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How Do Human Capital and Trade Liberalization affect the Labor Supply in Pakistan? A Time Series Analysis

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ARTICLE DETAILS	ABSTRACT
History: <i>Accepted 20 December 2019</i> <i>Available online 31 December 2019</i>	<p>Human capital and Trade liberalization are very important for smooth economic growth which gives birth to new employment opportunities that increase labor force participation in all sectors. Both have positive impact on labor supply and overall economy of Pakistan. Human capital has shown positive relation to trained and efficient labor force of the country and trade liberalization strategy. Transformation of labor supply is possible with the help of trade liberalization and technically educated, skilled and well experienced labor. If a country needs to enhance exports and international trade to improve its financial health, it needs technically educated and specialized labor force participation. The key objective of this paper is to analyze the impact of trade openness and human capital on labor supply in Pakistan. The improved labor market and increase in trade liberalization increases government current expenditures and the GDP of Pakistan. The study is based on time series analysis which has shown positive results on Human Capital and trade openness, in both formal and informal sectors. Skills exchange among countries lead to transformation of ideas and helps overall economy.</p>
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1. Introduction

The impactThe modern revisions were based on various theoretical and experimental studies of labor supply with differing outcomes. There were many factors of labor supply deliberated in different topical studies. Better health, education and training opportunities were reflected central to labor supply.

The major objective of the study is to analyze the impact of human capital formation and trade liberalization on labor supply in Pakistan. This article efforts to build a reasonable and credible long-

term policy for regional enhancement of human capital and support of trade liberalization. (Shapiro and Watson, 1980) and (Hall, 1997), have called for consideration of labor supply movements. The migration of labor force can affect the economy and labor working bulk (Kugler, 2005). Investment in human capital has improved the economic growth of Pakistan. Some of researchers like Azid et al. (2010), Ali et al. (2012), Mujahid (2014), Abubakar et al. (2015) and Julia et al. (2015) have studied labor supply and human capital formation with different valuation techniques and found different analysis.

Ali et al. (2012) studied the human capital formation and economic growth in Pakistan. It was not just possible through poverty alleviation to get economic development but had to do well with other economic growth indicators. Human capital was vital source of economic improvement. (Zaman et al. 2012) premeditated the dynamics between financial indicators and human expansion in Pakistan when it was facing vastly integrated world. But other channels through which the crises had impacted the financial sectors in Pakistan economy at general level were human capital and trade betterment. Maazouz (2013) observed empirical analysis of developing countries founded on return to investment in the human capital and strategy of labor market.

Azizan (2013) planned the strengthening Malaysia's scientific and technological development through human capital development. In Malaysia, knowledge centered technology had enhanced the efficiency of the economy. (Hassan et al. 2013) observed the significances of worker's remittances on human capital in Pakistan. It was found to have impact of worker's remittances on human capital. Bobonis and Morrow (2014) probed the labor coercion and the accumulation of human capital for betterment of economy. The study was based on the historical configuration of labor coercion that how people were forced to work.

Sabot (1989) studied the human capital formation in post green revolution in Pakistan, grounded on some introductory results. Study concentrated that how human capital works in rural areas. The elementary thing was school enrolment and well education to use human capital in rural zones. People edify their children only to get contact to urban markets. By dropping the crack between knowledge and to improving methodological education in agriculture segment in post green area was very significant for upgrading. The Solow growth model was used to provide closely justification to that model. The central objective of the learning was to boost the productivity and proficiency in rural areas in post green revolution in country Pakistan. To get better job chances, improved health and nutrition was essential because it upsurge the capability to work. Because of the differences in system of education the production of Pakistan was affected.

Mathur (1999) planned the human capital-based strategy for the regional economic growth, it could be handled on economic area. The main objective of the research was tried to launch the significant long-term strategy for the local economic development which was the addition and development of human capital. Human capital was the foundation of knowledge and technical change. The policy interferences for encouraging human capital struggles to private physical capital was safeguarded on efficiency ground. Two simple theories were well-defined in that study; neoclassical and modern theory of growth. Two instruments were used in that research including direct and indirect mechanisms. Without the training and execution of the knowledge, the region never documented the efficacy of knowledge. The study also tells that execution of knowledge transported innovations. The study also conferred about interregional and intraregional happenings and interactions between people and the firms. The main emphasis of the study was to better the long term regional activity and regional strategy for economic positive change.

