Employers Size Wage Differential: Does Investment in Human Capital Matter?

Nasir, Zafar Mueen and Iqbal, Nasir

Pakistan Institute of Development Economics Islamabad Pakistan

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Zafar Mueen Nasir
and
Nasir Iqbal[1]

Abstract: Wage differential due to employer size is one of the key areas of interest in labor market research because a strong positive relationship between employer size and wages has been observed in developed and developing countries. It is, however, relatively neglected area of research in Pakistan. The purpose of present study is to investigate the employer size wage differential by looking at human capital factors. The study is based on standard methodology and estimates earning functions on Labor Force Survey (LFS) data for year 2007-08. Results clearly show that human capital investment has a bigger role in determining wages in the larger firms as compared to smaller firms. The main policy implications emanating from the analysis are the higher investment in skill which increases opportunities for workers in the labor market for higher wages and for jobs with good characteristics especially in large sized firms. The government policy towards education and skill formation needs serious reforms and better allocation of funds so that people get chance to enhance their skill level hence wages.

I: Introduction

Wage differential due to employer size is one of the key areas of interest in the labor market research. A strong positive relationship between employer size, measured as firm or plant size, and wages has been found both in developed and developing countries (Masters, 1969; Pugal, 1980 and Criscuolo 2000).[2] In literature various theoretical explanations are forwarded to support the existence of wage differentials across the employer size. Neoclassical school of thought explains the existence of wage differential in the context of human capital theory within the framework of the standard competitive model. According to labor quality hypothesis, the large employers hire workers of higher quality thus pay higher wages. There are a number of other explanations also for the existence of employer size wage differential. The larger firms pay higher wages to compensate workers for bad working conditions; earn abnormal profits because of more market power and share their excess profits with their workers; avoid unionization, and substitute high monitoring cost with wage premium (Lallemand, et al, 2005). Moreover, larger firms require large number of workers therefore pay higher wages to attract better quality employees with required qualifications (Waddoups, 2007).

A number of reasons explain why larger firm look for higher quality workers for employment. Griliches, (1969) and Hamermesh, (1980) argue that larger firms are capital intensive so they need qualified and skilled labor. To promote research and development activities, large firm need labor with higher skill and education (Tan and Batra, 1997). Shapiro and Stiglitz, (1984) argues that large firm pay higher wages to attract labor with higher productivity due to existence of strong positive correlation between wages and productivity. Incentive for hard work (Shapiro and Stiglitz, 1984), to decrease the rate of turnover and associated cost of recruiting and training (Salop, 1979; and Oi, 1983), complementarities between entrepreneurial and worker ability (Lucas, 1978), and advance technology adopted by large firm (Kremer, 1993) are other reasons for large firms to employ higher quality labors.

In Pakistan, various studies have confirmed the positive relationship between human capital and income of the individuals and have shown that education enhance the

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[2] Besides, a number of other studies also reported employer size wage gap in different countries like United State (Brown and Medoff, 1989), Germany (Gerlach and Schmidt, 1990; Schmidt and Zimmermann, 1991; Gerlach and Huebler, 1998) Great Britain (Main and Reilly, 1993), Japan (Rebick, 1993), Canada (Morissette, 1993), Taiwan (Chuang and Hsu, 2004) and Australia (Waddoups, 2007).

earning potential of individuals[3]. However, there are few studies that have analyzed the existence of wage differentials. These studies have mainly investigated gender, region and sector-specific aspects of wage differentials. Nasir (1999 and 2000) and Hyder and Reilly (2005) examine the wage differential across the public and private sector and found that public sector workers earn higher wages as compare to private sector. Their findings support the hypothesis of human capital theory. Ashraf and Ashraf (1993a, 1993b, and 1996) estimated gender earnings gap and concluded that education explained the major part of earning differentials across gender. There is so far no study which explains the employer size wage differential in Pakistan.

The purpose of the present study is to investigate the employer size wage differential by looking at human capital factors to explain the difference. The study is based on the standard methodology and estimates earning functions on Labor Force Survey (LFS) data for the year 2007-08. The study is an important step to enhance our understanding about human capital theory in explaining the employer size wage differentials in Pakistan. It is organized in the following manner. Conceptual framework is presented in section 2. Section 3 discusses the data and methodology. Results are discussed in section 4 and conclusions are summarized in the last section.

