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Relationships between Employment and Growth from Industrial Perspective by Considering Employment Incentives: The Case of Turkey

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ABSTRACT: By using quarterly data this study applied Toda-Yamamoto (1995) method for the period 1988-2010 to uncover the relationship between growth and employment in aggregate and industrial respects and also to investigate the impacts of investment and employment incentives on employment for Turkish Economy. The findings showed that the relationship between growth and employment varied with the industries. The study covers ten industries and there were causalities detected for four out of ten industries, either one or two ways. For the rest six industries covered in the study, there was no causal relationship obtained. The incentives impacts on employment, similarly, vary with industries. The law numbered as 5084 had positive and statistically significant influences on social service, manufacturing, and transportation and communication industries while the law numbered as 5763 extracted positive and significant influences on energy production and distribution, and financial intermediation industries.

Keywords: Employment incentives; employment growth; economic growth; Toda-Yamamoto granger causality
JEL Classifications: JO8; E24

1. Introduction

With the Globalization, creating productive new employment areas for the growing labor force has become an important issue for many economies. Besides, after the recent Global crisis, there are strong doubts about that unemployment is related to economic growth such that economic growth does not create employment as much as it did before (Barışık et al., 2010 and Demirgil, 2010). Further, between 1996 and 2006, the average of the World Economy grew by 4.1% while employment growth has been 1.6% in the same period (ILO, 2007). Moreover, as the World Economy exhibited strong growth in 2010 and 2011- 5.1% and 4% respectively, the growth in employment was 1.3% in 2010 and the number of unemployed people in 2011 compared to 2007 increased by 27 million (ILO, 2012).

Weakening relationship between economic growth and employment in the World Economy is also valid for Turkey. After unstable expansion and contraction period in 1990s, Turkish Economy had the most serious crisis in 2001. In the following years, it enjoyed a period of sustained economic growth. However, the unemployment rate remained high during this period and despite a more stable growth, the unemployment rate has not returned to one before 2001. Investigating the question of why economic growth impacts employment less today can be valuable for other studies, such as causes of recent crisis, informal employment, productivity increase, increasing international trade etc. But, before that, closer look at the relationship between economic growth and employment would be helpful.

Hence, the purpose of this study is to answer questions if economic growth does not create employment as before, or if jobless growth phenomenon exists, is it true for all industries?, and which industries are more sensitive for the employment incentives? Answers to those questions are important to understand where the change in the relationship between economic growth and employment come from. Moreover, to explore influences of employment incentives on industries guide to design efficient incentive policies. Therefore, this study investigates the dynamic relation between the

economic growth and employment using the seasonal adjusted quarterly data covering the period 1988-2010 for Turkey. To do so, the method, which was developed by Toda-Yamamoto (1995) and improved by Rambaldi and Doran (1996), and Zapata and Rambaldi (1997), is used.

This study's findings showed that the relationship between growth and employment varied within the industries and supported the jobless growth phenomenon: There are only two causalities detected from economic growth to employment. Those are tourism and commerce industry and energy production and distribution industry but the signs for both industries are negative. Namely, the economic growth in those industries reduces employment in them. The incentives impacts on employment, similarly, vary with industries. The law numbered as 5084 had positive and statistically significant influences on social service industry, manufacturing industry, transportation and communication industry, while the law numbered as 5763 extracted positive and significant influences on energy production and distribution industry and financial intermediation industry.

The remainder of this study as follows: Section 2 contains a brief recent literature review on the effects of growth on unemployment and employment, section 3 covers econometric method, section 4 describes data used in this study and this study is finished with a conclusion.

2. Literature Review

Economic growth, increase in investment and production, are expected to increase demand for production factors, such as labor, capital etc. On the other hand, the impact of economic growth on employment is very much related to how much employment is sensitive to change in economic growth. Literature research indicated that there was no study investigating the relationship between employment and economic growth in industrial perspective but literature has numerous studies that have researched the relationship between unemployment and economic growth. Therefore, first, it will be briefly mentioned about available recent literature on economic growth effects on unemployment. The most famous and dominantly used model in those studies for researching the relationship between unemployment and economic growth is called "Okun's Law" due to Okun (1962). Okun (1962) established a relationship between economic growth and unemployment and put forward GDP decrease by 3 percent point as unemployment rate increase 1 percent point over the natural rate of unemployment. Okun's Law has gained wide acceptance in the literature.

For Instance, Freeman (2000) for the US by using national data and regional data covering the period 1959-1998 and 1977-1997 respectively, found that the Okun's Law relationship changed to that 2 percent point decrease in GDP as unemployment rate increase to 1 percent from what Okun (1962) suggested for the US. Moreover, the study by Lee (2000) for 16 OECD countries showed that the trade-off between unemployment rate and economic growth was smaller after 1970s since there were there were structural break in 1970s and the findings differed from country and country. Moosa (1997) also found different trade-off rate for G7 countries, the highest for North America and lowest for Japan. For Australia, however, Sögner (2001) found a stable relationship between unemployment rate and economic growth, and concluded no structural break for Australia due to political and economic policy changes. There look like a changing Okun's Law relationship in quantity from country to country and time to time.

Further, Crespo-Cuaresma (2003) suggested unemployment response to economic growth asymmetrically. Response of unemployment rate to economic growth is more in recession than in expansion period. Silvapulle et al (2004) also provided similar findings support asymmetric response of unemployment rate to economic growth. Further Viren (2001), cross-country study for 20 developed countries, provided evidences for asymmetric behavior. According to Viren (2001), in bad times, the unemployment response is near to zero and at the low employment level; influence of output growth is more. On the other hand, Lee (2000) did not find conclusive evidence on asymmetric behavior for OECD countries. Besides, all those developed economies findings, Moosa (2008) claimed that Okun's Law was not valid for the Algeria, Egypt, Morocco and Tunisia because of labor market structure of those countries, dominated by states.

