitation or learning-by-doing, which are rather associated with tenure. In this paper, we conduct an econometric analysis of the links of OJT and worker remuneration in the area of Tunis, using a case study data based on eight firms. We pay particular attention to the OJT costs sharing between firms and workers through an analysis of the signs of the coefficients of OJT variables in different wage equations. This is important because training costs may hamper intra-firm human capital accumulation. Yet, firms may be tempted to having workers pay for their within-firm training.

Our approach to these issues is to examine simultaneously wages and OJT. The relationship between human capital and earnings has been studied through wage equations by using regressors that describe education, training and other skills generated by work experience, while mostly for industrialised countries. For example, Dickerson and Green (2002) show in the UK that most generic skills have a substantial and growing impact on wages over the traditional human capital indicators like education and experience. Focusing on OJT has several advantages. First, OJT, work and wage setting decisions are nearer in time than general education and work, which should help when investigating their links. Second, OJT can often be simultaneously observed along with work performance and the type of tasks carried out. Third, OJT allows firm and worker skills to swiftly adjust to changing economic environment. In the meantime, the instantaneous cost-sharing of OJT between firm and worker can be captured by observers.

In Section 2, we discuss the modelling approach. In Section 3, we present the data. In Section 4, we report the estimation results. Section 5 concludes.

2. The Modelling Approach

2.1. General setting

The standard human capital accumulation model, based on perfect labour market assumptions, yields the equalization of worker net productivity (i.e. productivity minus training costs) with wage rate. In these conditions, OJT in the form of general training at the firm entry may correspond to a lower starting wage because of contemporary compensation for training cost, and later on to a higher current wage (if observed a few years after OJT) because of the subsequent productivity rise due to the initial training. In this framework, workers bear the full cost of general training and get the full return to it. However, not all human capital generated by training is general. By definition, specific human capital is accumulated in a given firm and is useful only in that firm, while general human capital can be used in any firm. This distinction matters for understanding how OJT is financed.

2.2. Sharing the training cost

Becker (1962), in a seminal theoretical study, shows that, under perfect labour and product markets and renegotiation possibilities, the worker should receive all the returns and pay all the costs of the training if it is general. On the other hand, if training is specific and the firm sets wages, the firm receives all the returns and pays all the costs. However, the training return is lost if firm and worker separate. In that case, they should rather share the return. Leuven (2005) reviews works that have

proposed diverse models for such sharing process (Becker, 1975; Mortensen, 1978; Hashimoto, 1981).

In the case of specific training, workers and firms may share both costs and returns. Workers may pay part of their OJT costs by accepting a lower starting wage, and realize later a return to this investment through greater wage growth. In some cases, the firm may accept to pay the whole cost of OJT because this would correspond to highly firm-specific training, which would not be associated with a decrease in starting wage.

As a consequence of the sharing of the cost of OJT between firms and workers, in the first period, before or during OJT, the actual wage is lower than the alternative wage. In the second period, after OJT, the wage rises at a level intermediate between that of the marginal product of the worker's labour in this firm and in alternative firms. These features translate into wage equations characterised by a negative coefficient of OJT for starting wage equations and for current wage equations when OJT is still ongoing.

On the other hand, we expect a positive OJT coefficient in current wage equations, that is, after OJT has been completed and the worker productivity has risen. Consequently, this characterisation in terms of the signs of OJT coefficients in starting and current wages, consistent with naive human capital theories, can be extended to a broader framework, making these signs particularly plausible.

In any case, empirical evidence is needed to ascertain what the correlations of starting and current wages with OJT are.

2.3. Review of empirical results

Since the end of the 1970s, a few empirical studies of the interactions of OJT and wages in developed countries are available. However, most of these studies cannot control for both observed and unobserved firm characteristics through specifying firm effects. To our knowledge, only Kahyarara and Teal (2008) introduce firm effects for a developing country.

In a seminal article, Barron et al. (1989), using a survey of US workers in entry level positions, find no significant OJT effect on starting wage and a positive significant effect on subsequent wage growth. Using a longitudinal data set on US young workers, Lynch (1992) finds that OJT is concentrated among white married unionized males with longer work experience. All training measures (including ongoing or former OJT in the firm) positively affect wages (rather starting wages since only for young workers), except off-the-job training and OJT in previous job. Parent (1999) avails himself of a larger sample, although taken from the same survey as Lynch. He finds that OJT with the current employer has a negative effect on starting wages, but not on current wages.

Similarly, using either national survey data or case studies, several authors (Blanchflower and Lynch, 1994, Bartel, 1995, Loewenstein and Spletzer, 1996, Krueger and Rouse, 1998, Dearden, Reed and van Reenen, 2006) find that OJT contributes to raising wages in the UK and the US. However, Lynch's conclusions of OJT specificity are challenged by Barron et al. (1998) who argue that training lowers starting wages when workers' unobserved ability differences can be controlled for.

For Africa, the literature is scant partly due to the lack of appropriate data on OJT, wages and worker characteristics. Using firm data from five African countries, Rosholm et. (2007) observe that firms pay for and provide general and specific training, especially to the best educated workers,

and that trained workers receive significant wage premiums. Kahyarara and Teal (2008), using workers panel data in Ghanaian and Tanzanian manufacturing firms, exhibit a positive effect of former job training on current earnings. By incorporating firm fixed effects, they find ongoing OJT to be negatively correlated with current earnings. Using worker level data in Ghana, Frazer (2006) finds that, during the 90s, the returns to apprenticeship were not statistically different from zero. Monk et al. (2008) find yet some heterogeneity within this country and across education levels. Finally, Johanson and Wanga (2008) report large wage returns to training in the Tanzanian informal sector.

Face to this inconclusive body of empirical results on positive, insignificant or negative effects of OJT on wages, our contribution is first to report evidence of OJT cost sharing using data from a case study of eight exporting firms in Tunisia. A shortcoming of these data is that only few firms are surveyed. However, this is offset by the joint presence of rare information: details about OJT, detailed description of firm and worker characteristics, matched employer-employee data¹. These data are currently the only available to investigate the issues of interest in Tunisia, for which little is known. We now turn to the data we use.

3. The Data

3.1. The context

High unemployment in Tunisia was around 16 percent in 1999, the date of the survey. The government attempted to reduce this unemployment through policies enhancing the skills of the Tunisian workers. However, with the termination of the Multi-Fibre Arrangements in 2005 and the implementation in 2007 of the Association Agreement with the EU, Tunisian firms face fiercer

¹ Recent evidence on wage returns to training using matched employer-employee data in various developing countries, albeit not Tunisia, is reported in Almeida and Lince de Faria (2014, Table A1).

competition. Moreover, economic globalization has brought further challenges to Tunisian workers. In 1994, the wages of unskilled industrial workers were on average lower than for Mediterranean competitors (CNUCED/PNUD, 2001). However, wages at the same skill levels are still three times lower in China and India than in Tunisia.

Improving sector productivity by enhancing human capital is a response. In 1996, the Tunisian government set a firms modernisation programme (MANFORME), including some fostering of within-firm training and vocational training. Between 1996 and 1999, 1161.7 million dinars (UNDP, 1994) were spent on this programme. In March 2000, more than 1300 firms had been assisted, amounting for 40 percent of total employment in firms of more than 20 employees.