II. Human Capital and Wage Differentials: A Conceptual Framework

Becker (1962) defines the human capital as the skills, education, health, and training of individuals. These endowments are considered capital because of their similarity with physical capital which yields returns. "All such qualities of a person, such as knowledge, health, skills and experience that affect his or her possibilities of earning current and future money income, psychological income, and income in kind are called human capital" (Kooreman and Wunderlink, 1997). Neoclassical theory explains that wages are paid on the basis of the marginal product of labor and human capital is a component to judge the productivity of the individual. Human capital theory seeks to explain wage differentials as a consequence of differing human capital stocks that determine an individual's marginal productivity.

Human Capital Theory is mainly based on education because it imparts knowledge and skills (Tilak, 1994). The direct effect of education is measured in term of pecuniary benefits accrue to the individual (Becker, 1962; Mincer, 1974; Hungerford and

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[3] Nasir and Nazli, 2000; Qureshi and Arif, 2001; Haq, 2005; Jamal, 2005; Kurosaki and Khan, 2006; Arif and Iqbal, 2009 and Awan and Iqbal, 2010

Solon, 1987; Tilak, 1994; Zuluaga, 2007). Investment in education increases the ability of the individuals and makes them more productive and efficient (Lockheed et al., 1980, and Jamison and Lau, 1982). Because in competitive labor market wages paid according to their marginal productivity therefore an individual with better marketable skills have higher productivity and more opportunities in labor market. These lead to higher earnings through good jobs or success in business projects. Training and health are other important and integral parts of human capital. Similar to education, training and health increase productivity of individuals, hence their earnings (Schultz, 1961 and Strauss and Thomas, 1995). Schultz (1961) attributes the difference in earnings between people to the difference in access to education and health.

To explain the phenomenon of employer's size wage differentials based on human capital theory, various explanations are documented in the literature. Most plausible explanation in this context is based on the labor quality theory. Large firms employ workers of higher quality thus pay higher wages (Chuang and Hsu, 2004). According to this theory, larger firms are more capital intensive; therefore require more skilled workers due to capital skill complementarity (Hamermesh, 1980). Oi (1983) argues that large firms, being more innovative and capital intensive need more qualified and specialized workers. Secondly, the higher levels of both human and physical capital per worker at larger employers are believed to be due to scale economies and/or preferential access to credit in imperfect capital markets. Thirdly, Oi (1983) and Garen (1985) argue that large plants employ higher quality workers to reduce monitoring costs per unit of labor services. Fourthly, to large firm pay more to reduced the workforce turnover (Oi, 1983 and Idson, 1996). Becker (1975) also argues that firms may reduce their turnover by increasing wages above workers alternative wage. Fifthly, the presence of more able entrepreneurs and of complementarities between entrepreneurial and workers ability imply higher quality workers at larger employers (Lucas, 1978). Sixthly, greater complexity of tasks induced by the more advanced technology adopted by large employers induces greater skill complementarity between workers and, therefore, higher returns to human capital (Kremer, 1993). Underpinning all these reasons, there is a common positive relationship between employer size human capital and wages.

The other explanation comes from the theory of compensation wage differential. Large firms tend to be more rigid in organizational structure and rely on rules to discipline their workers (Mellow, 1982). Large firms also impose greater pressure on workers and thus suppress worker's creativity (Lester, 1967). As a result, the workers in

large firms earn a compensating wage differential for less satisfying work (Masters, 1969 and Waddoups, 2007).

III.   Methodology

Following Becker (1964) and Mincer (1974), we begin with a human capital earning function which indicates that the variation in earnings arises from difference in investment in human capital defined as below:

$$W_i = \alpha_0 + \sum \beta_i X_i + u ....(1)$$

Where W_i represents wage rate while vector X_i represents all possible human capital factors that affect wages and u represents all unobservable variables. We extend our model by estimating separate earnings functions for different firm sizes. A semi-log earnings function defined below is estimated: Let the wage equation for each employer size be:

$$W_{ij} = \alpha_j + \gamma'_{ij} X_{ij} + v_{ij} ....(2)$$

$$i = 1,2,3,.........,n \quad j = 1,2,3,.........,m$$

Where i and j are indices for the ith individual and j^{th} firm size, respectively, W_{ij} is the wage rate, X_{ij} represents human capital factor for the ith worker belongs to j^{th} firm and v represents all unobservable variables. Educational endowment is one of the main factors that contribute in human capital enhancement. Education is divided into different level because different levels of education impart different skills and earnings. Five level of education i.e., 0– 4, 5–7, 8–9, 10–13, and degree education are included in the earnings function. Similar to formal education, technical education is also included into the model because of its crucial role in shaping the stock of human capital. Experience is an important part of the human capital but information on actual experience is missing in most of the surveys. Age and its squared term are therefore included in the specification as the proxy for experience. The quadratic term of age in the basic human capital model of Becker (1964) and Mincer (1974) captures the diminishing returns to experience with time.

The wage structure may differ due to different endowment of health of the workers. To capture the health of the workers, sick leave is used as a proxy. A dummy variable representing the health of individual is included in the model. Demographic

characteristics such as sex and marital status are also used in the model as dummy variables. In addition, the area of residence is used to capture the variations in geographic and regional economic development.

Decomposition of Wage Differentials

The difference in wages may arise due to two reasons; the difference in endowment and productivity-related personal characteristics of the workers which includes different levels of human capital, occupational difference, and other endowments. More productive workers will get higher compensation relative to the workers, who on average have a lower level of productivity-related characteristics and the wage structure across different sectors, i.e., employees with the same endowments may get different remuneration in different sectors.

Blinder (1973) and Oaxaca (1973) developed a methodology to measure the unequal treatment in wages. According to this framework, discrimination or 'unequal treatment' is revealed by differences in the estimated coefficients. To measure the wage differential, the mean of log wages between different sectors is used in calculations. The absolute difference D_{ij} is calculated as:

$$D_{ij} = LnW_i - LnW_j \quad ....(3)$$

Where i is the high wage firm and j is low wage firm. Wage differential equations across group i and j are:

$$LnW_i = f_i(X_i) = \sum \beta_i X_i \quad ....(4)$$

$$LnW_j = f_j(X_j) = \sum \beta_j X_j \quad ....(5)$$

Where X_i and X_j are the mean values of the vectors of characteristics of group i and j respectively. The gross difference can be expressed as

$$D_{ij} = LnW_i - LnW_j = [f_i(X_i) - f_i(X_j) + f_i(X_j) - f_j(X_j)] \quad ....(6)$$

Where $f_i(X_j)$ is the mean wage that employees of group j would receive if they were paid according to the wage structure of group i.

$$D_{ij} = \left[\sum \beta_i X_i - \sum \beta_i X_j\right] + \left[\sum \beta_i X_j - \sum \beta_j X_j\right] \quad ....(7)$$

$$D_{ij} = \sum \beta_i \left[X_i - X_j\right] + \sum \left[\beta_i - \beta_j\right] X_j \quad ....(8)$$

This implies total wage differential is decomposed into two parts. First, 'endowment differential' or 'explained differentials' which occur due to difference in characteristics of the individuals. Therefore the difference in the average logarithmic earnings of the two groups of workers exists due to the difference in the average amounts of earnings-related characteristics such as education, experience, gender and martial status etc. Second, 'treatment differentials' or 'unexplained differentials' due to difference in productivity characteristics of the workers. Therefore difference in average logarithmic earnings of the two groups exists due to the rate at which both group compensate their workers having the same characteristics and often used as a measure for discrimination. The size of this term will depend on the difference in the values of the regression coefficients estimated from earnings equations of the two groups. This strategy allows the determination of the part attributable simply to a difference in the structure of pay and a difference in the endowment of the workers which drive a wedge between pay levels in different sectors of employment.

IV. Data characteristics and descriptive statistics

The data for the study is taken from the Labor Force Survey (LFS) 2007-08. It is a regular feature of the Federal Bureau of Statistics (FBS) since July, 1963. These data provides comprehensive information on characteristics of the workers. The information on earnings, age, education levels, sex, marital status, regions, employer size, occupation, and employment status is particularly important for this study. To capture the number of employees working in the firm, following question is asked to the respondent "How many persons are engaged in the enterprise (including working proprietors, unpaid family workers, and paid employees)?" Respondent chooses one option from the following four options: i) Number of person upto 5; ii) 6 to 9; iii) 10 to 19; and iv) 20 and more. This is the only information available on the number of employees working in particular enterprises. By using this information; this study develops two categories bases on the firm size i.e. small firm and large firm. In small firm, first two options are merged therefore this category consists of those firms which has maximum nine employees. Large firms category is based on the 10 and more employees. This division is important because of the registration of larger firms (having ten or more workers) with taxation social security related departments. The sample of the study includes only wage employees and not the casual and peace rate workers.