Moreover, a study conducted for the United States is quite remarkable. According to the study in question, many workers were laid off in 2009 in the US, although the level of production has remained relatively stable. Therefore the relationship between economic growth and unemployment, Okun's Law, was concluded as wounded (Daly and Hobjin, 2010). Besides, in the case of Turkey,

Barışık et al., (2010), by applying Okun's Law over the period 1988-2008, found that economic growth in Turkey did not create employment. In addition, Demirgil (2010), over the period 1989-2007, also found that Okun's Law did not work for Turkey as well. Lastly, over the period 1978-2004, Yılmaz (2005) found that there was no causal relationship between economic growth and unemployment rate and concluded, as a reason, that the growth in Turkey was more capital intensive than labor intensive.

As seen above, the studies which have investigated this negative relationship between economic growth and unemployment rate found various results and most of them are applied to developed countries. In general the studies on unemployment rate and economic growth suggest existence of this type relationship but findings vary countries to countries, time to time and the relationship behaves differently period of expansion and recession. Further, studies also showed that employment or unemployment was not determined by economic growth for Turkey.

The literature is mostly dominated with testing Okun's Law. Yet there are some studies investigating relationship between employment and economic growth. Saget (2000) investigated European countries and obtained mixed results for employment and economic growth over the period 1989-1999: There was no relationship between economic growth and employment for Bulgaria and Ukraine; employment response to economic growth was positive for Hungary, Poland, Czech Republic, Slovakia and Russia; interestingly, growth created small but negative impacts on Romanian employment. Abdullah et al (2011) studied the relationship between macroeconomic variables and employment for Malaysia, Philippines and Singapore over the period 1970-2005. It did not find a causal relationship from economic growth to employment. Yam et al (2002), by using regression analysis, researched impact of economic growth on employment and found that 1 percent point increase in economic growth would increase employment 0.61 percent point over two years period for Singapore. Seyfred (2005) also studied US economy over the period of 1990-2003 and found that effects of economic growth on employment are not long lasting.

Here this study applies to employment growth and economic growth relationship from different perspective and for a developing country, Turkey. Since there is expected to be positive relationship between employment rate and economic growth and this study test is whether this relationship is valid for industrial sense after testing industrial causal relationship between employment growth and economic growth since literature review on both unemployment rate and economic growth and employment and economic growth does not provide conclusive results about issue and the studies has investigated issue in aggregate sense. Looking industrial sense to the issue is thought to reveal more information about the relationship between employment growth and economic growth. Therefore, it is also to provide answer to jobless growth question whether it is spread over economy or a partial phenomenon.

3. Econometrics Method

3.1. Unit Roots

In the beginning of the study, time series properties of all series under the concern of this study are investigated. In this study aggregate employment and aggregate economic growth, and industrial employment growth and income growth data are used quarterly. The study covers the period between 1988 and 2010 and more information for the data set will be provided below. For investigating time series properties of data set, the MZ_α and MZ_t unit root tests developed by Ng and Perron (2001) are used. Those tests are improved version of the Z_α and Z_t developed by Phillips (1987) and Phillips and Perron (1988). In Equation (1), the Augmented Dickey-Fuller (ADF) developed by Dickey and Fuller (1979) and Said and Dickey (1984) is seen and, here, t statistics of β_0 parameters obtained by using Least Squares (LS) Method are unit root test statistics.

$$\Delta y_t = d_t + \beta_0 y_{t-1} + \sum_{j=1}^{k} \beta_j \Delta y_{t-j} + u_{tk}, \qquad t=1,\ldots,T \qquad (1)$$

ADF unit root test tests the null $\beta_0 = 0$ that represents no unit root in y_t series against the alternative $\beta_0 < 0$ that y_t series is stationary. The reason of adding lagged variables of Δy_t to the

Equation (1) is to make parametric correction in order to get rid of autocorrelation problem in error terms. The MZ_α and MZ_t unit root tests are called as M tests and defined as in the Equation (2) and (3).

$$\mathrm{MZ}_\alpha = (T^{-1}y_T^2 - s_{AR}^2)(2T^{-2}\sum_{t=1}^{T} y_{t-1}^2)^{-1} \quad (2)$$

$$\mathrm{MZ}_t = (T^{-1}y_T^2 - s_{AR}^2)(2T^{-2}\sum_{t=1}^{T} y_{t-1}^2)^{-1}(T^{-2}\sum_{t=1}^{T} y_{t-1}^2 / s_{AR}^2)^{1/2} \quad (3)$$

s_{AR}^2 term in the Equation (2) and (3) is obtained as following: First, the Equation (1) is estimated by LS Method, later u_{tk} series is acquired and for u_{tk} series, $u_{t,k} = \alpha u_{t-1,k} + v_t$ is a data generation process such that s_{AR}^2 is autoregressive estimate of v_t's spectral density function at zero frequency. By using LS Method from the Equation (1), Let estimated β_j and u_{tk} be $\hat{\beta}_j$ and $\hat{e}_{tk}$ respectively and from those $\hat{\beta}(1) = \sum_{i=1}^{k}\hat{\beta}_i$ ve $\hat{\sigma}_k^2 = (T-k)^{-1}\sum_{t=k+1}^{T}\hat{e}_{tk}^2$ can be obtained. Thus, s_{AR}^2 defined in the MZ_α and MZ_t, given in the Equation (2) and (3) respectively, is equal to $\hat{\sigma}_k^2 / (1-\hat{\beta}(1))^{1/2}$. This study uses Barlett Kernel as a spectral estimate while the optimal lag length is determined by using the bandwith selection process proposed by Andrews (1991).

