Effect of Trade Openness on Unemployment in Case of Labour and Capital Abundant Countries

Nazia Anjum
Ph.D Scholar, National College of Business Administration and Economics, Lahore, Pakistan

Zahid Perviz
Assistant Professor, National College of Business Administration and Economics, Lahore, Pakistan

Abstract
This study examined the impact of trade openness on unemployment in case of capital-abundant and labour-abundant countries. Inflation rate, economic growth, population growth and political rights have been used as control variables in our empirical analysis. For this purpose, the study used the data for the period of 1990-2012 for 75 labour-abundant countries and 44 capital-abundant countries. IPS panel unit root test is used to check the normality and stationarity of the variables of interest and Mean Group and Pooled Mean Group heterogeneous panel cointegration techniques have been used to check the long run relationships among the variables of our study and to find the long run and short run parameters. In case of labour-abundant countries, trade openness has a significantly negative impact on unemployment in the long run. The variables of inflation rate and institutional quality also have negative and significant impact on unemployment. On the other hand, population growth is positively and significantly related with unemployment in the labour-abundant countries. While in case of capital-abundant countries, trade openness has a significantly positive impact on unemployment in the long run. The inflation rate also has negative and significant impact on unemployment. The impact of Population growth on unemployment is positively and significant. The coefficient of institutional quality remains statistically insignificant in case of capital-abundant countries.

Keywords: Trade openness, unemployment, capital and labor abundant
JEL Codes: F43, F02, O50

I. Introduction

Trade openness means free trade as a result of reduction in tariff and other trade barriers. In recent years increase in free movement of goods and services across international boundaries has been the most noticeable aspect of increasing integration of global economy. After the Second World War, many countries of the world took different measures such as tariff reduction and removal of non-tariff trade barriers to promote the liberalization of trade. The most significant development in this connection was the successful completion of the Uruguay Round of GATT (General Agreement on Tariff and Trade) negotiations and the establishment of WTO (World Trade Organization) in 1994 that led to further trade liberalization among the members. As a result, a noticeable trade activity has been emerged among different developed and developing countries.

Different costs and benefits may be associated with trade openness. Free trade is advocated on the grounds that it can be beneficial for the countries involved in free trade. Benefits of free trade include increase in economic activity through specialization and optimal utilization of resources. Trade openness considered as engine of economic growth [Yeboah et al. (2012); Yanikkaya (2003) and Awokuse (2008)]. The costs of free trade are generally related with shut down of infant industries which are not competitive enough to survive if they have to face the competition with firms abroad. This may result in reduction in job opportunities and unemployment. One of the main effects of international trade in the real world is the decrease in number of jobs, leading to significant unemployment.

Absolute advantage theory describes that both nations can gain from trade. If in the production of commodity one nation-I has an absolute advantage and nation-II has an absolute advantage in the production of second commodity. The nation-I will specialize and export the good in which it has absolute advantage and the nation-II will produce and export the other good in which it has absolute advantage (Smith, 1776). According to comparative advantage theory if nation-I has an absolute advantage in the production of both the goods and even nation-II has absolute disadvantage in the production of both the goods trade can be possible and beneficial. The nation-I will produce and specialize in the production of that commodity in which it has more comparative advantage and the nation-II will produce and specialize in that good in which it has less comparative disadvantage (Ricardo, 1817).

When two goods are produced by the expected trade partners having different factor intensities of labour and capital unemployment may increase with trade openness in the capital-abundant country. Whereas In labour-abundant country, unemployment may decrease with trade liberalization (Ohlin, 1933). Thus, How trade openness affects unemployment it depends on a country's relative factor endowment.

Mix kinds of results of the effects of trade openness have been reported by empirical research studies. However the results reported by empirical literature are not very much conclusive. For example Moore and Ranjan (2005) described that trade liberalization may increase unemployment in a capital abundant economy. Association of trade openness and unemployment has been reported by Janiak (2006). The underline mechanism put forward by Janiak (2006) suggests that destruction of job by the exit of low-productivity firms exceed job creation by high-productivity firms. On the other hand, Felbermayr et al. (2011) explored that if trade openness is increased by 10% results in decreases in unemployment by 1% for both developing and developed countries' analysis. It depends on a country's relative factor endowment that how trade openness affects on unemployment. Dutt et al. (2009) also explored the negative association between international trade and unemployment.

We want to empirically investigate the effect of trade openness on unemployment in case of labour and capital-abundant countries by using Mean Group (MG) and Pooled Mean Group (PMG) estimations.

II. Literature Review

Free trade is a globally recognized policy where imports and exports are not hampered by any government. The existing idea of free trade was further manifested by European Union and North American Free Trade Agreement (NAFTA). The elimination of trade restrictions enhances trade among different countries of the world. Many countries fear that trade openness is one of reasons of job reduction and decreases employment opportunities. This results in enhancing the rate of unemployment. The impact of trade openness may be different in labour-abundant and capital-abundant countries (Ohlin, 1933). Hence the association between international trade and unemployment seems to be ambiguous.

Baldwin (1995) explored the relationship among international trade, employment, wages and foreign direct investment by using data of OECD (Organization for Economic Cooperation and Development) countries. He examined short-run employment affect of changing in investment and trade patterns. The results showed that

change in domestic goods demand and increase in labour productivity, affected the domestic level of employment more than changes in the demand of import. The increase in imports offset the employment level. So, an increased import is major factor of unemployment particularly in low-technology industries.

Messerlin (1995) studied the effect of foreign trade and capital outflows on employment level. Results showed that effect of trade on aggregate employment level depended on labour markets, macroeconomic factors and policies. Greenaway et al. (1999) explored the effect of trade on employment level of industries for a 167 manufacturing industries in the United Kingdom. Dynamic labour demand model had been used to check the effects of imports and exports in a panel data from 1979 to 1991. The results of study showed that an increase in trade both in terms of exports and imports reduced the level of labour demand.

Landesmann et al. (2002) explored the impact of growing North-South trade on wages and manufacturing employment in Northern economies based on the data from seven industrial economies from 1980 to 1996. Results showed that growth of imports from South was affecting labour-intensive and skill-intensive industries. These changes caused to increase outsourcing in skill-intensive industries and represented loss of comparative advantage in labour-intensive industries. Growth of imports from South negatively affected employment and growth of exports to South positively affects employment.

Fedderke et al. (2003) explained product-price study. According to the analysis prices sharply increased in those markets that were labour intensive in South Africa. Due to trade openness there was an increase in the earnings of labour and rate of return to capital decreases.

Janiak (2006) examined that non-exporting firms were not as much productive as exporting firms. As a result of trade liberalization, an upward trend could be shown in intra-industry firms. It was observed that welfare as well as productivity was increased as a result of labour reallocation from large firms to smaller firms. A comparative analysis was seen on the employment level and two models were merged, one was model of intra-industry and other was large firm model. The results showed that a large exposure to trade was linked with low degree of employment and large scale of job destruction rather creation. It was revealed that a large exposure to trade was linked with low degree of employment and large scale of job destruction rather than job creation. It was observed that on one side there was benefit from trade while on other hand an opposition was generated to favor globalization.

