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THE INFLUENCE OF CONSUMPTION AND INVESTMENT ON UNEMPLOYMENT IN TURKEY: A SVAR APPROACH

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Abstract. *The aim of this paper is to examine the dynamic relationship between consumption, investment and unemployment in Turkey using structural VAR (SVAR) models. The four different SVAR models are estimated by using quarterly observations of dynamic and contemporaneous relations for the mentioned macroeconomic variables, covering the 2005-2016 period for the Turkish economy. Four different unemployment rates are used in the study to represent the unemployment rate in the Turkish economy, which are overall, young (15-24 age), male and female unemployment rates. Impulse response functions and variance decomposition results obtained from the study show that consumption shocks have a significant impact on both the unemployment rate and the investments, in support of the basic hypothesis that is argued in the study. Investment shocks also have a similar effect on unemployment rates and positive investment shocks have reduced unemployment rates. Moreover, another result obtained in all four models suggests that a shock in consumption increases investment through the accelerator effect.*

Keywords: *Consumption, Investment, Unemployment, Structural VAR.*

1. Introduction

The global crisis had devastating consequences for labor markets in the Turkish economy as much as on the markets of many other countries. Besides that, the unemployment rate in Turkey is currently higher than in most of the OECD countries. It also remains at a significantly higher level as compared with the pre-crisis period. In the first year after the beginning of the financial crisis, the economic growth declined 4.8% and the unemployment rates reached 14.86% in the second quarter of 2009, which historically is the highest level measured in Turkey. The average overall unemployment rate is 10.63% between 2005 to 2016, while the average youth unemployment rate is 19.70 %, which has reached its peak of 26.98% in 2009 (see Graph No. 1). According to the OECD

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Unemployment report, Turkey is the fifth highest country in terms of highest overall unemployment rates. Moreover, it is the fourth country with the highest rate of female unemployment in the OECD.

Economists are carrying out many studies, especially in the more developed countries, because of the need to investigate the source of unemployment more closely. However, due to the complexity of this issue, a generally accepted and consistent framework for the development of unemployment has not been established yet. Macroeconomic theory suggests that negative shocks in aggregate demand components will lead to a slowdown in economic activity, thus reducing employment. There is a view that unemployment rates, which have been rising since the beginning of the 1970s and continued throughout the 1980s, are not due to labor market rigidities. Many studies have focused on the impact that investments have on unemployment (Bean, 1989; Phelps,1994; Arestis and Mariscal, 2000; Sawyer, 2002).

Regarding the framework between the consumption, investment, and unemployment rate in macroeconomic theory, main three economic points of view have a different approach to explain these relationships. The Keynesian view argues that an increase in aggregate demand will have a positive impact on employment due to the decline in real wage as prices rise more than nominal wages. Similarly, the New Classical Macroeconomics view suggests that aggregate demand may have an effect on employment, but this effect will take place in the short term. However, as wages and prices in the long term are completely flexible and the expectations of economic individuals are corrected, the effect of change in aggregates demand on unemployment will cease to exist and the labor market will converge to natural unemployment rates. Unlike these two views, the New Keynesian view does not accept the fact that the changes in aggregate demand will have a significant impact on unemployment. The equilibrium in the labor market, which is called NAIRU (Non-accelerating Inflation Rate of Unemployment), suggests that workers will be willing to accept certain decisions during wage bargaining and that firms will volunteer to pay. The New Keynesian view argues that as capital stock or investment is a trended variable, the unemployment rate is a trendless variable. So, there is not such a thing as negative interaction among these variables. Ball (1999) revealed that the New Keynesian wisdom is not true and aggregate demands have strong effects on both short-run and long-run unemployment rates.

Based on the theoretical frameworks described above, the aim of this paper is to determine the dynamic relation between consumption, investment, and different unemployment rates in Turkey using structural VAR models. More specifically, we aim to quantify how shocks to consumption and investment are transmitted to unemployment rates. This paper also aims to contribute to the literature as a study of the effect of consumption and investment shocks on unemployment rates in Turkey using the SVAR method. The remainder of this paper is organized as follows: the review of literature is discussed in

Section No. 2. Data and methodological issues related to the specification and identification of the SVAR models are given in Section No. 3. The results of estimated models are presented in Section No. 4. Lastly, conclusions are drawn in Section No. 5.

2. Literature Review

This section presents some of the major papers in the literature about the relationship between consumption, investment and unemployment. Bean and Dreze (1991) show that the oil price shocks, which had reduced the capital stock profit rate, encouraged a decline in investment and further increased the unemployment rate in Europe. Blanchard (2000) characterized the relationship of these aspects with a view that there is a high and negative correlation between medium changes in unemployment and private investment, such as the *Modigliani Puzzle*. Herbertsson and Zoega (2002) reveal that when the expected future profit flow from investment increases the rate of labor, hiring also rises, in turn making the unemployment rate fall. Malley and Moutos (2001) study the relationship between capital accumulation and unemployment by considering the evaluation of employment with not only the absolute growth rate of a country's capital stock, but also its evolution relative to the capital stocks of other countries. Their findings point out that policies that promote a faster rate of capital accumulation should be a necessary component of any policy package aimed at reducing the unemployment rate.

