

The Effects of Structural Transformations in Economy on Labor Markets: the Case of OECD Countries*

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Abstract

In this study the effects of the structural transformation in economy of OECD countries on the labor markets are analyzed by using the panel data models. Findings indicate that there are significant effects of structural transformations in economy on labor markets as the increasing labor productivity has negative effect on the employment in economy. Another finding is that the increase in the labor productivity and specialization affects the long term unemployment rate in the direction of increase.

Keywords: Structural transformation, labor market, OECD countries

1. Introduction

The changes in the structure of world economy led to domination of the belief that the market dynamics shall contribute automatically to the productivity and growth with the role of “invisible hand”. Thus, while the conditions brought by the liberty provide the transition of the resources into productive areas, consisted optimal resource distribution shall constitute the appropriate conditions for productivity and growth.

The possibility of the developed or developing whole economies to have a growth process with the effect of the globalization fact depended on some dynamics. Within the context of provision of the sustainability, it is observed that the structural transformation in economies came into prominence, the sources moved from less productive areas to more productive areas and inner sector productivity increased. There is a significant contribution of the transformations in global scale in world economy in the realization of the structural transformation as a popular concept.

In this study, it is aimed to evaluate the effects of the structural transformations on labor markets within the context of economic indicators. Within this context, the effecting mechanisms of the structural transformations on labor markets was explained, related literature summary was given and after the definition of the data and methods used in the analysis, findings were presented.

2. The Effects of Structural Transformations on Labor Markets

The development of an economy is characterized with the changes occurred in the structure of economic activities. In this period, some sectors increase more rapidly than others due to characteristic changes. These complicated changes include the compound effects of factors such as changes in demand patterns; emerge of opportunities such as discovery of new products and processes, substitutability of technical developments and factors between sectors, changes in functions of the state economy and international competition patterns (George et al., 2005: 1).

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The economic development literature defines the reallocate of the labor realized within time between sectors as the process of the structural transformation. This process becomes true with the systematic decrease in the share of the agricultural sector in employment, the persistent increase in the share of services sector in employment and first increasing and then decreasing in the share of the industrial sector (Duarte & Restuccia, 2010: 134).

The structural change theory examines the transformation of the economic structure of underdeveloped economies from traditional structured based on agriculture into more developed structure which is modern, directed to urbanization and in dimensions of manufacturing industry and services sectors. The theory is based on the Neo-classical wage and resource allocation theories and analyses how this transformation process is realized (Todaro & Smith, 2011: 115). Kuznets (1971) discusses the concept in two phases by considering the structural transformations as traditionalized factors of economic development. According to this, most of the resources are transported into the agricultural sector in the beginning of the development process of economy. In the following levels of the development, the resources are subjected to assignment from agricultural sector into industry and services sectors. According to Kuznets, this forms the first phase of the structural transformation. In the second phase, there is the reassignment of the resources from agricultural and industrial sectors into services sectors. Kuznets (1966) and Maddison (1989) mention the findings that the structural transformation took place in all the developed countries.

Syrquin (1986: 437) indicates that the changes in economic structure are related with the development level systematically. Kuznets (1973: 247) stated that the structural changes after the transition from agriculture to other sectors included the changes; change in the scale of the productive units and changes like the transitions from individual initiatives to non-individual organizational economic units with the changes of the labor in professional status similar to the transition from industry to services sector.

3. Literature Summary

There are several theoretical approaches for the structural transformation fact in the literature. The approaches pertaining to structural transformations are in an interlocking structure with globalization theory (Cerny, 2009: 143).

While the idea that the production and employment structure of economy shall change by economic growth was suggested by Clark (1940: 120), the structural transformation was started to be seen as the source of the growth and recovery by Kuznets (1973: 251) and Chenery & Syrquin (1975). Syrquin (1994: 5) emphasizes the existence of a strong relationship between development level/growth and structural transformation with economic structure. Todaro (1997) and Ray (1998) focus on the contribution of the tendency process of labor which is plenty in traditional sector to the modern sector in which high wage is presented into the growth in income and employment (Sudihartono & Muhyiddin, 2008: 2-3). Dennis and Iscan (2011: 887) remark the negative relationship between the employment share of agricultural sector and real income per capita shall provide the transformation of the labor employed in agricultural sector to a country with high income level as a result of the reallocate between sectors. Structural transformations caused several characteristic changes such as total factor productivity in economy and it is the determinant of GDP elasticity (Moro, 2011: 403).

According to Rogerson (2007: 22), reallocate of the labor between sectors realizes through two channels. These are the income effect that non-homothetic preferences formed and replacement effects that the differential of productivity growth between sectors formed. Therefore, the structural transformations formed by the reallocation of the resources into more productive sectors have increasing effects the total factor productivity. The fact that the transfer of labor does not accompany the expansion of income produced in economy into works where it shall gain more productivity and wage causes the under-development period to continue in an economy (Rada & Arnim, 2012: 264).