Penalos (2000) considered the double role of human capital in growth: inequality and growth. The relationship between equality and growth was a central interest for economists and policy-makers. Higher rates of growth were associated with greater levels of human capital. The model endogenously determined the human capital and technology to point out the association between growth and inequality that was desired difficult due to offsetting supply and demand effects. There were three important sorts of the model. The model also delivered a possible tool for the poverty traps. Intermediate goods part was the perfect competitive. Different tax rates were imposed on skilled workers that shifted the curve up. The paper had offered different mechanism based on dual role of human capital.

Komastu (2009) emphasized the quantitative inquiry into local education administration in Pakistan. Educational level was very poor in Pakistan. Main attention was on local education enhancement. Because of transfers of teachers in cities was a weakness of education system, Urban education system affected a lot. In NWFP, local education system was very poor. There was huge difference in provincial, federal and district education level. Teacher's selections in remote areas and less preferences to rural areas was another negative point of education system.

Annabi et al. (2011) jagged out public expenses on human capital and growth, a case of country Canada. The study observed the case of Canada in which public expenditures on education was key factor to generating human capital that leads growth in Canada. Because of ageing problem country's progress was going to slow down but its substitute was human capital and knowledge accumulation to decrease contrary effects of all these goals. The share of public and private education was amended. Canada had more percentage of secondary education but low of masters and PhD education. The study advocates that those countries which need economic growth should focus on vocational education and technological that must be skill based. The life cycle overlapping generation model was applied to check the effects of public expenditures through the panel of human capital formation.

Fu and Gabriel (2012) examined the labor migration and human capital agglomeration effects on regional development in China. Labor mobility and human capital accumulation were fundamental for China development. Utility was a linear function of economic relevant situation. Stratified sampling technique was analyzed. Data was collected in 1990s and 30 Provinces were included. Regions with the higher FDI and more human capital accumulated were more established. GMM was used to judge the educational level. Chi-Square test and J Statistics were used to estimate the consequences.

Wha Lee and Francisco (2012) considered human capital formation in emerging Asia, time series data from 1970-2030. Among these aspects, there had been significant emphasis on high savings and the region's emphasized on exports. The constant highly educational completions of the younger cohorts had been main factor behind emerging Asia's excellent educational performance. The proportion of no schooling in Pakistan and India had degenerated. Bases of educational capital growth were, government policy, culture parent's income and education, income distribution, number of children and ethics. Model also empirically valued the relationship between educational investment as measured by enrollment rates by level of education, income and the non-income elements. Emerging Asia's very fast educational growth was essentially due to outstanding enrollments in primary and secondary levels, reinforced by the young population arrangement. The study exposed that outstanding economic progress of East Asia, account for the developments in emerging Asia's enrollment at the primary and

secondary levels that brought about substantial progress in emerging Asia's educational capital accumulation process.

Maazouz (2013) surveyed empirical analysis of developing countries based on return to investment in human capital and policy of the labor market. Study indicates that human being are appreciated asset for nation and human growth was based on their efficiency and choices. The Biker model was also used for many phases of human capital. The study observed the outcomes of human investment in low income countries and labor market. There was a competitive market. There was positive connection between education level and income level and because of their relation unemployment level also enlarged. The central objective of the study was higher education level and advancement of labor market. Primary education level was compulsory for human capital accumulation. There was need to advance relationship of human investment and higher education level for fulfillment of economic development. Because of investment in human capital it was conceivable that the policy of labor market was designed and economic demands were satisfied.

2. Data and Methodology

2.1 Data and Variables

This piece of research is based on time series and secondary data analysis. Data is taken from Economic Survey of Pakistan, World Development Indicator (WDI) and Handbook of Statistics of Pakistan's Economy.

Variables and Expected Signs

Table 1.