3.2. Granger Causality

One of methods very often used for investigating dynamic relationships between variables is Granger Causality proposed by Granger (1969). Formally, if Y_t time series is forecasted better with lagged variables of X_t, X_t is Granger-Cause of Y_t. Likewise, if X_t time series is forecasted better with lagged variables of Y_t, Y_t is Granger-Cause of X_t. Granger (1969) proposed F-test for testing Granger Causality. If Yt and Xt series are not stationary, LS estimate of vector autoregressive (VAR) model founded on non-standard asymptotic analysis invalidates Granger Causality tests. If time series contain unit roots, Sims, Stock and Watson (1990), under the null hypothesis of no-cointegration between time series, showed non-standard distributions. If the no-cointegration null hypothesis is rejected, they said that the asymptotic standard distribution is valid. In addition, Toda and Phillips (1993), when variables are cointegrated, put forward that F-test is not valid since they show that test statistics does not have standard distribution.

If there is a cointegration between variables, test for Causality between variables are more complex because existence of unit root creates various problems in statistical interpretation (see Toda and Phillips (1993) and Dufour and Renault (1998)). In the case of cointegration, it is highly possible to make wrong interpretation about Causality because degree of cointegration of time series and the number of cointegrated vectors between variables are determined wrongly. The alternative tests for the null of Granger non-Causality proposed by Mosconi and Gianini (1992) and Toda and Philips (1993) are not useful in terms of size and power. In testing Granger sense non-Causality, above-mentioned problems can be avoided if Toda-Yamamoto method proposed by Toda and Yamamoto (1995), and improved by Rambaldi and Doran (1996), and Zapata and Rambaldi (1997) is applied. Independent of one another, Giles and Mirza (1999), Toda and Yamamoto (1995), and Dolado and Lütkepohl (1996) to test the null hypothesis of non-Causality in Granger sense propose Wald Test that has asimtotic χ^2 distribution between variables within VAR model that does not consider integration or co-integration properties of variables.

Toda-Yamamoto Granger Causality test is based on estimation of augmented VAR ($p + d_{max}$) model. In this model, p indicates optimal lag length for Y_t and X_t series and d_{max} shows the highest degree of integration for Y_t and X_t series. The null hypothesis of Granger non-Causality is tested by using MWALD (Modified WALD) test. When this VAR model is estimated, it has asymptotic χ^2 distribution. Rambaldi and Doran (1996) expressed that there was an efficiency gain when Seemingly Unrelated Regression was used for estimating VAR ($p+d_{max}$) model to test the null hypothesis of Granger non-Causality. In addition, MWALD test statistic is easy to calculate in the SUR system. If the highest degree of integration for Y_t and/or X_t is d_{max}, then the Granger Causality test can be made within the framework of augmented VAR($p+d_{max}$) model provided in the Equations (4) and (5).

$$Y_t = \alpha_0 + \sum_{k=1}^{p+d_{\max}} \alpha_k Y_{t-k} + \sum_{k=1}^{p+d_{\max}} \beta_k X_{t-k} + \varepsilon_{1,t}, \quad (4)$$

$$X_t = \varphi_0 + \sum_{k=1}^{p+d_{\max}} \varphi_{kt-k} Y_{t-k} + \sum_{k=1}^{p+d_{\max}} \theta_k X_{t-k} + \varepsilon_{2,t}, \quad (5)$$

In VAR(p+$d_{\max}$) model given in the Equations (4) and (5), α_0 and ϕ_0 are constant terms, α_k, β_k, ϕ_k, and θ_k are the parameters associated to lagged variables of Y_t and X_t series, and $\varepsilon_{1,t}$ and $\varepsilon_{2,t}$ are identically and independently distributed error terms with mean 0 and constant variance. By using MWALD test, for $k = 1,...,p$ α_k , coefficients in the Equation (4) are jointly tested whether they are different than zero. If they are jointly found different from 0, then the null hypothesis that X_t series is not a Granger-Cause of Y_t series is rejected. In such instance it is called that X_t is a Granger-Cause of Y_t. Similarly, in the Equation (5) if ϕ_k coefficients are jointly found different from 0, then the null hypothesis that Y_t series is not a Granger-Cause of X_t series is rejected. In such instance, it is called that Y_t is a Granger-Cause of X_t. In addition, if both α_k and ϕ_k coefficients are found to be different than 0, it can interpreted that there is double-sided Granger Causality between Y_t and X_t series.

4. Data and Application

The data for industrial employments and industrial growths for Turkey's Economy are used in the study. Those data are quarterly and covers the period between 1988:Q4 and 2010:Q4. They were obtained from Turkish Statistical Institute (TSI) website. Between 1988 and 1999, the data are available semi-annually, between 2000-2004 they are available quarterly and after 2005 they are available at three different frequencies, which are, monthly, quarterly and yearly. In order to construct quarterly data set for industrial employment, those three different frequencies structure were turned into quarterly data by using Average Observation Method for covering 1988:Q4-2010:Q4 period. The TSI has published quarterly new national income series for Turkey's Economy since 2003 by using 1998 as a base year. First, the industrial growths for the industrial productions (Xs) which were the composition of seasonally-adjusted quarterly Gross Domestic Product (GDP) for which base year was 1987 were calculated by using g_t= (100*(log(X_t/logX_{t-1}) formula for 1987:Q1-2005:Q4 period, where X indicates industrial production and t indicates time. The industrial production series published by the TSI after 2006:Q1 is used backwardly via X_{t-1}=real X_t/(1+g_t) formula for estimating consistent earlier series. Therefore, the methodology followed for the real production series was also used for estimating industrial deflators. The constructed industrial employment, production and deflator series were quarterly and did not contain seasonality. Hence, real industrial production series after de-seasonalizing were divided by corresponding industrial deflators. Then, they were used in above-mentioned calculation