3.2. The survey and the firm sample

We base our econometric investigation on matched worker-firm survey data, for the first time for Tunisia². This is useful for distinguishing specific versus general human capital, which requires simultaneously observing the worker and the firm so as to be able to see if something different happens in different firms.

The data provide rich information on workers, while we can control for firm unobserved heterogeneity by using firm dummy variables. These data were directly collected in the workplace in 1999³. Eight firms of the formal sector and with no fewer than 50 employees were selected among exporting firms which are not fully foreign owned. Four firms belong to the textile-clothing sector

² Matched worker-firm data have been collected as part of the World Bank's Regional Program for Enterprise Development (RPED) surveys in Africa. Each of these surveys constitutes a sample of about 200 firms with about 10 interviewed workers in each firm. However, similar data are not yet available for Tunisia.

³ The methodology of the Tunisian survey appears in Nordman (2002) and Destré and Nordman (2003).

and four firms to the Mechanics, Metallurgical, Electrical and Electronics Industries (IMMEE). Although the firms were randomly selected in these two sectors, the sample is too small to accurately represent the underlying firm population. Therefore, we present our results as those of a case study. The eight firms are located in the Tunis area and they have on average 130 employees. The occupational structure within each firm, which was obtained from interviewing employers with a specific questionnaire, was used to constitute representative sub-samples of their workers. The surveyed workers were randomly chosen within each occupation strata and at least 10 per cent of the workforce was interviewed in each selected firm.

3.3. The workers

The 231 workers in the final sample were interviewed in February 1999. The employee questionnaire provides precise information about each worker, which is summarized in Table 1: individual characteristics (matrimonial status, number of dependent children, geographic origin, father's education), wages, educational investments (number of years spent in primary, secondary, higher and vocational education), post-school vocational training (apprenticeships, former internships, formal training within the current firm), total experience in the labour market and occupation in the current firm.

The sample is balanced across sectors and gender: 54.1 per cent of the selected employees work in the four textile firms and 45.9 per cent in the four IMMEE firms; half of the workers are female.

The average education, which is 9.6 years over the sample, is calculated using information on the highest education level reached. Successful educational years are higher for men (10.6 years) than

for women (8.7 years)⁴. Only very few (0.8 per cent) observed workers have never been to school, 9.9 per cent have only primary education, 71.8 per cent have achieved secondary education and 17.3 per cent have reached higher education. 31.6 per cent of employees have a vocational diploma connected to their current job.

Average tenure in the current firm is 5.9 years. Total actual experience is on average 9.1 years. This experience variable describes the actually stated years of experience, as opposed to just extrapolating experience from age. Thus, it excludes unemployment and other inactivity periods. On average, male workers in the sample have accumulated over 10 years of total experience against less than 8 years for female workers. Previous experience off the current job is on average 3.3 years. Thus, the ratio of mean tenure to mean overall work experience is 64 per cent, a favourable situation that allows proper separation of the human capital accumulated off and on current firm. This also indicates a non-negligible proportion of young, first-time workers, which is confirmed by an average age at 29.5 years.

OJT in the current firm is described by three variables. One dummy variable reports the worker's answer as to whether he/she received formal OJT in his/her current firm (FORMAD, 1 if yes). A second variable shows the number of years spent in formal OJT up to the interview date (FORMAA). The third OJT variable identifies either whether training is still ongoing at the interview date or if it occurred for workers in the firm for less than two years (FORSTIL, 1 if yes).

Although, 18 per cent of the workers have benefited from OJT within the current firm, its occurrence is much higher for males (34.5 per cent versus 1.7 per cent for females). Moreover, the

⁴ When calculated instead from the age at school leave, from which 6 years are deducted, the average number of schooling years nearly amounts to 13. Thus, by eliminating unsuccessful years of education, we obtain an education variable net from repeated classes. For comparison, Angrist and Lavy (1997) estimate the number of repeated classes at two to three years in Morocco. UNDP (1994) reports that Tunisia in the 1980's had a higher rate of repeated classes at the primary school than Morocco.

average OJT duration for trainees is small: about 6 month. Among the 42 trainees of the overall sample, 10 are still undergoing or have just finished OJT. Most OJT is concentrated in the IMMEE firms.

Some wage characteristics are worth noting. The average monthly wage by employees corresponds to 213 US dollars⁵, while male wages are on average 1.7 times female wages. Beyond differences in human capital endowments between sexes, the large female share of the labour force in textile firms, where wages are generally low, contributes to this wage differential: 94 per cent of the observed female workers belong to the clothing sector, while male workers of this sector represent only 14 per cent of all male workers. The average wage in the IMMEE sector is 1.6 times higher than in the textile sector. Educational and training differences partially explain this gap. On average, the IMMEE workers have 10.6 years of education compared to 8.9 years for textile workers.

The two legal minimum wages (SMIG, *Salaire Minimum Interprofessionnel Garanti*) correspond to 40 hours and 48 hours per week. In 1999, the SMIG of employees working 40 hours per week amounted to 156.7 dinars, while the SMIG for 48 hours per week was 177.8 Dinars. Workers in the textile sector are all rationed to a maximum of 48 hours of work per week, while in the IMMEE sector this boundary only concerns non-executive workers. The workers' current monthly wages in the two sectors are concentrated around values slightly above the minimum wages, while heavy right tails account for a small number of very skilled workers. Instead, while monthly starting wages are also very concentrated, they are often below the current minimum wage. This may be due to the rise in the SMIG since firm entry, as much as to workers actually paid under the SMIG.

⁵ The average monthly wage corresponds to 1.8 times the monthly SMIG of 1997 for 48 hours per week (177.8 Tunisian Dinars, that is: 125 US dollars in 2001). The declared monthly wages are those of January and February 1999.

4. The Results

4.1. The wage equations

Equations for starting wage and current wage are the basis of our investigation. The standard human capital accumulation model, without OJT, yields the usual Mincer log-wage equation. We complement it with OJT and firm dummy variables, while distinguishing tenure and off-firm experience.

Controlling for firm fixed effects through firm dummies is important on several grounds. It first accounts for unobserved firm characteristics that may affect wages and thus limits omitted variable bias. Second, it helps us control for the fact that many OJT decisions, and their connections with wages may be firm specific. In particular, some of the human capital accumulation during OJT may not be portable to other firms.

Wage may also be determined by rents from institutions, such as belonging to specific industries, unions, or the presence of different minimal wages. These effects are controlled using firm dummies. Additional correlates describing unions, minimal wages and industries are also included. Finally, the technological characteristics of the firms are controlled through firm dummies and information on the type of job occupied by the workers (team work, production line, and supervisor). The latter is useful as a possible determinant of wage heterogeneity through the differences in quality and productivity of different jobs. It is also important because OJT may affect wages differently for different jobs. Due to limited degrees of freedom, we cannot run separate regressions or include interacted effects for different job types, but at least we can attempt to control for them with these dummies.

4.2. Wage equation estimates

The estimates of wage equations are discussed in the following order. We first present basic OLS estimates, which include education and OJT regressors. Then, additional regressors are incorporated to control for characteristics of firms and jobs: firm dummies, job type (production line, denoted by CHAINE; team work, denoted by TEAM; and executive positions, denoted by ENCADR). They help us control for task complexity, ability and screening effects. Finally, we move to 2SLS estimates as an attempt to deal with the possible endogeneity of education, experience and training variables. For all models, the standard errors of the estimated coefficients are corrected or not for cluster effects at the firm level, and using or not robust estimators. Little differences in the results emerge by varying these procedures. We do not provide separate estimates for male and female workers so as to preserve degrees of freedom. Besides, introducing dummies for female workers is generally found to be insignificant.