Variables	Expected Sign
LEXP	Positive (+ve)
LITR	Positive (+ve)
GDP	Positive (+ve)
GDPDEF	Negative (-ve)
TOP	Positive (+ve)
TTX	Negative (-ve)
GCE	Positive (+ve)
FTR	Positive (+ve)

Table 2. Variables with Measurement Unit

VARIABLE	DESCRIPTION	UNIT OF MEASUREMENT
LITR	Literacy Rate	Ratio
LEXP	Life Expectancy at birth	No. of years
TOP	Trade Openness	Ratio
GDP	Gross Domestic Product	Rupees (Million)
GDPDEF	GDP Deflator	Percent
TLF	Total Labor Force	No.of People (Million)
TTX	Total Taxes	Rupees (Million)
GCE	Government Expenditures	Rupees (Million)
FTR	Fertility Rate	Percent

2.2 The Descriptive Analysis

Table 3: Descriptive Statistics Results

Variables	TLF	LEXP	LITR	GDP	GDPDEF	TTX	GCE	FTR
Mean	36.95	60.92	41.81	3737147	9.13	385556	489287	5.18
Median	33.87	61.22	42.2	1573097	8.77	172589	255862	5.49
Minimum	59.33	67.22	60	14668428	21.64	1753128	2017255	6.61
Maximum	18.7	53.94	22.1	54673	0.07	5658.5	5909.3	3.07
Std. Dev.	12.95	3.69	13.51	4310487	4.87	450009.6	527386.2	1.29
Skewness	0.36	-0.17	-0.05	1.034	0.47	1.283397	1.060544	-0.27
Kurtosis	1.83	1.94	1.38	2.709	3.29	3.76149	3.21	1.42

Source: Authors calculation in E-views

2.3 Correlation Analysis

Table 4: The Correlation Matrix

VARIABLES	TLF	LEXP	LITR	GDP	GDPDEF	TOP	TTC	GCE	FTR
TLF	1.00								
LEXP	0.97	1.00							
LITR	0.96	0.97	1.00						
GDP	0.93	0.85	0.86	1.00					
GDPDEF	-0.30	-0.39	-0.31	-0.20	1.00				
TOP	0.46	0.48	0.44	0.32	0.05	1.00			
TTX	0.92	0.83	0.83	0.92	-0.05	0.56	1.00		
GCE	0.95	0.87	0.88	0.92	-0.11	0.54	0.99	1.00	
FTR	-0.97	-0.95	-0.98	-0.92	0.30	-0.41	-0.88	-0.92	1.00

Source: Authors calculation in E-view

2.4 ARDL (Autoregressive Distributed Lag Model)

To check the co-integration in the model, the Auto Regressive Distributed Lag model is used. It is helpful to define whether co-integration between the variables exist or not.

2.5 Model Specification

The model specifies that TLF as a dependent variable is the function of the independent variables. The regression equation is as follows,

$$TLF = \beta_0 + \beta_1 LEXP + \beta_2 LITR + \beta_3 GDP + \beta_4 GDPDEF + \beta_5 TOP + \beta_6 TTX + \beta_7 GCE + \beta_8 FTR + \mu_i$$

Intercept term = β_0

Slope coefficients = $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$

The Equation

$$\Delta(TLF)_t = \gamma_0 + \sum_{i=1}^{\alpha} \gamma_{1i} \Delta(TLF)_{t-i} + \sum_{i=0}^{\alpha} \gamma_{2i} \Delta(LEXP)_{t-i} + \sum_{i=0}^{\alpha} \gamma_{3i} \Delta(LITR)_{t-i} + \sum_{i=0}^b \gamma_{4i} \Delta(GDP)_{t-i} + \sum_{i=0}^c \gamma_{5i} \Delta(GDPDEF)_{t-i} + \sum_{i=0}^d \gamma_{6i} \Delta(TOP)_{t-i} + \sum_{i=0}^e \gamma_{7i} \Delta(TTX)_{t-i} + \sum_{i=0}^f \gamma_{8i} \Delta(GCE)_{t-i} + \gamma_9 (TLF)_{t-1} + \gamma_{10} (LEXP)_{t-1} + \gamma_{11} (LITR)_{t-1} + \gamma_{12} (GDP)_{t-1} + \gamma_{13} (GDPDEF)_{t-1} + \gamma_{14} (TOP)_{t-1} + \gamma_{15} (TTX)_{t-1} + \gamma_{16} (GCE)_{t-1} + \gamma_{17} (FTR)_{t-1}$$

