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- Author (s):** Afshan Muneer, Hafsa Hina
- Affiliation (s):** Pakistan Institute of Development Economics
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Department of Economics and Statistics, Dr. Hasan Murad School of Management
University of Management and Technology, Lahore, Pakistan

Effect of Core Labor Standards and Informal Sector Employment on Economic Growth

Afshan Muneer and Hafsa Hina

Pakistan Institute of Development Economics, Islamabad Pakistan

Abstract

At present time, the phenomenon of core labor standards and informal sector employment is enticing attention in the economic growth paradigm. The current study attempted to elaborate the influence of core labor standards on economic growth of Pakistan in the presence of informal sector employment. For this purpose, human capital augmented Solow growth model proposed by (Mankiw et al. 1992) which was extended by adding core labor standards and informal employment. The aggregate time series data set was used for the time span (1999-2017). To resolve the endogeneity problem, Non-Linear Two Stage Least Square instrumental variable (NLTSLS-IV) approach was applied to estimate the growth model. The estimated outcome elaborated the positive relationship of core labor standards with the economic growth. The relationship between growth rate of both formal and informal employment was positive with economic growth. The conclusion pointed towards the fact that enforcement of core labor standards increases the economic productivity through protecting the workers' rights which ultimately enhances the economic growth. The policy-makers should consider the phenomenon of labor standards' enforcement in growth policies of the economy.

Keywords: core labor standards, economic growth, informal sector employment

JEL Classification: J83, O17, J80

Introduction

Over recent decades, issues of enforcing labor standards to protect workers' rights and existence of informal sector as a source of employment have become prominent. The conditions of working people have undergone major transformation in developing countries (Heintz & Pollin, [2003](#)). These countries have experienced high percentage of unemployed people. Akin to unemployment, the informal sector is considered as a residual category (Gerry, [1987](#)). Under the neoclassical approach, the insertion of informal sector allowed full-employment assumption in case when workers without

formal sector jobs, work informally (Hemmer & Mannel, [1989](#)). Although in current regime, the macroeconomic theories shifted their concern from short or medium term adjustment towards an improved interest of long term growth. An international assessment of advance countries predicted that job regulation and labor rights have adverse consequences on short track efficiency, however, they have a significant impression on economic growth (Boyer, [1993](#)).

An extensive rise in proportion of informal sector employment creates a broad trend towards informalization in labor market of the countries. This proportion seems to be rising even when the rate of economic growth is mounting (Castells & Portes, [1989](#); Benería, [2001](#); International Labor Office [ILO], [2002](#); Charmes, [2000](#)). According to the 15th International Conference of Labor Statisticians (ICLS), employment in informal sector comprises all household enterprises owned and operated by own-account workers (informal own-account enterprises) (ILO, [2016](#)).

Informal arrangement of employment is based on waged domestic work, agricultural day worker, urban street seller, and home producer of manufacturing things. Most of informal workers are self-employed. Moreover, women are disproportionately active in informal sector in many countries. An informal employment is not restrained to any single discrete sector of economy in the logic of a specific industry cluster or economic activity (ILO, [2002](#)).

Employment in informal sector flourishes when few alternative opportunities are available for workers. In many cases, informal sector employment is directly linked with the concern related to human rights violation in form of international labor standards (Heintz & Pollin, [2003](#)). These standards comprise four core labor standards which includes (i) provision of freedom of association and collective bargaining (ii) exclusion of discrimination in employment (iii) abolition of child labor (iv) prohibition of forced labor (Bazillier, [2005](#)).

The promotion of labor standards may have significant consequences on determinants of economic growth. Some opponents of societal clause in World Trade Organization (WTO) contend that the condition of weak labor standards is suitable for the development of poorest countries due to comparative advantage in unskilled labor force (Bazillier, [2008](#)). The production procedure entails to abuse workers in the presence of weak labor

standards (Mosley & Uno, [2007](#)). These standards cause reduction in efficiency level, lower output, and raise the costs. While, the occurrence of strong labor rights in the country are linked with better working conditions which increases productivity (Aidt & Tzannaos, [2002](#); Huber & Stephens, [2001](#)). The demand of labor standards rises to improve the per capita income since it increases the competence of labor force to compete with labor force of other countries. The core labor standards increase the economic growth of developing countries in both short-term and long-term (Martin & Maskus, [2001](#)). The universal assumption of negative relationship between informal sector employment and economic growth has been disputed on many fronts. The relative proportion of informal activities definitely contracted and expanded over time, however, these activities did not simply represent the transitional path towards higher economic growth level (Stansell, [1983](#); John, [1986](#)).