Martin and Mitra (2001: 417) determined that there were high level technical developments in agricultural and industrial sectors. Findings indicated that the technical development was faster in agriculture than industry in all the development phases. Yet it is seen that there was a converging situation regarding the relative rapid dispersion of the innovations in the growth ratios of the total factor productivity in agricultural sector. Fagerberg (2000: 403) states that the structural transformation shall have positive effects on the growth of the total productivity as some changes occur in the sectoral composition of labor and condition to increase the employment ratio of the total labor of some industries was provided.

As well as it is accepted that the structural changes have significant effect on the growth in total productivity, it is also seen that the factor merging this effect changes periodically. It is determined that the growth in income, productivity and employment in this first half of the 20th century indicated a strong correlation. In this context, it is determined that the new technologies and in the recent period electronic revolutions expanded the productivity in a significant ratio, nonetheless the employment share of industrial sector did not indicate such an increase (Fagerberg, 2000: 409). Rada and Arnim (2012: 274) determined the increase in labor productivity, as an input of production factor, because an opposite effect on the labor demands.

Dekle and Vandenbroucke (2012: 132) determined the structural transformation period since 1978 in China was affected by the size of the state structure and limitations on labor mobility, except productivity increase and in this period, productivity increase in agricultural sector had the greatest role. Rubery (1978: 24) states that the great changes on the labor market structure cause significant changes on the economic structure. Xie (2011: 2) determined the existence of a cubic relationship between real income per capita and share of labor in national income in the long term economic development period. In the study, it is emphasized that the share of the labor in national income indicates decrease in economy in every development levels in the first phases of the development.

Robinson (1971: 408) reached the result that factor transfer into non-agricultural sectors was highly meaningful and significant in the relatively underdeveloped countries in which there were great structural unbalances in factor markets and there was wide distribution of productivity between sectors. Bowlus (1993: 31) estimates the effect of cyclical fluctuations on wage level by explaining the logarithm of real weekly individual wage with the local and general unemployment ratios.

Rowthorn and Ramaswamy (1999: 28) determined the existence of a strong relationship between the employment share of industrial sector and income per capita in the period of 1963-1994 and at first increasing and then decreasing relationship in the first phases of recovery for 18 industrialized countries. Fan, Zhang and Robinson (2003: 361) suggests that the income of economic activity depends on the labor mobility between sectors by evaluating the contribution of the structural transformations into growth. Imbs and Wacziarg (2003: 84) determined that the reallocate of the resources into three sectors by the composition of the current theories as a result of the interaction of the openness to growth and trade and stated a curve in U shape was acquired in the case of the sectoral intensity was formed in graphics according to the income per capita.

Rowthorn and Coutts (2004: 6) determined a strong and hump shaped relationship between employment of industrial sector and income per capita according to the structural change period between the period of 1962-2002 for 23 countries. Furthermore, it was seen that it had a positive effect on the formation of a stable capital and industrial sector employment of overall trade balance. Estevão and Nargis (2005: 28) suggested the existence of a predicted negative relationship between wages and employment by analyzing a microeconomic balance relation directed to the structural changes in labor market. Dasgupta and Singh (2006: 7) came to the conclusion that the expansion in services sector had a positive effect on the increase in overall productivity in order to explain the structural change with Kaldorian approach in the period of 1990-2000 for 48 countries. Lima and Paredes (2007: 181) suggested the relationship that growth and wages indicated and pointed out that there was a structural change in unemployment by analyzing the dynamics of labor market in Chile. On the other hand, Rogerson (2007: 27) suggested that the differences between the labor markets in USA and Europe were resulted in the development of the services sector.

Robson (2009: 275) determined the structural transformations in the sectoral structures between the regions in England, caused limited effect on the decrease of the inequalities in the labor markets. Caroleo and Pastore (2010: 17) suggested significant determinations directed to the role of the labor in structural transformations.

Jiang (2011: 62) suggested that the contribution of the structural transformation in labor productivity decreased in time and specific factors caused the growth primarily. These are technological developments and capital accumulation. Xie (2011: 7) determined the existence of a strong cubic relationship between labor share and development level for 123 countries and there was a strong cubic relationship from the point of the approach that the economic structure of commodity exporter countries could be different. Gawrycka et al. (2012: 11-12) indicated that the changes in the net value of the fixed capital affected the growth in income more than the changes in the employment from the point of the Cobb-Douglas production function. In the study, it is emphasized that the increase in labor productivity caused decrease in employment.