In the estimates, higher impact of OJT on wages may result from worker selection by firms and vice versa. For example, assuming high ability workers can learn faster from OJT, there may be selection of the abler workers into OJT. It may be that the observed firms, more modern and export-oriented than many Tunisian firms, select or attract workers of higher unobserved productivity or more motivated. Moreover, firms may decide to invest in the human capital only of these employees they seek to retain. Although such or other selectivity effects may take place, it is impossible to control completely for them in these data. We thus have little choice but to assume that selectivity and matching effects may be overlooked for the purpose of investigating OJT issues in the Tunisian case. However, due to the rigidity and inefficiency of the Tunisian formal labour market (with sluggish administrative procedures, and little public information on jobs and workers), it is plausible that selection effects are less intensive than in industrialized countries.

In Muller and Nordman (2005), wage equations for different wage quartiles were investigated with these data. With such a special specification and a basic set of correlates, we found a preliminary evidence of correlation of OJT with current wages. Similarly, Muller and Nordman (2011) include OJT variables in current wage equations, while focusing on within-firm human capital externalities. However, in these previous studies, the dynamic dimension of the data on wages was not exploited, in particular the possibility of combining the employees' starting and current wages in the analysis.

OJT may depend on wages and be endogenous through several mechanisms. Firstly, there may exist a significant wage elasticity of education and training demand in developed economies (Friedmann, 1986). In that case, wage and OJT-education could be determined simultaneously. Secondly, wages and training may both respond to labour supply factors (as in Hoddinot, 1996, for urban Africa), which would generate another type of simultaneity. Finally, unobserved ability affecting wages and OJT may be correlated through faster learning of the most talented workers.

We successively report the estimated equations for starting and current wages, and for the diverse specifications shown in Tables 2 to 4.

4.2.1. Starting wages

We first describe the effects of the OJT variables on starting wages (Table 2). The coefficient of the number of years of OJT in the current firm is significant in all OLS specifications and with a negative sign. Yet, this effect vanishes for inefficient 2SLS, which corresponds to much of the literature results, where the OJT effect in starting wages is modest or indiscernible. Moreover, the coefficient of the dummy for OJT in the current firm is not significant at the 5 per cent level, perhaps because of high correlation of the dummy with the number of OJT years. Then number of OJT years captures some of the information about OJT occurrence, which may contribute to the effect described by the negative coefficient. Despite the latter caveat, the results are consistent with

OJT cost sharing between firm and worker, at least at the firm entry where most former OJT takes place.

In order to test for possible agreement about future training at the firm entry, which may be accounted for while bargaining for the starting wage, we include ongoing OJT in the regressors. However, since the coefficient of ongoing OJT is never significant, cost sharing may not occur at the firm entry in the case of training spells occurring a few years later, although it is hard to conclude since standard errors are high. It is plausible that these training spells are not anticipated at the entry.

For the firm dummies (FDM) OLS model of column 5, we introduce three dummies to control for heterogeneity related to task complexity, as in Barron et al. (1998): for executive or supervisor (ENCADR), for working in production line (CHAINE), and for working in a team (EQUIPE). In our data, these variables have no significant effects in the starting wage equation, except for ENCADR which slightly reduces starting wages, perhaps offsetting future promotion opportunities. However, their inclusion refines downwards the estimated negative impact of OJT on starting wages, and reinforces the cost sharing hypothesis. This result is expected if individual heterogeneity biases lead to underestimate the negative impact of OJT on the starting wage (as discussed in Parent, 1999).

The effect of off-firm experience is highly significant and positive in all estimated models, exhibiting an expected concave profile. At the sample mean, the marginal return to off-firm experience amounts to 6.9 per cent in the FDM OLS model of column 5, but this rate of return is relatively stable along the estimated models (1) to (5).

We briefly describe the impact of the other determinants of starting wages. The estimated effect of the education years is generally not significant, whatever the specification and estimation method. This is partly because we allowed for quadratic education effects along with linear effect which are

much correlated together; although linear education effects alone are also weakly significant⁶. As we show later, in these data, education is a major determinant of current wages. The fact that it does not determine much the starting wages suggests that something distinct from pure productivity assessment may be taking place when employers set wages at the firm entry. Similarly, the human capital accumulation in Koranic school is not converted into higher earnings in these firms. By contrast, former internship years have a strong positive effect on entry wages, hinting at the importance of specific human capital in these industries.

Surprisingly, female workers do not receive significantly lower wages at the firm entry, once firm dummies and other explanatory variables are included. It seems that for female workers the concentration in textile sector and in low job categories, along with limited education, suffices to explain the gender starting wage gap in the data. By contrast, starting wage is increasing in age at the entry, even given actual experience. This suggests that either the firm values age for itself, e.g. as a signal of private life experience contributing to skill accumulation, or that it uses age as a proxy of the actual worker experience (ill observed by the firm). However, the return to age in that sense, around 4 per cent per year for all estimates, remains below the return to experience *stricto sensu*.

Finally, the estimates of the firm dummies' coefficients are large and sometimes strongly significant, except for: (a) the second firm that shares similar characteristics with the reference firm 6, and (b) in Column (6) where too few degrees of freedom are available. This result is in accordance with the usual persistence of wage differentials across individuals with identical productive characteristics in empirical studies. However, we are here dealing with wage at the firm entry instead of current wages in most studies. In these data, workers with comparable measured characteristics earn different starting wages partly because they enter different firms. There is no significant effect of firm dummies interacted with OJT or education, including for the most technology-intensive firm. This

⁶ Using dummies for the different education levels is still more expensive in degrees of freedom, and also yields insignificant coefficients in starting wage equations.

feature rather favours the basic human capital theory interpretation of the negative OJT coefficient rather than more sophisticated risk-sharing theories for specific OJT.

In order to deal with potential endogeneity issues, we attempted to instrument the human capital variables⁷ in the 2SLS regressions of Table 2 for starting wage and Table 3 for current wage. The obtained substantial levels of the F-statistics and R^2 in instrumental equations suggest that we are not in the weak instrument case. The instruments in these regressions are indicated at the bottom of each Table.⁸

Thus, despite data limitations, using 2SLS provides an alternative perspective to OLS estimates on human capital returns in the Tunisian firms.⁹ Even if endogeneity issues may not be as fully corrected as we would like, the qualitative similarity of results from OLS and 2SLS, both in equations with and without firm dummies is rather comforting.

⁷ That is: years of completed schooling (EDUCATION), years of off-the-job actual experience (EXPERIENCE) and tenure in the current job (TENURE), the squared values of these three variables, years of formal OJT received in the incumbent firm (FORMAA) and the dummy for whether OJT is ongoing or recent (FORSTIL).

⁸ The main instruments are socio-demographic characteristics either entered or insignificant and omitted, in the wage equation, and the characteristics of the worker's father. Namely, the socio-demographic instruments include the worker's age, dummies for apprenticeship in a former firm, unemployment years, the number of dependent children and the marital status (married or single). These variables are correlated with worker human capital, while they may not be notable determinants of wage differentials. Additional instruments are generated by interacting these variables with the gender dummy, and the age and father's education. The schooling level of the worker's father is an important instrument, capturing various genetic and environment influences (Sahn and Alderman, 1988).