The nexus between macroeconomic variables and the rate of unemployment is also widely investigated; for example, Arestis and Mariscal (1998) investigate the determination of aggregate wages and unemployment in the UK. They also test whether a fall in investment causes long-term unemployment. Their results, as policy implications, point that both capital shortage could significantly influence long-term unemployment and a shortage in demand may have a persistent effect on employment. Arestis et al. (2007) examine the importance of capital stock in the determination of wages and unemployment rates for nine EMU countries and make a comparison of the findings across these countries. Their results verify that there is a negative relationship between investment and unemployment for all countries covered in the study. Miaouli (2001) used annual data from the manufacturing sector which contains five European countries. His findings state that investments within the private sector positively affect unemployment rates in all countries. In a similar vein, Nickell et al. (2005) study the empirical analysis of unemployment patterns in the OECD countries which span from 1961 to 1995. Their result confirms that unemployment is always determined by aggregate demand. Despite these studies, Karanassou and Snower (2004) conclude that imposing strong invariance restrictions on labor market activity implies that policies that increase the capital stock do not make any long-run effect on the unemployment rate. However, they also emphasize that in the case that this constraint is lifted, these policies may have a permanent effect on unemployment.

The linkages between investments and unemployment rates are also studied by Stockhammer (2004), who seeks to compare and test the validity of the NAIRU and Keynesian theories on unemployment in a time series method. He tests this suggestion and offers that the NAIRU formation performed poorly with only the tax wedge having a positive effect on unemployment as predicted. Alexiou and Pitelis (2003) tackle the relationship between capital stock and unemployment using a post-Keynesian approach, where a panel data study is used from 1961 to 1998 for several European countries. Their result reveals that finding the negative and statistically significant coefficient of capital stock justifies their hypothesis that capital stocks play a very significant role in explaining unemployment rates.

The dynamic features of relation between investment and unemployment rates have been considered, even though for generally developed countries. Abiad et al. (2015) study the macroeconomic influence of increased public investments for 17 OECD countries over the period of 1985-2013. Their results reveal that an increase in public investment is found to reduce the unemployment rate by about 0.11% in short term and by about 0.35% over the medium term. They show that the magnitude on unemployment reduction are larger in countries with a high level of investment efficiency. Bande and Karanassou (2014) examine the developments of regional unemployment rates in Spain from 1980 to 2000. They classify the regions of Spain in 17 groups by considering the low and high unemployment rates and estimate a structural labor market model for each group. Their findings show that investment is the main driving factor for the fluctuations of regional unemployment rates. Karanassou et al. (2008) study the role of capital accumulation in explaining the different unemployment practices of the Nordic countries. Their results display that capital accumulation plays an essential role in determining unemployment activities. Karanassou and Sala (2010) investigate the development of unemployment rate using the CRT approach in Australia over the 1993-2006 period. They point that capital accumulation was the key driving factor of the unemployment rate for the 1990s and early 2000s. Michaillat and Saez (2015) build a model and direct empirical findings to investigate the reasons of unemployment fluctuations observed in the United States. Their comparative results suggest that aggregate demand shocks are the principal source of unemployment fluctuations. Mian and Sufi (2012) reveal the importance of aggregate demand shocks on employment in the US. They state that the fall in aggregate demand explains almost 4 million of the lost jobs from 2007 to 2009. Bande and Riveiro (2013) assess the role of consumption patterns on unemployment by considering the investment channel for Spain. Their results argue that several transmission mechanisms of aggregate demand shocks are to the unemployment rates as a function of adjusting the capital stock.

There are a few studies within scientific literature in economics that attempt to reveal the nexus between the macroeconomic variables and the unemployment rates in Turkey.

Some studies that provide evidence regarding the nexus are as follows: Berument et al. (2006) investigate the effects of various macroeconomic policy shocks on both overall unemployment rates and the unemployment rates by different levels of education. They evaluated this effect by separating unemployment rates into two: male and female. Their findings show that income and price shocks affect the overall unemployment rates and its different components. They also present that monetary policy does not have any impact on unemployment rates. Berument et al. (2009) extend their studies in two regards by adding the unemployment rate of the different sector in economic activities. Their results reveal that unemployment rates within the sectors of agriculture and manufacturing respond differently to macroeconomic shocks such as real GDP, prices, interest rates and exchange rates. They also show that income and price shocks on unemployment rates of different sectors have effects both in the short and long runs.

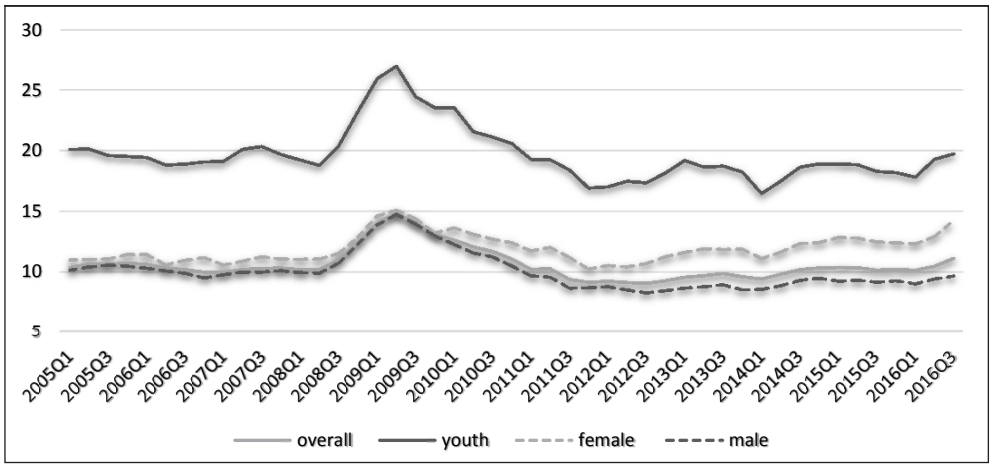
The linkages between the macroeconomic variables and the unemployment rates are studied by different macroeconomic variables. Doğan (2012) examines the response of unemployment rates to income, export, exchange rates, interest rates and inflation shocks. His findings show that while income, export and inflation decrease the unemployment rate, the exchange rates, interest rates and the money supply have an adverse effect. Aktar et al. (2009) find that the foreign direct investments and deviations in income do not have any effect in diminishing the unemployment rates. Doğrul and Soytaş (2010) investigate the interaction between oil prices, economic activity and employment, in this way embracing an efficiency wage model for equilibrium employment. They discover that the real price of oil and interest rates expand the forecast of unemployment rates in the long run. Tiryaki and Özkan (2011) try to analyze the link between economic growth and unemployment. Their results indicate that there is a one-way causality from income to the unemployment rate.