Descriptive statistics shows that the final sample of employed workers with positive earnings consists of 12,913 individuals in which 11,595 (89 percent of the total) individual works in small firms while 1,318 (11 percent of the total) individual works in

large firms (Table 1). The data on earnings include both cash and payments in kind. The current value of the in-kind benefits such as free or subsidized housing and transportation is included in the overall earnings reported in the survey. Average monthly earning of the all individual is Rs. 4,831 while average monthly earning of the individuals works in small firm (Rs. 4,694) is less than the average monthly earning of the workers employed in large firm (Rs. 6,031). The statistics reveals that the average age of the sample is about 30.25 years (30.26 and 30.11 for small and large firms respectively). Literacy rate is higher among the worker employed in large firms (0.62 percent) as compare to small firms (0.56 percent).

Table 1:
Summary Statistics

| Characteristics	All	Small Firms	Large Firms
Number of Observations	12,913	11,595	1,318
		Mean	
Monthly Income	4831	4694	6031
Log of Monthly Earning	8.2251	8.1992	8.4529
Personal Characteristics			
Age (Number of years)	30.2487	30.2636	30.1184
Sex (Male = 1)	0.8903	0.8915	0.8801
Marital Status (Married= 1)	0.5618	0.5619	0.5615
Literacy (Literate = 1)	0.5647	0.5588	0.6168
Human Capital Background			
Primary (Primary = 1)	0.0415	0.0434	0.0250
Middle (Middle = 1)	0.1952	0.2013	0.1419
Matric (Matric = 1)	0.1238	0.1248	0.1153
Intermediate (Intermediate = 1)	0.1241	0.1219	0.1426
Degree (Degree = 1)	0.0387	0.0356	0.0660
Professional Degree (Prof = 1)	0.0364	0.0265	0.1237
Training (Yes= 1)	0.0147	0.0140	0.0212
Health (No Sick Leave = 1)	0.7685	0.7837	0.6351
Region			
Urban (Urban = 1)	0.6521	0.6530	0.6434

Source: LFS 2007-08

Human capital variables show very interesting results. Proportion of individuals with low level of education like primary, middle and matric is high in small firm (0.04, 0.20 and 0.12) respectively as compare to large firm (0.02, 0.14 and 0.11 respectively) while the proportion of individuals with high level of education like intermediate, degree and professional degree is higher is larger firms (0.14, 0.06 and 0.12 respectively) as compare to smaller firms (0.12, 0.03 and 0.03 respectively). Very few professional are working in small firms. These findings confirms the human capital theory with the hypothesis that large firm employed worker with higher quality. In literature one of the main reasons that explain the wage differentials concept among the employer size is the quality of the worker. Worker with higher quality capital works in large firm and rewarded on the basic of their marginal productivity. Training, an important component of human capital, indicates that the proportions of workers with training are higher in larger firms than smaller firms (Table 1).

V. Wage differentials and Human Capital

Wage differentials among the workers are calculated on the basis of their human capital potentials for both categories of firms. Wage effect of education is higher in larger firm than smaller firm. With the similar education, individual earn more in larger firm as compare to smaller firms. Earning is also function of successive level of education. Results shows that earnings increase when the education of the individual increase from one category i.e. primary to other category i.e. middle. Wage effect is twice when an individual has some professional degree as compare to primary pass workers (Figure 1).