⁹ A word of caution is useful here. Some of these instruments could be deemed endogenous themselves if, for instance, the father has facilitated his child's access to job; or former labour market/training experiences off the firm affect directly the worker wage (although their coefficients are insignificant when included in the wage equation). For lack of better instruments, we are constrained to assume that it is not the case. Besides, the presence of firm-specific effects in the regressions should strengthen the quality of these instruments since firm effects should capture part of the influence of parental characteristics on the worker's insertion in the labour market. For example, the father may know well the firm's manager. Then, the severity of such issues is much reduced by the presence of firm dummies. The plausibility of the instrument hypothesis is reinforced by the fact that we are dealing with formal firms with well-established recruitment processes rather than with the informal sector where the father's connections could have a bigger role. For further discussion and tests on our instrumentation strategy, one could refer to Muller and Nordman (2011, online Appendix).

It seems fair to say that the available instruments are imperfect. Moreover, it is problematic to use an estimator that relies on asymptotic properties when the sample is relatively small. Therefore, we only mention 2SLS results as a comparison benchmark for OLS.

Even though, as shown in the tables, Sargan's tests of over-identification support the validity of the used instruments and their non-inclusion as explanatory variables. Since the small sample may make difficult testing over-identifying restrictions, we favour OLS estimates of the augmented Mincer model completed with firm dummies, rather than using instrumented variables. Finally, Wu-Hausman's tests do not reject the exogeneity of education, experience and training variables. Drawing from our estimation results, we shall discuss the likely source of endogeneity in the subsection about current wages.

As an additional control of endogeneity problems in current wage equations, we also provide OLS estimates where the tenure variable is excluded. Indeed, first, tenure may be endogenous and hard to instrument, and second, it is not considered in the standard Mincer model.

4.2.2. Current wages

We now turn to the current wage equations (Table 3). The estimates show a positive impact of former OJT in the current firm, as work productivity may have grown in time as a consequence of the training, and a negative impact of ongoing OJT, as firms and workers may share the cost of ongoing training. Although the coefficients of the OJT years in the current firm are not significant (columns 1 and 2), the dummy for former OJT has always a positive and significant coefficient. Therefore, only OJT incidence affects wage differentials, as opposed to OJT duration. A similar result has been obtained by Veum (1995) using US data, who interprets it as originated from measurement error in duration, a characteristic hard to recall with accuracy.

Moreover, the coefficient of the dummy for ongoing OJT is negatively significant at the 10 per cent level for all specifications. These results, jointly with the results in the starting wage equations, support both OJT raising worker productivity and the presence of contemporary cost sharing between firm and worker.¹⁰

Years of former internship have positive significant effects at the 5 per cent level in all OLS regressions and at the 10 per cent level in 2SLS estimates. Job tenure and its square are newly introduced variables compared to the starting wage equations. Recall that if general and specific human capitals were identical the marginal returns to experience and tenure would be the same. As a matter of fact, estimated marginal returns of tenure appear to be lower than those of off-firm experience. However, the results of Wald tests fail to reject the hypothesis of equality of the marginal returns to tenure and experience in current wage equations, and this, whatever the used estimation technique. These results support our intuition that, for our sample, acquired human capital over time may be mostly general and therefore transferable across firms.

The highly statistically significant marginal return to tenure (at the sample mean) is insensitive to the inclusion of OJT variables. This finding does not support its introduction in wage equations motivated partly to capture the effects of OJT (Mincer and Jovanovic, 1981). Such approaches may be too coarse to properly account for OJT characteristics. For example, tenure may be mostly related to informal training as opposed to formal OJT. Furthermore, our personal observations of these firms suggest us that informal learning processes are widespread. Workers informally learn on-the-job through their own experience and by watching others performing tasks. For example, in garment

¹⁰ Crossing OJT with education years produces mixed results (not shown). On the one hand, former OJT crossed by education years is never significant whether in starting or current wages equations. On the other hand, current OJT crossed by education years is not significant in the starting wage equation, while it has a positive significant effect in the current wage equation, indicating that OJT may be more efficient for better educated workers. Yet, in order to preserve on degrees of freedom with our small sample, we choose not to introduce the crossed effects of OJT and education.

firms, experience often enhances productivity through trial-and-error spells applied to clothing scraps.

Table 4 summarizes the marginal returns to the main human capital variables obtained from the regressions of starting and current wages displayed in columns (5) and (8) of Tables 2 and 3. As typically found in the literature on returns to schooling in Africa¹¹, private returns are higher at secondary and post-secondary levels, thus increasing with the number of education years. This may be due to the fact that those who enrolled at higher levels are more likely to come from the most educated families, and as a result may benefit from intra-family education externalities. There may also be a shortage of high skills, relative to firm and state labour demands, on the Tunisian labour market. Using data from National Population-Employment Surveys in Tunisia in 1980 and 1999, Zouari-Bouattar et al. (2004) also find education returns increasing with education levels in simple Mincer-type equations. Their estimated mean education return is 9.5 per cent in 1980 and 5.9 per cent in 1999.

The marginal returns to education and experience considerably drop when moving from starting wage to current wage equations, as can be checked by calculating them from the coefficients on both the linear and quadratic terms, for example at the sample mean, even if those returns are much more significant in current wage equations. This may be attributed to several factors. First, returns may have been higher in the past when the Tunisian manpower was generally less skilled. Second, the impact of education and experience on starting wages includes a short-run ‘selection premium’ in the sense that the ablest workers could be hired more easily and simultaneously get higher earnings than less experienced or less educated workers. Once incorporated in the firm, the additional premium to more able workers may be lower, since they would have to pay a fixed cost to

¹¹ Schultz (2004), Kahyarara and Teal (2008), Kuépié et al. (2009).

leave it. This would contribute to increasing the apparent relative returns to human capital at the entry.

Let us make the plausible assumption that, for most trained workers, OJT dummies correspond to about one year duration or less.¹² Then, we find that the wage premium for OJT, either former or ongoing, is significantly higher at the 5 per cent level than the marginal returns to education and experience.¹³ OJT content may be more valuable to the firm than mere experience or schooling. Moreover, OJT sessions may be much more intensive than spending time routinely learning at work or at school. Another reason why post-training OJT returns appear as high may be the occurrence of promotions for which OJT is required.

Focusing on FDM OLS estimates, we find that the possible compensation suffered by the workers for the OJT at the entry is substantial, about three times the marginal return to education. For current wages, the coefficients of the OJT dummies are also considerable: minus 3.7 times the marginal return to education for ongoing OJT, and plus 3.9 times for former OJT. Clearly, omitting OJT would miss an important part of the relation between wages and human capital accumulation for these workers.

Let us examine the other wage determinants. In contrast with its insignificance for starting wages, the coefficient of the dummy for female workers is negatively significant in current wage equations, except for inaccurate 2SLS or misspecified OLS (in Column 7 that does not include tenure lest it would be overly endogenous). These results suggest a degree of gender discrimination against female workers. Such possible discrimination seems to be absent at the firm entry, and develops along with worker's career.

¹² Recall that the mean duration for trained worker is six months.

¹³ Except in the rare occurrence when all the corresponding coefficients are not significantly different from zero.

On the opposite, Koranic schooling affects neither starting nor current wages, no more than no schooling at all does. The negative impact on starting wages of joining a trade union vanishes for current wages. It may be that negative opinions about hiring unionized workers by the firm manager fade away along with growing familiarity with those workers.