According to labor market profile 2018, the percentage of number of workers in informal economy of Pakistan was 73 in the year 2014. Pakistan ranked 5 in global rights index of workers which is the worst ranking in the world. Both the informal sector employment and labor standards play an important role in economic growth of a country. The current study attempted to explore the impact of core labor standards and informal sector employment on economic growth of Pakistan. The theoretical model was constructed by augmenting labor standards and informal sector employment in Solow growth model proposed by (Mankiw et al., [1992](#)). The current study focused to evaluate long-term effects for better establishment of core labor standards which provide long-term steady state of developing country. In other words, the effect of informal sector employment was examined on economic growth. However, the findings suggested that both informal trend of employment and increasing attention to labor standards' improvement can accelerate the economical growth. Rest of the research is aligned into four sections. Section 2 discusses literature review and section 3 elaborates the theoretical framework, empirical methodology, and data. Empirical results are presented in section 4, whereas section 5 dwells upon conclusion.

Literature Review

Literature review elaborates the influence of employment on economic growth in an informal sector. The role of labor standard in informal sector is also presented as an important perspective of economic growth. Different studies intricate the effect on economic growth by using various factors as

Peterson (1982) examined the negative effect of informal sector by using public expenditures and focused on the transition from informal sector to formal sector for economic growth. Portes and Schauffer (1993) applied different monetary and physical input methods to learn topology of informal sector and verified it as an engine for sustained economic growth. By following the methods, Cheng and Gereffi (1994) analyzed the expression of informal sector for four industrialized countries of East Asia by using data (1963-1988). They concluded positive responses of small enterprises of informal sector in economic growth by connecting globally.

On the other side, Loayza (1996) presented the effect of informal sector existence on economic growth of Latin American countries by using the data from early 1990s in endogenous growth model. The multiple causes and multiple indicator technique was applied. It was obtained that the expended size of informal sector would diminish the rate of economic growth. Similarly, Eilat and Zinnes (2000) elaborated the relationship between informal sector and economic growth by using data set of (1990-1997). They determined that contraction of informal sector was attended with economic growth.

Gibson (2005) described the impact of informal sector on economic growth rate by applying dynamic structure computable general equilibrium (CGE) model with numerical simulation. The lower economic growth was found in the presence of expended informal sector. In this context, Porta and Shleifer (2008) highlighted the negative issues of informal sector on economic development and concluded that highly productive formal sector firms are the main causes of economic growth.

Debrah (2007) examined the authorities' effort to formalize the informal sector for productive employment and transform it for obtaining economic growth. For this purpose, a qualitative approach was used. It was concluded that informal sector can participate as a gainful source of employment in economic growth of countries of Sub-Saharan Africa.

Dell'Anno (2008) considered the relationship between informal economy and economic growth for Latin American countries and found the informal sector as a beneficial cradle for economic growth. Chidoko et al. (2011) explored the same phenomenon for Zimbabwean economy and recommended the employment potential of informal sector as an important portion of economic growth.

Loayza and Rigolini (2011) described the positive impact of cycles and trends of informal sector on economy as a growth engine by covering the data set (1984-2008) for 54 countries. Etim and Daramola (2020) explored the analytical perspective of informal sector contribution in the economic growth of Nigeria and South Africa. The size of informal sector was projected from the time period 2011-2025. The study concluded that informal sector can contribute to economic growth by providing better infrastructure support, technology support, and social support which would lead to an increase in production level and economic growth of both countries.

The existing literature describes the relationship between labor standard and economic growth in different perspective as Freeman (1992) described impair well-being effect of labor market policies on economic growth. Boyer (1993) evaluated the labor regulationist approach theoretically and empirically to comprehend the stability of economic growth. A positive response of respective approach was concluded for long-run implication. In this regard, Layard and Nickell (1999) expressed the employment protection and labor market regulations in the frame of economic growth by using labor market institutions for the time period (1983-1997). The concluding remark predicts strict labor regulations that are necessary for economic growth. Bazillier (2004) elaborated the core labor standard effect on the economic growth of 108 developing countries for the time period (1960-1996) by applying correspondence analysis. The estimating result of two stage least square (2SLS) expressed positive impact of labor standard on economic growth of developing countries. Countries with same level of human capital, labor force, and investment have distant growth rates based on their labor standards which is also explained in the study of Bazillier (2008). Whereas, Besley and Burgess (2004) exposed the constraint on growth rate in the presence of labor standard in economy. On the other side, the studies of Calderon et al. (2007) and Bonnal (2010) scrutinized the relationship between international labor standard and economic growth rate by using Generalized Method of Moment Instrumental Variable (GMM-IV) technique and Generalized Method of Moment (GMM), respectively for 121 countries. It concluded that higher labor standard practices accelerate the economic growth rate of developed and developing countries.

The relationship between labor standard, informal sector, and economic growth is elaborated in literature in opposite context. Heintz and Pollin

(2003) elaborated this relationship for Latin American countries by using time period from (1990-1997) and presented the labor regulations necessary for raising economic growth and decreasing the informal sector level. While, the study of Loayza et al. (2005) explained this relationship in an opposite way by using the data from time period (1990-2003) for 75 countries.

The above mentioned studies showed a positive relationship between labor standard and economic growth. Moreover, some studies also showed a positive relationship between informal sector employment and economic growth. It means that the economies with higher level of labor standards and higher level of informal sector employment depict the higher level of economic growth. However, in some other cases, the opposite relationship occurs.

