

The Impact of Training on the Conditional Wage Distribution in Selected Service Subsectors in Malaysia

(Kesan Latihan ke Atas Taburan Upah Bersyarat bagi Sektor Perkhidmatan Terpilih di Malaysia)

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ABSTRACT

Human capital theory postulates that human capital investment has positive impact on wages. Training as one of the human capital components is important for providing the workforce with the necessary skills, enhancing workers skills and productivity and hence raising their wages. The objective of this paper is to investigate the degree to which work-related training affect the location, scale and shape of the conditional wage distribution using quantile regression (QR) approach. Using data from the Workers' Competitiveness Survey conducted in the year 2007/2008, we utilize both ordinary least squares (OLS) and QR regression techniques to estimate associations between work-related training and wages for selected services subsectors in Malaysia. The results show that the association between number of training attended and wages are dissimilar across the five quantiles. The training affects not only the location but the scale and the shape of the conditional wages distribution. We also observe positive and significant training effects as well as symmetrical-sloping profiles across quantiles of the conditional wages distribution.

Keywords: Conditional wage distribution; quantile regression; training

ABSTRAK

Teori modal manusia menyatakan pelaburan modal manusia mempunyai kesan positif ke atas upah. Latihan sebagai salah satu komponen modal manusia dapat memberikan kemahiran yang diperlukan oleh tenaga kerja, meningkatkan kemahiran serta produktiviti pekerja dan seterusnya upah mereka. Objektif kertas kerja ini ialah untuk mengkaji sejauh mana latihan dalam kerja mempengaruhi lokasi, skala dan bentuk taburan upah bersyarat dengan menggunakan pendekatan regresi kuantile. Kedua-dua teknik regresi Kuasa dua Terkecil (OLS) dan kuantile telah digunakan untuk menganggarkan hubungan antara latihan dan upah bagi sektor perkhidmatan terpilih di Malaysia berdasarkan data daripada Tinjauan Daya Saing Pekerja yang dijalankan pada tahun 2007/2008. Keputusan kajian menunjukkan hubungan antara bilangan latihan yang dihadiri dengan upah adalah tidak sama merentasi lima kuantile. Impak latihan bukan sahaja mempengaruhi lokasi tetapi juga skala dan bentuk taburan upah bersyarat. Kesan latihan ke atas upah adalah positif dan signifikan pada setiap kuantile dan pekali teranggarnya menunjukkan bentuk yang simetri merentasi kuantile bagi taburan upah bersyarat.

Kata kunci: Taburan upah bersyarat; regresi kuantil; latihan

INTRODUCTION

Human capital theory postulates that human capital investment has positive impact on wages. Training as one of the human capital components enhances workers skills and productivity and hence raises their wages. Work-related training is very important for providing the workforce with the necessary skills as well as for improving productivity and enhancing the competitiveness of firms and the economy. The Government of Malaysia has placed great emphases on training and skill upgrading since the First Malaysia Plan (1965 – 1970). National Mission introduced in the Ninth Malaysia Plan (2006 – 2010) was a national effort to become a developed

and a high income nation by 2020. The second thrust of the National Mission in the Ninth Malaysia Plan (NMP) was to raise the capacity for knowledge and innovation and nurture 'first class mentality'. There were several programs and projects undertaken in the NMP to deliver the National Mission's priorities of improving the education system, increasing innovation and ensuring holistic human capital development to develop the country's human capital in order to drive the transformation to a knowledge-based economy. One of the key factors required to drive a knowledge-based economy in the NMP was education and training. A total of RM45.1 billion or 23% of total expenditure is allocated in the NMP to implement various education and training

programs to sustain economic resilience and growth and drive a knowledge-based economy (Malaysia 2005). Two policy mechanisms for encouraging increased employer expenditure on training undertaken by the Malaysia Government are tax exemption and compulsory levy scheme to enterprises which train their workers. The establishment of the Human Resource Development Council (HRDC) in 1992 which was later renamed to Human Resource Development Limited (HRDL) in 2001 was aimed at enhancing workers training and skill upgrading. However, impact of training on wages and training effectiveness are rarely studied in Malaysia due to the lack of appropriate data.

Human capital theory articulates that human capital will enhance workers' productivity and skills. But how far human capital particularly training plays a role in raising wages is always becoming a research question. Becker (1964) and Mincer (1974) provide an explanation that links investment in training with wages. Over the past thirty years or so, the impact of training on wages attracted much attention in the theoretical and empirical economic literature as well as amongst policy makers. Training is widely regarded as the means by which productivity and living standards can be raised especially amongst those less skilled segments of the workforce (Ok & Tergeist 2003). The mean returns to various forms of human capital have been extensively investigated in the labour economics literature, especially the returns to formal education (Card 1999) and work-related training (Ashenfelter & Lalonde 1996). However, the regression analysis is typically based on conditional mean analysis and in the case of wages regression it explains only the behaviour of the average wage group. Regression analysis of policy effects shows only the training-wages impact on the average group and thus, results in only a partial and often misleading expression of policy effects. Analysts of the determinants of wages have also acknowledged that workplaces are highly heterogeneous. As a consequence, the returns to human capital (i.e. education and training) may vary across individuals with the same observed human capital. To account for this heterogeneity, researchers control for regional differences, industry and employer characteristics by including these variables in wage equations. Recent research, however, suggested that this approach may be insufficient to capture the real effect of employer heterogeneities and found that employee and employer characteristics interact in the process of the determination of wages (Cardoso 2000).