3. Data, Methodology, and Model Specifications

The empirical analysis of this paper employs quarterly data for the period 2005:1 to 2016:3. There are six macroeconomic variables related to Turkey in investigating the dynamic relation between consumption, investment and unemployment in this paper. The final consumption expenditure of resident households (*cons*) and gross fixed capital formation (*inv*) are from the Central Bank of the Republic of Turkey (CBRT) and unemployment rates (*overall, youth, female* and *male*) come from the Turkish Statistical Institute (TUİK). All variables of the SVAR models are real values and in logarithm.

Graph No. 1 presents the unemployment rates that are used in the models of Turkey from 2005 to 2016. The overall unemployment rate increased to 14.85% in 2009 following the economic contraction. Then, it dropped to 9.07%, which is the lowest rate for that period and it reached 11.14% in the third quarter of 2016. Regarding the youth unemployment rate, like many countries that have been affected by the latest global crises,

it can be seen that it increased severely from 18.7% to 26.97% in the second quarter of 2009. Currently, it amounted to 19.74%. With the recent crises, both the female and male unemployment rates increased to 15.1% and 14.76%, respectively. They respectively declined to 10.25% and 8.25% after the crises and increased gradually during the last years.



GRAPH No. 1. **Unemployment rates in Turkey (2005-2016)**

Source: the Turkish Statistical Institute.

Table No. 1. **The descriptive statistics of variables**

Variable	Observation	Mean	Median	Min	Max	Std. Dev.
cons	47	19.024	18.997	18.763	19.295	0.167
inv	47	18.199	18.176	17.771	18.593	0.244
overall	47	2.356	2.331	2.206	2.698	0.114
youth	47	2.975	2.955	2.802	3.295	0.105
male	47	2.299	2.272	2.115	2.691	0.138
female	47	2.476	2.456	2.328	2.714	0.094

Table No. 1 presents the mean, median, minimum, maximum, and standard deviations (Std. Dev.) of the used variables. All the variables are in logarithmic form. While among the sub-categories of unemployment the youth unemployment rate has the highest mean over the period, the male unemployment rate has the highest variation.

3.1. Model Specifications

To investigate the dynamic relation between the housing prices and macroeconomy, the SVAR methodology is used. Our baseline model is a three-variables VAR model that contains quarterly data on final consumption expenditures (*cons*), gross fixed capital formation (i.e., investment, *inv*) and unemployment rates (*overall, youth, female* and *male*).

Below is the structural representation of a VAR model:

$$Ay_t = C(L)y_t + Bu_t \quad (1)$$

Where A is the matrix of contemporaneous interactions between variables, y_t is an (n × 1) vector of the endogenous macroeconomic variables, $C(L)$ is an (n × n) matrix of lag operator L, representing impulse-response functions of the shocks to the elements of y_t, B is an (n × n) matrix which captures the linear relations between structural shocks and those in the reduce form; finally, u_t presents an (n × 1) vector of structural shocks which are uncorrelated and identically distributed in a normal manner.

Unfortunately, equation (1) cannot be estimated directly because of identification problems; the reduced form is determined by multiplying equation (1) by an inverse matrix A^{-1} to estimate the SVAR model.

$$y_t = D(L)y_t + u_t \quad (2)$$

where $D(L) = A^{-1}C(L)y_t$, $u_t = A^{-1}Bu_t$. u_t is an (n × 1) vector of shocks in reduced form that are uncorrelated and normally distributed, yet contemporaneously correlated with each other. The relation between structural shocks and reduced-form shocks is the following:

$$Au_t = B\varepsilon_t \quad (3)$$

Equation (3) is also known as the *AB* model. To obtain the SVAR parameters in equation (1), one can easily impose a constraint on matrix A and B. To identify structural parameters given a *K x 1* dimensional VAR, one would require general *K(K-1)/2* restrictions on the SVAR. The SVAR model used in this paper has a dimension of 3 × 1, so it requires 3 restrictions on the structural parameters. The recursive (i.e., Cholesky) ordering gives the 3 restrictions imposed on the structural parameters in the benchmark SVAR model.

According to the recursive ordering approach, the matrix A should be identified as a lower triangular matrix and matrix B as an n-dimensional identity matrix. Hence, it is necessary to consider the ordering of variables. When the general implementation of literature is considered, the most exogenous variable is placed on the top of the ordering, assuming it will not be contemporaneously affected by succeeding variables. According to the below given ordering scheme, each variable in the parentheses is not contemporaneously affected by the subsequent shocks that follow it, while it is contemporaneously affected by the shocks from the preceding variables (İvrendi and Pearce, 2014). In all the SVAR models that have been employed in this paper, consumption is not contemporaneously affected by any other variables in the SVAR model as it is placed on the top of the ordering. Investment is placed second, which implies that it does not react contemporaneously to unemployment shocks, but is affected contemporaneously by consumption shocks. When used in the same method, unemployment rates are affected by all shocks

to the system, but do not contemporaneously affect them as it is placed at the bottom of the ordering. The A and B matrices can be shown the following form:

$$\begin{bmatrix} 1 & 0 & 0 \\ a21 & 1 & 0 \\ a31 & a32 & 1 \end{bmatrix} \begin{bmatrix} Ucons \\ Uinv \\ Uunemp \end{bmatrix} = \begin{bmatrix} b11 & 0 & 0 \\ 0 & b22 & 0 \\ 0 & 0 & b33 \end{bmatrix} \begin{bmatrix} \varepsilon cons \\ \varepsilon inv \\ \varepsilon unemp \end{bmatrix}$$

Table No. 2 shows that the ordering of the four different SVAR models to analyze the interaction between consumption, investment and unemployment rates variables in the paper. The X elements are variables that are not included in the model, while the + elements represent the variables located in the model.