Dutt et al. (2009) studied the relationship between unemployment and trade liberalization by using the cross-country data on unemployment, trade policy and different controls variables. They used both OLS estimates and panel estimates fixed effects, differences GMM and system GMM. Cross sectional results supported Ricardian prediction that unemployment and trade openness had inverse relationship.

Kien and Heo (2009) used system GMM model to investigate the effects of trade openness on employment level in Vietnam from 1999 to 2004. The results showed that raise in industrial output increased the demand for labour and increasing wage rates increase unemployment levels. Increase in exports increase derived labour demand. This indicates that the increasing level of exports provide job opportunities for labour.

Chinembiri (2010) examined the impact of trade on employment in South Africa in a Labour Demand framework. He studied the extent to which exports, imports, output and wages affected employment levels across different sectors at the aggregated levels. Results showed that Tertiary employment lagged by one year significantly effects current tertiary employment. Increase in imports reduces demand for labour in the primary sector i.e. fishery, forestry, mining and agriculture activities, and in the secondary sector i.e. utilities, manufacturing and construction industries. Results also showed that increased in exports did not increase derived labour demand for any of the sectors.

Helpman and Itskhoki (2010) explained that a reduction in trade barriers could increase unemployment. Because reduction in trade barriers increased the trade and profitability of exporting firms. Unemployment increased when workers shifted towards the sector producing exporting goods, if exporting sector had greater tendency characterized labour market frictions.

Kim (2010) examined the relationship between aggregate unemployment and international trade in the existence of labour market institutions. The research was conducted by using the data of 20 OECD countries for the period 1961 to 2008. He empirically investigated the effect of trade on unemployment rate and the effect of trade on unemployment in the existence of labour market institutions. Results showed that increase in

trade increased aggregate unemployment as it interrelated with strict labour market institutions and trade liberalization reduced the level of aggregate unemployment if the labour market was illustrated by flexibility.

Felbermayr et al. (2011) developed conditions under which the effect of trade improved labour market outcomes. They showed that the labour market implications of trade liberalization were determined by the effect of trade on aggregate productivity. Results showed that there was inverse relationship between trade liberalization and unemployment.

Groizard et al. (2011) explained that a fall in trade cost of the industry considerably reduced job creation and increased job destruction. The consequences of reduction in trade industry cost on job destruction were greater than on job creation.

Hassan et al. (2011) investigated the relationship between trade liberalization and unemployment in the case of India. They used state and industry level data on unemployment rate and trade protection in the case of India. There was no strong evidence that unemployment increased with trade liberalization. The state level results showed that urban unemployment declined with trade liberalization in state in the presence of flexible labour markets and there was larger share of employment in net exports industries. The industry level analysis showed that in the presence of trade protection, there were less chances of unemployment of labour, especially in case of net export industries.

Makioka (2011) argued that the consequences of trade liberalization on unemployment were influenced by inter-sectoral and intra- sectoral reallocation of labour. To capture the impact of trade openness on unemployment the study built a model having two sectors and two countries. One was good differentiated sector, illustrated by various firms and search friction labour market. The results showed that trade openness raises both labour market stiffness and incomes in a sector where goods were differentiated due to fall in cost hiring. As a result there was job creation in a sector where goods were differentiated while there was a negative impact of labour inflow from outside the sector. These reverse effects could be cancelled out each other. According to this study the net effect of trade liberalization on unemployment relies on labour market characteristics of a country.

Zaki (2011) worked on the relationship between trade, employment and gender in Egypt. He explained trends in trade and employment from a gender perspective and empirically studied the effect of trade on employment. He used two models in his research. In first model, he used a time series data of exports and employment from 1960 to 2009. In Second model, he used human capital model to know the effect of trade on wages and employed a model to see the effect of trade on the probability of changing the employment status. Results showed that increase in exports from 1960 to 2009 increased employment and male's wages and increase female's probability of working.

Ranjan (2012) examined that in importing sector job creation and job destruction both were increased whereas both were decreased in export competing sector. So the impact of trade openness on unemployment was ambiguous. The impact of job destruction was greater in import competing sector. There was no instant decrease in job destruction in export competing sector, which resulted in short run spikes in destruction of job and unemployment in reaction of international trade. Trade openness also raised international income inequality. In export competing sector international income inequality increased while in import competing sector international income inequality declined.

Benedik (2013) focused on the trade liberalization in developing countries as well as elaboration of informal sector. The equilibrium phenomenon and various levels of trade incorporation of individual countries were neglected. In order to evaluate the welfare effects, standard models were used. The transition economies were seemed to be more inclined towards informal sector, where labour did not have high-productivity jobs. Data set comprised of 15 Latin American and Caribbean countries. A structural model of informality, international trade and unemployment was estimated. The analysis showed that there existed a negative impact of trade openness on informal sector.

Gozgor (2014) empirically examined the influence of globalization and trade liberalization on unemployed rate in developed countries. The analysis emphasized on G7 countries that included Germany, France, Italy, United kingdom, Japan, united states and Canada. The empirical findings were gathered from panel data which demonstrated that there was significant and negative link between unemployment rate and trade liberalization. The four measures of trade openness and globalization were analyzed here. These four measures included nominal openness, economic globalization index, real openness, and KOF globalization index. A

significant reduction in equilibrium level of unemployment had been seen in G7 countries. Furthermore real GDP per capita, inflation rate, productivity change and population also affected unemployment.

Celine et al. (2014) examined that unemployment could be the caused by trade liberalization if reallocation of labour would be the result of such labour market friction with above average labour sector. The model used panel data and sector specific market frictions of labour had been estimated. Such estimation was done in order to assess welfare and employment effects of Trans-Transat-lantic Trade and investment Partnership (TTIP) on European Union and United States. It was found that those countries in friction-intense sectors with a comparative advantage experienced an increase in unemployment, even if the welfare was increased. The study analyzed that trade openness generated higher unemployment in these sectors having week labour market frictions.

In the present study we are trying to fulfill the research gap regarding the distribution of the world into labour and capital-abundant countries by using Mean Group (MG) and Pooled Mean Group (PMG) estimations. We want to empirically investigate the impact of trade openness on unemployment in case of labour and capital abundant countries.

III. Historical Background of Trade Openness

Free trade plans have been floated for many years among countries at different levels. Discussions, deliberation talks, conferences and meetings have paved the way for efforts to bring openness in trade and economic activities. Equality and reciprocity based free trade is proving quite successful in both neighboring and regional member countries. There is still need to add to this freedom and continuous process of debate is going on among different countries at various forms.