While ordinary least squares technique allow one to estimate the association between the regressors and the conditional mean of the wage distribution, quantile regression (QR) method allows the regressors to be associated with change to the scale and the shape of the wages distribution as well. QR takes into account the employer's and employees' heterogeneity in the way wages respond to variation in those variables which are normally expected to affect them – gender, human capital,

firm attributes and industry characteristics. Unlike mean (OLS) regressions, these techniques allow the study of the effect of each of the covariates along the whole wages distribution and consequently, the estimation of the effect of employers' and employees' heterogeneity upon wages. Moreover, since QR analysis uses the entire sample to estimate each quantile, there is no sample selection bias problem.

Although there has been a recent surge in the estimation of wage equations using quantile regression techniques (Machado & Mata 2001; Fitzenberger et al. 2001; Byung-Joo & Lee 2006) and attention has been shifted to exploring the degree to which one of the human capital component e.g. education might be associated with more complex changes in the conditional wage distribution but according to Arulampalam et al. (2010) there are no studies investigating the association between work-related training and the conditional wage distribution. This paper aims to analyse the complex factors of wage determination focusing on the impact of training on wages using the QR technique based on the Workers' Competitiveness Survey data in selected services sector namely Information and Communication Technology (ICT), Health, and Education in Malaysia. The services sector has been identified as an important economic growth driver in several Malaysia Plan including the NMP. The sector grew at 7.2 percent annually, raising its contribution to Gross Domestic Product to 61 percent by the end of the NMP period. The three subsectors namely ICT, education and health become subject of our study for three reasons, (1) their potential high income contributions to economic growth and human capital development over the NMP period and (2) the nature of these subsectors that require continuous training needs to achieve the skill development and enhancement and life-long education requirement of the nation to become a knowledge-based economy and (3) their major roles in enhancing productivity and competitiveness of services sector. Development focus has also been given to these three subsectors to place Malaysia in the global and competitive world. In the NMP more focus and allocation for training and skill upgrading were placed on the national agenda and budget by government to these three subsectors.

The paper is organized as follows. The next section briefly surveys the theory and empirical studies on work-related training. Section three introduces the QR techniques and section four discusses the data and provides the descriptive statistics of the data. Section five reports the empirical estimates of wage equations of the data using OLS regression and different quantile regressions (QR). This section also discusses wage determination factors particularly training factors in different quantile wage groups, and investigates causes of wage inequalities conditional on different covariates. The last section offers conclusion and policy implication and proposes possible extensions for further research.

LITERATURE REVIEW

There is a large and growing literature on estimating the effect of work-related training on wages. It is also well-documented that work-related training has a positive effect on wages and year-on-year wages growth (see the survey by Blundell et al. 1999). Blundell et al. (1999) use data from the British National Child Development Survey to analyse the effect of training between 1981 and 1991 on wage growth. They find significant effects of roughly 8% for employer-provided training on wage growth over 10 years. Lechner (2000) estimates the effect of enterprise-related training in East Germany in the early 1990s and finds significant effects in the second year after the training of about 350 *Deutsche Mark* per month (more than 10% of participants mean earnings prior to training). Average wage differentials between training participants and non-participants estimated by standard Mincer-type wage equations extended with training measures are quite high (Parent 1999; Loewenstein & Spletzer 2000; Goux & Maurin 2000; Muehler et al. 2007). Goux and Maurin (2000) estimate the return to firm provided training in France and found that the return is 7.1%. Kuckulenz and Zwick (2003) use the German data and find that participation in work related training is associated with more than 15% higher wages while Leuven and Oosterbeek (2008) find that the returns to training is 10%. In some studies, training returns are even higher than wage returns to schooling (Schöne 2004). However, Pischke (2001) finds hardly any significant effect of training on wage levels or wage growth using data from the German Socioeconomic Panel. Schöne (2001) also finds that return to training in Norway is very low at only 1%. Recent study by Albert et al. (2010) investigate the determinants of workers' participation in training activities and the effects of training on wages using data from European Community Household Panel on six countries over the period 1995-2001. Based on measures of four distinct training types, they find that while OLS estimates yield significant wage returns to training for nearly all of the countries, fixed-effects estimations show returns to be not statistically different from zero.

Earlier studies use coefficient of experience and job tenure to measure the effect of general training and specific training respectively (Altonji & Shakotko 1987; Topel 1991). Topel (1991) finds that return to tenure is higher than to experience by 25%, which implies that specific training is more effective than general training in raising wages. The latter studies that attempt to measure the effect of accumulating human capital through training include Mincer (1988), Altonji and Spletzer (1991), Lynch (1992), Barron et al. (1999) and Loewenstein and Spletzer (1999). Over the years, especially in developed countries, the availability of data has allowed researchers to analyse directly the link between on-the-job training and the pattern of wage (Lillard & Tan 1992; Barron et

al. 1999; Mincer 1988; Lynch 1992). Lynch (1992) points out that on-the-job training rising wages at the current employers but not at future employers, whereas the effect of off-the-job training is the reverse. On the other hand, she finds that on-the-job training acquired before current job is not significant, which implies specific training. Lynch (1992) finds that a week of company training is associated with a 0.2% higher wages. Veum (1999) finds that in-house on the job training financed by the firms is more effective in raising workers' wages. He finds that an hour of company training increases wages by 0.7% to 0.9%. Training can be short or long term depending on the program requirement. But the length of training may affect firms' productivity if they are facing shortage of labour especially associated with off-the-job training. Loewenstein and Spletzer (2000) find that the length of training is not a significant determinant of wages. On the other hand, Regner (2002) finds that training that takes longer time is more effective in raising workers' wages. Sousounis (2009) provides evidence of the relationship between training and earnings based on the British Household Panel Survey data.

