

# Employment, Trade Openness and Capital Formation: Time Series Evidence from Pakistan

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## Abstract

*This study is an attempt to investigate the impact of gross fixed capital formation (GFCF), trade openness and wage proxy on employment in Pakistan. Annual data series is used from the period 1977 to 2010. Unit root test is used to check the properties of time series data. Johansen co-integration technique was applied to determine long run relationship. The empirical findings suggest that there are two co-integrating vectors during the concerned period of time in Pakistan. The study found a positive relationship of employment with GFCF and trade openness and negative with wage proxy. The value of ECM (-0.109558) also shows a significant speed of adjustment.*

**Keywords:** employment, trade openness, gross fixed capital formation, Pakistan

## Introduction

The fundamental aim of this paper is to explore the effects of trade openness and Gross fixed capital formation (GFCF) on the employment of Pakistan over the period 1977-2010. Thus, Pakistan provides a good case to examine how employment growth was influenced by international trade and Gross fixed capital formation (GFCF).

Employment remains the main issue for economists and politicians all over the world. Policy makers always tried to explore and find out ways to generate employment opportunities for the growing population. Pakistan is the 10th largest country in the world according to the size of the labor force. According to government of Pakistan's estimates, total labor force was 41.83 million in 2001-02, 45.5 million in 2003-04, 50.05 million in 2006-07 and is 53.72 million in 2009-10. Labor force is growing every year but the opportunities for employment are declining. Pakistan has not sufficient resources to adequately absorb the increasing labor force in productive activities. Although government of Pakistan has implemented number of policies to generate new employment opportunities but these are not enough (Shahnawaz et al, 2011).

The classical trade theory based on Heckscher-Ohlin theorem argues that trade openness will increase employment in developing countries since they are labour-abundant. Since the classical trade theory rests on the unrealistic assumptions such as perfect competition and full-employment, the new trade theory introduce labour market imperfections into its theoretical models (Alpaslan 2011).

There exists a growing literature on the theoretical relationship between international trade and employment. Although these new models of international trade emphasize that there exists a significant theoretical relationship between trade openness and unemployment, the sign of the net impact of trade on employment varies in different theoretical frameworks.

The remainder part of the study is organized as follows: Section 2 describes review of literature. Methodology and data issues are given in Section 2. Results are described in section 4 and last section presents conclusions and policy suggestions.

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## Review of literature

Shahnawaz, et.al (2011) investigates the impact of globalization on the level of employment in Pakistan. Globalization is used as proxy variable such as foreign direct investment, workers remittances and trade openness. Time series data was used for the period of 1973-2009. Johansen technique was applied for co-integration and ECM for short run analysis. It was analyzed that foreign direct investment and workers remittances showed positive impact on employment not only in short run but also in long run in Pakistan. Trade openness and social and political aspect of globalization negatively affects the employment.

Meidani and Zabihi (2012) analyzed “The Dynamic Effect of Globalization on Unemployment Rate” for Iran. The time series data was used for the period of 1971-2006. Johansen-Juselius approach was used for co-integration test. For globalization, ratio to total export to GDP and ratio to total import to GDP proxies were used. It was analyzed that globalization has significant and negative effect on unemployment rate.

Akcoraoglu and Acikgoz (2011) showed the relationship among Employment, International Trade and Foreign Direct Investment for Turkey. Quarterly time series data was used for the period of 1990-2010. For estimation, ARDL bounds testing and fully-Modified OLS techniques were applied. By using both ARDL and FM-OLS technique showed that the impact of FDI flows on the employment was negative and statistically significant in the long run. Furthermore, positive and significant effect of exports on employment was observed in the long run. Granger causality tests was applied to indicate the existence of a short-run as well as a long-run and causality from exports to employment was showed.

Aktar, et.al (2009) analyzed The impact of Foreign Direct Investment, export, economic growth and total fixed investment on unemployment for Turkey. The data was used for the period of 1987-2007. Foreign direct investment (FDI), gross national product (GNP), Export (EX), total fixed investment as of GNP shares (TFI) and unemployment rate (UR) variables were used for estimations. To find out the interrelationships, Johansen cointegration technique was test to analyzed. It was analyzed that export and total fixed investment has positive impact on unemployment rate which is against the theory where as all other variables are significant and signs are according to theory.

Javed, et.al (2012) analyzed the relationship among Foreign Direct Investment (FDI), Trade and Economic Growth in South Asian countries (India, Bangladesh, Sri Lanka and Pakistan). The data were taken from world development indicator (WDI) for the period of 1973-2010. The Generalized Method of Moments (GMM) technique was applied for estimations. It was observed that FDI has positive impact on output in India, Bangladesh and Pakistan and negative on Sri Lanka. The impact of exports was positive upon output in all the countries.