Figure 1:
Average Monthly Earnings of Workers by their Human Capital Potential
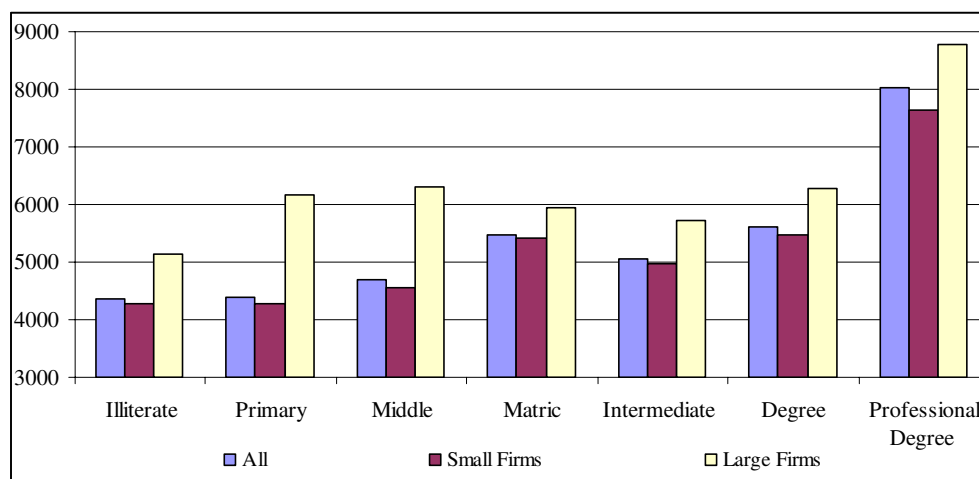
Source: LFS 2007-08

Experience significantly affects the earnings of individuals and the association of earnings with age signifies the role of experience for higher earnings. It is interesting to note that although there are significant differences in compensation for workers across the employer size, yet the age earnings profiles follow the life-cycle pattern in both categories where income increases with age for some time, reaches at the peak and then declines. Some interesting observations can be made on the basis of these age-earnings profiles. The workers in the larger firms start at a higher level of earnings and reach a higher peak as compared to the smaller firms. They attain the highest level of earnings (Rs. 7371) in the age group 51–60. The highest increase in earnings is observed when workers jump from age group of 21–30 to age group of 31–40 in larger firms. The sharp decline in the earnings experienced by the all employees afterwards after age group of 51–60, is due to the retirement benefits, which are much lower than the regular job benefits (Table 2).

Table 2:
Average Monthly Earnings of Workers by Age Group

Age Group	All	Small Firm	Large Firm
10 to 20	3512	3421	4545
21 to 30	4870	4750	5729
31 to 40	5671	5484	7205
41 to 50	5747	5605	7047
51 to 60	5839	5708	7371
61 and above	5105	4963	6865
All	4831	4695	6032

Source: LFS 2007-08

The age earnings profiles of workers in the smaller firms shows lower earnings at the start and remain low than bigger firms for all age group. In small firm, earnings increase very smoothly with the successive age group till the age group 51–60, when their earnings reach the peak and start declining afterwards. The decline in the earnings of the workers employed in smaller firms is sharp unlike the workers employed in larger firms (Table 2).

Wage differentials are calculated for various types of individual characteristics based on employer size. Results shows that male worker earn more in large firms as compare to small firm. Similarly, monthly earning of male worker is also higher than the female worker. Married workers earn more as compare to their unmarried counterpart. Married workers enjoy higher salaries in larger firms than smaller firms. Person with

technical education earn higher wages in both type of firms but comparatively higher in larger firms (table 3).

Table 3:
Average Monthly Earnings of Workers by their Characteristics

Characteristics	All	Small Firm	Large Firm
Male	5082	4958	6184
Female	2794	2528	4912
Married	5476	5346	6615
Unmarried	4005	3859	5285
Literate	5201	5028	6583
Illiterate	4351	4273	5144
Technical Training	5656	5482	6662
No Technical Training	4819	4683	6018
Urban	4981	4796	6641
Rural	4549	4505	4932

Source: LFS 2007-08

VI.   Results and Discussion

Table 4 displays the traditional log wage regression with firm size dummy and separate regression by firm-size groups. The results of column 1 show that even after controlling for the worker's attributes, human capital attributes and regional dummy, the firm-size variable remains positive and highly significant. The Chow test is also used which reveals that there are structural differences in these categories and a single equation does not explain the differences in earnings. For this reason, separate equations are estimated for both types of firms. Estimated coefficients display importance of human capital which varies across firm-size. Overall results show that education does have a positive and significant effect which increases with firm size. Attainment of five year education rather than no education has positive but insignificant impact on earning across the firm size. There are very interesting findings on return to education at different level of education between the both categories. Wage effect of middle education is higher in small size firms (22 percent and significant) than large size firm (20 percent and insignificant). Similarly, for matric and intermediate, returns on education are higher in small firms than large firms (Table 4). But, return to education is higher in larger firm with degree and professional education than smaller firms. This supports the argument

that large firms require workers of high quality and often regard education as an indicator of potential productivity. Hence, they tend to hire and pay greater rewards to educated workers. This confirms the human capital theory which envisage bigger role for education and training in larger firms.