A part from its benefits, economists are also concerned about the costs associated with free trade. The emergence of economics as an organized branch of science can be attributed to the writings of Adam Smith (Smith, 1776).In the beginning, traders, merchants, government officers and bankers had opinion that a nation was considered as rich whose exports were more than imports. This idea was termed as mercantilism. Possessions of precious metals by a country were considered to be important for being rich and powerful. Thomas Munn was the most influential writer and exponent of the theory of mercantilism. Each government and ruler tried all its best to accumulate precious resources. On the contrary all nations could not increase their exports and decrease their imports and one government could gain at the expense of the other. This concept led to economic nationalism. The theory of mercantilism measures the power of a nation on the basis of the stock of precious metals it possessed (Salvatore, 2011).

In a broader way, more logical reasons were found for the mercantilists' desire for gathering and collecting the precious metals. Like they were basically writing for rulers and rulers had to strengthen their respective armies to capture more land and colonize. More gold means more money in circulation and greater business activity. The government through restricted imports and exports would stimulate national output and employment. But today beside these resources, a nation is considered wealthy whose human resources are helping in the production of goods and services to satisfy human needs. Free trade among countries is being propagated by different international organizations on the grounds that it will increase the welfare of the people despite a large degree of trade liberalization. We are again seeing emergence of mercantilist ideas as many nations are trying to cope with high unemployment. Furthermore they check imports in order to motivate domestic production and employment.

For this purpose, they impose restrictions on international trade through different tariff and non-tariff trade barriers. They help their industries by giving subsidies for worldwide competitiveness of the state for its future. Developing countries are cautious in this regard. Some tariff and quotas have been abolished but tax benefits and subsidies are there to give protection. This is causing different trade relating disputes between developed and developing countries. We can say that mercantilism seems declining but is well alive and flourishing in this age and time.

Absolute advantage theory (Smith, 1776) describe that if trade is done between two nations, then both nations would gain from trade. If one nation gains nothing, it would refuse to trade. According to this theory, trade is based on absolute advantage of both nations. If each nation specializes in the production of the commodity of its absolute advantage and exchanges some part of its output for the commodity of its absolute disadvantage, both nations end with consuming more of both commodities.

Ricardo (1817) presented the law of comparative advantage. According to him if nation has complete disadvantage in the production of both the goods and other country has complete advantage in the production of both commodities then trade is beneficial for both the countries. One nation should produce and specialize that product in which its disadvantage is less and other country should produce and specialize that good in which its advantage is more. According to Heckscher-Ohlin theory a nation will export that commodity and produce in its relatively abundant and cheap factor and import the commodity intensive in its scarce and expensive factor. In order to reap the benefits of free trade, different trade agreements have been done among different nations. For example GATT (General Agreement on Tariff and Trade) held negotiations with different nations to remove trade restrictions. It also advocated the non-preferential treatment among the trading nations Since World war II under GATT, 7 trade rounds held and final was Uruguay Round. In April 1994 GATT members signed the Uruguay agreement under which trade liberalization in agricultural goods and services was stressed along with reduction in nominal and effective rate of tariff.

The status of GATT was uplifted to an organization. The WTO (World Trade Organization) has been seeking as a single body to implement all the decisions and agreements of GATT to liberalize the trade and to reap the benefits of trade by the nations. For the sake of our analysis we have grouped the countries of the world into two categories. Countries used in our analysis are categorized into labour abundant and capital abundant. The countries whose capital labour ratio is higher than the world's capital labour ratio are considered as capital abundant countries. While the countries whose capital labour ratio is lower than the world's capital labour ratio are considered as labor abundant countries. The graphs show different trends of trade openness and unemployment in case of capital and labour-abundant countries.

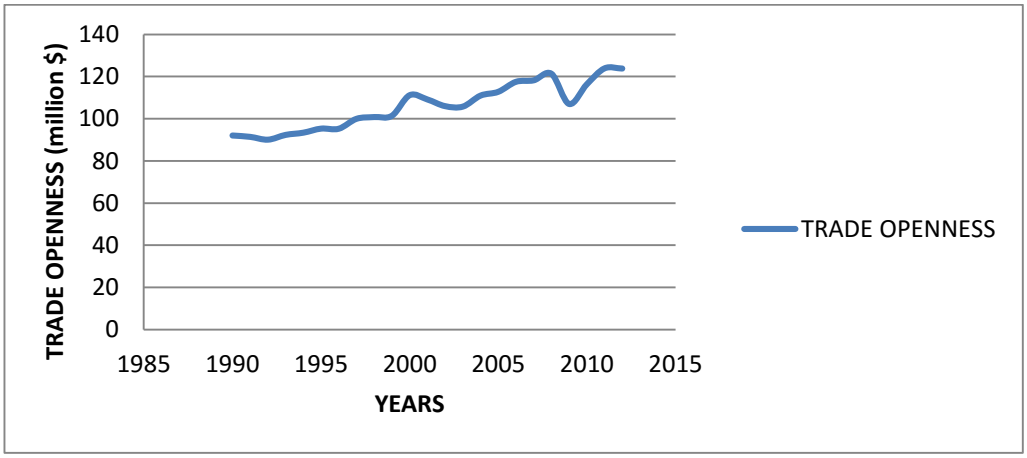

Figure 1: Trends of Trade Openness in Capital-abundant Countries

Figure 1 reveals the trends of trade openness in capital-abundant countries from 1990 to 2012. As the graph shows there is a decrease in trade openness from 1990 to 1992 and after 1992 it is gradually increasing. Trade openness has increased very sharply in the year of 2000 and then there is a decrease in it. From 2004 to 2012 trade openness fluctuated very prominently. There is an increasing trend then decreasing and once again an increasing trend in trade liberalization in case of capital-abundant country.

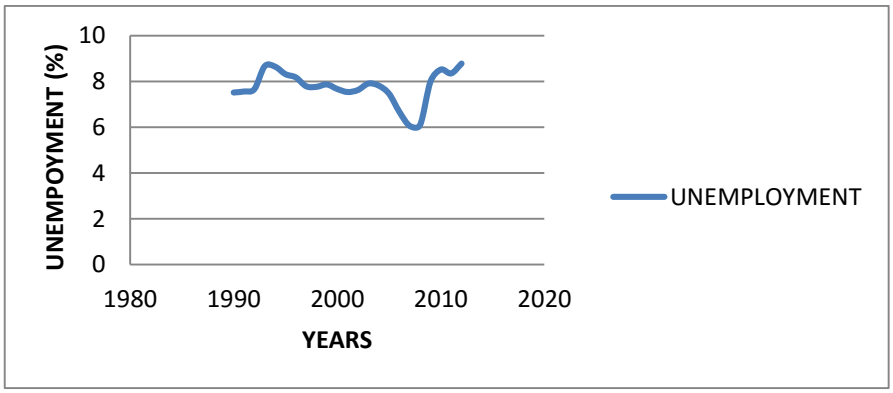

Figure 2: Trends of Unemployment in Capital-abundant Countries

Figure 2 represents unemployment trends in capital-abundant countries from the period of 1990 to 2012. When capital-abundant countries restricted there trade then there is a fall in rate of unemployment. These two graphs reveal that unemployment has increased with the liberalization of trade in capital-abundant countries. There is a positive relationship between trade openness and unemployment in case of capital-abundant countries.