Theoretical Framework, Methodology, and Data

This section provides theoretical framework and estimation methodology of analysis. Additionally, description of data is also included.

Setup of Model

The core labor standards and informal sector employment influence the economic growth as described in previous section. This section elaborates the role of both core labor standards and informal sector employment on economic growth by practicing the human capital augmented Solow growth model as proposed by Mankiw et al. (1992) which is extension of Solow (1956). Murdoch and Sandler (2002) and other researchers explored the impact of diverse variable on long-term per capita income. The current study would compute the effect of core labor standards on economic growth in the presence of informal sector employment by spillover effects on different production components.

The production function in Cobb-Douglas form can be written as:

$$Y_t = K_t^\sigma H_t^\rho (A_t L_t)^{1-\sigma-\rho} \quad (1)$$

$$\sigma, \rho \in [0,1) \quad \text{and} \quad \sigma + \rho \in [0,1)$$

where, K symbolizes the physical capital sock, H represents the human capital stock. A elaborates the labor productivity level and L shows level of labor force. σ and ρ serve as output elasticities relative to physical and human capital. Whereas, $(1 - \sigma - \rho)$ represents output elasticity for

effective labor ($A_t L_t$). In this model, the symbol L is used to depict the labor force which includes both types of labor, that is, formal and informal. By following the study of Cimoli et al. (2005), the labor force can be expressed as follows:

$$L_f + L_i = L$$

In the above equation, L_f shows the formal labor, while L_i represents the informal labor. The labor force L is the combination of both the formal and informal labor. For simplicity, labor force is expressed by L .

In general case, A elaborates the level of total factor productivity. However, in this model, it depicts the labor productivity level based on labor standards. Since, the economists consider A as a residual whose encompass quality changes in the output (Chen, 2007). On one side, A elaborates labor productivity, while labor standards affect this productivity level on the other side (Autor et al., 2007; Martin & Scarpetta, 2012).

However, L and A are assumed to grow exogenously which can be expressed as:

$$L_t = L_0 e^{nt+vt}$$

$$A_t = A_0 e^{gt+\mu CI}$$

where, n represents the growth rate of formal labor and v expresses the growth rate of informal labor. While, g depicts the growth rate of labor productivity. μ is the parameter which determines the effect of labor standards CI .¹ In this way, the number of effective unit of labor ($A_t L_t$) grows at the rate of $(n + v + g)$.

In terms of effective labor unit, the equation (1) can be written as:²

¹ Here, we want to accentuate that the extended model by using the equation of A_t , should not interpreted as the labor standards affect the economic growth through technological process as in general model case. But the extension based on the notion that A_t depict the physical input such as labor productivity independently and labor standards effect the labor productivity in the analysis (Bazillier, 2008).

² The solution of production function equation in term of effective labor unit is as follow:

$$\frac{Y_t}{A_t L_t} = \frac{K_t^\sigma H_t^\rho (A_t L_t)^{1-\sigma-\rho}}{(A_t L_t)}$$

$$\frac{Y_t}{A_t L_t} = \left[\frac{K_t}{A_t L_t} \right]^\sigma \left[\frac{H_t}{A_t L_t} \right]^\rho$$

$$\tilde{y}_t = \tilde{k}_t^\sigma \tilde{h}_t^\rho \quad (2)$$

The transition equation of physical capital can be expressed as:

$$\dot{\tilde{k}}_t = s_K \tilde{y}_t - (n + v + g + \delta) \tilde{k}_t \quad (3)$$

Similarly, the transition equation for human capital can be written as:

$$\dot{\tilde{h}}_t = s_H \tilde{y}_t - (n + v + g + \delta) \tilde{h}_t \quad (4)$$

By following Mankiw et al. (1992), the same production function practice to physical capital, human capital, labor standards, informal sector employment, and consumption.

If $\sigma + \rho < 1$ then, this expresses the decreasing return to all types of capital. Then, equation implies that the economy converges to steady state level.

Steady State Level of Income

In the steady state, it can be assumed that, $\dot{\tilde{h}}_t = 0$, then the equation (4) can be written as:

$$s_H \tilde{y}_t = (n + v + g + \delta) \tilde{h}_t$$

By substituting the value of \tilde{y}_t from equation (2) into the above equation,

$$\tilde{h}_t = \left[\frac{s_H}{(n+v+g+\delta)} \right]^{\frac{1}{1-\rho}} \tilde{k}_t^{\frac{\sigma}{1-\rho}} \quad (5)$$

By substituting this value into other steady state condition of $\dot{\tilde{k}}_t = 0$, Then we obtain,

$$\tilde{k}_t^* = \left[\frac{s_K^{1-\rho} s_H^\rho}{(n + v + g + \delta)} \right]^{\frac{1}{1-\sigma-\rho}} \quad (6)$$

