DOES COMPENSATING WAGE DIFFERENTIALS EXIST IN THE FORMAL SECTOR IN PAKISTAN?

MUHAMMAD RAFIQ* and MIR KALAN SHAH**

* Institute of Management Sciences, Peshawar – Pakistan.
** Institute of Development Studies, Agricultural University, Peshawar – Pakistan.

ABSTRACT

The purpose of writing this paper was to find out the validity of the Compensating Wage Differentials in Pakistan and to use the analysis to find out the Value of Statistical Life and Injury for the country. This is a pioneering work. The study has focused on evaluating the compensating wage differential among the blue-collar industrial workers in Lahore. The survey was conducted in all parts of Lahore from May 2009 to October in the same year. Based on the estimation results of four alternative hedonic wage equations, the Value of Statistical Life (VSL) for Pakistan has been estimated to be 25.16 million PKR per statistical life. Moreover, the Value of Statistical Injury (VSI) has been estimated to be 111,000 PKR per statistical injury. The study confirms that the compensating-wage differential does exist in the formal private sector in Pakistan. The results of the study shall help the policy makers and other researchers.

Key Words: Hedonic, Compensating Differentials, Fatal, Non-fatal, Lahore


INTRODUCTION

Workers while considering the job characteristics examine many pecuniary and non-pecuniary characteristics of work, such as wages, work-time, career path, ease and hardships of work, pension benefits, risk of life and health. Nonetheless, as noted by Viscusi (1978a) job safety remains one of the most important characteristics. The theory of compensating wage differentials postulates that if a particular job is riskier than other jobs and if this is known to the workers, then there must be some other more valued characteristics of that job as a compensation, but if the non-monetary aspects of all the others job are the same, then the compensation should be in the from the higher wages. This wage premium to compensate the workers for higher risk is described as ‘Willingness to Accept’ Behavior. Economists term a trade off between health and wealth as the Value of a Statistical Life (VSL) and Value of Statistical Injury (VSI). The former case involves swapping wealth for less likelihood of dying and the latter involves an exchange for a reduction in the chances of getting injured. These estimated values are used to evaluate public safety project such as highway safety measures, air pollution control measure, climate change mitigation strategies and other safety measures.

While glancing at the state of labor market of blue-collar workers in Pakistan, wages in the private sector are predominantly the result of labor demand and supply especially in the manufacturing sector. However, job safety regulations and its implementation in Pakistan reveals that a vast majority of poor, illiterate and rural migrants are employed in unregulated sectors like construction, agriculture, mining, and especially in small and medium industries. Women and children being mostly casual workers are particularly vulnerable due to their inaccessibility to basic occupational health and safety protection. Pakistan Statistical Year Book (2007) has highlighted the plight of the employees’ health and safety situation in the country from year 1993 to 2002. The total number of accidents including fatal and non-fatal remained high till year 1996 with a minimum number of 4.43 per thousand of workers to the maximum in year 1995 which were 7.31 per thousand of workers. However, among these numbers, the ratio of minor accidents remains a major portion of the reported industrial accidents.

Fatal accidents were highest in years 1993 and 2001 which were 34 per thousand of workers. However, for the years 1994-2000, the ratio is around between 12 per thousand to a maximum of 19 per thousand industrial workers. Yet, in year 2002, the fatalities were almost 29 per thousand workers. Serious non-fatal accidents and minor cases were highest in year 1993, though they showed a decreasing tendency until year 2000. The situation on the other hand, reversed back in year 2001 and year 2002. However, data pertaining to inter and intra industry fatal and non fatal differences could not be made certain.

Having said this, the present study is an attempt to establish the validity of the Theory of Compensating Wage Differentials put forwarded by Adam Smith (1776) and subsequently to obtain the value of statistical life and injury in Pakistan. The study is based on hedonic (quality-adjusted) wage model to assess the demand for safety by
estimating the relationship between wage and job-related risk. The study has focused on the blue collar male workers of the manufacturing sector in Lahore.

The objective of the study was to empirically estimate the compensating earnings differentials for job-related fatal and non-fatal risks in Pakistan. The hypothesis was tested that workers are rational and they do consider risk while accepting jobs. This will be the first study of its kind. The results of the study shall assist different agencies and research bodies for the evaluation of different safety programs. Incidentally, the results of this study can also be used to assess the human cost of the ongoing war on terror in Pakistan. Moreover, it shall aid the insurance companies to settle the claim of Life and Limb. It will also provide a breeding ground for further research work in this area.

**Theoretical Framework**

Workers while considering the job characteristics examine many pecuniary and non-pecuniary characteristics of work. Wages, work time, career path, ease and hardship of work, pension and benefits, risk of life and health. Nonetheless, as noted by Viscusi (1978a) job safety is expected to be one of the most important characteristics. The theory of compensating wage differentials postulates that if a job is riskier than the other jobs and this is known to the workers, then there must be some other more valued characteristics of that job as a compensation, but if the non-monetary aspects of all the others job are the same, then the compensation should be in the from the higher wages.