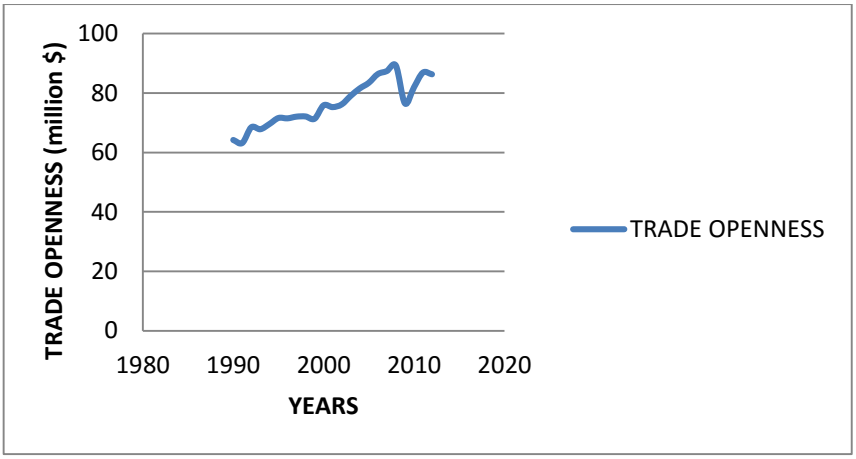

Figure 3: Trends of Trade Openness in Labour-abundant Countries

Figure 3 shows different trends of trade openness in case of labour-abundant countries from 1990 to 2012. There is a slight but increasing trend in liberalization of trade from 1990 to 1992. But after that there is a sharp increase in trade openness in labour-abundant countries. In the year of 2008 trade openness was decreased and then it has an increasing trend in case of labour-abundant countries.

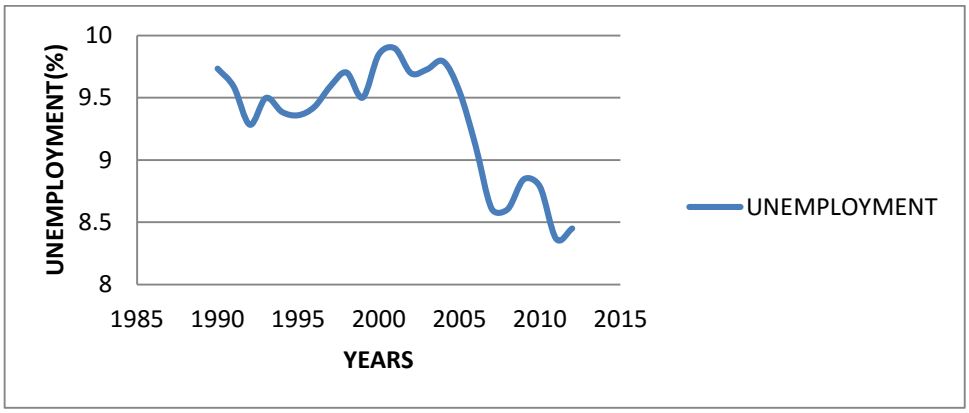

Figure 4: Trends of Unemployment in Labour-abundant Countries

Figure 4 represents that when labour-abundant countries liberalized their trade the unemployment started to decrease. Hence there is a negative association between trade openness and unemployment.

IV. Theoretical Framework

Trade openness can have an effect on different economic and socio-economic indicators It may have important implications for employment. Unemployment may increase with trade openness in the capital-abundant country. Because of increase in international trade the capital abundant country specializes in capital intensive goods therefore demand for capital relative to labour increases and demand for labour goes down which results in increase in unemployment. While in labour abundant counties the situation is reversed. In a labour-abundant country, unemployment may decrease with trade openness. As labour abundant country specializes the production of labour intensive good, the demand for labour increases which may result in the increase in wage of labour and decrease in unemployment. The actual impact of trade openness on unemployment depends upon a country's relative factor endowment.

Some other variables such as inflation, GDP growth rate, population growth rate and quality of institutions may also affect unemployment. The impact of these variables on unemployment has been reported by various studies. Phillips curve (Phillips, 1958) reports the negative association between inflation and unemployment.

Moreover, the positive relationship of inflation and unemployment has also been documented by some studies [Cooley and Hansen (1989); Mortensen and Pissarides (1994); Shi (1997); Beyer and Farmer (2007); Kumar (2008) and Berentsen et al. (2008)]. Economic growth may also be helpful to bring down unemployment [Oladeji (1994); Rama (1998) and Stephen (2012)]. Population growth rate is positively related by unemployment. Hollister and Goldstein (1994) state that if the population growth rate is higher resulted in increase in labour supply and an excess supply of labour force may increase unemployment. However, in those countries where population is low the results may be different. The quality of institutions may affect unemployment. Here, the role of institution is very important. The quality of institutions may also be helpful to enhance economic growth which, in turn, may help in reducing unemployment from a country [McDonald and Yao (2003) and Baker et al. (2004)].

For studying the effect of trade openness on unemployment the following model is being used.

$$UN_{it} = f(TO_{it}, INF_{it}, GR_{it}, POP_{it}, IQ_{it})$$

where,

UN_{it} = Unemployment rate for country i at time t measured as unemployed labour % of total labour force

TO_{it} = Trade openness for country i at time t measured as the sum of imports and export as a share of GDP

INF_{it} = Inflation rate for country i at time t measured as Consumer prices Index

GR_{it} = Growth rate of GDP for country i at time t

POP_{it} = Population Growth Rate for country i at time t

IQ_{it} = Institutional quality as measured by an index of Political Rights for country i at time t

In our analysis, unemployment rate has been used as dependent variable whereas trade openness is independent variable. Inflation rate, GDP growth rate, population growth rate and institutional quality have been taken as control variables. The annual data for 119 countries of the world for the period of 1990 to 2012 has been used. Due to non-availability of data, rest of the countries were excluded. Data for all variables is from World Development Indicators (WDI) except the data of institutional quality which is taken from Freedom House database.

IV.I. Panel Unit Root Tests

The first step in the procedure of estimation is to find whether the variables are stationary or non-stationary. Most of the economic variables are non-stationary in nature and estimations give misleading results. The relationship among variables has no significance in case of unit root problem. In the case of non-stationary data, the Mean, variance and Co-variance are time variant and provide ambiguous and spurious findings. To resolve this issue, transformation is made from non-stationary to stationary by taking differences. The unit root test provides procedure to check the presence or absence of stationarity in the data. The fundamental principle of panel unit root test is to integrate the effect of time series and cross section aspect to quantify asymptotic behavior.