The above equation (6) describes the steady state level of physical capital. For steady state level of human capital, put this value in the equation (5),

$$\tilde{h}_t^* = \left[\frac{s_H^{1-\sigma} s_K^\sigma}{(n + v + g + \delta)} \right]^{\frac{1}{(1-\sigma-\rho)}} \quad (7)$$

The equation (7) depicts the steady state level of human capital. By putting the value of equation (6) & (7) in equation (2),

$$\tilde{y}_t^* = \left[\frac{s_K}{(n + v + g + \delta)} \right]^{(1-\sigma-\rho)} \left[\frac{s_H}{(n + v + g + \delta)} \right]^{(1-\sigma-\rho)\rho}$$

After simplifying the above expression, we get,

$$y_t^* = A_t \left[\frac{s_K^\sigma s_H^\rho}{(n + v + g + \delta)^{\sigma+\rho}} \right]^{\frac{1}{(1-\sigma-\rho)}} \quad (8)$$

By putting value of A_t and take log of the equation (8), we obtain:

$$\ln(y_t^*) = \ln \left[\frac{y_t}{L_t} \right]^* = \ln(A_0) + g_t + \mu CI + \frac{\sigma}{1-\sigma-\rho} \ln(s_K) + \frac{\rho}{1-\sigma-\rho} \ln(s_H) - \frac{\sigma+\rho}{1-\sigma-\rho} \ln(n + v + g + \delta) \quad (9)$$

The equation (9) elaborates the income per worker of the economy. This equation shows the impact of physical capital, growth rate of formal and informal labor, human capital, and labor standards on the income per worker.

The Speed of Convergence Activity

The convergence activity describes the movement of income per worker (y_t) towards the steady state level of income per worker (y_t^*). The economy moves on balance growth path with a specific speed of convergence activity. This speed varies for different countries.

The conditional convergence can be derived by using equation (3). In this case, first order Taylor approximation relative to steady state level yields:

$$\frac{\dot{\tilde{k}}_t}{\tilde{k}_t} \approx r(\ln \tilde{y}_t^*, \ln \tilde{k}_t^*) + \left. \frac{\partial (\ln \tilde{y}_t, \ln \tilde{k}_t)}{\partial \ln \tilde{y}_t} \right|_{\ln \tilde{y}_t = \ln \tilde{y}_t^* (\ln \tilde{y}_t - \ln \tilde{y}_t^*)} + \left. \frac{\partial (\ln \tilde{y}_t, \ln \tilde{k}_t)}{\partial \ln \tilde{k}_t} \right|_{\ln \tilde{k}_t = \ln \tilde{k}_t^* (\ln \tilde{k}_t - \ln \tilde{k}_t^*)} \quad (10)$$

By taking derivative of equation (10) and putting the values, we get,

$$\frac{\dot{\tilde{k}}_t}{\tilde{k}_t} \approx r(\ln\tilde{y}_t^*, \ln\tilde{k}_t^*) + (n + v + g + \delta)(\ln\tilde{y}_t - \ln\tilde{y}_t^*) - (n + v + g + \delta)(\ln\tilde{k}_t - \ln\tilde{k}_t^*)$$

The above equation can be written as follows:

$$\frac{\dot{\tilde{k}}_t}{\tilde{k}_t} \approx (n + v + g + \delta) [(\ln\tilde{y}_t - \ln\tilde{y}_t^*) - (\ln\tilde{k}_t - \ln\tilde{k}_t^*)] \quad (11)$$

This equation elaborates the steady state level of \tilde{k}_t . Similarly, by applying the convergence procedure, the steady state level of \tilde{h}_t can be expressed as:

$$\frac{\dot{\tilde{h}}_t}{\tilde{h}_t} \approx (n + v + g + \delta) [(\ln\tilde{y}_t - \ln\tilde{y}_t^*) - (\ln\tilde{h}_t - \ln\tilde{h}_t^*)] \quad (12)$$

By taking time derivative of equation (2) and putting the value of equation (11) & (12). Following is obtained,

$$\frac{\dot{\tilde{y}}_t}{\tilde{y}_t} = (n + v + g + \delta) (\sigma + \rho)(\ln\tilde{y}_t - \ln\tilde{y}_t^*) - (n + v + g + \delta) [\sigma(\ln\tilde{k}_t - \ln\tilde{k}_t^*) + \rho(\ln\tilde{h}_t - \ln\tilde{h}_t^*)] \quad (13)$$

After solving the above expression, following equation is obtained:

$$\frac{\dot{\tilde{y}}_t}{\tilde{y}_t} = \lambda (\ln\tilde{y}_t^* - \ln\tilde{y}_t)$$

where, $\lambda = (n + v + g + \delta) (1 - \sigma - \rho)$

The above equation can also be written as:

$$\frac{d\ln\tilde{y}_t}{dt} = \lambda (\ln\tilde{y}_t^* - \ln\tilde{y}_t) \quad (14)$$

In the equation, λ expresses the speed of convergence activity. Equation (14) indicates the movement of (y_t) towards the (y_t^*) at a speed approximately proportionate to the distance from (y_t) . The growth rate value of $(\ln\tilde{y}_t^* - \ln\tilde{y}_t)$ is constant and equal to the value of λ .