Booth (1991) finds that the training returns for men are 11.2% and 18.1% for women. Blundell et al. (1996) find that returns to on-the-job training is not significant for women but it is 3.6% for men. In another study, Blundell et al. (1999) find that the returns for employer-provided training for men is 8.3% using a larger sample than the earlier study. Yoshida and Smith (2005) found a positive impact from training on wages, but did not differentiate returns by gender. Parent (2003) shows that for men employers-supported training increase hourly wage by more than 10%, but it is only 2% for women. Budria and Pereira (2007) investigate the determinants and wage effects of training in Portugal and find that training has a positive and significant impact on wages. The estimated wage return is about 30% for men and 38% for women. They use three alternative classifications of training activities and find that training in the firm, training aimed to improve skills needed at the current job and training with duration less than a year are associated to larger wage gains. Almeida-Santos and Mumford (2006) also use BHPS data to examine wage returns to training incidence and duration. They find that individual wage returns to training differ greatly depending on the nature of the training (general or specific), and the skill levels of the recipient (white or blue collar). Training courses containing general components showed higher returns compared to all training courses. They find very limited wage returns from training for blue collar workers aged between 30 and 40 years, and no significant effects for workers older or younger than that. By contrast, their findings suggest a range of positive returns for high skill workers. Almeida-Santos et al. (2010) use household panel data to explore the wage returns associated with training incidence and intensity (duration) for British employees. They find these returns differ depending on

the nature of the training; who funds the training; the skill levels of the recipient (white or blue collar); the age of the employee; and if the training is with the current employer or not. Using decomposition analysis, training is found to be positively associated with wage dispersion.

Recent empirical studies find that training increases both wages and performance and, consistent with theory grounded in imperfect labour markets, also find evidence of a wedge between wages and productivity effects and that employees and employers share benefits from training. This applies both to industry- and firm-level studies (Conti 2005; Ballot et al. 2006; Dearden et al. 2006; Sepulveda 2010). Becker (1964) and Mincer (1974) argue that wage profile increases upward as human capital increases because individual productivity increases. Bartel (1995) finds that investment in training tend to increase workers' productivity. Conti (2005) presents panel evidence on the productivity and wage effects of training in Italy using several modelling specifications and a variety of panel data techniques to show that training significantly boosts productivity. However, no such effect is uncovered for wages. Conti (2005) seems to suggest that firms actually reap more of the returns. Dearden et al. (2006) analyse the link between training, wages and productivity at the sector level using a panel of British industries. They find that raising the proportion of workers in an industry who receive training by one percentage point increases value added per worker in the industry by 0.6% and average wages by 0.3%. Kuckulenz (2006) finds for Germany that the impact of continuing training on firm productivity is three times higher than the one on individual wages. Two other interesting studies are Barron et al. (1999) and Goux and Maurin (2000). Both studies are based on data for workers and firms. Barron et al. (1999) find only small effects of training on wages (based on fixed effect estimation), but large effects on productivity. Their results imply that firms bear most costs of training, but also get most of the returns to training. Goux and Maurin (2000) find an effect of about 5% for training when not controlling for selectivity.

Gerfin (2004) provides estimates of the effects of training on wages which can be seen as a lower bound for the effects on productivity. Training is measured either as firm-sponsored training or as any work-related training. The results indicate that it is important to account for multiple training events. Taken together, there are significant effects of work-related training on wages of roughly 2% for each training event. Kuckulenz and Zwick (2003) use German data set in 1996 to 1998 to calculate the 1998 to 1999 earnings effect of training for different "types" of employees and employers and for different training forms. Their study emphasize on the heterogeneity of the effects of different post school training types and for different groups of training participants. They interact the training dummy with all explanatory variables in the earnings equation to allow for training returns heterogeneity to depend on employee and

firm characteristics. Their separate analysis of internal and external training reveals that the significantly positive returns of training is mainly driven by external training.

Konings and Vanormelingen (2010) use firm level panel data of on-the-job training to estimate its impact on productivity and wages. They apply and extend the control by function approach proposed by Akerberg et al. (2007) for estimating production functions which allows them to correct for endogeneity of input factors as well as training. They find that productivity increases by 1.4%-1.8% in response to an increase of 10 percentage points in the share of trained workers while wages only increase by 1.0%-1.2%. Their results are consistent with recent theories that explain work related training by imperfect competition in the labour market. Jones et al. (2012) use panel data for Finnish co-operative banks to study the impact of training on wages and performance. They find stronger evidence that training improves worker outcomes rather than organizational performance. The estimated wage elasticity with respect to training ranges from 3%-7% depending upon specification but they find virtually no training effects on organizational performance.