IV.II. Im, Pesaran and Shin (IPS) Test

Im et al. (2003) gives a modified version of LLC test with a heterogeneous unit root among the cross sections of a panel. The equation of IPS is as follows:

$$\Delta Y_{it} = \beta_i + \rho Y_{it-1} + \sum_{k=1}^{n} \eta_{ik} \Delta Y_{it-k} + \lambda_{it} + \sigma_i + u_{it} \qquad (1)$$

With a hypothesis of:

H_0: $\rho_i = 0$ for each cross section

H_1: $\rho < 0$

Null hypothesis is of a unit root problem in all cross sections with an alternative hypothesis of stationarity. IPS test generates its own t-statistic in the following way:

$$T_{\bar{t}} = \frac{\sqrt{N}\{\bar{t}_{NT} - E(t_T|\rho_i = 1)\}}{\sqrt{Var(t_T|\rho_i = 0)}} \Longrightarrow N(0,1) \quad (2)$$

where

$$\bar{t}_{NT} = (1/N)\sum_{i=1}^{N} t_{iT}$$

$\bar{t}_{NT}$ is average of ADF *t*-statistics for each individuals. The absolute value of $\bar{t}_{NT}$ should be greater than tabulated value to reject the null hypothesis.

IV.III. Mean Group (MG) and Pooled Mean Group (PMG) Estimation

There are number of panel estimators used in econometrics. According to the literature mean group and pooled mean group are going to be used in various recent empirical works. Mean Group and Pooled Mean Group estimators give best existing conciliation for consistency and efficiency.

IV.IV. Mean Group (MG) Estimator

Mean group (MG) is used as an estimator of mean in a panel for different estimates of all groups. The persistent estimates of the mean parameter can be determined through MG estimator (Pesaran and Smith, 1995). MG estimator provides proficient findings for a large sample size (Pirotte 1999). The coefficient distribution across group is examined after the equation estimation of each cross-section. The average estimate called MG is the fundamental concern.

The consistence estimates of the average of parameters can be provided through Mean group estimators. In this process slops and intercepts both are permitted to change across countries. Possible homogeneity between groups is not considered. From mean of the long run parameters it determined the panel long run parameter. The Auto-regressive distributed lag (ARDL) model will be of following form:

$$Y_{it} = \alpha_i + \rho_i Y_{i,t-1} + \beta_{0i} X_{it} + \beta_{1i} X_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

For country *i*, where *i*=1,2,…., N.

When T is small, for N and T MG estimators have adequately large asymptotic normal distribution. The biased dynamic panel data model can lead to ambiguous estimations.

In a nut-shel, for every country MG estimator measures a separate equation by permitting heterogeneity of coefficients, slops and intercepts. Short run parameters and the mean of error correction coefficient are measured as unweighted average of individual coefficient in MG estimators. MG estimator also allow for homogeneity of long run coefficients over a single subset of countries and regressors. Hauseman or likelihood ratio test can be applied to test the comprehensive fitness of MG and PMG estimations. These tests are depending on the consistency and efficiency of the estimators.

IV.V. Pooled Mean Group (PMG) Estimator

Pooled Mean Group (PMG) is intermediatery method between Mean Estimators and Traditional Estimators. It engages average and pooling as well. It is originated on the ARDL (auto-regressive distributed lag) approach that is used for cointigration analysis. Primarily, Pesaran and Smith (1997) offered and then explained by Pesaran et al. (1997, 1999).

In PMG estimator error variances, intercepts and the speed of adjustment (short-run) coefficients are permit to change freely across the groups. While coefficients are forced to be the same across countries in long run. It reveals a low degree of heterogeneity. In short run error variance and coefficient it permits for heterogeneity but enforce homogeneity for long run coefficients. Dynamic changes are more important with PMG estimators between short run and long run. The null hypothesis that PMG estimator is consistent and efficient which show that long run coefficients are homogeneous.

Followings are some basic assumptions of The PMG estimator (Pesaran et al., 1999).

Firstly in ARDL model the error terms are serially uncorrelated and are indistinguishable independently distributed (*iid*) having mean value of zero and variance is constant. The explanatory variable can be taken as exogenous. Secondly, ARDL model roots are steady and fall outside the unit circle. This assumption makes

sure that there exists long run relationship between variables. Thirdly, across the countries long run parameters remain the same.

The ARDL model proposed by Pesaran et al. (1999) can be expressed as follows:

$$Y_{it} = \alpha_i + \lambda_i Y_{i,t-1} + \beta_{0i} X_{it} + \beta_{1i} X_{i,t-1} + \varepsilon_{it} \quad (4)$$

And the error correction framework representation can be expressed in equation form as:

$$Y_{it} = \alpha_i + \lambda_i Y_{i,t-1} + Y_{i,t-1} - Y_{i,t-1} + \beta_{0i} X_{it} + \beta_{1i} X_{i,t-1} + \beta_{0i} X_{i,t-1} - \beta_{0i} X_{i,t-1} + \varepsilon_{it} \quad (5)$$

$$Y_{it} - Y_{i,t-1} = \alpha_i + \lambda_i Y_{i,t-1} - Y_{i,t-1} + \beta_{0i} X_{it} + \beta_{1i} X_{i,t-1} - (\beta_{0i} X_{i,t-1} - \beta_{0i} X_{i,t-1}) + \varepsilon_{it} \quad (6)$$

$$\Delta Y_{it} = \alpha_i - (1 - \lambda_i) Y_{i,t-1} + (\beta_{0i} + \beta_{1i}) X_{i,t-1} - \beta_{0i} \Delta X_{it} + \varepsilon_{it} \quad (7)$$

$$\Delta Y_{it} = \alpha_i - \phi_i Y_{i,t-1} + (\beta_{0i} + \beta_{1i}) X_{i,t-1} - \beta_{0i} \Delta X_{it} + \varepsilon_{it} \quad (8)$$

$$\Delta Y_{it} = \alpha_i - \phi_i (Y_{i,t-1} - \theta_i X_{i,t-1}) - \beta_{0i} \Delta X_{it} + \varepsilon_{it} \quad (9)$$

$\phi_i = 1 - \lambda$ is a speed of convergence. $\theta_i = \beta_{0i} + \beta_{1i}/\phi_i$ and β_{0i} show long run and short run relationships. $\underline{\phi_i}$ is error correction term and also ensures the cointegration in the model.

IV.VI. Hausman Test

To capture the difference between homogeneity and heterogeneity Hausman test is used. Given restrictions are true; PMG estimators limits the long run elasticities to be equal across all panels and this may give consistent and efficient estimates across countries. If the model is heterogeneous, then MG estimates are consistent in either case, however, PMG estimates are inconsistent. The null and alternative hypotheses of Hausman test are given as:

H_0: Estimator PMG is efficient and consistent, but MG is not efficient.
H_1: Estimator PMG is inconsistent, but estimator MG is consistent.