TABLE No. 2. **The ordering of SVAR models**

Variable	cons	inv	overall	youth	female	male
Model 1	+	+	+	x	x	x
Model 2	+	+	x	+	x	x
Model 3	+	+	x	x	+	x
Model 4	+	+	x	x	x	+

In this paper, standard Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests are performed to determine for the stationary of the series before estimating the reduced VAR model. It can be seen from Table No. 3 that all the series appear to be I (1).

TABLE No. 3. **Unit root tests**

Level	ADF			PP		
	Critical value	t-Statistic	First Difference	Critical value	t-Statistic	First Difference
cons	-3.51	-2.43	-3.66**	-3.51	-1.94	-7.17**
inv	-3.51	-2.71	-5.06**	-3.51	-1.98	-5.13**
overall	-2.92	-2.48	-3.09**	-2.92	-1.82	-3.22**
youth	-3.51	-2.50	-4.51**	-3.51	-2.02	-4.51**
female	-3.51	-2.16	-4.66**	-2.92	-1.89	-4.69**
male	-2.92	-2.26	-3.45**	-2.92	-1.64	-3.51**

The asterisk ** denotes significance at the 5% level. Test results are given with intercept and trend and intercept in the table.

4. Empirical Results

All the VAR in this study are estimated using a constant and two lags are determined by Akaike and Schwarz criteria to get rid of the autocorrelation problem. After estimating the SVAR models, three important findings are obtained to interpret the economics re-

sults. These are the following: contemporaneous structural coefficient, impulse-response function, and forecast error variance decomposition. Before analyzing the dynamic macroeconomic effect of the consumption and investment on unemployment, it can be said that most of the coefficients estimating the contemporaneous effect between the variables are statistically significant and consistent with our theoretical expectations of explaining the contemporaneous interaction between the variables in the tables. In all models, when an unexpected increase occurs in consumption and investment, all unemployment rates respond negatively and significantly during the period.

4.1. Contemporaneous Structural Coefficients

The estimated contemporaneous structural coefficients of the relation between consumption, investment and unemployment are presented in Tables Nos. 4-7.

TABLE No. 4. **Contemporaneous structural coefficients with the overall unemployment rate**

variables	cons_d1	inv_d1	overall_d1
cons_d1	1	**0**	0
inv_d1	**-1.30 (-6.48)**	1	0
overall_d1	-0.27 (-1.21)	**0.44 (3.62)**	1

Note: Standard errors are in parentheses. Bold cells show statistically significant coefficients. The "d1" marks represent those variables that are stationary by taking the first difference.

Table No. 4 reports the contemporaneous structural coefficient estimates obtained from the estimated model that contains the overall unemployment rate. The findings show that a 1% increase in consumption increases the investment expenditures by 1.30%. The instantaneous effect of the investment on overall unemployment is negative and statistically significant. Focusing on the contemporaneous structural coefficients in that model, we can also observe that a 1% increase in the investment leads to a 0.44% decrease in overall unemployment rates.

TABLE No. 5. **Contemporaneous structural coefficients with the youth unemployment rate**

variables	cons_d1	inv_d1	youth_d1
cons_d1	1	**0**	0
inv_d1	**-1.34 (-6.62)**	1	0
youth_d1	**-0.73 (-2.34)**	**0.63 (3.87)**	1

Note: Standard errors are in parentheses. Bold cells show statistically significant coefficients. The "d1" marks represent the variables which are stationary by taking the first difference.

The second SVAR model contains the youth unemployment rate, which is described as the unemployment rate of the 15-24 age group in Turkey. It is worth noting that the effects of consumption on investment and of the investment on youth unemployment rate

are statistically significant. Thus, a 1% increase in the consumption rises the investment by 1.34%. Table No. 5 also shows that an increase in investment decreases the youth unemployment rate. A 1% rise in the investment decreases youth unemployment rate by 0.63% as the expansion of aggregate demand triggers investment expenditures.

TABLE No. 6. **Contemporaneous structural coefficients with the female unemployment rate**

variables	cons_d1	inv_d1	female_d1
cons_d1	1	**0**	0
inv_d1	**-1.38 (-6.80)**	1	0
female_d1	-0.44 (-1.42)	**0.66 (4.12)**	1

Note: Standard errors are in parenthesis. Bold cells show statistically significant coefficient. "d1" presents the variables which are stationary by taking the first difference.

In the third SVAR, the female unemployment rate is included the model. Table No. 6 shows that investment is contemporaneously affected by changes in consumption as in the previous model. It is clear that the effect of consumption on investment is statistically significant and positive. Thus, a 1% increase in the consumption rises the investment by 1.38%. Table No. 6 also presents investment shocks that are an influence on the female unemployment rate. When a 1% increase in the investment decreases, the female unemployment rate also does by 0.66%.

TABLE No. 7. **Contemporaneous structural coefficients with the male unemployment rate**

variables	cons_d1	inv_d1	male_d1
cons_d1	1	**0**	0
inv_d1	**-1.24 (-4.67)**	1	0
male_d1	-0.41 (-1.54)	**0.43 (2.96)**	1

Note: Standard errors are in parentheses. Bold cells show statistically significant coefficients. The "d1" mark presents the variables which are stationary by taking the first difference.