Let's suppose, $x = \ln\tilde{y}_t - \ln\tilde{y}_t^*$ and then following equation is obtained:

$$\ln \tilde{y}_t = (1 - e^{-\lambda t}) \ln \tilde{y}_t^* + e^{-\lambda t} \ln \tilde{y}_0 \quad (15)$$

where, $\ln \tilde{y}_0$ represents the initial value of income per worker. By Subtracting $\ln \tilde{y}_0$ from both sides of the equation (19-15), following equation is obtained:

$$\ln \tilde{y}_t - \ln \tilde{y}_0 = (1 - e^{-\lambda t}) \ln \tilde{y}_t^* + (1 - e^{-\lambda t}) \ln \tilde{y}_0 \quad (16)$$

By substituting the value of \tilde{y}_t^* from equation (7-9) into the equation (20-16), following expression is obtained:

$$\begin{aligned} \ln \tilde{y}_t - \ln \tilde{y}_0 = & (1 - e^{-\lambda t}) \ln \left[\frac{S_K^\sigma S_H^\rho}{(n + v + g + \delta)^{\sigma + \rho}} \right]^{\frac{1}{(1 - \sigma - \rho)}} \\ & + (1 - e^{-\lambda t}) \ln \tilde{y}_0 \end{aligned} \quad (17)$$

By supplanting $\tilde{y}_t = \frac{Y}{AL}$ in equation (17) with $y = \frac{Y}{L}$, we acquire,

$$\begin{aligned} \ln \frac{y_t}{y_0} = & \omega \left[\ln(A_0) + g_t + \mu CI \right. \\ & + \frac{\sigma}{1 - \sigma - \rho} \ln(s_K) + \frac{\rho}{1 - \sigma - \rho} \ln(s_H) \\ & \left. - \frac{\sigma + \rho}{1 - \sigma - \rho} \ln(n + v + g + \delta) \right] - \omega \ln \tilde{y}_0 \end{aligned} \quad (18)$$

where, $\omega = 1 - e^{-\lambda t} = 1 - e^{-(n+v+g+\delta)(1-\sigma-\rho)t}$

The equation (18) describes the convergence activity of augmented Solow growth model. It infers that growth rate of income per worker is explicated by the determinant of steady state level and initial level of income under specified assumptions.

By considering equation (9), the empirical model is established to assess the effect of core labor standard and informal sector employment on economic growth. Assume that, the growth rate of labor productivity g_t follows a deterministic trend in equation (9) according to the study of Mankiw et al. (1992). However, the empirical model can be expressed as follows (Jalil & Idrees, 2013):

$$\ln y_t = a_0 + \mu CI + \gamma_1 \ln(S_K) + \gamma_2 \ln(S_H) + \gamma_3 \ln(n + v + g + \delta) + \varepsilon_t \quad (19)$$

where,

$$\gamma_1 = \frac{\sigma}{1 - \sigma - \rho}, \quad \gamma_2 = \frac{\rho}{1 - \sigma - \rho}, \quad \gamma_3 = \frac{\sigma + \rho}{1 - \sigma - \rho}$$

In equation (19), y_t shows the income per worker, CI expresses core labor standards, S_K describes physical capital, S_H presents the human capital, and n and v serve as a growth rate of formal and informal labor, respectively. While, the value of $(g + \delta) = 0.05$ (Mankiw et al., 1992). $a, \mu, \gamma_1, \gamma_2$ and γ_3 represents the parameters where ε_t is error term.

where $\mu, \gamma_1, \gamma_2 > 0$, and $\gamma_3 < 0$.

The current study estimated the impact of core labor standards and informal sector employment on economic growth. Global index measure is used for labor standards which depicts the evaluation of social consciousness in economy. Additionally, the effect of informal sector employment in economy is elaborated.

Data, Variable Description, and Estimation Methodology

The current study was carried out for Pakistan by using time series data which ranged from 1999-2017, comprising of eighteen years (Mankiw et al., 1992). The dataset consisted of one dependent variable and four independent variables. The dependent variable was income per worker which represents economic growth of country. The income per worker is described as rate of gross domestic product (GDP) at local currency unit divided by combination of formal and informal labor. The independent variables include core labor standard index, formal and informal labor, human capital, and physical capital. The core labor standards index is comprised of other five indexes. The construction of core labor standards index is elaborated in the Appendix (Table A1). Formal and informal labor is used in the form of growth rate by applying growth formula.³ The human capital is described by gross secondary enrollment ratio which explains the number of enrolled student in secondary school. The physical capital series is generated by using first order difference equation of capital stock⁴ (Burney, 1986) and by applying perpetual inventory method. For this purpose, the data of gross fixed capital formation was used. The

³ The formula for growth rate is express as to subtract the past value from the current value. Then divide that value with the past value and multiply by 100.