The theory was originally formed by Adam Smith (1776) who explicated that “The wages of laborers vary with the ease or hardship, the cleanliness or dirtiness, the honorableness or dishonorableness of the employment”. Economists have developed statistical models to realize the difference in workers’ productivity and different components of job by unraveling wage-risk tradeoff from other factors affecting wages. Griliches (1971), Rosen (1974, 1986), and Thaler and Rosen (1975) have reorganized this concept. The critique has been termed as the Hedonic (quality adjusted) Wage Model which tries to determine the variability in wages pertaining to different factors including job related fatal and non-fatal risks.

While considering the Hedonic Wage Model, the demand for labor is a decreasing function of the cost of employing laborers. These costs include wage, compensation, training and development, rest days, provision of safety measures, etc. Firms are willing to pay less to their workers as the cost of safety for a given level of profit increases. Given the wage risk offers, workers choose a wage-risk combination in the market offering highest wages. The supply of labor is fractionally influenced by their wage, risk preferences, besides numerous pecuniary and non pecuniary job characteristics.

The Hedonic Wage Model can be explained with state-dependent utility functions, let \( U(w) \) represent the utility of a worker in good health earning wage \( w \) and let \( V(w) \) represent the utility of an injured worker at wage \( w \). Customarily, workers are paid compensation for an injury depending upon wages that one was receiving. Suppose that the compensation received by the worker and its association with the wage is symbolized by the functional form of \( V(w) \). Besides, this it is also supposed that workers favor healthy state over an injured one, that is, \( U(w) > V(w) \), more over the marginal utility of income is positive, symbolically, \( U'_\omega > 0, V'_\omega > 0 \). However, in addition to this one’s risk objectivity should be larger than zero too. Labors select the wage-risk deal by the side of market alternative, for explanation we suppose, \( w(p) \), for capitalizing on the expected utility. For further exposition of the concept, all the wage and risk combination can be represented as:

\[
Z = (1 - p) U(w) + pV(w). \tag{1}
\]

The wage-risk tradeoff given this concept is given by

\[
\frac{dw}{dp} = \frac{-Zp}{Zw} = \frac{U(w) - V(w)}{(1 - p) U(w) + pV(w)} > 0, \tag{2}
\]

Therefore, wage must increase with the increase in the degree of risk. As a result the wage-risk swap is equated with the differentiation in the utility levels of the two statuses by the expected marginal utility of income. We need the observed market data to study equality between these two, and for many workers, observations of a range of workers are the combination of workers’ wage and risk trade-offs. Hedonic Wage Models trace this point by workers which is determined by the demand and supply in the market. Precisely, the coefficients match to the employee’s marginal willingness to accept risk on one hand. But On the other hand it also looks in to employees demand for more safety and the firm’s incremental cost for the provision of increased safety demand plus the decrease in the marginal cost faced by the firm owing to more risk faced by the workers.
MATERIAL AND METHODS

Description of the Study Area

The survey to interview blue collar workers of a manufacturing sector was conducted in Lahore, Pakistan. Lahore is the capital of Punjab province and is the second largest city in Pakistan after Karachi. It is popularly known as the Heart of Pakistan, due to its historical importance in the creation of Pakistan, and it is also the cultural, political, and educational center of the country. Lahore is the second largest financial hub of Pakistan and has large industrial areas including Kot Lakput, Quaid-e-Azam industrial estate, the new Sundar Industrial Estates and many others. It has around 2652 large, small and medium-sized industries ranging from chemical to textile and engineering. Lahore is famous for being hub of hand-made carpet manufacturing city in Pakistan.

Variables to be measured

For estimation of the Hedonic Wage Equation, take home monthly wages have been used as a dependent variable. This was obtained directly from the respondents. The independent variables include risk measures such as annual average fatalities per 10,000, nonfatal accident per 100 workers. Moreover, human capital variables (such as age and age square, education, experience) were added as covariates. Other covariates include job characteristics (such as type of permanent or temporary jobs, distance from the work place, union affiliation, job related trainings compensation provided by the company in case of industrial accident etc). Dummy variables include Industrial dummy, and professional dummy variables to control for differences in the wages of different industries and professions. These variables have been considered for the present study after a methodical review of the literature. Recently the same variables were employed by Madheswaran (2004) for evaluating the VSL for India and also from the Meta analysis of Viscusi and Aldy (2003).

The data pertaining to worker’s fatal accident was compiled from the records of the Punjab Employees Social Security Institute (PESSI), whereas the annual average non-fatal accidents per 100 workers which were compiled from the data set of the Labor Force Survey (2006).

Sampling and Data Collection Method

For drawing the representative sample, stratified random sampling technique was adopted. These strata are the nine industrial groups based on the National Industrial Codes (NIC). However, data was collected from only the registered factories.

Amongst the nine stratus numbers of factories and respondents were selected based on the risk faced by the workers. For determining the appropriate sample size, the study has made use of Cochrane precision formula which is given as:

\[ n_0 = \frac{(t)^2pq}{e^2} \]

where

- \( t = 4 \),
- \( p = 0.6 \) which is the probability of success was calculated from the pilot study of fifty workers
- \( q = 0.4 \) and
- \( e \) = precision error which is assumed to be 0.05

This gave us an appropriate sample size of 384 blue collar male workers.