This study contains aggregate production and employment data and industrial production and employment data for electricity, gas, steam, water and sewerage (in short, Energy Production and Distribution) industry, administrative and support service activities (in short, Social Services) industry, construction (Construction) industry, manufacturing (Manufacturing) industry, mining and quarrying (in short, Mining) industry, wholesale, retail trade, accommodation and food service activities (in short, Tourism and Commerce) industry, financial, insurance and real estate activities (in short, Financial Intermediation) industry, agriculture, forestry and fishing (in short, Agriculture) industry, transportation, storage, information and communication (in short, Transportation and Communication) industry.[1]

After investigation for the incentive laws in Turkey, it was seen that there were complex legislations and practices. Therefore among all incentive laws only the incentive laws that were numbered as 5084 and 5763 which were set main framework of today's incentive structure were undertaken by this study for the analyzing period, 1988-2010. In order to study impacts of those incentive laws, the study constructed dummy variables. The law numbered as 5084 covers less

[1] Note: Series names undertaken in this study are named by TSI and series names in the pharantese are renamed by this study.

developed regions in where per capita income is less than USD 1500 and the law numbered as 5763 has national scope but it does not include construction industry. As the dummy variables were constructed, the dates that laws were initiated were considered. The law numbered as 5084 came into force on 01.04.2005 and the law numbered as 5763 came into force on 01.10.2008.[2] Those laws have reduced loads on wage paid by employers. They have sought to increase employment by regulations, such as reducing corporate taxes, providing exemption from taxes on wages, energy assistance and free land, which came into force on different dates. Yet this study's interest is only to evaluate those two laws impacts in the case of decline in wage loads on both industrial and aggregate employments.

The study, first, investigated whether the series were stationary before analyzing dynamic relationships between production and employment. For stationarity, the MZ_α and MZ_t unit root tests developed by Ng and Perron (2001) were applied to the series. The MZ_α and MZ_t unit root tests' results are shown in the Table 1.

Table 1. Ng-Perron Unit Root Test Results

	Level		First-Order Difference	
Series	MZ_α^a	MZ_t^b	MZ_α	MZ_t
Aggregate Employment	0.05	0.03	-34.84*	-4.17*
Energy Production and Distribution	-0.8	-0.37	-42.56*	-4.6*
Social Service	1.26	1.02	-43.01*	-4.64*
Construction	-2.08	-0.75	-42.76*	-4.61*
Manufacturing	1.13	1.47	-40.19*	-4.48*
Mining	-1.37	-0.69	-33.77*	-4.09*
Tourism and Commerce	0.95	1.75	-43.38*	-4.64*
Financial Intermediation	2.95	4	-43.36*	-4.65*
Agriculture	-0.94	-0.49	-37.52*	-4.33*
Transportation and Communication	1.77	1.62	-38.47*	-4.35*
Aggregate Growth	1.03	2.03	-19.36*	-3.06*
Growth in Energy Production and Distribution	0.95	3.57	-12.65**	-2.42**
Growth in Social Service	1.01	2.31	-18.29*	-2.99*
Growth in Construction	0.69	0.6	**-2.82**	**-1.12**
Growth in Manufacturing	-0.98	1.8	-17.76*	-2.92*
Growth in Mining	-0.59	-0.32	-41.12*	-4.53*
Growth in Tourism and Commerce	0.85	1.25	-12.09**	-2.38**
Growth in Financial Intermediation	1.86	5.04	-39.32*	-4.4*
Growth in Agriculture	-2.41	-0.89	-28.83*	-3.78*
Growth in Transportation and Communication	1.07	2.7	-17.02*	-2.87*

Notes: **1.** * and ** indicates statistical significance at 1 and 5 percent significance level respectively.
2. a Test only contains constant term; it is a one-sided test; the critical values for 1, 5 and 10 percent significance level are -13.8, -8.1 and -5.7 respectively.
3.b Test only contains constant term; it is a one-sided test; the critical values for 1, 5 and 10 percent significance level are --2.58, -1.98 and -1.62respectively.

In the second and third columns of the Table 1, the unit roots tests results for the level of the series and in the fourth and fifth columns of the Table 1, the unit roots tests results for the first difference of the series can be seen. By using the first regression model given in the Equation (1) which only contains constant term, the MZ_α unit root test cannot reject the null hypothesis of non-stationarity at 5 percent significance level for all series. Again by using the same regression model, when the MZ_t unit root tests were investigated, the null hypothesis of non-stationarity cannot be rejected at 5 percent significance level for all series as well. The MZ_α and MZ_t unit root tests done for the first-order difference and given in the fourth and fifth columns of the Table 1 rejected the null of non-stationary at 5 percent significance level for all series except for employment in Construction industry. Those findings, except for Construction industry, indicate that there is a first order integration between the employment and growth series for all other data. On the other hand, the

[2] Official Gazette (2004) and Official Gazette (2008)

findings provided in the Table 1 for Construction industry imply that employment and growth is integrated at second order.

Before going to investigate relationships between industrial growths and employments by running VAR models, the optimal lag lengths are uncovered for all series. The VAR models use industrial production and employment data as endogenous variables in bivariate fashion and include the dummy variables for the promoting investment and employment as exogenous variables. As mentioned above, the dummy variables takes value 1 after initiation and 0 otherwise.

In the Table 2, the results for the optimal lag length are seen. By finding optimal lag lengths, eight is chosen as maximum lag length. The Table 2 provides the results for the optimal lag lengths found by using AIC, SBC, LR, FPE and HQ criteria. The purpose of providing more than one result for optimal lag lengths is that VAR models are sensitive to the lag length used in estimation. When LR, FPE and AIC criteria are investigated, findings about the optimal lag lengths are similar to each other. In addition, the similar argument can be made for SBC and HQ. Therefore, regarding optimal lag lengths, this study uses the results obtained from AIC and SBC criteria in order to investigate the relationships between industrial employments and growths.