⁴ $K_t = (1 - \delta)K_{t-1} + I_t$

depreciation rate was fixed at the rate of 5% due to unavailability of data every year.

The data for income per worker and human capital is available in World Development Indicators (WDI) published by World Bank (WB). The sources for data of variables which are included in construction of core labor standards is presented in Appendix Table A1. The Labor Force Survey (LFS), published by Pakistan Bureau of Statistics (PBS), Islamabad, is used for the data of formal labor and informal labor.⁵ The data for physical capital is presented in Pakistan Economic Survey (PES) published by Ministry of Finance, Government of Pakistan, Islamabad. The estimation procedure was carried out by using Non-Linear Two Stage Least Square and Instrumental Variable (NLTSL-IV). This approach is useful when explanatory variables of linear and non-linear function are correlated with the disturbance term of equation in regression analysis.

Empirical Results

This section elaborates the empirical results of analysis obtained by applying Two Stage Least Square Instrumental Variables approach. The variable series are converted into natural log except the growth rate of formal and informal labor variable due to the presence of negative values in series. The conversion of series into logarithmic form lowers the impact of outliers in series and smoothens the data series to conduct the desired analysis (Maddala, [1992](#)).

The estimation procedure is conducted on the basis of log linear function which is a suitable form for time series analysis. However, the presence of unit root problem in series causes spurious regression. Additionally, the order of integration of series is determined to check the possibility of cointegration analysis. For this purpose, the Augmented Dickey and Fuller ([1979](#)) (ADF) test is applied on the dataset. The result of ADF test is presented in Table 1(A) and Table 1 (B) below.

⁵ The data of division of labor force into formal and informal labor is start to publish from the year 1999 year in the Labor Force Survey. That's why, the dataset is taken for the short period of nineteen years for the desired analysis.

Table 1(A)*Augmented Dickey-Fuller Unit Root Test at Level of Series*

Variable	Lag	Drift	Trend	Test Statistics	Order of integration
$\ln y_t$	2	Yes	Yes	-4.13**	$I(0)$
$\ln(S_K)$	0	Yes	No	-3.62***	$I(1)$
$\ln(S_H)$	2	Yes	Yes	-3.39**	$I(0)$
$(n + v + g + \delta)$	1	Yes	No	-2.52*	$I(0)$
$\ln CI$	0	Yes	No	-2.52*	$I(0)$

Note. *** significance level at 1%, ** significance level at 5%, * significance level at 10%.

Table 1(B)*Augmented Dickey-Fuller Unit Root Test at First Difference of Series*

Variable	Lag	Drift	Trend	Test Statistics	Order of integration
$\Delta \ln(S_K)$	0	Yes	No	-3.62***	$I(0)$

Note. *** significance level at 1%.

The ADF result displays that all the variables including income per worker, human capital, growth rate of formal, and informal labor are integrated of order zero or $I(0)$. It means that these variables are stationary at level except the physical capital variable which is non-stationary. This variable is stationary at first difference or $I(1)$. The ADF test expressed that the dependent variables are integrated at order of zero $I(0)$, while the independent variables are integrated at the order of $I(0)$ or $I(1)$. By applying Hendry (1995) general to specific approach, first difference variables with insignificant lags are neglected from the model. The result of co-integration test is depicted in Table 2. The income per worker is the dependent variable of the model. The results described that F-statistics value rejected the joint null hypothesis of no long run relationship among the variable because value lied above the higher bound of critical value. Therefore, a long-run relationship exists across the income per worker and independent variables of the model.

Table 2
The Estimated Results of Co-Integration Test

Independent Variable	F-Statistics	df	I(0)	I(1)	Outcome
$\ln y_t$	4.88***	5	2.96	4.26	Co-integration

Note. *** significance level at 1%, ** significance level at 5%, * significance level at 10%.

The theory predicts endogeneity problem between core labor standards index and economic growth. This problem is resolved by applying NLTSLs-IV approach on the model (1). For this purpose, lagged values of first differences and levels are practiced as instruments. The equation is estimated by applying NLTSLs-IV approach. The long-run and short-run estimated results of this approach are provided in Table 3 and Table 4.⁶ In the long-run analysis, the estimated coefficient of core labor standards index in relation with economic growth is positive and statistically significant (Bazillier, 2004). The relationship between share of physical capital and economic growth is negative, however, statistically significant. The share of human capital in relation with economic growth is also positive but insignificant. While, the coefficient estimates of growth rate of formal and informal labor in relation with economic growth is negative and insignificant. In short-run analysis, the coefficient signs of variables are approximately consistent with the long run analysis.

Apparently, the resulting coefficient of estimated equation seems impressive. But coefficient value of some variables appears insignificant. The residual of estimated equation highlighted one outlier during 2009. This outlier effect may be present due to global recession which affects the economy to some extent (Khawaja et al., 2010). Therefore, this effect is captured by introducing the dummy into estimated equation which is represented by (Dum09). The dummy is equal to 1 during the year 2009 and zero in the other periods. The equation is estimated again by incorporating dummy and represented by model (2). However, the dummy is insignificant in the long-term, however, significant in short-term analysis.