Following are the test statistics for the Hausman test:

$$H = (\hat{\theta}_{MG} - \hat{\theta}_{PMG})' \psi^{-1} (\hat{\theta}_{MG} - \hat{\theta}_{PMG})$$

$$\hat{\psi} = v(\theta_{MG}) - v(\theta_{PMG})$$

H-statistics follow chi-square distribution

$$H \geq x^2{}_k$$

where, *k* is the degree of freedom and it is also the dimension of *θ.*

V. Empirical Results

This chapter presents the empirical results of our analysis. The results of unit root test proposed by Im et al. (1999) have been reported to check the order of integration in the variables. Secondly, MG and PMG estimators will be discussed to check the long run and short run relationships among the variables of interest in the labour-abundant and capital-abundant countries.

Table 1
Unit Root Test for Labour-abundant Country's Panel

Variables	At level		At 1st difference	
	With Intercept	With intercept and trend	With Intercept	With intercept and trend
UN_{it}	-1.141(0.112)	-1.142(0.125)	-21.931(0.00)	-17.4824(0.0000)
TO_{it}	-1.2982(0.097)	-2.62544(0.0043)	-22.969(0.000)	-19.0438(0.0000)
INF_{it}	-15.199(0.000)	-11.6056(0.0000)	-30.017(0.000)	-25.581(0.0000)
GR_{it}	-11.217(0.000)	-9.19477(0.0000)	-31.665(0.000)	-26.8327(0.0000)
POP_{it}	-23.550(0.000)	-34.4837(0.0000)	-32.855(0.000)	-38.2822(0.0000)
IQ_{it}	-6.562(0.000)	-5.565(0.0000)	-18.038(0.000)	-14.68(0.000)

The table 1 shows the results of IPS unit root test for the panel of labour-abundant countries. The null hypothesis of IPS test is the series is non-stationary. The results show that unemployment remains non-stationary at its level but becomes stationary at its first difference. The rest of variables are stationary both at their level and first difference. The results indicates the mix order of integration i.e. I(0)for unemployment and I(1) for rest of variables; inflation rate, GDP growth rate, population growth rate and political rights.

Table 2
Unit Root Test for Capital-abundant Country's Panel

Variables	At level		At 1st difference	
	With Intercept	With intercept and trend	With intercept	With intercept and trend
UN_{it}	-0.9215(0.237)	-1.26775(0.1024)	-12.613(0.000)	-9.6136(0.0000)
TO_{it}	-2.0101(0.022)	-6.39482(0.0000)	-16.724(0.000)	-12.756(0.0000)
INF_{it}	-11.86(0.00)	-7.31335(0.0000)	-20.998(0.000)	-18.2525(0.0000)
GR_{it}	-11.040(0.000)	-8.58696(0.0000)	-22.361(0.000)	-18.6647(0.0000)
POP_{it}	-5.2983(0.000)	-7.93429(0.0000)	-17.500(0.000)	-15.7847(0.0000)
IQ_{it}	-1.9E+1(0.00)	-1.7E+14(0.0000)	-8.6998(0.000)	-7.80341(0.0000)

The table 2 shows the results of IPS unit root test for the panel of capital-abundant countries. The results have same conclusion about the variables as in the labour-abundant countries. The results show that unemployment remains non-stationary at its level but becomes stationary at its first difference. The rest of variables are stationary both at their level and first difference. The results indicates the mix order of integration i.e. I(0) for unemployment and I(1) for rest of variables; inflation rate, GDP growth rate, population growth rate and political rights.

Table 3
PMG Results for Labour-abundant Panel
Dependent Variable UN_{it}

Variables	Coefficient	Std. Err.	z-value	P>|z|
TO_{it}	-0.0045546	0.0011321	-4.02	0.000
INF_{it}	-0.0014111	0.0005482	-2.57	0.010
GR_{it}	-0.0728656	0.0055574	-13.11	0.000
POP_{it}	0.385859	0.0511266	7.55	0.000
IQ_{it}	-0.1577466	0.0271822	-5.8	0.000
Short Run Results				
ECM	-.345963	.0387624	-8.93	0.000
dTO_{it}	-.0082792	.0058133	-1.42	0.154
$dINF_{it}$	.0054298	.0192084	0.28	0.777
dGR_{it}	.0105258	.0115151	0.91	0.361
$dPOP_{it}$	.213818	1.544243	0.14	0.890
dIQ_{it}	-.0582104	.1008494	-0.58	0.564
Intercept	3.001274	.3953818	7.59	0.000
Hausman Test 1.098 (0.873)				

The table 3 shows the results of PMG estimators for long run and short run. The study estimates the MG and PMG estimators and run the Hausman test to check the efficiency of estimates. The Hausman test statistic is very low and probability value is very high to conclude that PMG estimates are efficient. The results of PMG show that the coefficient of trade openness is significant and has negative sign that means trade openness has a negatively impact on unemployment in long run [Celin et al. (2014); Hassan et al. (2011); Felbermayr et al. (2011) and Mumtuz (1996)]. According to H-O theory unemployment is inversely affected due to increase in international trade in labour abundant countries in long run. According to results of the coefficient of inflation is significant at 1% level and has negative impact on unemployment. As Phillips curve shows that if we want to reduce unemployment we have to restore the inflation. This shows that inflation and unemployment are inversely related to each other. The negative sign of its coefficient shows an inverse relationship between inflation and unemployment. The coefficient of GDP growth rate is significant and its impact on unemployment is negative. While coefficient of population growth rate has positive and significant sign which means population growth rate is positively impacting the unemployment. The coefficient of Political rights is significant and has a negative impact that means an inverse relationship between political rights and unemployment. For the short run results, the coefficient of error correction term is negative and highly significant. It shows the existence of short run relationship in the model and also the speed of adjustment 35.6% in a year from short run disequilibrium to long run equilibrium.

Table 4
PMG Results for Capital-abundant Panel
Dependent Variable UN_{it}

Variables	Coefficient	Std. Err.	z-value	P>|z|
TO_{it}	0.009878	0.0038171	2.59	0.010
INF_{it}	-0.14708	0.0302316	-4.87	0.000
GR_{it}	-0.0912	0.0153	-5.97	0.000
POP_{it}	0.935736	0.2018981	4.63	0.000
IQ_{it}	-0.04835	0.1925784	-0.25	0.802
Short Run Results				
ECM	-.1941774	.034415	-5.64	0.000
dTO_{it}	.0313751	.0129369	2.43	0.015
$dINF_{it}$	-.0772099	.0285851	-2.70	0.007
dGR_{it}	-.0437654	.0170287	-2.57	0.010
$dPOP_{it}$	-1.337155	.6593613	-2.03	0.043
dIQ_{it}	-.2266492	.155958	-1.45	0.146
Intercept	2.383632	.422469	5.64	0.000
Hausman Statistic 1.987 (0.452)				

Table 4 shows results of PMG in case of capital-abundant countries' panel. The Hausman test statistic is very low and probability value is high enough to conclude that PMG estimates are efficient to interpret and estimates of PMG are given in the table. The coefficient of trade openness is significant at 1% level of significance and is positive. It means that trade openness has positive impact on unemployment in case of capital abundant countries in long run [Kim (2011); Helpman and Itskhoki (2010) and Baldwin (1996)]. As H-O theory tells that unemployment increases along increase in international trade in case of capital abundant counties in long run. With The coefficient of Inflation rate is significant and negatively related to unemployment. While the coefficient of GDP growth rate has negative and significant sign. Therefore, there is an inverse relationship found between unemployment and GDP growth rate. The coefficient of Population growth rate is significant and its impact on unemployment is positive. The coefficient of Political rights remains insignificant.