Mallick (2012: 22) determined that economic factor, labor, infrastructure and financial factor are the main determinants of the private investments in industrial sector in the process of the structural transformation in India. On the other hand, Mehta (2012: 170) emphasized that employment was positively effective and statistically significant in the whole periods in the explanation of the value added in the economy of India.

4. Methodology and Data

In the study, it is aimed to examine the effects of the structural transformations in OECD countries on labor markets. Panel data analysis was used for using the data set based on broad country and time observations for the period of 1990-2012 for OECD member countries. In the data set of the study; Laborsta of International Labor Organization (ILO), OECDStat of Organization for Economic Co-operation and Development (OECD) and World Development Indicators of World Bank (WB) databases were used.

The structural transformation in economy is generally examined by the changes of the employment and share of income in sectors. It is accepted that the most clear and easily measurable characteristic of the structural transformation in economy is the change in the sectoral composition of labor. However, the studies directed to the structural transformation generally suggest that the share of income and the share of employment in the sectors indicate consentaneous changes (Stahl, 2001: 360). In the case that there are effects of structural transformation on the labor markets, in sectoral context; employment, labor productivity, fixed capital stock, value added, labor participation, export, import, real exchange rate and wages come into agenda.

Value added of the sector which is the determinant of the share in national income of the sectors in economy is applied in order to explain the income structure in the intercountry analyses (Temin, 1967: 175). The wage which is paid in return of the value added that the labor creates during the creation of the income in economy is a financial element and also a significant component of the total demand.

Lilien Index (Goschin et al., 2008: 254), which is one of the main factors having a role in the process of reallocate of the sectoral employment for structural transformations in economy and is accepted as the indicator of specialization is used as a significant explanatory variable of the model. This index which is used as a measurement especially for the structural changes in the composition of employment is an indirect indicator for the effecting level of the sectoral change effects to labor demand in the formation of income (Ansari et al., 2013: 1). In this context, Lilien Index (LLN) data was calculated. Moreover, overall employment (EMP), gross domestic product (GDP), labor productivity (LP), long term unemployment ratio (LU_EMP), value added volume in economy (VADD), gross national income per capita (GNI_PC) and wages (WAGE) data were used as variables in the study.

Model form which is examining the effect of the value added in the economy and the change in the overall labor productivity accepted as a proxy of the structural transformation in the economy on the employment is:

$$\begin{aligned} \text{EMP}_{it} &= \alpha + \beta_1 \text{LP}_{it} + \beta_2 \text{VADD} + u_{it} \\ \text{EMP}_{it} &= \alpha + \beta_1 \text{EMP}_{i,t-1} + \beta_2 \text{LP}_{it} + \beta_3 \text{VADD} + u_{it} \end{aligned}$$

The first model examines the effects of the labor productivity and value added variables on employment. It is considered that the dependent variable in the model is affected by the negative way of labor productivity from the explanatory variables and positive way of the created value added. The second model is the dynamic model created by using the delay of the dependent variable.

The model form examining the effects of the structural factors in the economy on the long term unemployment ratio is:

$$\begin{aligned} \text{LU_EMP}_{it} &= \alpha + \sum \beta_1 Z_i + u_{it} \\ \text{LU_EMP}_{it} &= \alpha + \beta_1 \text{LU_EMP}_{i,t-1} + \sum \beta_2 Z_i + u_{it} \end{aligned}$$

The first model examines the the effects of Lilien specialization index, wages, income and labor productivity on the long term unemployment ratio in the economy. It is expected that specialization index and labor productivity affects the dependent variable in positive way in the model and income affects it in negative way. The second model is a dynamic model which is made by using the delay of the dependent variable.

5. Findings

The econometric analysis findings in the study were summarized in stages. Therefore by testing whether the problems such as heteroskedasticity and autocorrelation which are possible to be seen in classical regression models are present in the models used or not, it was avoided to cause biased and less efficient estimators (Baltagi et al., 2008: 70). Moreover second order autocorrelation test was carried out for the error term of the first differences model in dynamic panel models (Baltagi, 2005: 141) and Sargan over identification test was applied (Sargan, 1958: 401) in order to test that instrumental variables are optimal instrumental variables.

The models in Table 1 explain the effects change in the labor productivity accepted as a representative of the structural transformation in economy and the value added created in economy on the employment level. During reaching the results presented in the table, diagnostic controls directed to the fundamental assumptions of the models were carried out and Hausman test ($\chi^2[2] = 174,56$) was used in the estimator selection. In this direction, robust fixed effects estimator model is quite significant in the existence of variance and autocorrelation changing with the Huber-White errors in Model A according to F test. On the other hand, Model B indicates the dynamic analysis results made by using the lag of the dependent variable by benefitting from the Generalized Method of Moments of Arellano and Bond (1991). In this model, EMP_{it-2} which is the 2 period lag of the employment variable as the instrument variable was used as the instrument variable instead of EMP_{it-1} which is between independent variables and which is a lag value of the dependent variable. In the first difference model, ΔLP_{it} was used instead of LP and $\Delta VADD_{it}$ was used instead of VADD.