There has been a recent surge in the estimation of wage equations using quantile regression techniques (Machado & Mata 2001; Fitzenberger et al. 2001; Byung-Joo & Lee 2006) to estimate the impact of one of the human capital components namely education on the location, scale and shape of the conditional wage distribution. Arias et al. (2001), Gonzales and Miles (2001) and Martins and Pereira (2004) estimate the returns to education across the conditional wage distribution using quantile regression (QR) techniques. Martin and Pereira (2004) use cross-sectional data from a variety of different data sources covering 15 European countries plus the USA and find that returns to schooling increase over the wage distribution. Martins and Pereira (2004), as well as Arias et al. (2001), point out the implications of these results, that increased education may be associated with a widening of the (conditional) wage distribution, and may not always improve the prospects of low-earning workers as much as hoped by policy makers. Machado and Mata (2001) use quantile regressions to describe the conditional wage distribution in Portugal and find that although returns to schooling are positive at all quantiles, education is relatively more valued for highly paid jobs. Consequently, schooling has a positive impact on wage inequality. And they find that most of the estimated change in wage inequality was due to changes in the distribution of worker's attributes, rather than to increased inequality within a particular type of worker.

However, literature on the degree to which the other human capital component, e.g. training might be associated with more complex changes in the conditional wage distribution is very limited. According to Arulampalam et al. (2010) there are no studies investigating the association between work-related

training and the conditional wage distribution. They use quantile regression techniques (Koenker & Bassett 1978) to document the heterogeneity in the way wages respond to variations in those variables which are normally expected to affect them -gender, human capital, firm attributes and industry indicators (Mincer 1974). They investigate the degree to which work-related training, another important form of human capital affects the location, scale and shape of the conditional wage distribution. Using the first six waves of the European Community Household Panel, they utilize both ordinary least squares and QR techniques to estimate associations between work-related training and wages for private sector men in ten European Union countries. Their results show that, for the majority of countries, there is a fairly uniform association between training and hourly wages across the conditional wage distribution. However, there are considerable differences across countries in mean associations between training and wages.

According to the literature, wage returns to training are likely to be positive and large, even surprisingly large, compared with the return to one year of education at a young age. The possibility of underinvestment in training is discussed in many countries, as well as in the EU (Laukkanen 2010). The conclusions, however, are difficult to draw, since the returns to training seem to depend on the data, the country and the model used. Laukkanen (2010) estimates the return to training using quantile regression techniques and data from the Finnish Adult Education Surveys of 1990, 1995 and 2000, which quite extensively include the “competing” forms of human capital. The results from the basic life cycle model show positive returns to training. The coefficient estimates suggest that one course of vocational training increases the gross hourly wage by 1.3%-1.8%. Gorlitz (2010) investigates the impact of on-the-job training on wages using German linked employer-employee data. She compares wages of employees who intended to participate in training but did not do so because of a random event with wages of training participants. The study finds that the estimated wage returns are statistically insignificant. On average, participants have a wage advantage of more than 4% compared to non-participants.

In Malaysia, evidence on training returns is scant. The general level of technical and industrial skills in Malaysia is relatively low even though there is evidence of increased training and skill acquisition among firms (Wan Abdul 1995). Lee et al. (1995) (cited in Chung 2000) find that in the selected manufacturing sector, rates of return for men are higher than those for women. A report submitted to the ILO and the Government of Malaysia in 1989 (cited in Lee et al. 1995) find that returns to certificate level training from private institutions tend to be higher than training from government institutions. Wan Abdul (1995) finds that transnational corporations have a greater incidence of training and re-training their work force. Tan and Batra (1995) examine the effect of training

on firm productivity and find that internal formal training for skilled workers had a positive significant relationship with firm productivity. Even though they did not directly measure the effect of training on wages, this positive relationship may imply that wages increase with training since there is a positive relationship between productivity and wages. All the above mentioned studies are conducted on firms. The studies on benefits or impact of training for workers' wages in Malaysia are very limited. Chung (2000) compares returns to training between females who attend training and who did not attend using the Malaysian Family Life Survey (MFLS) data. The study finds that females who participate in job-related training receive higher wages than that for males. The study also shows that both private and government types of training have positive and significant returns and full-time training benefit more to workers earnings. Rahmah and Zulridah (2007) investigate the effect of various types of training on individual wages in manufacturing sector in Malaysia. Analysis is based on the data of 2,045 workers surveyed in 1999 to 2000 in the Klang Valley and Penang. They comprise of production workers working in various manufacturing sub sectors. The results from this study show that various fields of training have positive significant effect on wages. Training received from previous job and on-the-job training also contributes significantly to wage increase. In contrast, off-the-job training and length of training are not significant.