Awan, et.al (2010) estimated the nexus between Foreign Direct Investment and Pakistan's economy. The time series data were taken for the period of 1971-2008. Augmented Dickey Fuller test was used for stationarity and co-integration technique was used for estimation. It was analyzed that trade openness, inflation and Gross Fixed Capital Formation has positive and statistically significant impact on Foreign Direct Investment (FDI), where as current account balance has negative impact on FDI. The impact of Debt services was positive but it was statistically insignificant.

Siddiqui and Iqbal (2005) examined the impact of trade openness on output growth in Pakistan. Gross Domestic Product (GDP), Export, Import, investment and population growth were the major variables. The data were taken from International Financial Statistics (IFS) for the period of 1972-2001. Augmented Dickey Fuller test was used for stationarity and co-integration procedure was used for estimation. The results showed that long-run relationship between GDP and trade openness was negative and statistically significant at one percent. Where as impact of investment on GDP was positive.

## Data and Methodology

In this paper four variables are used namely Employment, Gross fixed capital formation, trade openness and wages. The annual data on employment, Gross fixed Capital formation, import, export and GDP are taken from International Financial Statistics (IFS) CD-ROM data base of international monetary fund. The wages data is collected from chamber of commerce Lahore which was composed from Lahore local market.

### Empirical Model and Variable Descriptions

Employment (logarithm) is used as dependent variable. The Data for employment in Pakistan has been collected from IFS.

Independent variables are constructed as follows:

<b>RTRADE</b>	trade openness is taken as sum of import and export of Pakistan for the period of 1977-2010. by combining import and export, the trade openness is taken and then Finally trade openness scared by nominal GDP in order to obtain as proxy (ratio of trade openness to GDP).
<b>GROSS FIXED CAPITAL FORMATION (LNGFCF)</b>	It is very important factor for Pakistan economy. Data of GFCF has been taken from IFS.
<b>WAGES</b>	Wages which is taken as proxy i.e minimum wage rate.

## Methodology

Prior to any time-series econometric analysis, it is necessary to investigate the stationarity properties of the variables. A stationary series fluctuates around a constant long-run mean and, this implies that the series has a finite variance which does not depend on time. On the other hand, non-stationary series have no tendency to return to a long-run deterministic path and the variances of the series are time-dependent and non-stationary series suffer permanent effects from random shocks and thus the series follow a random walk.

The affect of trade openness and GFCF on employment in Pakistan is examined in the following ways: First of all it is examined whether a time series has a unit root. Then long run relationship among the variables is found by applying the Johansen's multiple cointegration tests. Once the variables are found to be co-integrated, meaning that long-run equilibrium holds between them, they may still be in disequilibrium in the short run. Therefore, we have estimated an error correction model (ECM) to determine the short run dynamics of the system.

### Augmented Dickey—Fuller (ADF) test for unit roots

Augmented Dickey–Fuller (ADF) test is used to assess the order of integration of the variables. Dickey and Fuller (1979, 1981) devised a procedure to formally test for non-stationarity. The key insight of their test is that testing for non-stationarity is equivalent to testing for the existence of a unit root. Three possible shapes of ADF test are given below.

$$\Delta Y_t = \alpha Y_{t-1} + \sum_{k=0}^n \beta_k \Delta Y_{t-k} + \varepsilon_t \dots \dots \dots 1$$

$$\Delta Y_t = \delta_0 - \alpha Y_{t-1} + \sum_{k=0}^n \beta_k \Delta Y_{t-k} + \varepsilon_t \dots \dots \dots 2$$

$$\Delta Y_t = \delta_0 - \alpha Y_{t-1} + \delta_2 t + \sum_{k=0}^n \beta_k \Delta Y_{t-k} + \varepsilon_t \dots \dots \dots 3$$

The difference in the three equations is of elements  $\delta_0$  and  $\delta_2 t$  where  $\delta_0$  an intercept term is and  $\delta_2 t$  represent trend in a series.

After applying the ADF test it is analyzed that all the variables are stationary at first difference. Because all the variables are stationary at 1<sup>st</sup> difference so, Johansen co-integration is applied for estimation.

### Johansen's test Co-integration

The theory of cointegration developed in Granger (1987) and elaborated in Engle and Granger (1987) addresses this issue of integrating short-run dynamics with long-run equilibrium. Granger (1987) pointed out that a linear combination of two or more non-stationary series may be stationary. Because all the variables are stationary at 1<sup>st</sup> difference I(1) so, Johansen co-integration is applied for estimation.