Table 1: The Effects of Structural Transformation on Employment

	Model A SE	Model B GMM
EMP (lag)		0.5789639*** (0.0317107)
LP	-0.7347587*** (0.1301179)	-0.3847973*** (0.0373849)
VADD	0.9172533*** (0.1123777)	0.4556815*** (0.0339205)
Constant	-13.06458 (2.540278)	-7.066299*** (0.6451046)
N (obs.)	609	551
N (country)	30	30
R ² (within)	0.8432	
F Stat	57.48	
Sargan		358.41

Robust standard errors in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Findings of the models suggest that there is a negative effect of the changes in the labor productivity (LP) in economy on the employment. Moreover, the indication of the lag of the employment variable a significant coefficient in Model B positively and statistically points out that the current employment level affects the employment increase in positive way. The value added created in economy generally is seen to have positive effect on the employment and significant statistically. For Arellano-Bond assumptions given in Model B to be consistent, the model should not indicate second order autocorrelation. Test carried out indicated that there is not such a problem (1. Degree [$z = -2.9254$], 2. Degree [$z = 0.29083$]), therefore the assumptions are consistent.

Models in Table 2 explain the effects of the factors in structural transformation in economy on the long term unemployment rate. During reaching the results presented in the table, diagnostic controls directed to the fundamental assumptions of the models were carried out and Hausman test ($\chi^2[4] = 69,84$) was used in the estimator selection. In this direction, robust fixed effect estimator model is significant in the existence of variance and autocorrelation changing with the Huber-White errors in Model A according to F test. On the other hand, Model B indicates the dynamic analysis results made by using the delay of the dependent variable by benefitting from the Generalized Method of Moments of Arellano and Bond (1991).

In this model, LU_EMP_{it-2} which is the 2 period lag of the employment variable as the instrument variable was used as the instrument variable instead of LU_EMP_{it-1} which is between independent variables and which is a lag value of the dependent variable. In the first difference model, ΔLLN_{it} was used instead of LLN , $\Delta WAGE_{it}$ was used instead of $WAGE$ and ΔGNI_PC_{it} was used instead of GNI_PC .

Table 2: The Effects of Structural Transformation on Unemployment

	Model A SE	Model B GMM
LU_EMP (lag)		0.580483*** (0.0589801)
LLN	0.1353754*** (0.0526506)	0.0728096*** (0.0241765)
WAGE	-0.5898532** (0.2495152)	-0.2299605** (0.1144125)
LP	2.800285*** (0.5535457)	1.365701*** (0.3607554)
GNI_PC	-1.967694*** (0.6126046)	-1.260208*** (0.5298999)
Constant	26.96229*** (4.511502)	14.37556*** (2.578841)
N (obs.)	329	290
N (country)	20	19
R ² (within)	0.2605	
F Stat	7.83	
Sargan		312.05

Robust standard errors in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The findings gained from models can be summarized as follows: The changes (LP) and Lilien index (LLN) in the labor productivity in economy have positive effect on the long term unemployment ratio and significant statistically. The fact that wages in models indicate a negative relationship with long term unemployment meets the theoretical expectations. The fact that wages have negative and statistically significant coefficient justify the relationship between the related variable and independent variable from the point of Phillips curve. The fact that GNI_PC variable is with negative coefficient and significant in both models indicates that increasing income level per capita has negative effect on the long term unemployment ratio. Moreover, the fact that the lag of the dependent variable indicates positive and statistically significant coefficient points out the current unemployment ratio affected the increase of this ratio in positive way. For Arellano-Bond assumptions given in Model B to be consistent, the model should not indicate second order autocorrelation. Test carried out indicated that there is not such a problem (1. Degree [$z = -1.5604$], 2. Degree [$z = 0.13515$]), therefore the assumptions are consistent.

6. Conclusion

The resources in the economy shift from low productive sectors to more productive sectors in the period of the structural transformation. Within this concept, the thesis of Kuznets and its followers brings out that while the share of the agricultural sector in total employment decreases, its share shall increase at first industrial and then services sectors.

In the study, the effects of the structural transformation on the labor markets were analyzed with panel data model. The findings indicate that the changes in the labor productivity have negative effect on employment. Furthermore, it is concluded that the increase in the labor productivity and specialization had a positive effect on the long term unemployment ratio in economy.

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