⁶ The variable of human capital is deleted from the equation under the general to specific strategy to get the better estimates in the short run analysis.

The estimated results of long-run dynamics of final model (2) are also expressed in Table 3. Under long-term analysis, the estimated coefficient of relationship between core labor standard index and economic growth was positive and statistically significant. This result described that the existence of core labor standards would increase economic growth of the country. The implementation of these labor standards would increase the protection of workers which positively affects the labor productivity of workers. This process would prove a step to lead the economy on the path of growth (Bazillier, 2004). The implementation and effectiveness of core labor standards would participate in the economic growth by increasing protection and living standards of the workers.

Table 3

Long Run Estimates of the Non Linear (TSLS-IV) Approach

Independent Variable	Model (1)	Model (2)
C	26.694 [1.517]	15.083*** [6.639]
$\ln CI$	0.646* [2.251]	0.465* [1.750]
$\ln(S_K)$	-0.225** [-3.208]	-0.156** [-2.689]
$\ln(S_H)$	0.302 [0.859]	0.026 [0.228]
$(n + v + g + \delta)$	-0.004 [-1.108]	0.003** [2.068]
Adjusted R^2	0.786	0.675
F -Statistics	5.615 [0.090]	4.119 [0.065]
J -Statistics	2.316 [0.127]	0.171 [0.679]
Observations	19	19

Note. *** significance level at 1%, ** significance level at 5%, * significance level at 10%. [] t-statistics values are in parenthesis.

The estimated coefficient for share of physical capital in relation with economic growth is negative but statistically significant. This relationship expresses that the ratio of physical capital in economy would increase economic growth (Mankiw et al. [1992](#); Solow, [1956](#); Brumm; [1996](#); Gundlach, [1995](#), Li et al., [1998](#); Nonneman & Vanhoudt, [1996](#)). The negative relationship highlights the two reasons. One reason is that by decreasing the ratio of physical capital, the working hours of workers would increase which increase the labor productivity. This would lead to an increase in economic growth of the country (Bartolini & Bonatti, [2008](#)). The second reason is that economic growth is computed by dividing GDP with combination of formal and informal labor instead of population and physical capital is computed by using formula method as described in variable construction. The change in variable construction may create negative coefficient for the relationship between share of physical capital and economic growth (Arcand & D'hombres, [2007](#)).

The estimated coefficient for share of human capital in relation to economic growth is positive, however, statistically insignificant. It represents that human capital of a country increases the economic growth rate. The insignificance of estimated results express the uneducated people and also the children who do not attend school. Uneducated people cannot actively participate in economic activities, while people with human capital can raise economic growth and prosperity in country (Mincer, [1984](#)).

The results describe that formal and informal sector employment has a positive relationship with economic growth.⁷This relationship is statistically significant. People linked with informal sector employment are mostly uneducated and unskilled. These people participate in informal economic activities in accordance with their abilities and also contribute in economic growth (Porta & Shleifer, [2008](#)). On the other side, people linked with formal sector employment have a high level of education and skills. They actively participate in economic growth activities (Hanushek & Kim, [1995](#)). In this respect, both formal and informal employment participates in the production activities of the economy. These production activities include production of goods and services in different sectors and enhance

⁷ The positive relation is obtained in this analysis because formal and informal labor is used instead of population in the empirical analysis of the study which contradicts with the results of growth model.

the overall production level of the economy and increase the economic growth (Paudel & Perera, [2009](#)).

In short-run dynamics, the estimated coefficient for core labor standards index and share of physical capital are consistent with the estimated coefficients of long-run dynamics. The estimated results of short-run dynamics of model (2) are presented in Table 4.⁸ The dummy variable shows a positive and statistically significant relationship with the economic growth.

The error correction mechanism is applied to estimate the speed of adjustment of economy in time series analysis. The error correction term for this analysis is -0.44 . This term shows the speed of adjustment (λ) which describes the convergence of income per worker towards the steady state level of the income per worker. The estimated coefficient represents that economy would converge at the speed of 44% towards the steady state equilibrium level of income per worker which represents economic growth.⁹

The value of J-statistics describes the validity of instrument used in the analysis. The estimated results express the strength of instrument because the probability value of J-statistics is near to 1 for the model (2). The diagnostic tests which comprise of Bruesh & Godfrey ([1981](#)) test to analyze serial correlation, Jarque-Bara statistics for residual normality, and Engel ([1982](#)), introduce Autocorrelation Conditional Heteroscedasticity (ARCH) Lagrange Multiplier test to check heteroscedasticity, were applied on the dynamic error correction model. The estimates of model (2) satisfy all these diagnostic tests and are also available in Table 4.

Table 4

Short-Run Estimates of Non-Linear TSLS-IV Approach

Independent Variable	Model (1)	Model (2)
$\Delta \ln CI$	0.480*** [7.506]	0.239*** [5.461]

⁸ The human capital and growth rate of formal and informal labor is dropped in the short run analysis to get better significance level of the estimates.