Table 2. Optimal Lag Length for VAR Models

Series	LR	FPE	AIC	SBC	HQ
Aggregate Employment-Aggregate Economic Growth	5	5	5	2	2
Employment in Energy Production and Distribution – Growth in Energy Production and Distribution	7	8	8	2	7
Employment in Social Service - Growth in Social Service	4	1	1	1	1
Employment in Construction - Growth in Construction	2	3	3	2	2
Employment in Manufacturing - Growth in Manufacturing	5	6	6	2	2
Employment in Mining - Growth in Mining	1	1	1	1	1
Employment in Tourism and Commerce - Growth in Tourism and Commerce	6	8	8	2	6
Employment in Financial Intermediation - Growth in Financial Intermediation	6	6	6	1	3
Employment in Agriculture - Growth in Agriculture	5	5	5	1	1
Employment in Communication and Transportation - Growth in Communication and Transportation	5	5	5	1	1

In doing analysis, this study considered the optimal lag lengths obtained from both AIC and SBC, and integration orders obtained from the unit root tests. Namely, other than the Construction industry, VAR models use one more lag length than an optimal lag length suggested by using AIC and SBC but in the case of the Construction industry, VAR models use two more lag length than optimal lag length obtained by using AIC and SBC because in the Construction industry employment is a first-order series and the growth of it is a second-order series. Toda-Yamamoto Granger Causality test takes the highest integration order of series into consideration, so VAR models optimal lag structures, obtained according to AIC or SBC, were increased by two more lags and VAR models were estimated accordingly. The fourth and fifth columns of the Table 2, respectively, provide the optimal lag lengths obtained according to AIC and SBC.

According to the lag lengths given in the second and third columns of the Table 3, MWALD statistics results are provided in the fourth and fifth columns of the Table 3. The MWALD test results in the fourth column of the Table 3 indicate that the null of that there is no Granger Causality available from employment to economic growth is not rejected at 5 percent significance level for the Social Service, the Construction, the Mining, the Tourism and Commerce, the Agriculture, and the Transportation and Communication industries. On the other hand, for the Energy Production and Distribution, the Manufacturing, and the Financial Intermediation industries, the null of no Granger Causality from employment to economic growth is rejected at 5 percent significance level. In addition, this last point is also true for the Aggregate employment and Aggregate economic growth.

Table 3. Toda-Yamamoto Granger Causality Test Results

Null Hypothesis	AIC	SBC	MWALD test results according to AIC criteria	MWALD test results according to SBC criteria
Aggregate Employment is not a Granger-Cause of Aggregate Economic Growth.	6	3	14.95** (+) [0.011]	0.58 (-) (0.748)
Aggregate Economic Growth is not a Granger-Cause of Aggregate Economic Employment.	6	3	3.12 (+) [0.682]	4.07 (+) (0.131)
Employment in Energy Production and Distribution is not a Granger-Cause of Growth in Energy Production and Distribution.	9	3	35.29*** (+) (0.000)	0.35 (+) (0.555)
Growth in Energy Production and Distribution is not a Granger-Cause of Employment in Energy Production and Distribution.	9	3	15.56** (-) (0.049)	10.90*** (+) (0.004)
Employment in Social Service is not a Granger-Cause of Growth in Social Service.	2	2	0.33 (-) (0.566)	-
Growth in Social Service is not a Granger-Cause of Employment in Social Service.	2	2	0.17 (-) (0.679)	-
Employment in Construction is not a Granger-Cause of Growth in Construction.	5	4	3.89 (-) (0.274)	1.55 (+) (0.461)
Growth in Construction is not a Granger-Cause of Employment in Construction.	5	4	3.10 (+) (0.376)	2.94 (+) (0.230)
Employment in Manufacturing is not a Granger-Cause of Growth in Manufacturing.	7	3	13.02** (+) (0.043)	2.08 (+) (0.354)
Growth in Manufacturing is not a Granger-Cause of Employment in Manufacturing.	7	3	12.58** (+) (0.050)	9.00*** (+) (0.011)
Employment in Mining is not a Granger-Cause of Growth in Mining.	2	2	0.22 (-) (0.639)	-
Growth in Mining is not a Granger-Cause of Employment in Mining.	2	2	0.00 (-) (0.959)	-
Employment in Tourism and Commerce is not a Granger-Cause of Growth in Tourism and Commerce.	9	3	7.65 (-) (0.468)	0.67 (+) (0.714)
Growth in Tourism and Commerce is not a Granger-Cause of Employment in Tourism and Commerce.	9	3	16.63** (+) (0.034)	4.65* (-) (0.098)
Employment in Financial Intermediation is not a Granger-Cause of Growth in Financial Intermediation.	7	2	20.17*** (+) (0.003)	0.42 (-) (0.518)
Growth in Financial Intermediation is not a Granger-Cause of Employment in Financial Intermediation.	7	2	9.83 (+) (0.132)	4.85** (+) (0.028)
Employment in Agriculture is not a Granger-Cause of Growth in Agriculture.	6	2	3.18 (-) (0.672)	1.77 (-) (0.183)
Growth in Agriculture is not a Granger-Cause of Employment in Agriculture.	6	2	4.11 (-) (0.534)	0.44 (-) (0.505)
Employment in Transportation and Communication is not a Granger-Cause of Growth in Transportation and Communication.	6	2	7.55 (-) (0.183)	1.51 (+) (0.219)
Growth in Transportation and Communication is not a Granger-Cause of Employment in Transportation and Communication.	6	2	4.31 (+) (0.506)	1.92 (+) (0.167)

Note A:

1. Values in parentheses indicate associated p-values.

2. If AIC=SBC, Only AIC results are provided and for SBC part "-" signs are placed.

3. %1(***), %5(**) and %10 (*) show statistical significance level for MWALD statistics.