Table 2:
Coefficients of Ordinary Least Square Estimates for Different Sectors
(Dependent Variable = Log Monthly Earnings)

Variables	Full Sample	Small Firms	Large Firms
Age	0.06***	0.06***	0.05***
	(0.00245)	(0.00255)	(0.00908)
Age Square	-0.0006***	-0.0007***	-0.0005***
	(3.06e-05)	(3.16e-05)	(0.000117)
Sex (male = 1)	0.78***	0.82***	0.53***
	(0.0183)	(0.0192)	(0.0613)
Marital Status (Married = 1)	0.006	-7.87e-05	0.087*
	(0.0153)	(0.0162)	(0.0453)
Primary	0.044	0.034	0.158
	(0.0289)	(0.0297)	(0.117)
Middle	0.088***	0.087***	0.081
	(0.0154)	(0.0160)	(0.0564)
Matric	0.172***	0.176***	0.114*
	(0.0183)	(0.0191)	(0.0610)
Intermediate	0.114***	0.114***	0.107*
	(0.0185)	(0.0194)	(0.0590)
Degree	0.180***	0.156***	0.191**
	(0.0304)	(0.0330)	(0.0817)
Professional Degree	0.509***	0.456***	0.520***
	(0.0326)	(0.0385)	(0.0725)
Health	0.00588*	0.00963**	0.00311***
	(0.0171)	(0.0199)	(0.0147)
Urban	0.0721***	0.0596***	0.190***
	(0.0120)	(0.0125)	(0.0402)
Firm Size	0.196***		
	(0.0188)		
Constant	6.236***	6.200***	6.764***
	(0.0406)	(0.0422)	(0.145)
Observations	12913	11595	1318
R-squared	0.237	0.238	0.168

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The coefficients of variable age (proxy for experience) in all three categories are statistically significant but its square term bears negative and statistically significant coefficient, implying diminishing returns on experience after a specific age. However the effect of experience is greater in small size firms than large size firms. This means that firm specific human capital is more important than general human capital across the firm

size. Health of the workers also plays significant role on earnings of worker according to the firm size. The higher earnings associated with age, education, and health provides clear support to the human capital theory in the firm size (Becker, 1964 and Mincer, 1974). As consistent with most studies, male or married workers in general earn higher wages than female or single workers.

VII. Decomposition Analysis

The decomposition analysis presented in Table 5 reveals very important results. The positive sign of 'explained or endowment differentials' shows the better characteristics of the workers implied in large firms. This is quite oblivious because those with better human capital variables and characteristics take the initiative to join large firms. The treatment differentials or unexplained part has positive sign and larger in magnitude.

Table 3:
Oaxaca Decomposition

Wage Differentials	Explained or Endowment Differentials	Unexplained or Treatment Differentials	Total
$LnW_{LARGE} - LnW_{SMALL}$	0.0562	0.1975	0.2537

VIII. Concluding Remarks and Policy Options

The study on employer size wage differential based on LFS 2007-08 data clearly shows that human capital investment has a bigger role in determining wages in the larger firms as compared to smaller firms. The human capital is measured as investment on education, training, experience and health. When the wage differential between large and small firms of 0.2537 is decomposed into difference due to endowment and due to wage structure, the human capital factors explained almost 6 percent difference in the earnings. This clearly indicates the importance of human capital investment for larger firms. It may be noted here that larger firms not only pay higher wages but also provide higher benefits such as social security and paid holidays. The main policy implications emanating from the analysis are the higher investment in skills which increase opportunities for workers in the labor market for higher wages and for jobs with good characteristics especially in large size firms. The main reason is the higher productivity associated with skills due to human capital. The government policy towards education and skills formation needs serious reforms and better allocations of funds so that people get chance to enhance their skill level.

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