What can we infer from the estimated coefficient changes after instrumentation, regarding the most likely source of endogeneity of education? Measurement error would yield a drop in the education coefficient, while ability bias would increase it. With FFE OLS, the return to education in the current wage equation without squared education amounts to .072. With 2SLS (even if exogeneity cannot be rejected in the Hausman tests), it diminishes slightly to .069. Then, the OLS bias is upward. With a quadratic profile in education, the diagnosis of an upward biased return is not changed. Respectively, at the sample mean: : 0.0707 from OLS 0.0686 from 2SLS. On the whole, the results suggest a small and insignificant ability bias, or an approximate offsetting of measurement error and ability biases.

Let us turn to the work type variables. In contrast with the findings for starting wages, being executive or supervisor is associated with significantly higher wages. On the other hand, working either on a production line or in a team has no significant effect on current wages. In the estimated specification, the reference firm is the most technology-intensive. Indeed, Firm 6's characteristics set it apart from other firms because it belongs to the ITC branch of the IMMEE and remunerates its employees better. The mean education of its observed employees amounts to 15.4 years of completed schooling, whereas the firm sample average is 10 years. It is also a young company, in which average employee tenure is 1.4 years (the firm sample average is 5.8 years). Moreover, it is monopolistic for its product (electronics components) within the country. Accordingly, even though the small sample size prevents us from doing so systematically (or to include such interacted effects for all firms), we maintained education and OJT variables interacted with the Firm 6 dummy in

Column (6), where these interacted coefficients appeared insignificant. Thus, there is little support for specificity of OJT in such effects¹⁴.

Finally, other firm dummies are found to be more significant for current wages than for starting wages. This may be due to specific rules for wage hikes and career development within each firm, whereas starting wages may be more constrained by market conditions since new workers usually do not suffer from large exit costs at the entry.

5. Conclusion

Using matched employer-employee data from Tunisia, we have investigated the interaction of OJT investment and wages. Using a case study of firm-employee data in the area of Tunis, we find that the duration of former OJT negatively influences starting wages, while there is no anticipated effect of delayed future training on wages at the firm entry. Besides, current wages are positively affected by former OJT but negatively affected by ongoing OJT.

These results support the hypothesis that there may be both productivity gains and cost sharing along with OJT. Our estimation results are consistent with popular human capital theories and broader OJT cost sharing theories, as opposed to some of the inconclusive empirical literature. Although our results call for confirmation from other data from Tunisia, our case study encourages

¹⁴ We also attempted a more general specification with interaction effects of Firm 6 with all individual human capital variables, gender and job dummies (not shown). As expected because of limited available information, this version showed insignificant interacted effects. However, these results suggest that the high returns to these components of human capital in Firm 6 are relatively well taken into account by the level of human capital variables in this firm and by the non-linearity in returns. As a matter of fact, removing the observations of this firm from the sample has little influence on the OLS estimates of the marginal returns once firm dummies are introduced.

further investigation. In particular, understanding better the determinants of OJT could be a fertile avenue of research.

Our estimation results may suggest policy implications, although caution should be taken not to extrapolate results for a few firms to the whole Tunisian manufacturing or more broadly. Technical change and intensifying competition resulting from trade liberalization imply more advanced skills and higher productivity from workers. From a social point of view, such skill upgrade is also important for improving the incomes of vulnerable groups and the young in Tunisia, who are increasingly politically active as during recent unrest accompanying and following President Ben Ali's fall.

The private sector may contribute to enhancing the labour force skills through OJT programmes, all the more so that much of the human capital accumulated through OJT seems to be portable between firms. However, our estimates show that firms are bearing much of the cost of OJT. This situation is sustainable only if this cost does not jeopardize their profitability.

Subsidies to stimulate within-firm OJT programmes (see Cammett, 2007) may be useful if they lead firms to substantially raise their training initiatives. Fostering OJT in that way would benefit to young workers by preserving their remunerations at the firm entry, thereby contributing to the country's stability.

References

- Almeida R.K., Lince de Faria M. (2014), "The Wage Returns to On-the-Job Training: Evidence from Matched Employer-Employee Data", IZA Discussion Paper, DP No. 8314.
- Angrist, J.D. and Lavy, V. (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.
- Barron, J.M., Berger, M.C. and Black, D.A. (1998), "Do Workers Pay for On-the-Job Training," *The Journal of Human Resources*, 34(2), pp. 235-252.
- Barron, J.M., Black, D.A. and Lowenstein, M.A. (1989), "Job Matching and On-the-Job Training," *Journal of Labor Economics*, Vol. 7, No. 1, pp. 1-19.
- Bartel, A.P. (1995), "Training, Wage Growth, and Job Performance: Evidence from a Company Database," *Journal of Labor Economic*, Vol. 13, No. 3, pp. 401-425.
- Becker, G. (1962), "Investment in Human Capital: A Theoretical Analysis," *Journal of Political Economy*, 70(5), 9-49, October.
- Becker, G. (1975), *Human Capital*, 2nd edition, Chicago: University of Chicago Press, 1975. 1st edition, Chicago: University of Chicago Press, 1964.
- Blanchflower, D.G. and Lynch, L. (1994), "Training at Work: a Comparison of US and British Youths," in Lynch, L.M. "Training and the Private Sector," NBER Comparative Labour Market Series, University of Chicago Press.
- 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.
- CNUCED/PNUD (2001), "L'intégration de la Tunisie dans l'Economie Mondiale. Opportunités et Défis," Tunis, May.
- Dearden, L., Reed, H. and van Reenen, J. (2006), "The Impact of Training on Productivity and Wages: Evidence from British Panel Data," *Oxford Bulletin of Economics and Statistics*, 68, 4, 397-421.
- Destré, G. and Nordman, C.J. (2003), "The Impacts of Informal Training on Earnings: Evidence from French, Moroccan and Tunisian Matched Employer-Employee Data," *L'Actualité Économique*, 78(2), pp. 179-205, 2002.
- Dickerson, A. and Green, F. (2002), "The Growth and Valuation of Generic Skills," SKOPE Research Paper No. 20, Spring.
- Frazer, G. (2006), "Learning the Master's Trade: Apprenticeship and Human Capital in Ghana," *Journal of Development Economics*, 81(2), pp. 259-298.
- Friedmann, R.B. (1986), "Demand for Education," in *Handbook of Labor Economics*, vol. 1, chap. 6, Ashenfelter O. and Layard R. (eds), North Holland.
- Hashimoto, M. (1981), "Firm-Specific Human Capital as a Shared Investment," *American Economic Review*, 71, pp. 475-482.
- Johanson, R. and Wanga, G. (2008), "Skills Training for the Informal Sector in Tanzania", World Bank Report.
- Kahyarara, G. and Teal, F. (2008) "The Returns to Vocational Training and Academic Education: Evidence from Tanzania," *World Development*, Vol. 36, Issue 11, November, pp. 2223-2242.
- Krueger, A. and Rouse, C. (1998), "The Effect of Workplace Education on Earnings, Turnover, and Job Performance," *Journal of Labor Economics*, Vol. 16, No. 1, 61-94, January.