Note B: Data were de-seasonalized and used after taking logarithm.

Besides searching existence of causality, the study determines the direction of those dynamic relationships between employment and economic growth. Thus, the coefficients summation of VAR models can be also found and provided within parentheses in the Table 3. (+) or (-) indicates positive or negative dynamic relationship from one variable to another. According to the fourth column of the Table 3, between Aggregate employment and Aggregate economic growth there is a positive relationship from employment to economic growth. When the results obtained for the industries are analyzed, employment extracts positive influence on economic growth for the Energy Production and Distribution, the Manufacturing, and the Financial Intermediation industries. However, there is no relationship from employment to economic growth detected for the rest of series under investigation. Again when the fourth column of the Table 3 is looked to analyze the Granger Causality from Aggregate economic growth to Aggregate employment, the null hypothesis of no Granger
Causality is not rejected at 5 percent significance level. In addition to this, the same can be said for the Social Service, the Construction, the Mining, the Financial Intermediation, the Agriculture, and the Transportation and Communication industries. Yet there is a Granger Causality run from economic growth to employment for the Energy Production and Distribution, the Manufacturing, and the Tourism and Commerce industries at 5 percent significance level. In order to determine the direction of the relationship from employment to economic growth, the signs of coefficients summation are also provided in the fourth column of the Table 3. According to those findings, the growth in the Energy Production and Distribution industry affects the employment in this industry negatively, but economic growth influences employment positively for the Manufacturing, and the Tourism and Commerce industries. However, for other industries and Aggregate series, there is no such relationship detected.

When SBC criteria are taken into consideration, associated MWALD tests results and the signs of the coefficients summation of VAR models about the relationship between the industrial employments and economic growths are given in the fifth column of the Table 3. MWALD tests results indicate that the null of no Granger Causality from employment to economic growth cannot be rejected at 5 percent significance level for all industrial and aggregate series undertaken in the study. These findings can be interpreted as employment does not explain economic growth. On the other hand, the null of no Granger Causality from economic growth to employment is not rejected at 5 percent significance level for the Social Service, the Construction, the Mining, the Agriculture, and the Transportation and Communication industries. But for the Energy Production and Distribution, the Financial Intermediation, and the Manufacturing industries, economic growth is found as a Granger-Cause of employment at 5 percent significance level. In addition, this is also true for the Tourism and Commerce industry at 10 percent significance level. When the directions of the relationships are analyzed, it is clearly seen that the economic growth has positive effects on the employment for the Energy Production and Distribution, the Manufacturing, and the Financial Intermediation industries. In opposed to this, it is found that the economic growth in the Tourism and Commerce industry extracts negative influence on the employment in this industry.

VAR models are very sensitive to the lag length used in VAR models. Therefore, this study used more than one criterion to determine lag lengths included in the models. Those are AIC and SBC. While SBC parsimony feature is taken into consideration, the results obtained from AIC and SBC were quite meaningful. Therefore, the results obtained from AIC are more representative for Turkish Economy.

This study also investigates effects of incentives for investment and employment regulations on industrial employments and industrial growths within the same VAR models that analyzed the dynamic relationships and the direction of the relationships between industrial employments and industrial economic growths. These effects can be investigated with size and significance of estimated coefficients. The findings for the incentives laws are given in the Table 4. In the second and third columns of the Table 4, the incentives laws influence on employment is shown in the case AIC criterion. The second column provides the effects of law numbered as 5084 and the third column provides the law numbered as 5763. Here it needs to remind that this study only is interested in these incentive laws influences on employments, not on growths. Therefore it does not report their effects on economic growths.

Table 4. Predicted Coefficients for the Dummy Variables and Their Significance

	Results According to AIC Criteria		Results According to SBC Criteria	
Dependent Variables in VAR Model	**D1_5084**	**D2_5763**	**D1_5084**	**D2_5763**
Aggregate Employment	-0.002	0.005	-0.004	0.006
Aggregate Economic Growth	0.015*	-0.003	0.017**	-0.002
Employment in Energy Production and Distribution	-0.016	0.034**	-0.042*	0.038
Growth in Energy Production and Distribution	0.010**	-0.001	0.001	-0.001
Employment in Social Service	0.007**	0.002		
Growth in Social Service	0.003	0.001		
Employment in Construction	0.013	0.005	0.013	0.005
Growth in Construction	0.006	-0.002	0.004	0.001
Employment in Manufacturing	0.011***	-0.003	0.010***	0.001
Growth in Manufacturing	-0.014	0.006	-0.016*	-0.003
Employment in Mining	0.012	-0.005		
Growth in Mining	0.028***	-0.001		
Employment in Tourism and Commerce	0.004	-0.013***	0.002	-0.006
Growth in Tourism and Commerce	-0.006	0.003	-0.005	0.004
Employment in Financial Intermediation	0.016**	0.016**	0.011	0.016**
Growth in Financial Intermediation	0.002	-0.001	0.003	-0.001
Employment in Agriculture	0.004	0.013	0.002	0.008
Growth in Agriculture	-0.004	0.014*	-0.014	0.008
Employment in Transportation and Communication	0.006**	0.003	0.003	0.004
Growth in Transportation and Communication	0.005	-0.006	0.002	0.001

Note A: *, **, *** are t-statistics statistical significance level at %1, %5 ve %10 respectively.
Note B: In the case of AIC=SBC, only AIC results are provided.