3. Methodological Issues

3.1 Unit Root Test

In the time series analysis, shocks are always momentary and over the time, these shocks can be removed and the series come back to their long run mean values. In time series analysis, stationarity of the variables are tested through the Augmented Dickey Fuller Test (ADF) which recycled to check the order of integration. ADF test is used to avoid the extra lagged length of the dependent variable for the prevention of auto-correlation problem in the model.

The ARDL method will apply in event of the rationalization of ADF test. If all the variables are integrated in different orders like I (1) and I (0), then Autoregressive Distributed Lag (ARDL) model will apply. On the other hand, if the variables are integrated in the same order like I (0) and I (0), then OLS (Ordinary Least Square) technique shall apply.

Table 5: Results of ADF unit root Test

Variables	Level including intercept	Level including trend and intercept	1st including intercept	diff	1st including trend and intercept	diff and conclusion
FTR	-0.3348	-2.5313	-2.7088		-10.21	I(1)
GCE	1.8790	3.6764	-7.43		-2.2350	I(1)
GDPDEF	-3.412058	-3.5412	-6.2368		-6.1617	I(0)
GDP	-0.1108	-2.8375	3.3633		-9.10	I(1)
LEXP	1.7758	-0.3487	-4.7328		-4.19	I(1)
POPG	-1.6494	-5.20	-2.0567		-1.7936	I(0)
TLF	0.2679	-2.0565	-7.0039		-7.0766	I(1)
TOP	-6.8455	-8.9750	-10.5740		-10.4457	I(0)

TTX	-0.7650	-2.36532	-6.7415	-6.6942	I(1)
LITR	-0.6452	-0.4687	-2.5051	-4.6563	I(1)

Source: Authors calculations in E-views

The above table shows that some variables are stationary at intercept which is very useful for techniques and examination, some variables are stationary at level and some at first difference.

3.2 Bound Test for Co-integration

For the purpose of finding out the long run relationship, we use the ARDL technique. For the application of ARDL, Bound Test is applied first. The following table revealed all these things.

Table 6: ARDL Bound Test

Bound Test Models	F-Stats	Upper bound critical Value	Conclusion
TLF/LEXP,LITR,GDP,GDPDEF, TOP,TTX,GCE,FTR	7.837	2.85	Co integration

Model in the first column of the table shows the bound test is used. The model is defining the TLF as a dependent variable and GDPDEF, TOP LEXP, LITR, GDP, GCE TTX, and FTR are independent variables. The value of F Statistics is given in the second column. The third column reveals upper bound limit. The value of F-Statistics value should be greater than the upper bound value. The value of F-Statistics is 7.837 and upper bound value is 2.85. The F-Statistics value is greater than the upper bound critical value. It indicates the long run relationship between total labour force and independent variables in the model.

Long Run and Short Run Results for Human Capital Formation as a Determinant of Labor Supply.

Table .7: Short run results

ARDL Cointegration

Original dep. variable: TLF

Selected Model: ARDL(2, 2, 0, 0, 2, 0, 0, 1, 2)

Date: 02/17/17 Time: 13:01

Sample: 1972 2016

Included observations: 43

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TLF(-1))	0.016617	0.169243	0.098186	0.9226
D(LEXP)	-1.913366	2.658266	-0.719780	0.4783
D(LEXP(-1))	-3.191346	2.313308	-1.379559	0.1799
LITR	0.085606	0.055387	1.545613	0.1348
GDP	0.000000	0.000000	0.897927	0.3778
D(GDPDEF)	0.024443	0.057044	0.428498	0.6720
D(GDPDEF(-1))	0.121777	0.052826	2.305245	0.0297
TOP	-4.545240	4.575227	-0.993446	0.3300
TTX	-0.000004	0.000002	-1.565475	0.1300