- Kuépié, M., Nordman, C.J. and Roubaud, F. (2009), "Education and Earnings in Urban West Africa", *Journal of Comparative Economics*, Vol. 37, Issue 3, pp. 491-515.
- Leuven, E. (2005), "The economies of private sector training: a survey of the literature," *Journal of Economic Surveys*, 19(1), 91-111.
- Loewenstein, M.A. and Spletzer, J.R. (1996), "Belated Training: The Relationship Between Training, Tenure and Wages," Bureau of Labor Statistics Working Paper 296, September.
- Lynch, L.M. (1992), "Private-Sector Training and the Earnings of Young Workers," *American Economic Review*, 82(1), pp. 299-312.
- Mincer J. and Jovanovic, B. (1981), "Labor Mobility and Wages," in S. Rosen (ed), *Studies in Labor Markets*, pp. 21-64, Chicago: University of Chicago Press.
- Mortensen, D.T. (1978), "Specific Capital and Labor Turnover," *Bell Journal of Economics*, The RAND Corporation, vol. 9(2), pp. 572-586.
- Monk, C., Sandefur, J. and Teal, F. (2008), "Does Doing an Apprenticeship Pay Off? Evidence from Ghana," University of Oxford working paper CSAE WPS/2008-08.
- Muller, C. and Nordman, C.J. (2005), "Human Capital and Wages in Two Leading Industries of Tunisia: Evidence from Matched Worker-Firm Data," *Brussels Economic Review*, vol. 48, No. 1-2, pp. 183-208.
- Muller, C. and Nordman, C.J. (2011), "Intra-Firm Human Capital Externalities in Tunisia," *Journal of Development Studies*, 47(4), pp. 657-675.
- Nordman, C.J. (2002), "Diffusion du capital humain et effets d'entreprise: Approche par frontière de gains sur données appariées marocaines et tunisiennes," *Revue Economique*, 53(3), pp. 647-658.
- Parent, D. (1999), "Wages and Mobility: The Impact of Employer-Provided Training," *Journal of Labor Economics*, 12(2), pp. 298-317.
- Rosholm, M., H. S. Nielsen and A. Dabalén (2007), "Evaluation of Training in African Enterprises," *Journal of Development Economics*, 84, pp. 310-329.
- 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.
- Schultz, T.P. (2004), "Evidence of Returns to Schooling in Africa from Household Surveys: Monitoring and Restructuring the Market for Education," *Journal of African Economies*, Vol. 13, AERC Supplement 2, ii95-ii148.
- UNDP (1994, 2002), *Le PNUD en Tunisie*, Tunis.
- Veum, J. R. (1995), "Sources of Training and Their Impact on Wages," *Industrial and Labor Relations Review*, 48(4), pp. 812-826.
- Zouari-Bouattour, S., Zouari, S. and Boudraa, L., (2004), "Evolution des taux de rendement de l'éducation en Tunisie," mimeo Université de Sfax.

APPENDIX

Table 1. Workers' characteristics

Variables	Mean	Standard deviation	min	max
Age of individuals (AGE)	29.532	7.774	15	52
Sex (FEMALE, 1: woman; 0 man; conversely for MALE)	0.498		0	1
Geographical origin (PROVE, 1: rural area; 0 otherwise)	0.147		0	1
Matrimonial situation (MARI, 1: if married; 0 if divorced, widowed or single)	0.368		0	1
Single male (CELIBAH, 1: yes; 0 otherwise)	0.303		0	1
Number of dependent children (ENFT)	0.580	1.060	0	5
Father has a level of Primary school (PPRIM, 1: yes; 0 otherwise)	0.173		0	1
Father has a level of Secondary school (PSECON, 1: yes; 0 otherwise)	0.164		0	1
Father has a level of Higher education (PSUP, 1: yes; 0 otherwise)	0.125		0	1
Father is illiterate (PANAL, 1: yes; 0 otherwise)	0.194		0	1
Years of schooling (EDUCATION)	9.676	3.880	0	18
Individual went to Koranic school only (KORAN, 1: yes; 0 otherwise)	0.177		0	1
Previous apprenticeship in a firm (APPRENTI, 1: yes; 0 otherwise)	0.363		0	1
Periods of internship related to the current job (STAGA, in years)	1.468	3.617	0.00	24.0
Periods of internship not related to the current job (STAGAN, in years)	0.121	0.759	0.00	6.00
Unemployment spells (CHOMA, in years)	1.385	2.825	0.00	18.0
Previous relevant experience (EMSIM, 1: yes; 0 otherwise)	0.554		0	1
Previous professional experience (EXPE*, in years)	3.261	4.689	0	22
Start date in the current firm (ENTREE)	1992.1	5.901	1968	1997
Tenure in the current firm (TENURE, in years)	5.898	5.902	0.17	30.08
Former formal training received in the current firm (FORMAD, 1: yes; 0 otherwise)	0.182		0	1
Former formal training period in the current firm in years (FORMAA)	0.091	0.323	0	3
Ongoing or recent formal training in the current firm (FORSTIL, 1: yes; 0 otherwise)	0.043		0	1
Member of an union (SYNDIC, 1: yes; 0 otherwise)	0.203		0	1
Work in team (EQUIPE, 1: yes; 0 otherwise)	0.367		0	1
Work in production line (CHAINED, 1: yes; 0 otherwise)	0.320		0	1
Executive or supervisor (ENCADR, 1: yes; 0 otherwise)	0.190		0	1
Current hourly wage (in dinars)	1.893	1.347	0.29	7.57
Starting hourly wage (in dinars)	1.138	1.019	0.04	6.73
Log of current hourly wage (LNSALH)	0.197	0.251	-0.54	0.88
Log of starting hourly wage (LNSALEH)	-0.213	0.863	-3.209	1.906
Current monthly wage (in dinars)	315.13	231.38	52	1350
Starting monthly wage (in dinars)	190.19	172.07	6	1000
Proximity to the minimum wage (SMIG, 1: if $150 \leq \text{SAL} \leq 190$; 0 otherwise)	0.17	0.37	0	1
<i>Firm dummies **</i>				
FIRM 1 (IMMEE sector)	0.134		0	1
FIRM 2 (IMMEE sector)	0.160		0	1
FIRM 3 (Textile sector)	0.143		0	1
FIRM 4 (Textile sector)	0.130		0	1
FIRM 5 (Textile sector)	0.130		0	1
FIRM 6 (IMMEE sector)	0.087		0	1
FIRM 7 (IMMEE sector)	0.078		0	1
FIRM 8 (Textile sector)	0.139		0	1

*: This experience variable is an actual measure, as opposed to a potential one based on age. It excludes experience in the current job (TENURE) and possible unemployment and inactivity periods.