Table No. 7 reports the findings of the model which was used to study the male unemployment rate. The estimates reveal that the effects of consumption on investment and of the investment itself on the male unemployment rate are statistically significant. A 1% increase in consumption leads to a rise in investment by 1.24%. The changes within investment simultaneously affect the male unemployment rate – it decreases with an increase in investment. The theoretical expectation behind the relationship between consumption and investment, which are components of aggregated demand and unemployment, is that the increase in consumption and investment expenditures will decrease unemployment rates. Findings from four different models that studied unemployment rates in Turkey demonstrate that the positive significant effect of investment on unemployment rates confirms the assumption that growth within the capital stock (investment) increases the rate of employment.

4.2 Impulse-Responses

After identifying the contemporaneous effects in the SVAR model, we are interested in evaluating the total effect which deals with both contemporaneous and lagged instances of a shock to each variable on itself and on the other variables included in the model. In all models, the bootstrap CIs are obtained using Hall's (1992) percentile intervals. The Hall's CIs are based on a 1000 bootstrap replications. In all figures, the solid line indicates the point estimate, while the dashed lines represent the 95% of confidence intervals. For all SVAR models, the shocks correspond to one standard deviation and the impulse-response functions are explained for a horizon of 10 quarters.

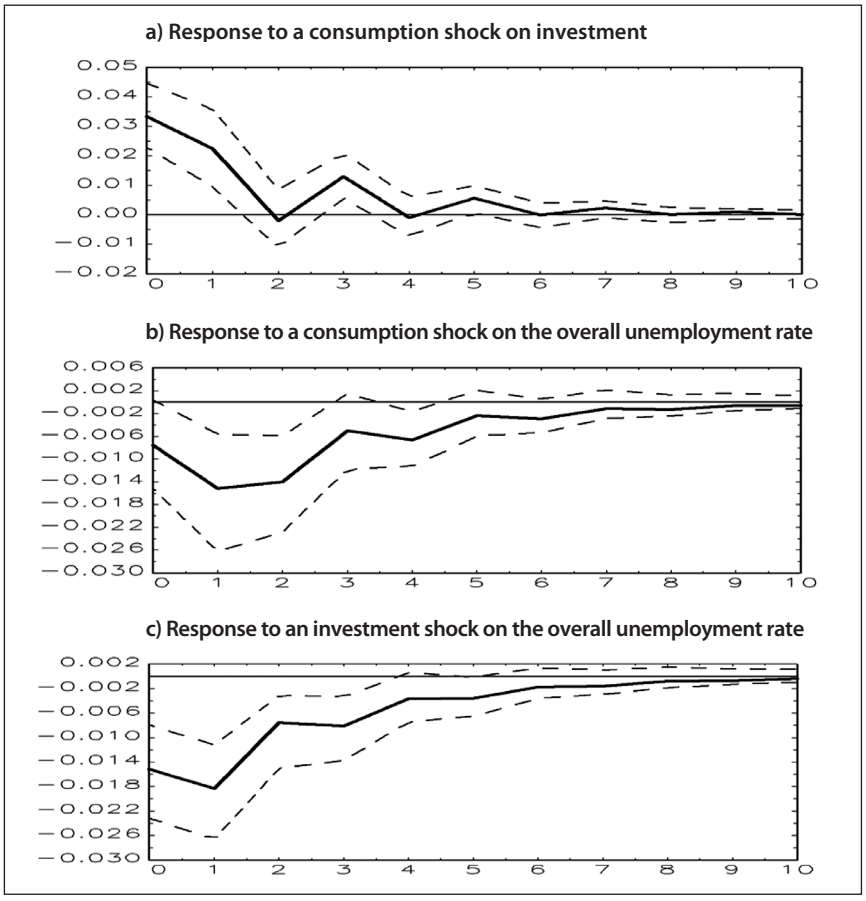


FIGURE No. 1. **Impulse responses of the overall unemployment rate** *

* The dotted lines show the upper and lower bands of the 95% of the bootstrapped confidence intervals computed using 1000 replications of Hall's percentile method.