METHODOLOGY

MODEL SPECIFICATION

In order to explain individual earnings, economists traditionally use the so-called Mincer equation, a standard tool in human capital theory (Mincer 1974). In this standard equation, the growth of earnings over working life, that is, the experience wage profile, reflects worker returns to investments in human capital. In subsequent years, authors have increased the number of explanatory variables included in the regression, initially with the introduction of tenure, as a proxy for specific training investment, and later with the addition of variables capturing training incidence and intensity, individual, job and firm characteristics (Chiswick 2003). In this augmented framework, training may be considered as inherently heterogeneous and it is legitimate to expect the size of the wage returns to differ according to the nature and the type of the training program (Leuven 2004). Thus the augmented form of the earnings function is as follows.

$$\begin{aligned} \ln WG = & \beta_0 + \beta_1 EXP + \beta_2 EXP2 + \beta_3 SCH \\ & + \beta_4 TRN + \beta_5 DSI + \beta_6 DS2 + \beta_7 DO \\ & + \beta_8 DG + \beta_9 DE1 + \beta_{10} DE2 \\ & + \beta_{11} DM1 + \beta_{12} DM2 + \beta_{13} DK1 \\ & + \beta_{14} DK2 + \beta_{15} DK3 + \varepsilon \end{aligned} \quad (1)$$

where,

- lnWG* = logarithm of monthly wage
EXP = work experience (in years)
EXP2 = work experience squared (in years²)
SCH = years of schooling
TRN = number of training attended
DS1 = dummy for subsector: 1 if health, 0 otherwise
DS2 = dummy for subsector: 1 if ICT, 0 otherwise
DO = dummy for type of ownership: 1 if foreign, 0 otherwise
DG = dummy for gender: 1 if female, 0 otherwise
DE1 = dummy for ethnicity: 1 if Chinese, 0 otherwise
DE2 = dummy for ethnicity: 1 if Indian & others, 0 otherwise
DM1 = dummy for marital status: 1 if married, 0 otherwise
DM2 = dummy for marital status: 1 if widow/widower, 0 otherwise
DK1 = dummy for occupational category: 1 if managerial, 0 otherwise
DK2 = dummy for occupational category: 1 if professional, 0 otherwise
DK3 = dummy for occupational category: 1 if technician, 0 otherwise
 ε = stochastic disturbance

Besides number of training attended by workers, we explore the possible heterogeneity in training returns to job and firm characteristics, such as occupational categories (managerial, professional, technician and sales & marketing), economic subsectors (health, ICT and education) and type of ownership (foreign and local). Further determinants of earnings other than found in the standard Mincer equation (work experience and years of schooling) include a dummy for gender (male treated as base group), two dummies for ethnicity (Chinese and Indian & others with Malays as base group), two dummies for marital status (married and widow/widower with single as base group). All these explanatory variables allow us to control a large part of the individual's and employer heterogeneity.

ESTIMATION METHOD

QR analysis provides an attractive alternative estimation method to overcome various shortcomings of mean regression analysis. QR analysis does not impose arbitrary exogenous sample selection criteria to divide the sample, and we can estimate as many quantile regressions as practically possible. Moreover, since QR analysis uses the entire sample to estimate each quantile, there is no sample selection bias problem. Koenker and Basset (1978) propose the QR method to analyse the conditional quantiles of the dependent variable using covariates. The 50th QR is the familiar conditional median regression. QR analysis has several advantages over the typical mean regression estimation method. Since the QR is estimated

by minimizing the sum of absolute values of residuals instead of the sum of squared residuals, it is robust to heteroscedasticity, or a few extreme observations. Also, it is possible to examine different conditional quantiles of the distribution, not just the conditional mean of the dependent variable. Buchinsky (1998, 2001) have used the QR method to analyse various U.S. labour market issues. The QR method estimates the different responses of covariates to a wage equation in different quantiles of a wage distribution. More specifically, the quantile regression model is defined as

$$y_i = x_i' \beta(q) + u_i = Q_q(y_i) + u_i \quad 0 < q < 1 \quad (2)$$

where $y_i = \ln WG$ and x_i is the vector of all the explanatory variables in Eqn.(1); $\beta(q)$ is the vector of parameters to be estimated for a given value of the distribution's quantile q and u_i is the error term assumed to be independently and identically distributed with symmetric distribution around zero; $Q_q(y_i)$ denotes the q th quantile of the conditional distribution of y_i given the known vector of regressors x_i . In this paper, regression analyses are performed at five different quantiles of the wages distribution (i.e. 10th, 25th, 50th, 75th and 90th percentile). Koenker and Bassett (1982) propose a method to evaluate whether the location-shift model is appropriate by testing the equality of the slope coefficients across all quantile regressions with Wald test.

DATA AND DESCRIPTIVE STATISTICS

Since secondary data from Labour Force Survey collected by Department of Statistics Malaysia are not made available to public, the workers data employed for this study were obtained through a fieldwork from the Workers' Competitiveness Study conducted in 2007/2008 by a group of researchers from the Faculty of Economics & Management and Faculty of Social Science & Humanities, Universiti Kebangsaan Malaysia. This study was funded by The Ministry of Science & Technology Malaysia under Science Fund research grant. To our knowledge, this is the most recent and only data set at the individual level available to study the impact of training on wages. Survey questionnaires were distributed to respondents either by mail or through enumerators. The sample consisted of 1,033 respondents from four occupational categories e.g. managerial, professional, technical, and sales & marketing in health, ICT and education service subsectors. This study covered four areas namely Penang, Klang Valley, Federal Territory of Kuala Lumpur and Johore Bahru based on their intense development in the Malaysian services sector.