**: The means of the firm dummies describe the sample distribution of the workers across firms and sectors.

Table 2. Starting Wages
Dependent variable: Log hourly starting wage (LNSALEH)

	(1) OLS	(2) FDM OLS	(3) FDM OLS	(4) FDM OLS	(5) FDM OLS	(6) FDM OLS	(7) FDM IV (2SLS)
<i>Individual socio-economic characteristics</i>							
Years of education (EDUC)	-0.0479 (0.0438)	0.0164 (0.0423)	0.0172 (0.0417)	0.0202 (0.0417)	0.0118 (0.0419)	0.0280 (0.0436)	0.0481 (0.1175)
Years of education squared (EDUC ²)	0.0065*** (0.0022)	0.0032 (0.0022)	0.0032 (0.0021)	0.0030 (0.0021)	0.0037* (0.0021)	0.0027 (0.0023)	0.0023 (0.0060)
Years of former internships (STAGAA)	0.4088*** (0.1276)	0.3811*** (0.1237)	0.3672*** (0.1225)	0.3662*** (0.1224)	0.3545*** (0.1230)	0.3256*** (0.1245)	0.3986*** (0.1450)
Off-the-job actual experience (EXPE)	0.1051*** (0.0231)	0.0973*** (0.0224)	0.0957*** (0.0222)	0.0954*** (0.0222)	0.0993*** (0.0222)	0.0902*** (0.0230)	0.1754*** (0.0443)
(Off-the-job actual experience) ²	-0.0050*** (0.0011)	-0.0047*** (0.0011)	-0.0045*** (0.0011)	-0.0046*** (0.0011)	-0.0046*** (0.0011)	-0.0040*** (0.0011)	-0.0087*** (0.0023)
Dummy for female (FEMALE)	-0.3468*** (0.0839)	-0.1595 (0.1105)	-0.1844* (0.1090)	-0.1741 (0.1091)	-0.1252 (0.1210)	-0.1285 (0.1242)	-0.1668 (0.1242)
Age when entering firm (AGENTR)	0.0476*** (0.0093)	0.0425*** (0.0090)	0.0416*** (0.0089)	0.0414*** (0.0089)	0.0408*** (0.0089)	0.0442*** (0.0092)	0.0348*** (0.0107)
Dummy for Koranic school (KORAN)	-0.0979 (0.0931)	-0.1606* (0.0907)	-0.1220 (0.0918)	-0.1247 (0.0917)	-0.1344 (0.0931)	-0.1538 (0.0942)	-0.1644 (0.1333)
Dummy for trade union membership (SYNDIC)	-0.2608*** (0.0999)	-0.2180** (0.0970)	-0.2154** (0.0961)	-0.1974** (0.0970)	-0.2074** (0.0980)	-0.2092** (0.0989)	-0.2862** (0.1328)
<i>On-the-job training (OJT) variables</i>							
Dummy for former formal OJT in the current firm (FORMAD)	-0.0316 (0.1002)	0.0394 (0.1189)					
Years of former formal OJT in the current firm (FORMAA)			-0.2345* (0.1195)	-0.2368** (0.1194)	-0.2426** (0.1203)	-0.2496** (0.1217)	0.0041 (0.5323)
Dummy for ongoing OJT in the current firm (FORSTIL)				0.2120 (0.1671)	0.2184 (0.1674)	0.2592 (0.2479)	-0.3690 (0.7483)
<i>Individual heterogeneity controls</i>							
Dummy for executive or supervisor at the time of the survey (ENCADR)					-0.1644* (0.0927)	-0.1862* (0.0951)	
Dummy for work in production line at the time of the survey (CHAINED)					-0.1247 (0.1159)	-0.1366 (0.1175)	
Dummy for work team at the time of the survey					0.0422	0.0219	

(EQUIPE)					(0.0842)	(0.0853)	
<i>Firm dummies and interactions</i>							
EDUC*FIRM 6						0.2567	
						(0.5162)	
EDUC2*FIRM 6						-0.0057	
						(0.0197)	
FORMAA*FIRM 6						-0.3197	
						(1.3833)	
FORSTIL*FIRM 6						0.0891	
						(0.3939)	
FIRM 1		-0.5328***	-0.4559***	-0.4178**	-0.3577**	2.1899	-0.6614*
		(0.1662)	(0.1686)	(0.1710)	(0.1786)	(3.3375)	(0.3571)
FIRM 2		-0.1328	-0.2096	-0.1533	-0.1096	2.4146	-0.2545
		(0.1710)	(0.1560)	(0.1620)	(0.1733)	(3.3284)	(0.3030)
FIRM 3		-0.3022*	-0.3576**	-0.3051*	-0.2149	2.3200	-0.4869
		(0.1777)	(0.1684)	(0.1732)	(0.1783)	(3.3406)	(0.3122)
FIRM 4		-0.5587***	-0.6058***	-0.5534***	-0.4429**	2.0718	-0.6780**
		(0.1851)	(0.1755)	(0.1801)	(0.1876)	(3.3374)	(0.3326)
FIRM 5		-0.3211*	-0.3692**	-0.3137*	-0.2246	2.2997	-0.5061
		(0.1787)	(0.1677)	(0.1731)	(0.1785)	(3.3378)	(0.3282)
FIRM 7		-0.3387*	-0.3779**	-0.3332*	-0.3055*	2.2223	-0.4949*
		(0.1735)	(0.1677)	(0.1711)	(0.1748)	(3.3338)	(0.2888)
FIRM 8		-0.7986***	-0.8461***	-0.8014***	-0.7347***	1.8011	-0.8987***
		(0.1726)	(0.1617)	(0.1652)	(0.1699)	(3.3417)	(0.2796)
Constant	-1.5632***	-1.4043***	-1.3200***	-1.3892***	-1.4024***	-4.0277	-1.3845**
	(0.2810)	(0.2968)	(0.2826)	(0.2874)	(0.3117)	(3.3387)	(0.5580)
Observations	231	231	231	231	231	231	231
R-squared	0.67	0.73	0.73	0.73	0.74	0.74	
Pseudo Squared							0.69
Sargan statistic of overidentifying restrictions							22.89
Sargan p-value							0.12
Wu-Hausman F test							1.05
(H ₀ : 'Exogeneity of instrumented variables')							
Wu-Hausman p-value							0.39

Standard errors are in parentheses. ***, ** and * mean respectively significant at the 1%, 5% and 10% levels.

The instrumented variables in the IV regression (7) are: EDUC, EDUC², EXPE, EXPE², FORMAA, FORSTIL.

The excluded instruments used in the IV regression include: PPRIM, PANAL, ENFT, ENFT², ENFT*AGE, PROVE, MARI*FEMALE, MARI*MALE, CHOMA, CHOMA², EMSIM, APPRENTI, STAGAN, PPRIM*AGE, PANAL*AGE, PPRIM*ENFT, PSECON*ENFT, PSUP*ENFT, PANAL*ENFT, PPRIM*CHOMA, PSECON*CHOMA, PANAL*CHOMA.

Variables and instruments are defined in Table 1.