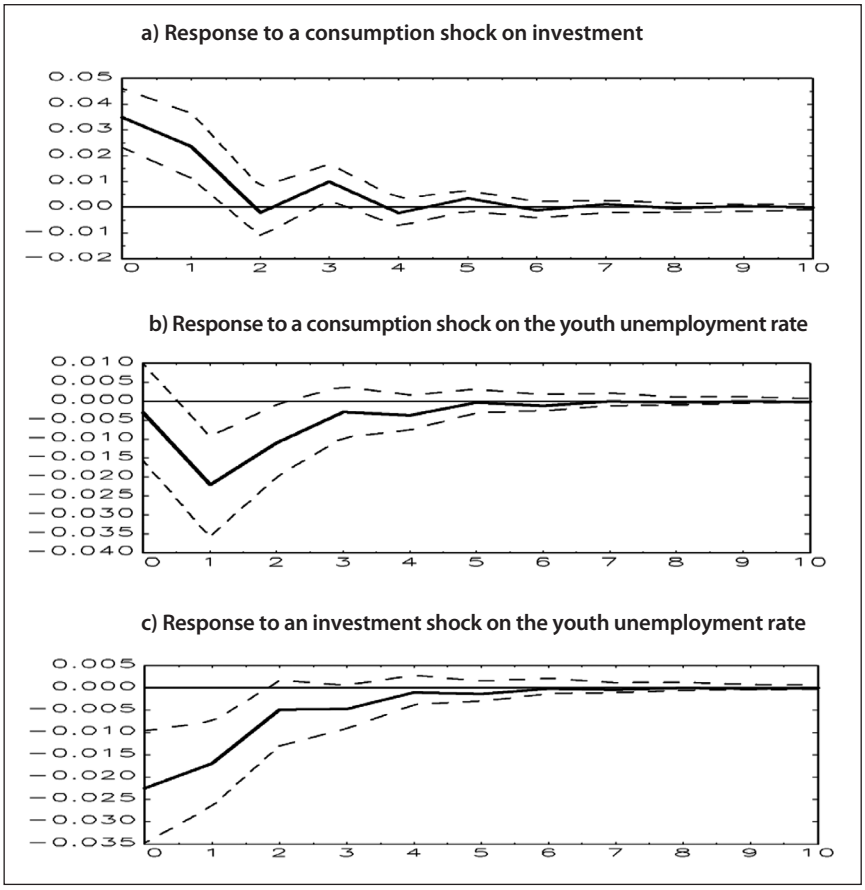


FIGURE No. 2. **Impulse responses of the youth unemployment rate***

* The dotted lines show the upper and lower bands of the 95% bootstrapped confidence intervals computed using 1000 replications of Hall's percentile method.

The impulse response functions contain the following three variables of shock in the SVAR model: consumption, investment, and the overall unemployment rate. The shock is defined as an exogenous and unexpected rise in consumption. Shocks are defined in the same vein for other variables. Figure No. 1 shows a significant positive response of investment to a consumption shock, which is to increase instantly it up by a two-quarter value. A single, standard deviation of the positive shock of consumption appears to have a significant negative effect on overall unemployment rates. Investment shocks also present a similar pattern, but the response to them is slightly greater and the response itself has longer effects on the overall unemployment rate.

Figure No. 2 explains the impulse response functions that include youth unemployment rates. The results reveal a similar effect as in the previous model. In Figure No. 2, it can be easily seen that a standard deviation of consumption produces an important con-

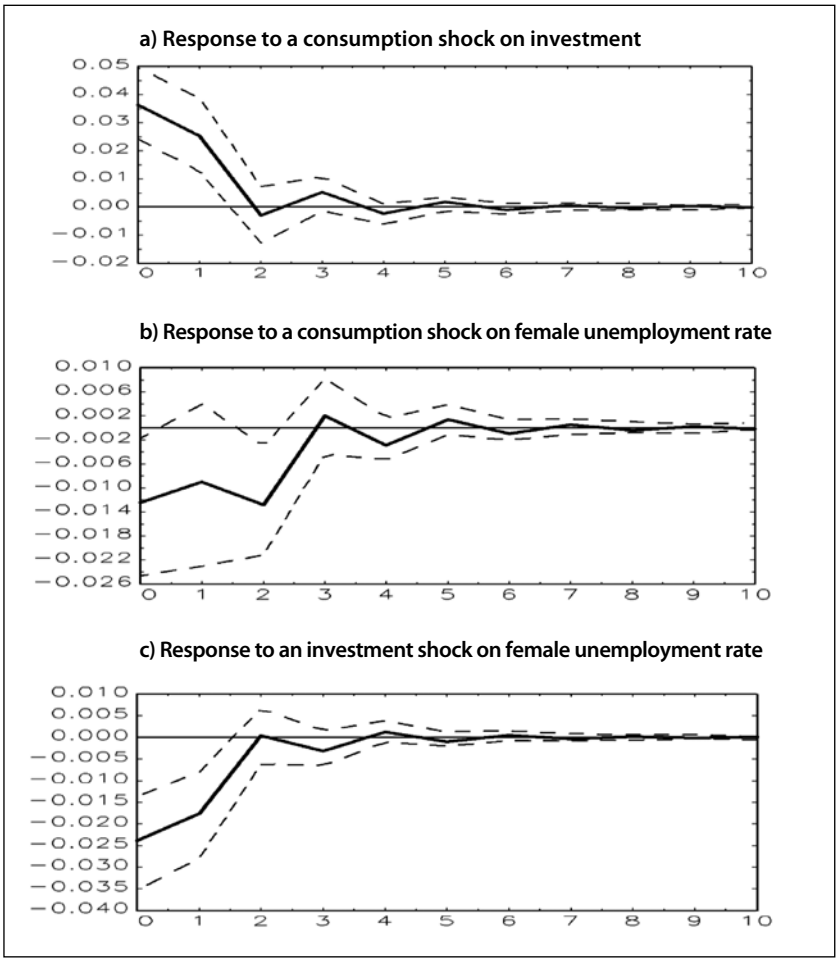


FIGURE No. 3. **Impulse responses of the female unemployment rate***

* The dotted lines show the upper and lower bands of the 95% of the bootstrapped confidence intervals computed using 1000 replications of Hall's percentile method.

temporaneous impact on investment, which can be interpreted as an accelerator effect on the economy. As theoretically expected, both consumption and investment shocks have statistically significant effects on youth unemployment rates in Turkey. Such responses of consumption and investment appear to be compatible with theories, because an increased aggregate demand stimulates higher economic activity and employment areas in the economy, so the youth unemployment rate will decrease.