⁹ The negative sign is necessary condition for convergence towards the equilibrium level of steady state. While, the sufficient condition is that its range lies between -1 and zero.

Independent Variable	Model (1)	Model (2)
$\Delta \ln (S_K)$	-0.135*** [-6.530]	-0.076*** [-3.881]
$\Delta(n + v + g + \delta)$	-0.004*** [6.173]	-
<i>Dum09</i>	-	0.027** [1.973]
EC	-0.871*** [-7.255]1	-0.447*** [-6.626]
Adjusted R^2	0.909	0.819
<i>F</i> -Statistics	19.653 [0.000]	12.358 [0.000]
<i>J</i> -Statistics	5.406 [0.368]	0.308 [0.997]
Diagnostic Test		
Serial Correlation LM Test	0.457 [0.499]	0.730 [0.392]
ARCH Test	0.169 [0.681]	1.086 [0.297]
JB Normality Test	0.295 [0.863]	0.399 [0.819]
Observations	19	19

Note. *** significance level at 1%, ** significance level at 5%, * significance level at 10%. [] t-statistics values are in parenthesis.

Conclusion and Policy Implications

The current study evaluated the effect of core labor standards and informal sector employment on economic growth. For this purpose, human capital augmented Solow growth model as proposed by Mankiw et al. (1992) was extended by incorporating core labor standards and informal sector employment to evaluate their effect on economic growth. The computed estimates described that core labor standards have a positive relationship with economic growth. The effective implementation of core labor

standards would enhance the growth rate of economy. The impact of growth rate of formal and informal labor on economic growth was positive. The increase in number of labor forces including both the formal and informal rises the productivity level and contributes in the growth rate of economy. The concluding remark was that the presence of good labor standards enhances the growth rate of economy. They reduce the exploitation behavioral activities and protect the rights of labor force. These activities increase the confidence and productivity level of workers in the economy. Under these circumstances, a large number of labor force including both formal and informal would actively participate in economic growth activities. It is suggested that policy makers should incorporate core labor standards in national labor policy and their implementation must be established by competent authorities in labor market of economy. Soft policies are required for providing facilities to activities of the informal sector. At the same time, the economic growth policies should provide opportunities to the workers of informal sector for entering in the formal sector by providing employment and other social benefits. This would not only increase the production level, however, it would also enhance the living standard of people. Both of these possessions contribute in increasing the economic growth rate of Pakistani economy.

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Annexure A

Table A1

Variables Description used in the Construction of Core Labor Standards Index

No.	Variables	Definitions	Source
1-Index of Freedom of Association and Collective Bargaining (I_{FC})			
(a)	The unionization rate (UR)	It is the ratio of union force in the labor force of the country.	-
(b)	The number of ILO ratified convention (NRC) on freedom of association:	This indicator based on the ratification of six ILO conventions. Two of them are accepted as core conventions.	ILO website
(c)	Civil right indicator (CRI)	This indicator includes the combination of Civil liberty index (LI) and political index (PI).	Freedom House website
2-Index of Gender Discrimination related to Employment (I_{GD}):			
(a)	Alphabetization rate differences (ARD)	It represents by the ratio of Female literacy rate (FLR) and male literacy rate (MLR).	World Bank website
(b)	School enrollment rate differences (SERD)	This rate include the ratio of female school enrollment rate (FSER) and male school enrollment rate (MSER) (Primary, Secondary and Tertiary)	World Development Indicator (WDI)
(c)	Income differences (IN)	It denotes the difference in percentage of male average monthly income (MI) and female average monthly income.	Labor Force Survey (LFS)
(d)	Female Activity rate (FAR)	It consists of the female labor force participation rate.	WDI
(e)	Gender empowerment measures (GEMI)	An UNDP index calculated the gender inequality based upon three scopes of	WDI

No.	Variables	Definitions	Source
		empowerment. (Gender Inequality Index)	
3-Index of Child Labor (I_{CL})			
(a)	Raw index (RI)	This index represent the Working children percentage between the ages of 10 - 14 years old.	LFS
(b)	Adjusted index (AI)	This index includes the ratio of those children who does not attend primary school having age (10-14) years old.	LFS
4-Index of Forced Labor (I_{FL})			
(a)	Core form of forced labor (<i>Forced1</i>)	This Indicator comprise of core form of forced labor, by using scale range from 0-5. Busse and Braun (2003).	Anti-Slavery International and ICFTU (2001), Busse and Braun (2003), Country Reports on Human Rights Practices for 2002.
(b)	All form of forced labor (<i>Forced2</i>)	This Indicators link with all form of forced labor, by using scale range from 0-9. Busse and Braun (2003).	
5-Index of ILO's convention ratification (I_{CR})			
(a)	All number of ratified convention (N_2)	The total number of ILO conventions is 190.	ILO Website
(b)	Number of core ratified convention (N_1)	ILO has 8 core conventions.	