D(GCE)	-0.000000	0.000002	-0.233259	0.8175
D(FTR)	-3.904873	6.421777	-0.608067	0.5486
D(FTR(-1))	21.895395	9.463098	2.313766	0.0292
CointEq(-1)	-0.581634	0.158441	-3.670989	0.0011
Cointeq = TLF - (1.3216*LEXP + 0.3243*LITR + 0.0000*GDP -0.0676				
*GDPDEF + 4.6708*TOP -0.0000*TTX + 0.0000*GCE + 1.6919*FTR				
-68.9593)				

Table.7 Long Run Results
Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEXP	1.321642	0.350009	3.776025	0.0009
LITR	0.324323	0.166401	1.949044	0.0626
GDP	0.000001	0.000000	5.847110	0.0000
GDPDEF	-0.067637	0.052999	-1.276196	0.2136
TOP	4.670771	4.263408	1.095549	0.2837
TTX	-0.000012	0.000004	-2.782249	0.0101
GCE	0.000013	0.000003	3.951040	0.0006
FTR	1.691862	1.218639	1.388321	0.1773
C	-68.959265	13.842403	-4.981741	0.0000

Source: Authors Calculations in E-views

The model is constructed on nine variables. The TLF is a dependent variable and TOP, TTX, LEXP, LITR, GDP, GDPDEF, GCE, FTR are independent variables. The coefficients define the association of independent variables with dependent variable. All values are given in above table, coefficients, Std. Error, t-Statistics and Probability are given.

LEXP has a positive link with TLF; its value is 1.32. If life expectancy increases then they will do supplementary work and contribute more in the labor force. LITR is also positively correlated to TLF, its value is 0.32. It indicates that as literacy rate increases, TLF also increases.

The effect of GDP is also positive on TLF. It upsurges the over-all production in the economy, therefore labor will contribute additionally in the country that will increase the total labor force. The value of GDP is 0.000001 which is positive. The GDP will upturn the chances of the work for people in service and white collar jobs too because of this improvement (Manner and Paxson, 2000). When magnitude of the economy develops then women recognize that they have better job opportunities and are stimulated to become economically active. It increases women contribution in the productive accomplishments (Mujahid et al.2013). A body that indicates upturn of women participation in workforce has a reliable and very momentous connotation with economic growth (Tansel 2002) and Fatima and Sultana.

TLF is negatively related to GDPDEF. Its value lies in -0.06. It indicates that when inflation rises, then purchasing power of labor decreases and their contribution level also decreases. When their purchasing power decreases, then they will spend less of their income on health, accommodation, education level etc. (Akram et al. 2008).

TOP is trade liberalization (openness), which is positively related with TLF. The value of TOP is 4.67. It indicates that as trade boosts, the total number of labor force also increase because of increase in the output.

TTX is negatively related to TLF, with value of -0.000012. If taxes rise, then labor movement will increase which decreases labor supply. If total taxes increase, then labor's purchasing power is also affected and decreases their expenditure on health and education, which results in decrease of labor supply. GCE are positively associated to TLF. As government expenses increase, the productivity increases too. It will help start new projects that boost employment resulting in increased labor force sharing. The GCE value is 0.000013. The FTR is positively related to TLF, its value is 1.69. The number of people will rise in labor force and overall supply of labor also grows.

4. Conclusion

Physical capital is nothing without human capital as human capital formation is core of any economy. Human capital is developed through better health facilities, vocational education, skill-based strategies, training institutes with proper training pattern, higher life expectancy and fertility rate. Trade liberalization enhances the overall labor productivity through international market. Trade openness (trade liberalization) and human capital formation positively affect total labor force in Pakistan. Most of the studies have found that deficiency in worker's mobility and the sluggish movement of capital between geographical regions were the barricades to adjustment. Education not only delivers high income but also offers the openings in the labor market. Health of the labour, another very essential element for human capital formation must be looked after and excellent health facilities must be provided. LEXP has a positive effect on total labor force. As life expectancy increases, the labor force involvement also rises. LTR is also incorporated, with education level and then labor force participation in positive term. GDP increases the production level which will increase the total labor force. This piece of research article is based on authentic, justifiable, applicable and sound results.

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