Table 1 summarizes the descriptive statistics of the variables used in this study and the regression analyses. We estimate regressions of the logarithm of monthly wages on covariates representing demographic variables such as gender, marital status, ethnic group, human capital (as measured by years of schooling,

TABLE 1. Descriptive statistics of variables

Variable	Mean	Median	SD	Skewness [#]
Monthly Wage (<i>WG</i> , in RM)	2696.37	2321.59	1565.63	3.846*
Logarithm of monthly wage (<i>lnWG</i>)	7.791	7.750	0.443	0.540*
Work experience (<i>EXP</i> , in years)	7.510	5.000	7.075	1.785*
Work experience-squared (<i>EXP2</i> , in years ²)	106.41	25.00	212.17	4.517*
Years of schooling (<i>SCH</i> , in years)	15.28	15.00	1.311	0.605*
Number of training attended (<i>TRN</i>)	1.22	1.00	1.133	0.437*
Subsector				
Health (<i>DS1</i>)	0.161	0.000	0.367	-
ICT (<i>DS2</i>)	0.326	0.000	0.469	-
Type of ownership				
Foreign (<i>DO</i>)	0.125	0.000	0.331	-
Gender				
Female (<i>DG</i>)	0.621	1.000	0.485	-
Ethnicity				
Chinese (<i>DE1</i>)	0.145	0.000	0.352	-
Indian & others (<i>DE2</i>)	0.121	0.000	0.326	-
Marital Status				
Married (<i>DMI</i>)	0.510	1.000	0.500	-
Widow / widower (<i>DM2</i>)	0.016	0.000	0.127	-
Occupational Category				
Managerial (<i>DK1</i>)	0.079	0.000	0.270	-
Professional (<i>DK2</i>)	0.762	1.000	0.426	-
Technician (<i>DK3</i>)	0.128	0.000	0.334	-

Note: [#] unit free statistics, * the hypothesis of normality is rejected under Jarque-Bera test.

work experience and number of training attended), job characteristics as represented by occupational category and firm attributes (type of ownership and subsectors). The descriptive statistics review that most of the workers are female, Malays, engaged with local companies, married and work in education subsector. Professional comprises 76.2% of the total workers and this is in line with the nature of the services subsectors selected (ICT, education and health). About 66% of workers receive some formal training with the average number of training attended of 1.22. The average work experience and years of schooling are 7.51 and 15.28 years respectively. Although the average monthly wage is RM2696.37, about 50% of the workers earn less than RM2321.59 a month. The distribution of monthly wage is highly skewed (coefficient of skewness = 3.846) and the Jarque-Bera test for the normality assumption is rejected. Even after taking the logarithm, the monthly wage distribution also departs from normality although the coefficient of skewness is improved. These findings support the use of quantile regression.

RESULTS OF ESTIMATION

As a benchmark for our QR results, we also present OLS estimates of the wage equation before discussing the QR

estimates. With OLS, the effects of all covariates on wage distribution are assumed to have only location shifts but QR assumes location shifts as well as scale and shape of the conditional wage distribution. Table 2 presents the results of OLS regression and QR at five different quantile levels.

OLS ESTIMATES

The second column of Table 2 presents the least squares estimates of monthly wage. Using OLS regression, we find 14 out of 15 variables are significant either at 1% or 5% significance levels and the signs of the coefficients are as expected in the wage determination. The estimation results show that as years of work experience increase, the monthly wage will increase at a decreasing rate (as shown by the negative sign of the estimated coefficient associated with work experience-squared, *EXP2*). The years of schooling and number of training attended are significantly related to monthly wage. *Ceteris paribus*, each additional year in schooling and training attended are respectively associated with 12.6% and 4.6% higher wage.

The median wage of workers from health and ICT subsector are respectively 8.5% and 17.4% higher as compared to education subsector. Female workers receive lower wage as compared to male workers. On the other

TABLE 2. Estimation results of wage

	OLS estimates	Quantile Regression estimates				
		0.10	0.25	0.50	0.75	0.90
Constant	5.306 (0.135)***	4.932 (0.246)***	5.101 (0.245)***	5.368 (0.217)***	5.449 (0.198)***	5.421 (0.312)***
EXP	0.040 (0.004)***	0.031 (0.008)***	0.032 (0.006)***	0.037 (0.006)***	0.047 (0.005)***	0.056 (0.008)***
EXP2	-0.001 (0.0001)***	-0.001 (0.0002)**	-0.0004 (0.0003)	-0.0004 (0.0002)**	-0.0007 (0.0002)***	-0.0008 (0.0002)***
SCH	0.126 (0.008)***	0.124 (0.013)***	0.130 (0.016)***	0.124 (0.014)***	0.129 (0.013)***	0.130 (0.019)***
TRN	0.046 (0.009)***	0.052 (0.015)***	0.035 (0.010)***	0.038 (0.008)***	0.025 (0.011)**	0.053 (0.016)***
DS1	0.082 (0.032)**	-0.013 (0.071)	-0.017 (0.038)	0.037 (0.042)	0.092 (0.034)***	0.214 (0.080)***
DS2	0.160 (0.024)***	0.137 (0.046)***	0.131 (0.023)**	0.111 (0.026)***	0.131 (0.035)***	0.216 (0.045)***
DO	0.102 (0.032)***	0.074 (0.055)	0.048 (0.033)	0.048 (0.028)*	0.085 (0.054)	0.182 (0.074)**
DG	-0.060 (0.020)***	-0.050 (0.036)	-0.048 (0.024)**	-0.050 (0.026)*	-0.045 (0.033)	-0.058 (0.038)
DE1	0.093 (0.029)***	0.201 (0.040)***	0.117 (0.033)***	0.097 (0.032)***	0.087 (0.036)**	0.050 (0.049)
DE2	0.069 (0.030)**	0.069 (0.054)	0.030 (0.027)	0.029 (0.043)	0.058 (0.042)	0.090 (0.052)*
DMI	0.072 (0.022)***	0.064 (0.032)**	0.085 (0.018)***	0.084 (0.025)***	0.060 (0.028)**	0.023 (0.044)
DM2	0.257 (0.077)***	0.182 (0.139)	0.237 (0.097)**	0.184 (0.103)*	0.239 (0.150)	0.315 (0.199)
DK1	0.367 (0.066)***	0.510 (0.104)***	0.396 (0.072)***	0.322 (0.092)***	0.297 (0.102)***	0.446 (0.167)***
DK2	0.163 (0.056)***	0.288 (0.103)***	0.197 (0.054)***	0.154 (0.083)*	0.138 (0.084)	0.223 (0.121)*
DK3	0.086 (0.061)	0.257 (0.107)**	0.156 (0.055)***	0.077 (0.090)	0.046 (0.089)	0.062 (0.138)
R ²	0.5293	-	-	-	-	-
Pseudo-R ²	-	0.3041	0.3128	0.3452	0.3384	0.3579