The findings for the law numbered as 5084 are that it extracts positive and statistically significant influence at 5 percent significance level on the employment in the Social Service, the Manufacturing, the Transportation and Communication, and the Financial Intermediation industries. Other than these four industries, there is no statistically significant relationship, including aggregate sense, detected for this incentive law. A close look to these effects releases that the sizes of influences are quite big in the Manufacturing and the Financial Intermediation industries and not much important in the Social Service, and the Transportation and Communication industries.

In the case of the other incentives law numbered as 5763, it has positive and statistically significant influence at 5 percent significance level on the employment in the Energy Production and Distribution, and the Financial Intermediation industries. However, it has negative and statistically significant at 5 percent level on employment in the Tourism and Commerce industry.

In conclusion, according VAR models with using AIC criterion, the incentive law numbered as 5084 increased the employment in the Social Service, the Manufacturing, the Transportation and Communication, and the Financial Intermediation industries. On the other hand, by using the same modeling, the second incentive law numbered as 5763 rose the employment only in the Energy Production and Distribution, and the Financial Intermediation industries.

In the models that the optimal lag structures are determined according to SBC criterion, the results of the incentive laws are given in the fourth and fifth columns of the Table 4. In the fourth column, the results for the incentive law numbered as 5084 are given whereas the fifth column provides the results for the incentive law numbered as 5763. The incentive law numbered as 5084 affects the employment in the Energy Production and Distribution negatively at 10 percent significance level. On the other hand, the incentive law has positive and statistically significant effect, at 1 percent, on the Manufacturing industry employment. There is no any other statistically significant effect detected for this incentive law. Further, for the incentive law numbered as 5763, there is only statistically significant result obtained, that is positive and significant effect at 5 percent level on the Financial Intermediation industry's employment.

5. Conclusion

In this study, the dynamic relationships for aggregate and industrial employments with aggregate and industrial economic growths were investigated over the period of 1988:Q4-2010:Q4. Before analyzing the dynamic relationships for the aggregate and industrial employment series with the corresponding economic growth series, the stationarity properties of the series under investigation were examined via the MZ_{α} and MZ_{t} unit root tests developed by Ng and Perron (2001). While the unit tests indicated that all series were the first order-integration except for that the employment series of Construction industry was the second-order integration. The study used the method developed Toda and Yamamoto (1995) to investigate the dynamic relationships between employment and economic growth, and meanwhile, used AIC and SBC criteria to add optimal lag lengths into VAR models.

According to the test results based on AIC; there are positive Granger Causalities from the Aggregate employment to the Aggregate economic growth, from the employment in the energy production and distribution industry to the economic growth in the energy production and distribution industry, from the employment in the financial intermediation industry to the economic growth in the financial intermediation industry, from the economic growth in the manufacturing industry to the employment in the manufacturing industry, and from the economic growth in the tourism and commerce industry to the employment in the tourism and commerce industry. However, for the energy production and distribution industry, there exist a Granger Causality from economic growth to employment but the sign for it is found to be negative. For the rest of the series in the study, there is no dynamic relationship detected. According to those results, the economic growth in Turkey only creates employment in the manufacturing, and the tourism and commerce industries. At this point as being understood, the reason for the sustained growth pattern that Turkey has been kept going with after 2002 left unemployment as a consistently debated issue is that the economic growth only creates employment in two sectors but not in the rest of them. In addition, the economic growth in the energy production and distribution industry causes interestingly decline in the employment in this industry. It is thought that investment in this industry has been on labor-saving production process instead of labor-expanding production process. On the other hand, the findings about Granger Causality from the employment to the economic growth for aggregate series, the energy production and distribution industry, and financial intermediation industry tell that employment expansion in those create economic growth. These findings point out that employment increase creates economic growth rather than economic growth creates employment.

The study also investigated two incentive laws, numbered as 5084 and 5763, impacts on aggregate and industrial employments. For the 5084 incentive law, it is found to have statistically significant effects on the employment in the social Service, the manufacturing, and the transportation and commerce industries. For the 5763 incentive law, it is found to have statistically significant effects on the employment in the energy production and distribution, and the financial intermediation industries. The incentive law numbered as 5084 is a law that is designated for low income regions, that is, it does not cover whole Turkey. Therefore, in low income regions, incentive policies that reduce loads on wages would be more influence in terms of increasing employment. On the other hand, the incentive law numbered as 5763 has a nation-wide coverage and it provides incentives for all industries except for construction. It was initiated, after decline happened to export in 2008, in order to support manufacturing companies. However, the law did not cause employment increase in manufacturing industry. This put forward that manufacturing industry is not sensitive to such incentive practices. Loads on wages encourage informal employment. Informal employment is rather lower in manufacturing industry compared with other industries. But in low income regions, loads on wage are an important factor that leads informal employment to increase. If the findings are assessed in this framework, regulations on reducing loads on wages have a positive effect on preventing companies from employing informally.

For assessing employment creation of economic growth through incentive laws for Turkey, providing incentives to manufacturing, and tourism and commerce industries would increase success of incentives. On the other hand, regulations to those industries should be growth promoting instead of reducing loads on wages, so incentives are thought to be more efficient because the law numbered as 5763, which was to aim reducing wage loads, has not affected employment in these industries. However, regulations that reduce loads on wages, such as the law numbered as 5084, are more

effective and extract influences on various industries in low-income regions. It is thought that such low-income-region incentive policies have substantial impacts on reducing production costs in low income regions and that they might affect informal employment.

References

Andrews, D.W.K. (1991), Heteroskedasticity and Autocorrelation Consistent Covariance Matrix Estimation, Econometrica, 59, 817-858.

Abdullah, N., Naim, Z.A., Long, Y. (2011), Employment and Macroeconomic Variables: Evidence from Malaysia, Phillipines and Singapore, International Journal of Economics and Finance, 3(3), 139-148.