In the table, the coefficient of error correction term is negative and significant. It shows a short run relationship in the model and also a speed of adjustment from short run disequilibrium to long run equilibrium at 19.41% in a year. The coefficient of trade openness is positive and significant at 5% level of significance in short run. Therefore, trade openness has a positive impact on unemployment in short run in case of capital abundant countries. While the coefficient of inflation rate is significant at 1% level and has a negative sign. If inflation increases unemployment decreases in short run. The coefficient of GDP growth rate is negative and significant at 5% level. This explains that GDP growth rate and unemployment move in the opposite direction in short run. The coefficient of Population growth rate is negative and significant at 5% level. Population growth rate and unemployment are negatively related in capital abundant countries in short run. The coefficient of political rights is insignificant.

VI. Conclusions and Policy Recommendations

The study explores the impact of trade openness on unemployment in case capital-abundant and labour-abundant countries. Inflation rate, economic growth, population growth and political rights have been used as control variables. For this purpose, the study used the data sample of 1990-2012 for 75 labour-abundant countries and 44 capital-abundant countries. Further, IPS panel unit root test is used to ensure the normality and stationarity of the variables of interest and Mean Group and Pooled Mean Group heterogeneous panel cointegration techniques have been used to ensure the long run relationships in the models and to find the long run and short run parameters.

The results of unit root test show that all variables are stationary at their level except unemployment in case of labour-abundant and capital-abundant countries. The cointegration has been also found in case of labour-abundant and capital-abundant unemployment models. From the Huasman test, the coefficients of pooled mean group have been found more efficient and reliable for the analysis. In case of labour-abundant model in the long run, trade openness has a significantly negative impact on unemployment. The inflation rate also has negative and significant impact on unemployment. Further, institutional quality is also having negative and significantly impact the unemployment in the labour-abundant countries. On the other hand, population growth is positively and significantly contributing the unemployment. In the short run, these all variables have the insignificant impact on unemployment.

The coefficient of trade openness is significant at 1% level of significance and is positive. It means that trade openness has positive impact on unemployment in case of capital abundant countries in long run. As Ohlin theory tells that unemployment increases along increase in trade openness in case of capital-abundant counties in long run. With The coefficient of Inflation rate is significant and negatively related to unemployment. While the coefficient of GDP growth rate has negative and significant sign. Therefore, there is an inverse relationship found between unemployment and GDP growth rate. The coefficient of Population growth rate is significant and its impact on unemployment is positive. The coefficient of Political rights remains insignificant.

In the table, the coefficient of error correction term is negative and significant. It shows a short run relationship in the model and also a speed of adjustment from short run disequilibrium to long run equilibrium at 19.41% in a year. The coefficient of trade openness is positive and significant at 5% level of significance in short run. Therefore, trade openness has a positive impact on unemployment in short run in case of capital abundant countries. While the coefficient of inflation rate is significant at 1% level and has a negative sign. If inflation increases unemployment decreases in short run. The coefficient of GDP growth rate is negative and significant at 5% level. This explains that GDP growth rate and unemployment move in the opposite direction in short run. The coefficient of Population growth rate is negative and significant at 5% level. Population growth rate and unemployment are negatively related in capital abundant countries in short run. The coefficient of institutional quality is insignificant.

We have empirically investigated the relationship between trade openness and unemployment. Our empirical results indicate that inflation has negative and significant impact on unemployment in both labour-abundant as well as in capital abundant countries. It means that policies to reduce inflation may increase unemployment. The results proved that an economy has to face a tradeoff between inflation and unemployment. Therefore, policy makers need to make a rational and wise choice about the combination of inflation and unemployment.

Population growth has positive and significant impact on unemployment. Rapid increase in population may result in excess supply of labour as compared to demand would result in unemployment. The policies designed to control population may be helpful in reducing unemployment. Economic growth shows negative and significant relationship with unemployment. Policies aimed to increase economic growth may be reducing unemployment. Policy makers should do the needful to promote economic growth. The creation of an environment conducive for economic growth can be helpful to reduce unemployment.

The association of trade openness and unemployment is different for capital and labour-abundant countries. In case of labour-abundant countries trade openness has negative and significant impact on unemployment (Celin et al., 2014; Hassan et al., 2011; Felbermayr et al., 2011 and Mumtuz, 1996). In real world, developing countries which are generally labour-abundant hesitate to involve in free trade agreements by fearing that cost of such agreements for their economies may exceed the benefits. Our results indicate that developing countries can engage in free trade without having any fear of reducing in employment opportunities. On the other hand trade openness has positive and significant effect on unemployment for capital-abundant countries [Kim

(2011); Helpman and Itskhoki (2010) and Baldwin (1996)]. However, these results need to be interpreted with caution. The economic implication of trade openness may be of various dimensions. Trade openness can affect different economic indicators in different ways. Even its effects for unemployment may be somewhat complex. Trade openness may not affect the employment opportunities for skilled and unskilled labour in the same way. Therefore an in-depth analysis regarding the economic and social effects of trade openness is required before the formulation of policies.

References

Awokuse, T.O. (2008). Trade Openness and Economic Growth: is Growth Export-led or Import-led? *Applied Economics*, 40(2), 161-173.

Baker, D., Glyn, A., Howell, D. and Schmitt, J. (2004). *Unemployment and Labour Market Institutions: The Failure of the Empirical Case of Deregulation*. Working Paper No. 43, Policy Integration Department Statistical Development and Analysis Unit, International Labour Office, Geneva, Switzerland.

Baldwin, R.E. (1995). *The Effects of Trade and Foreign Direct Investment on Employment and Relative Wages*. NBER Working Paper No. 5037, The National Bureau of Economic Research, Cambridge, USA.

Berentsen, A., Menzio, G. and Wright, R. (2008). *Inflation and Unemployment in the Long Run*. NBER Working Paper No. 13924, The National Bureau of Economic Research, Cambridge, USA.

Beyer, A. and Farmer, R.E. (2007). Natural Rate Doubts. *Journal of Economic Dynamics and Control*, 31(3), 797-825.

Céline, C., Marco, F., Marcelo, O.L. and Frédéric, R.N. (2014). *Trade in Unemployment*, Research Study Series No. 64, United Nations Conference on Trade and Development, Geneva, Switzerland.

Chinembiri, E. (2010). *An Empirical Assessment of the Impact of Trade Liberalization on Employment in South Africa*. A Paper for Trade and Industrial Policy Studies, Trade & Industrial Policy Strategies (TIPS), Pretoria, South Africa.