Note: ***significant at $\alpha = 0.01$, **significant at $\alpha = 0.05$, * significant at $\alpha = 0.10$

hand, the average monthly wage of workers who work in foreign firm is 10.7% higher as compared to workers who work in local firm. Analysis by occupational categories shows that the wages of workers in managerial and professional group are significantly higher if compared to sales & marketing workers.

Although most of the estimated coefficients are highly significant with expected sign, but the OLS estimates may not be reliable due to the existence of non-Gaussian disturbances as explained earlier. The estimated regression line provides an estimate of the monthly wage at the mean value, which may not be representative of the entire distribution. Therefore

quantile regression is more appropriate in analysing the conditional distribution of the dependent variable and we can develop more detailed and accurate information from the wage equation in all different levels of wage groups.

QUANTILE REGRESSION ESTIMATES

In our study, quantile regression allows observationally identical workers who have different unobserved abilities to experience different wage levels and different wage paths as the values of regressors that measure worker characteristics or labour market institutions change. The

coefficients of the regressors may differ at different points of the conditional wage distribution and can affect wage inequality. Table 2 also includes the regression estimates for five different quantiles (i.e. 0.10, 0.25, 0.50, 0.75 and 0.90) of the monthly wage distribution. To further evaluate whether the location-shift model is appropriate, the Wald test has been applied to test the equality of each parameter estimates across all quantiles. The results are summarized in Table 3. In addition, the corresponding p-values for the test of equality of individual slope coefficient between two selected quantiles are also reported in the same table.

As discussed earlier, the purpose of the paper is to investigate the impact of training across the conditional wages distribution. From Table 2, we can observe a symmetrical-sloping profile for number of training attended across the conditional wages distribution. The returns on training are relatively higher (about 5.3%) at the lower quantile (0.10) and upper quantile (0.90) as compared to 25th quantile (3.5%) and 75th quantile (2.5%), while the OLS estimates of the training-wages association is 4.6% as reported earlier. Differences in the training coefficients across quantiles suggest that training may be associated with expanded or compressed conditional wage distributions. From Table 3, the QR estimates of the association of training with wages differ significantly across all quantiles (with p-value = 0.025). The implication is that training not only affects the location of the conditional wage distribution but also the shape of the distribution.

This finding is consistent with the study by Almeida-Santos et al. (2010) who use household panel data

to explore the wage returns associated with training incidence and intensity for British employees. Using decomposition analysis they find training is positively associated with wage dispersion. However, this finding is in contrast with finding by Arulampalam et al. (2010) who find the association between training and hourly wages varies little across the conditional wage distribution for the majority of countries in EU. Of course, their sample is different since they focus only on private sector men and so our estimates are not comparable.

Inspection of the estimated coefficients of the years of schooling reveals that the QR estimates are fairly uniform (around 0.130) across the conditional wages distribution. Since the years of schooling is significantly related to monthly wage at each quantile and the QR estimates do not differ significantly across all quantiles, it can be concluded that years of schooling only affects the location of the conditional wage distribution. The findings are not consistent with previous findings by Arulampalam et al. (2010), Budria and Pereira (2004) in which education is associated with increased dispersion of the conditional wage distribution. The observed negative sign of the QR estimates of work experience-squared, *EXP2* in all the five quantiles indicates that the monthly wage increases at a decreasing rate as years of work experience increase. Female workers are also found to receive lower wage as compared to male workers in all the five quantiles. From the results of Wald test, the observed differences are identical across quantiles.

The coefficients of some of the dummy variables differ in scale at the different points of the conditional wage distribution and can, thus affect wage inequality.