Barışık, S., Çevik, E.İ., Kırcı Çevik, N. (2010), Türkiye'de Okun Yasası, Asimetri İlişkisi ve İstihdam Yaratmayan Büyüme, Maliye Dergisi, 159, 88-102.

Crespo-Cuaresma, J. (2003), Revisiting Okun's Law: a Piecewise-linear Approach, Oxford Bulletin of Economics and Statistics, 65, 439–451.

Demirgil, H. (2010), Okun Yasası'nın Türkiye İçin Geçerliliğine Dair Ampirik Bir Çalışma, Alanya İşletme Fakültesi Dergisi, 2/2, 142-155.

Dickey, D.A., Fuller, W.A. (1979), Distribution of the Estimators for Autoregressive Time Series with a Unit Root, Journal of the American Statistical Association, 74, 427−431.

Daly, M., Hobijn, B. (2010). Okun's Law and the Unemployment Surpise of 2009, FRBSF Economic Letter, 2010-07.

Dolado, J.J., Lutkepokl, H. (1996), Making Wald Tests Work for Cointegrated VAR Systems, Econometric Review, 15, 369-86, 1996.

Dufour, J.M., Renault, E. (1998), Short Run and Long Run Causality in Time Series: Theory, Econometrica, 66, 1099-1125.

Freeman, D.G. (2001), Regional Test for Okun's Law, Int'l Advances in Economic Research, 6(3), 557–570.

Granger, C.W.J. (1969), Investigating Causal Relations by Econometric Models and Cross-spectral Methods, Econometrica, 37(3), 424-438.

Giles, J.A., Mirza, S. (1999), Some Pretesting Issues on Testing for Granger Noncausality, Economic Working Paper No. 9914, Department of Economics, University of Victoria.

International Labour Office (2007), Global Employment Trends January 2007, International Labour Organization, Geneva.

International Labour Office (2012), Global Employment Trends 2012; Preventing Deeper Job Crisis, International Labour Organization. Geneva.

Lee, J. (2000), The Robustness of Okun's Law: Evidence from OECD Countries, Journal of Macroeconomics, 22, 331–356.

Moosa, I.A. (1997) A cross-country comparison of Okun's coefficient, Journal of Comparative Economics, 24, 335–56.

Moosa, I.A. (2008). Economic Growth and Unemployment in Arap Countries: Is Okun's Law Valid?, International Conference on the Unemployment Crisis in the Arap Countries, Cairo Egypt, 7-18 March 2008

Mosconi, R., Giannini, C. (1992), No-Causality in Cointegrated Systems: Representation, Estimation and Testing, Oxford Bulletin of Economics and Statistics, 54, 399-417.

Ng, S., Perron, P. (2001), Lag Length Selection and the Construction of Unit Root Tests with Good Size and Power, Econometrica, 69, 1519-1554.

Official Gazette (2004), 06.02.2004, no. 25365, Ankara, Turkey.

Official Gazette (2008), 26.05.2008, no. 26887, Ankara, Turkey.

Okun, A.M. (1962), Potential GNP: Its Measurement and Significance, Proceedings of the Business and Economic Statistics Section, American Statistical Association.

Phillip, P.C.B. (1987), Time Series Regression with a Unit Root, Econometrica, 55, 227-301.

Phillips, P.C.B., Perron, P. (1988), Testing for a Unit Root in Time Series Regression, Biometrika, 75(4), 335–46.

Rambaldi, A.N., Doran, H.E (1996), Testing for Granger Non Causality in Cointegrated Systems Made Easy, Working Papers in Econometrics and Applied Statistics 88, Department of Econometrics, the University of New England.

Said, S.E., Dickey, D. (1984), Testing for Unit Roots in Autoregressive Moving-Average Models with Unknown Order, Biometrika, 71, 599-607.

Saget, C. (2000), Can the Level of Employment be Explained by GDP Growth in Transition Countries? (Theory versus the Quality of Data), Labour, 14(4), 623-643.

Silvapulle, P., Moosa, I.A. and Silvapulle, M.J. (2004), Asymmetry in Okun's Law, The Canadian Journal of Economics, 37(2), 353-374.

Sims, C.A., Stock, J.H., Watson, M.W. (1990), Inference in Linear Time Series Models withSome Unit Roots, Econometrica, 58, 113-144.

Sögner, L. (2000), Okun's Law, Does the Austrian Unemployment- GDP Relationship Exhibit Structural Breaks?, Empirical Economics, 26, 553-564.

Seyfred, W. (2005), Examining Relationship between Employment and Economic Growth in Ten Largest States, Southwestern Economic Review, 32(1), 13-24.

Toda, H.Y., Yamamoto, T. (1995) Statistical Inference in Vector Autoregressions with Possibly Integrated Processes, Journal of Econometrics, 66, 225-250, 1995.

Toda, H.Y., Phillips, P.C.B. (1993), Vector Autoregressions and Causality, Econometrica, 61(6), 1367-1393.

Viren, M. (2001), The Okun Curve is Non-linear, *Economics Letters*, 70, 253-257.

Yam, T.K., Wu, F., Heng, T.M., Ping, J.T., Sia, H.Y. (2002), Employment Growth will Trail Economic Recovery in 2002: Evidence from Econometric Estimates. Economic Survey of Singapore, First Quarter, 45-52.

Yılmaz, Ö.G. (2005) , Türkiye Ekonomisinde Büyüme İşsizlik Oranları Arasındaki Nedensellik İlişkisi, İstanbul Üniversitesi İktisat Fakültesi Ekonometri Ve İstatistik Dergisi, 2, 11-29.

Zapata H.O., Rambaldi A.N. (1997), Monte Carlo Evidence on Cointegration and Causation, Oxford Bulletin of Economics and Statistics, 59, 285-298.