Table 3. Current Wages
Dependent variable: Log hourly current wage (LNSALH)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	FDM OLS	FDM OLS	FDM OLS	FDM OLS	FDM OLS	FDM OLS	FDM IV (2SLS)
<i>Individual socio-economic characteristics</i>								
Years of education (EDUC)	-0.0880*** (0.0268)	-0.0487* (0.0254)	-0.0413 (0.0251)	-0.0416* (0.0250)	-0.0371 (0.0247)	-0.0309 (0.0254)	-0.0183 (0.0271)	-0.0650 (0.0911)
Years of education squared (EDUC) ²	0.0088*** (0.0013)	0.0064*** (0.0013)	0.0059*** (0.0013)	0.0059*** (0.0012)	0.0050*** (0.0012)	0.0047*** (0.0013)	0.0035** (0.0014)	0.0069 (0.0046)
Years of former internships (STAGAA)	0.2271*** (0.0777)	0.1656** (0.0748)	0.1759** (0.0737)	0.1788** (0.0733)	0.2011*** (0.0722)	0.1800** (0.0730)	0.1967** (0.0797)	0.1807* (0.1039)
Off-the-job actual experience (EXPE)	0.0415*** (0.0118)	0.0502*** (0.0115)	0.0512*** (0.0113)	0.0519*** (0.0113)	0.0493*** (0.0111)	0.0475*** (0.0113)	0.0421*** (0.0122)	0.0797*** (0.0294)
(Off-the-job actual experience) ² (EXPE) ²	-0.0007 (0.0007)	-0.0012* (0.0006)	-0.0012* (0.0006)	-0.0012* (0.0006)	-0.0014** (0.0006)	-0.0012* (0.0006)	-0.0013* (0.0007)	-0.0026 (0.0019)
Tenure in the firm (TENURE)	0.0489*** (0.0101)	0.0590*** (0.0097)	0.0597*** (0.0095)	0.0571*** (0.0096)	0.0523*** (0.0095)	0.0515*** (0.0096)		0.0629* (0.0373)
TENURE ²	-0.0008* (0.0005)	-0.0012*** (0.0004)	-0.0012*** (0.0004)	-0.0011** (0.0004)	-0.0012*** (0.0004)	-0.0012*** (0.0004)		-0.0019 (0.0018)
Dummy for female (FEMALE)	-0.2885*** (0.0508)	-0.1990*** (0.0665)	-0.1788*** (0.0658)	-0.1805*** (0.0655)	-0.1766** (0.0715)	-0.1846** (0.0727)	-0.1259 (0.0786)	-0.1477 (0.0996)
Dummy for Koranic school (KORAN)	-0.0482 (0.0580)	-0.0619 (0.0553)	-0.0631 (0.0534)	-0.0626 (0.0531)	-0.0339 (0.0528)	-0.0415 (0.0531)	-0.0296 (0.0584)	-0.0704 (0.0672)
Dummy for trade union membership (SYNDIC)	-0.0972 (0.0647)	-0.0907 (0.0612)	-0.0887 (0.0602)	-0.0994 (0.0602)	-0.0763 (0.0607)	-0.0847 (0.0609)	0.0434 (0.0634)	-0.1198 (0.0923)
<i>On-the-job training (OJT) variables</i>								
Years of former formal OJT in the current firm (FORMAA)	0.0982 (0.0696)	0.0371 (0.0727)						
Dummy for former formal OJT in			0.1861***	0.2323***	0.2321***	0.2021**	0.2393***	0.7408*

the current firm (FORMAD)							
	(0.0707)	(0.0750)	(0.0736)	(0.0838)	(0.0813)	(0.4072)	
Dummy for ongoing OJT in the current firm (FORSTIL)		-0.1919*	-0.2240**	-0.2584*	-0.3590***	-1.0347**	
		(0.1079)	(0.1061)	(0.1557)	(0.1153)	(0.5252)	
<i>Individual heterogeneity controls</i>							
Dummy for executive or supervisor at the time of the survey (ENCADR)			0.1917***	0.1750***	0.3530***		
			(0.0617)	(0.0631)	(0.0599)		
Dummy for work in production line at the time of the survey (CHAINE)			-0.0533	-0.0615	-0.0697		
			(0.0678)	(0.0686)	(0.0747)		
Dummy for work team at the time of the survey (EQUIPE)			-0.0738	-0.0859*	-0.0894*		
			(0.0490)	(0.0493)	(0.0540)		
EDUC*FIRM 6				0.2971			
				(0.3049)			
EDUC ² * FIRM 6				-0.0092			
				(0.0117)			
FORMAD* FIRM 6				0.1227			
				(0.1843)			
FORSTIL* FIRM 6				0.1251			
				(0.2189)			
FIRM 1	-0.4423***	-0.4535***	-0.4837***	-0.5414***	1.9208	-0.3982***	-0.5521**
	(0.1077)	(0.1037)	(0.1045)	(0.1058)	(1.9656)	(0.1137)	(0.2272)
FIRM 2	-0.4611***	-0.3566***	-0.3787***	-0.4805***	1.9485	-0.5386***	-0.2606
	(0.0949)	(0.1016)	(0.1018)	(0.1064)	(1.9598)	(0.1170)	(0.3184)
FIRM 3	-0.5901***	-0.5082***	-0.5342***	-0.6280***	1.8120	-0.7222***	-0.5038*
	(0.1025)	(0.1057)	(0.1062)	(0.1087)	(1.9665)	(0.1184)	(0.2809)
FIRM 4	-0.5578***	-0.4762***	-0.4966***	-0.5824***	1.8526	-0.5700***	-0.4217
	(0.1079)	(0.1108)	(0.1108)	(0.1136)	(1.9650)	(0.1239)	(0.3074)
FIRM 5	-0.5940***	-0.5067***	-0.5299***	-0.6071***	1.8273	-0.6075***	-0.4763
	(0.1029)	(0.1068)	(0.1070)	(0.1085)	(1.9648)	(0.1192)	(0.2993)
FIRM 7	-0.5906***	-0.5332***	-0.5518***	-0.5868***	1.8568	-0.4979***	-0.5141**
	(0.1039)	(0.1046)	(0.1046)	(0.1044)	(1.9631)	(0.1143)	(0.2334)
FIRM 8	-0.5911***	-0.5060***	-0.5199***	-0.6047***	1.8374	-0.6021***	-0.3839
	(0.0992)	(0.1030)	(0.1028)	(0.1035)	(1.9666)	(0.1138)	(0.2711)

Constant	0.1390 (0.1343)	0.4410*** (0.1396)	0.3101** (0.1465)	0.3451** (0.1471)	0.5123*** (0.1629)	-1.9295 (1.9579)	0.6710*** (0.1784)	0.3108 (0.5165)
Observations	231	231	231	231	231	231	231	231
R-squared	0.73	0.78	0.79	0.79	0.80	0.81	0.76	
Pseudo Squared								0.69
Sargan statistic								16.54
Sargan p-value								0.28
Wu-Hausman F test								1.57
Wu-Hausman p-value								0.13

Standard errors are in parentheses. ***, ** and * mean respectively significant at the 1%, 5% and 10% levels.

The instrumented variables in the IV regression (8) are: EDUC, EDUC², TENURE, TENURE², EXPE, EXPE², FORMAD, FORSTIL.

The excluded instruments used in the IV regression include: PPRIM, PANAL, ENFT, ENFT², ENFT*AGE, PROVE, MARI*FEMALE, MARI*MALE, CHOMA, CHOMA², EMSIM, APPRENTI, STAGAN, PPRIM*AGE, PANAL*AGE, PPRIM*ENFT, PSECON*ENFT, PSUP*ENFT, PANAL*ENFT, PPRIM*CHOMA, PSECON*CHOMA, PANAL*CHOMA.

Variables and instruments are defined in Table 1.

Table 4: Marginal returns to human capital^a

	FDM OLS (5) <i>Starting wage equations</i>	FDM 2SLS (8)	FDM OLS (5) <i>Current wage equations</i>	FDM 2SLS (8)
Years of education	0.0828*	0.0923	0.0599***	0.0692
Off-the-job actual experience	0.0693***	0.1185**	0.0401***	0.0628***
Years of Tenure			0.0382***	0.0406*
Years of former OJT	-0.2426**	0.0041		
Dummy for ongoing OJT	0.2184	-0.3690	-0.2240**	-1.0347**
Dummy for former OJT			0.2321***	0.7408*

***, ** and * mean respectively significant at the 1%, 5% and 10% levels.

^a: the returns are calculated at the sample means.