TABLE 3. Tests of slope coefficient equality across quantiles

Explanatory variables	Marginal significance levels (p-values)		
	Quantile 0.10 & 0.90	Quantile 0.25 & 0.75	All quantiles
<i>EXP</i>	0.028**	0.943	0.045**
<i>EXP2</i>	0.396	0.003***	0.690
<i>SCH</i>	0.802	0.139	0.967
<i>TRN</i>	0.971	0.453	0.025**
<i>DS1</i>	0.025**	0.007***	0.165
<i>DS2</i>	0.188	0.990	0.010**
<i>DO</i>	0.087*	0.545	0.803
<i>DG</i>	0.860	0.898	0.998
<i>DE1</i>	0.007***	0.467	0.032**
<i>DE2</i>	0.776	0.572	0.355
<i>DM1</i>	0.291	0.404	0.562
<i>DM2</i>	0.556	0.992	0.823
<i>DK1</i>	0.775	0.197	0.170
<i>DK2</i>	0.694	0.428	0.702
<i>DK3</i>	0.265	0.208	0.641

Note: *** significant at $\alpha = 0.01$, ** significant at $\alpha = 0.05$, * significant at $\alpha = 0.10$

According to the estimates, the firm attributes such as type of ownership and subsectors tend to increase wage inequality. The effect of these dummy variables seems to be strengthened in the upper tail of the wage distribution. For the upper 10% of the distribution, the median wage of workers who work in foreign firm is 19.9% higher as compared to workers who work in local firm. The median wage of workers from health and ICT subsector are respectively 23.9% and 24.1% higher as compared to education subsector. The reported differences are relative higher than the OLS estimates. It is interesting to notice that the in-between coefficient differences of *DS2* are significant (with p-value = 0.01) in the joint test among all five quantiles but not significant in the equality test between bottom and upper 10% as well as bottom and upper 25%. The opposite picture prevails in *DS1* coefficients.

Relative to the base of sales & marketing, the estimated coefficients of all the occupational category dummies reveal that the association between managerial, professional, technician and wages decreasing across the conditional log wages distribution. The observed differences, in particular, are significant at the lower quantiles. However, the differences in these coefficients are not significantly different across quantiles.

CONCLUSION

We use a quantile regression technique to investigate the degree to which training affects the location, scale and shape of the conditional wages distribution. Using the data from the Workers' Competitiveness Survey in 2007/2008, we investigate these issues for workers in selected services subsector e.g. ICT, education and health in Malaysia. Our findings for training intensity suggest that associations between number of training attended and wages are dissimilar across the conditional wages distribution. We observe positive and highly significant associations between numbers of training attended and wages as well as a symmetrical-sloping profile across quantiles of the conditional wages distribution. The returns on training are relatively higher at the 10th and 90th quantile but lower at the 25th and 75th quantile. Training intensity is found to not only affect the location but also the shape of the conditional wage distribution.

The study finds that training affects wage distribution significantly at all quantiles but the effects are not symmetrical. The returns to training are relatively higher at the 10th and 90th quantile but lower at the 25th and 75th quantile. These findings suggest a more-well-developed and comprehensive system of job training that can offer individual workers at all levels of the labor structure more opportunities to attend training to upgrade their skills and better chances to reduce the wage gaps. The success of training program and projects depends on cooperation among stockholders involved in

job provision in Malaysia such as industry, employers, employees, government, universities and colleges, formal and vocational schools. The education, training and lifelong learning delivery systems need to be improved and made more comprehensive to enhance the quality of human capital and produce the towering individuals needed to meet the challenges of development and drive a knowledge-based economy. Most Malaysian companies recognize the importance of human capital development including training for their success but are faced with problems in funding these activities. Employers often decide upon acquiring modern equipment and expanding their establishments rather than training and developing and upgrading skills of their employees. At the same time, the quality of education either in formal and vocational schools and university levels in general is not adequate. It is an alarming issue among industries in Malaysia that the majority of graduates are critically limited in practical skills and in their ability to adapt to professional work, work discipline and teamwork. To close this gap, the Human Resource Development Fund (HRDF) was established to allow employers to reserve proportions of their budget for employee training and the National Dual Training System (NDTS) was improved to establish closer cooperation between industry and educational system for matching skills requirement and employability skills of graduates. It is still unclear whether the NDTS has been successful in matching employability skills of graduates either from universities or vocational schools and employer skill or job requirements and has improved the employment prospects of graduates in the job search phase. The success of HRDF to encourage training activities by the industries for their employees is also unclear.

Since job trainings in Malaysia for workers are mainly conducted after the completion of formal schooling in the current or previous jobs or after the completion of formal schooling, the increased demand for high level of education after the secondary schooling do not raise the levels of occupational qualifications because job training was detached from schooling. In this regard, a focus on more practical training programs in schooling either formal or vocational may help strengthen job training in Malaysia. By introducing a vocational training system in schools the participation of social partners (employers) could be enhanced in training at various vocational schools and this will reduce mismatching between skill requirements by employers and employability skills of graduates and chances of hiring graduates from these schools would be higher. Social partners should play adequate role in managing and conducting job training in terms of developing the norms for training and skill standards, controlling examinations and awarding certificates.

The implications are that this paper suggests a stronger integration of job training into schooling – not only into vocational school, but into the higher level

of education – and greater involvement in training at vocational school by employers. With reference to the proposed reform policy on the National Dual Training System in the NMP, this study suggests that the government should have greater involvement in the vocational or industrial qualification and training programs provided by employers in an effort to improve the system.

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