As one of the figures revealed in this paper, Figure No. 3 presents the impulse-response function of the model that included within its estimations the female unemployment rate. Unlike in the first two models, the female unemployment rate presented in this model does not significantly respond to a positive shock in consumption even if

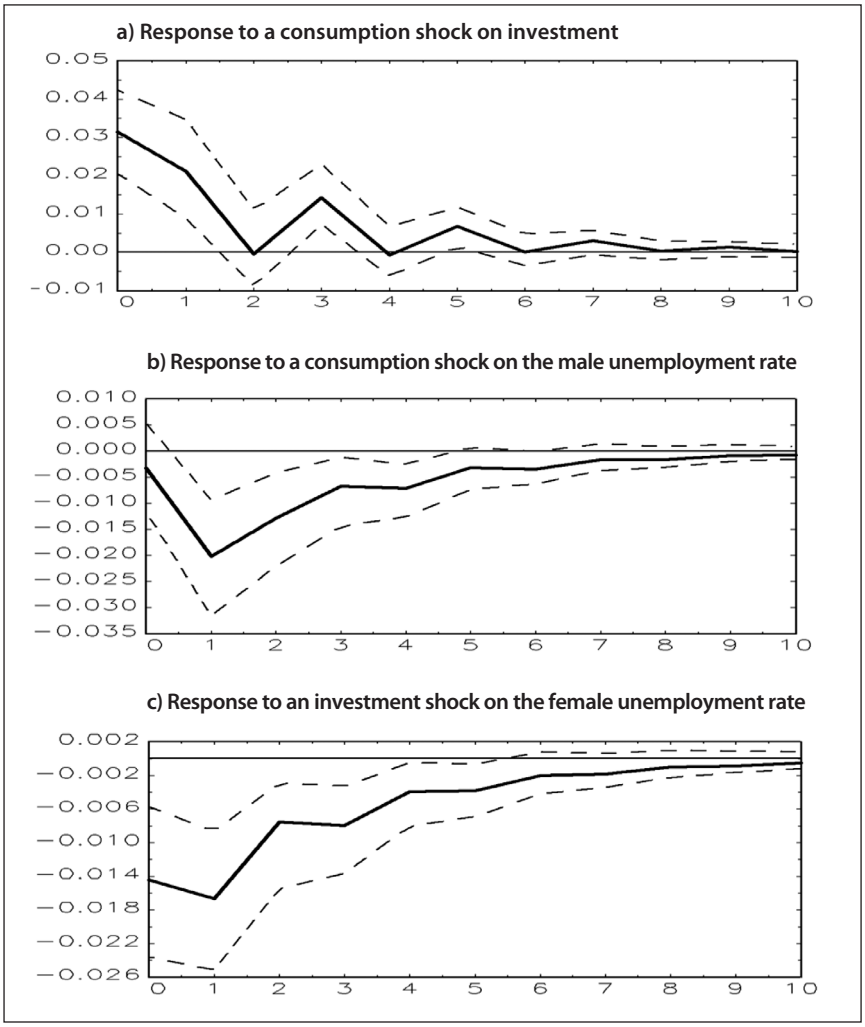


FIGURE No. 4. **Impulse responses of the male unemployment rate***

* The dotted lines show the upper and lower bands of the 95% of the bootstrapped confidence intervals computed using 1000 replications of Hall's percentile method.

the effect is as negative as expected. Nonetheless, this unexpected finding is short-lived (around the 2nd quarter) and has little significance. Regarding the effect of investment shocks on female unemployment rates, there is a significant and negative effect on female unemployment rates, but it is not persistent and diminishes in the second quarters.

Figure No. 4 captures the response of the male unemployment rate to consumption and investment shocks. As it is shown in the previous three models, the impact of investment and consumption shocks on male unemployment rates is statistically significant and negative. When we consider the positive consumption shocks, the male unemploy-

ment rate responds significantly and negatively. Only by a single quarter after this shock does the male unemployment rate reach its minimum point at approximately 2%, then quickly rise along this path to its steady state value. After positive investment shocks, the male unemployment rate falls along the fourth quarter and reaches its minimum point by about 1.8%. After that, this effect fades away beyond the fifth quarter. These figures clearly show that a positive shock to an aggregate demand component (consumption and investment) significantly decreases the unemployment rate. These findings also imply that expansionary aggregate demand shocks have strong and prolonged effects on unemployment rates.

Overall, the impulse responses to aggregate demand shocks (consumption and investment) are in line with the existence of a relationship between aggregate demand and unemployment rates. These findings are consistent with Blanchard (2000), Arestis and Mariscal (1998) and Arestis et al. (2007). When analyzing the macroeconomic effects of consumption and investment as an aggregate component in all estimated models, it is clearly shown that all kinds of unemployment rates respond negatively and significantly during the first three-four quarters; thereafter, the effects tend to disappear steadily in the medium and long terms. This pattern is precisely compatible with the Keynesian statement that expansionary aggregate demand policy is an effective tool for stimulating economic activity.

4.3. Variance Decomposition

The variance decompositions show that the portion of variance in the prediction for each variable in the system is attributable to its own shocks and to shocks to other variables in the system. The variance decompositions show that the portion of variance in the prediction for each variable in the system is attributable to its own shocks and to shocks to other variables in the system.

TABLE No. 8. **Variance decomposition with the overall unemployment rate**

Variables	*Cons_d1*			*Inv_d1*			*Overall_d1*		
Quarter	**1**	**5**	**20**	**1**	**5**	**20**	**1**	**5**	**20**
Cons_d1	1.00	0.91	0.91	0.48	0.52	0.52	0.05	0.24	0.24
Inv_d1	0.00	0.06	0.06	0.54	0.41	0.41	0.21	0.30	0.31
Overall_d1	0.00	0.03	0.03	0.00	0.06	0.07	0.73	0.45	0.45

Note: This table reports the share of variance of each variable that is explained by the structural shocks. The variance decomposition is computed at the 20th quarter ahead in response to a unit's structural shock.

By observing Table No. 8, one should notice that all of the share of variance in consumption is due to its own structural shocks in the first quarter. At the end of the 20th quarter's own structural shocks, investment and overall unemployment rate explain the 91%, 6% and 3% of volatility in consumption, respectively. Table No. 8 also presents

the variance in investment. Initially, at the end of the 5th quarter, 54% of volatility in investment comes from its own structural shock. Also, consumption shocks explain 48% of variation in investment. The variance decomposition of the overall unemployment is almost 21% accounted for by investment shocks.