### Empirical Model

The econometric analysis in this paper is based on the following equation.

$$\ln EMP = \beta_0 + \beta_1 \ln GFCF + \beta_2 RTRADE + \beta_3 WAGE + Ut$$

Where  $\beta$ 's are constant and coefficient / parameters of the equation. The  $Ut$  is random error of the model. The theoretical expectations regarding to employment and Gross Fixed Capital Formation is that, there exist positive relationship between them and negative relationship between wage and employment (Akcoraoglu 2011).

### Empirical Results

The first step in co-integration analysis is to test the stationary property of variables under consideration. Thus we utilized the unit root test of augmented Dickey-Fuller (ADF) test statistics.

Dickey and Fuller (1979) explained that if the series is non-stationary the null hypothesis representing a unit root cannot be rejected.

**Table 1: Results of Augmented Dickey –Fuller tests**

Variable	Level	t-value	First Difference	t-value
LNEMP	-0.9765	-3.5562	-4.2977	-3.5614
LNGFCF	-0.4300	-2.9558	-4.4665	-2.9591
RTRADE	1.6737	-3.5562	-4.4434	-3.5614
WAGE	-2.1561	-3.5614	-4.0282	-3.5670

By comparing t-cal and t-critic we come to know that all the variables are non-stationary at level and stationary at first difference at 5 % level of significance.

Since all the variable are stationary and integrated of order one ,so we employ co-integration technique of Johansen et al.(1988)and Johansen and Juselius et al.(1990)to test whether their exist a long run relationship among variables.

**Table 2: Johansen Co-integration test Statistics**

Trace test (Null hypothesis)	Alternative hypothesis	Trace statistics	5 % critical value
$r=0$	$r \geq 1$	83.10543	47.21
$r \leq 0$	$r \geq 2$	38.86728	29.68

In the above table, the trace test statistics are given. The results indicate that there are two co-integrating vectors in the model.

**Table 3: Normalized Co-integrating Coefficients: 1 Co-integrating Equation**

LNEMP	LNGFCF	RTRADE	WAGE	C
1.000000	0.082325* (0.03066) (2.68490)	0.272661** (0.11824) (2.30606)	- 0.012228** (0.00624) (-1.9588)	9.754643

\* and \*\* denote significant at 1 % and 5% level respectively. Note: standard error and t-values are in parenthesis respectively.

Normalized co-integrating coefficients with standard error and t-statistics are given in table 3. The results shows that the impact of Gross fixed capital formation (GFCF) and Trade openness to GDP ratio (RTRADE) on employment is positive and impact of wages (WAGE) is negative. The long-run elasticity from the coefficient of GFCF suggests that 1 percent increase in GFCF yields 0.08 percent increase in employment (EMP). The results are statistically significant at 1 percent. These results are in line with findings of Awan et al (2010). The coefficient of Ratio of trade openness to GDP (RTRADE) shows that one unit increase in RTRADE resulted in an increase of 27.27 percent in yearly employment and results are statistically significant at 5 percent. These results are consistent with Siddiqui and Iqbal (2005) for Pakistan, Meidani and Zabihi (2012) for Iran and Akcoraoglu and Acikgoz (2011) for Turkey. The coefficient of wages shows that one hundred rupees increase in monthly wages results in a decrease of 2.1 percent in employment level in the country. The results are significant at 5 percent. These results are in line with findings of Akcoraoglu and Acikgoz (2011) for Turkey.

**Table 4: Error Correction Model Results**

Regressor	Coefficient	Standard Error	t-statistics
Intercept	0.025170**	0.01407	1.78832
ECM(-1)	-0.109558*	0.04571	-2.39655

\* and \*\* significant at 5 percent and 10 percent respectively.

The vector error correction model (VECM) estimation result is given in above (table 4). According to expectations, the sign of ECM (-1) found to be negative and statistically significant. The coefficient of ECM term discloses that adjustment process is quite slow and almost 11 percent of the last year's disequilibrium in the employment level from its equilibrium path will be corrected the present year.

## Conclusion

This study investigates the various interrelationships between employment, gross fixed capital formation, trade openness, and wages as proxy for the period 1977 and 2010. We apply Johansen co-integration test to analyze the interrelationships among the given selected variables. We find that there are two co-integrating vectors in the system, which indicates the long run relationship. Although all the variables affect the employment significantly, gross fixed capital formation and trade openness has positive impact on employment with theoretical expectation. However, wage proxy has a negative impact on unemployment. Based on the empirical result, the study suggests that Government of Pakistan should encourage the investors to invest in the country by creating healthy atmosphere.

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