Methods for Data Analysis

The analysis of data requires the estimation of hedonic wage equations and job risk equations. The equation is given as follows:

\[ \ln w_i = \alpha + H_i \beta_1 + X_i \beta_2 + p_i \beta_3 + q_i \beta_4 + \epsilon_i \]

Where \( \ln w_i \) is the log of worker \( i \)'s take home hourly wage, \( \alpha \) is a constant term, \( H \) is a vector of personal characteristic variables for the worker \( i \). This include education measured as years of education, age and age square, experience, \( X \) is a vector of job characteristic variables for the worker \( i \), the job characteristics considered for the present study comprises of, compensation dummy, six industries dummy, profession dummy variables, \( P_i \) is the fatality risk associated with worker \( i \)'s job, \( q_i \) is the nonfatal injury risk associated with worker \( i \)'s job, and \( \epsilon_i \) is the random error.
**Computation of VSL**

Value of Statistical Life and Value of Statistical Injury were computed using the following standard equation:

\[
\begin{align*}
VSL &= \beta_3 \times W^- \times 2000 \times 10000 \\
VSI &= \beta_4 \times W^- \times 2000 \times 100
\end{align*}
\]

where,

- \(\beta\)'s are the respective risk coefficients,
- \(W^-\) is the mean wage rate which is multiplied with the 2000 standard working hours to annualize the Value and is multiplied with the scale of the variable which is per 10,000 workers for the fatality risk variables and per 100 worker for the non-fatal risk variable.

**RESULTS AND DISCUSSION**

Results of the regression model with the dependent variable as log of wage are presented in the following table. The table shows that a one year extra education increases the wage by 1.3%, whereas every passing year increases wage by 0.8%; both the results are statistically significant and the sign are the same as the expected sign. Experience is also positively related to the dependent variable, as expected, however, the result is not statistically significant. Risk variable are PESFAT and LFSPK which are measuring fatal and non fatal risk respectively, as expected both the variables are positive and are also statistically significant. Yet, one unit increase in the risk of death, that is, 1/10,000 increases the hourly wage by 34%, whereas, a one unit increase in the risk of injury which is 1/100 increases the hourly wage by 15%. Concerning the use of the industrial dummy variables, the results demonstrate that workers working in textile and chemical sector are earning significantly more than in the base sector, whereas workers of paper and printing group are earning slightly more than the base group. However, the workers of basic metal and fabricated metal group are earnings less as compared to the base group. The results of the entire industrial groups used are statistically significant. Trained people also earned more but the results are not robust. The use of professional dummy variables such as supervisor and foreman explain the difference in the earnings of the professions. Both the professions earn more as compared to all other professions. The results are statistically significant.

<table>
<thead>
<tr>
<th>Table 1 Estimation results of regression model</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Explanatory variables</strong></td>
</tr>
<tr>
<td>EDUCN</td>
</tr>
<tr>
<td>AAAGE</td>
</tr>
<tr>
<td>EXPER</td>
</tr>
<tr>
<td>PESFAT</td>
</tr>
<tr>
<td>LFSPK</td>
</tr>
<tr>
<td>TXTDM</td>
</tr>
<tr>
<td>CHEME</td>
</tr>
<tr>
<td>SUPER</td>
</tr>
<tr>
<td>FORMN</td>
</tr>
<tr>
<td>BSCMT</td>
</tr>
<tr>
<td>FABRI</td>
</tr>
<tr>
<td>TRNNG</td>
</tr>
<tr>
<td>PAPER</td>
</tr>
<tr>
<td>Constant</td>
</tr>
<tr>
<td><strong>R²</strong></td>
</tr>
<tr>
<td><strong>F</strong></td>
</tr>
<tr>
<td><strong>VSL</strong></td>
</tr>
<tr>
<td><strong>VSL @85PKR/$</strong></td>
</tr>
<tr>
<td><strong>VSI</strong></td>
</tr>
</tbody>
</table>

The F-statistics confirms the overall significance of the above mentioned model and it also has the high explanatory power. The model explains twenty five percent of variation in the regressand. Considering the cross-section nature of the data this is though adequate. The results have been used for computing the Value of Statistical Life (VSL) and the Value of Statistical Injury (VSI) which is 25.16 million and one hundred and eleven thousand Pakistani rupees respectively. The table also reports dollar value of Life and Limb at the present exchange rate. The results are robust and the model has been specified by making use of the Likelihood Ratio test. The predicted value of life computed from the model is comparable with the Indian estimates.
CONCLUSION AND RECOMMENDATIONS

The purpose of this research is to find out the validity of compensating wage differential in Pakistan. To estimate this research 2652 blue collar workers of manufacturing sector in Lahore was interviewed. Based upon the results of the survey and the subsequent estimation, the study concludes that the Compensating- Wage Differential does exist in the formal private sector and the market does compensate the workers for taking risk. The Value of Statistical Life and Limb estimated by the present study are original values and it shall help policy makers to carry out the cost-benefit analysis of the safety projects. It shall also work as a spring board for further exploration and research in this area.

REFERENCES