TABLE No. 9. **Variance decomposition with the youth unemployment rate**

Variables	*Cons_d1*			*Inv_d1*			*Youth_d1*		
Quarter	**1**	**5**	**20**	**1**	**5**	**20**	**1**	**5**	**20**
Cons_d1	1.00	0.92	0.92	0.49	0.56	0.56	0.00	0.21	0.21
Inv_d1	0.00	0.06	0.06	0.51	0.41	0.41	0.25	0.27	0.27
Youthl_d1	0.00	0.02	0.02	0.00	0.03	0.03	0.75	0.52	0.52

Note: This table reports the share of the variance of each variable that is explained by the structural shocks. The variance decomposition is computed at the 20th quarter ahead in response to a unit structural shock.

In Table No. 9, regarding the variance decomposition for the youth unemployment rate, it is important to notice the significant contribution of investment, which accounts for 25% of the variation at the first quarter and its effect does not change at the end of 20th quarter (27%). Notably, although shocks to consumption do not play a significant role in explaining the variation of the youth unemployment rate at the first quarter, after the fifth quarter, consumption shocks do explain the 21% of variation in investment. According to another finding in Table No. 9, as the variance decomposition of consumption at the first quarter is totally accounted for to its own shocks, after the fifth quarter, investment shocks explain only 6% of the variation in consumption. It is interesting to observe that the variation of investment is equally explained by the consumption and investment shocks from the first quarter. From the fifth quarter, though, shocks to consumption account for 56% of investment variation.

TABLE No. 10. **Variance Decomposition with the female unemployment rate**

Variables	*cons_d1*			*inv_d1*			*female_d1*		
Quarter	**1**	**5**	**20**	**1**	**5**	**20**	**1**	**5**	**20**
cons_d1	1.00	0.93	0.93	0.51	0.60	0.60	0.07	0.15	0.15
inv_d1	0.00	0.07	0.07	0.49	0.40	0.40	0.26	0.32	0.32
female_d1	0.00	0.00	0.00	0.00	0.00	0.00	0.68	0.54	0.54

Note: This table reports the share of the variance of each variable that is explained by the structural shocks. The variance decomposition is computed at the 20th quarter ahead in response to a unit structural shock.

In the models where the female unemployment rate is included, it is indicated that investment shocks explain a significant portion of variation in the female unemployment rate at all forecast horizons. For example, in the fifth quarter forecast horizon, investment shocks contribute to 32% of the variance in the female unemployment rate. The second important driving factor for the female unemployment rate, presented in Table No. 10,

stems from consumption shocks. Its power in female unemployment variation is 7% in the first quarter and it reaches 15% at the end of 20th quarter.

TABLE No. 11. **Variance decomposition with the male unemployment rate**

Variables	*Cons_d1*			*Inv_d1*			*Male_d1*		
Quarter	1	5	20	1	5	20	1	5	20
Cons_d1	1.00	0.91	0.91	0.47	0.48	0.49	0.01	0.25	0.25
Inv_d1	0.00	0.05	0.05	0.53	0.40	0.40	0.16	0.23	0.23
Male_d1	0.00	0.04	0.04	0.00	0.11	0.11	0.83	0.52	0.52

Note: This table reports the share of the variance of each variable that is explained by the structural shocks. The variance decomposition is computed at the 20th quarter ahead in response to a unit structural shock.

Finally, Table No. 11 shows the model which includes the male unemployment rate in investigating the dynamic relation between consumption, investment and unemployment rates. The findings from this model are not much different from the previous three models. Apart from its own shocks that contribute an important part of its variance (83%), the consumption (25%) and investment (23%) shocks are also important in explaining the variance of the male unemployment rate.

5. Conclusion

This paper presents a dynamic empirical analysis between consumption, investment, and the unemployment rates in Turkey using contemporaneous structural coefficients, impulse responses and forecast error variance decomposition from various Structural Vector Autoregressive (SVAR) models that are applied for the 2005-2016 period, accomplished by using quarterly data. This study uses four different unemployment rates, which are overall, youth, male and female to evaluate the relation between aggregate demand and unemployment rates in Turkey. The analyses provide evidence of a short-run dynamic interaction between the variables of interest. The findings also confirm that the response of unemployment rates to consumption and investment is consistent with conventional macroeconomic views. They typically argue that an increase aggregate demand will increase economic activity and so unemployment rates will decrease.

The findings obtained from all models used in this paper reveal that there is a negative relationship between consumption, investment and the unemployment rates. However, there are some gender alterations in the influence of shocks on unemployment rates. It is observed that a shock caused by consumption has a stronger and deeper effect on youth unemployment rates. The findings present that the second highest response is performed by male unemployment rates in Turkey. It can be also seen that investment, as an important component of aggregate demand, has an effect on all different unemployment rates. The youth and female unemployment rates seem to have a very strong response to investment shocks. The one standard deviation shocks to investment have the biggest

impact on the female unemployment rates higher than other unemployment rates. These results show that shocks in the expansionary aggregate demand in the Turkish economy have a stronger impact on youth and female unemployment rates. However, the duration of this effect varies between two and three quarters.

The effect of consumption shocks on investment is analyzed by different SVAR models. The findings suggest that the effects of consumption shocks on the investment are statistically significant and positive. The evidence of a positive relationship that exists between consumption and investment in Turkey is consistent with the above discussion and conventional wisdom. The abovementioned finding is also supported by the results of impulse response and variance decomposition analyses. The policy implications of findings argue that an expansionary aggregate demand can have temporary effects on unemployment rates. It is thought that the expansionary policies, which are applied in order to promote against the aggregate demand, are necessary for the struggle against unemployment.

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