Cooley, T.F. and Hansen, G.D. (1989). The Inflation Tax in a Real Business Cycle Model. *American Economic Review*, 79(4), 733-48.

Dutt, P., Mitra, D. and Ranjan, P. (2009). International Trade and Unemployment: Theory and Cross-national Evidence. *Journal of International Economics*, 78(1), 32-44.

Fedderke, J., Shin, Y. and Vaze, P. (2000). *Trade and Labour Usage: An Examination of the South African Manufacturing Industry*. Discussion Paper Series Number 33, School of Economics, University of Edinburgh, Edinburgh, UK.

Felbermayr, G., Prat, J. and Schmerer, H.J. (2011). Trade and Unemployment: What do the Data Say? *European Economic Review*, 55(6), 741-758.

Felbermayr, G., Prat, J. and Schmerer, H.J. (2011). Globalization and Labour Market Outcomes: Wage Bargaining, Search Frictions, and Firm Heterogeneity. *Journal of Economic Theory*, 146(1), 39-73.

Gozgor, G. (2014). The Impact of Trade Openness on the Unemployment Rate in G7 Countries. *The Journal of International Trade and Economic Development*, 23(7), 1018-1037.

Greenaway, D., Hine, R.C. and Wright, P. (1999).An Empirical Assessment of the Impact of Trade on Employment in the United Kingdom. *European Journal of Political Economy*, 15(3), 485-500.

Groizard, J.L., Ranjan, P. and Rodríguez-López, J.A. (2011). *Offshoring and Job Flows*, Mimeo, UC-Irvine.

Hasan, R., Mitra, D., Ranjan, P. and Ahsan, R.N. (2012). Trade Liberalization and Unemployment: Theory and Evidence from India. *Journal of Development Economics*, 97(2), 269-280.

Ohlin, B.G. (1933). *Interregional and International Trade*, Harvard University Press, Cambridge.

Helpman, E. and Itskhoki, O. (2010). Labour Market Rigidities, Trade and Unemployment. *The Review of Economic Studies*, 77(3), 1100-1137.

Holister, R. and Goldstein, M. (1994). Reforming Labour Markets in the Near East. International Center for Economic Growth, New York.

Im, K.S., Pesaran, M.H. and Shin, Y. (2003). Testing for Unit Roots in Heterogeneous Panels. *Journal of Econometrics*, 115(1), 53-74.

Janiak, A. (2006). *Does Trade Liberalization Lead to Unemployment? Theory and Some Evidence*. UniversiteLibre de Bruxelles, Mimeo.

Kien, T.N. and Heo, Y. (2009). Impacts of Trade Liberalization on Employment in Vietnam: a System Generalized Method of Moments Estimation. *The Developing Economies*, 47(1), 81-103.

Kim, J. (2010). *The Effects of Trade on Unemployment: Evidence from 20 OECD Countries*. Research Papers in Economics No. 19: Department of Economics, Stockholm University, Stockholm, Sweden.

Kumar, A. (2008). *Labour Markets, Unemployment and Optimal Inflation*. University of Victoria, Mimeo.

Landesmann, M., Leitner, S. and Stehrer, R. (2001). *Trade Liberalization and Labour Markets: Perspective from OECD Economies*. WIIW Paper No. 20, The Vienna Institute for International Economic Studies, Vienna Austria.

Makioka, R. (2011). *Trade, Unemployment, and Reallocation with Search Frictions*. Hitotsubashi University, Mimeo.

McDonald, C. and Yao, J. (2003). *Mauritius: Unemployment and the Role of Institutions.* IMF Working Paper No. 03/211, International Monetary Fund, Washington, USA.

Messerlin, P.A. (1995). *The Impact of Trade and Foreign Direct Investment on Labour Markets: The French case*. OECD Jobs Study Working Paper No. 9, Organization for Economic Cooperation and Development, Paris.

Moore, M.P. and Ranjan, P. (2005). Globalization vs. Skill-Biased Technological Change: Implications for Unemployment and Wage Inequality. *The Economic Journal*, 115(503), 391-422.

Mortensen, D.T. and Pissarides, C.A. (1994). Job Creation and Job Destruction in the Theory of Unemployment. *Review of Economic Studies*, 61(3), 397-415.

Matusz, S.J. (1996). International Trade, the Division of Labour, and Unemployment. *International Economic Review*, 37(1), 71-83.

Oladeji, S.I. (1994). Absorption of Educated Manpower into Nigeria's Informal Sector. *Diagnostic Studies Series 1, NMB, Lagos.*

Pesaran, M.H. and Smith, R. (1995). Estimating Long-Run Relationships from Dynamic Heterogenous Panels. *Journal of Econometrics*, 68(1), 79-113.

Pesaran, M.H., Shin, Y. and Smith, R. (1997). *Pooled Estimation of Long-Run Relationships in Dynamic Heterogeneous Panels*. Cambridge Working Papers in Economics No. 9721, University of Cambridge, Cambridge, England.

Pesaran, M.H., Shin, Y. and Smith, R. (1999). Pooled Mean Group Estimation of Dynamic Heterogeneous Panels. *Journal of the American Statistical Association*, 94(446), 621-634.

Phillips, A.W. (1958). The Relationship between Unemployment and the Rate of Change of Money Wages in the United Kingdom 1861-1957. *Economica*, 25(100), 283-299.

Rama, M. (1998). How bad is Unemployment in Tunisia? Assessing Labour Market, Efficiency in a Developing Country. *Research Observer*, 13(1), 59-78.

Ranjan, P. (2012). Trade Liberalization, Unemployment, and Inequality with Endogenous Job Destruction. *International Review of Economics and Finance*, 23(1), 16-29.

Salvatore, D. (2011). *International Economics: Trade and Finance*, John Wiley & Sons, New York, USA.

Shi, S.A. (1997). Divisible Search Model of Fiat Money. *Econometrica*, 65(1), 75-102.

Stephen, B.A. (2012). Stabilization Policy, Unemployment Crises and Economic Growth in Nigeria. *Universal Journal of Management and Social Sciences*, 2(4), 55-63.

Yanikkaya, H. (2003). Trade Openness and Economic Growth: A Cross-country Empirical Investigation. *Journal of Development Economics*, 72(1), 57-89.

Yeboah, O.A., Naanwaab, C., Saleem, S. and Akuffo, A.S. (2012). Effects of Trade Openness on Economic Growth: The Case of African countries. Paper presented in *Annual Meeting of Southern Agricultural Economics Association*, held in February 4-7, 2012, Southern Agricultural Economics Association, Birmingham, UK.

Zaki, C. (2011). On Trade, Employment and Gender: Evidence from Egypt. Paper Presented in the *3rd ICITE Regional Conference on African Perspectives on Trade and Labour Market Adjustment, Employment and Gender, and Labour Market Dynamics*, African Development Bank and Organization for Economic Co-operation and Development, Tunis, Tunisia