The Permanent and Transitory Effects on Consumption and Income: Evidence from the Turkish Economy

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Abstract

This paper, using the Turkish data, employs a VAR model to decompose permanent and transitory shocks on consumption and income. Pistoresi (1997), using USA data, reaches an empirical result that the permanent part of private consumption explains the much of the variance of series, whereas that of income explains the less of variance of series. Corugeda, Price and Blake (2007), using the UK data, have the conclusion that permanent shocks are the dominant effects on variances of consumption and income.

Data used for this study is obtained from the Turkish Central Bank EDDS and ranges from 1987:1 to 2006:3. The paper first searches the evidence for consumption literature, then, after monitoring the unit root and seasonality analyses, runs impulse responses and variance decompositions through VAR analyses. At the end of this study, one can reach the relative importance of permanent and transitory impacts on private consumption and GDP of the Turkish Economy.

Keywords: Permanent, transitory, VAR, impulse-response functions, variance decomposition, consumption, income

JEL classification codes: C32, E32

I. Introduction

In this work, temporary and permanent parts of the income and consumption series are considered. The importance of this consideration comes from both empirical searches and mostly theoretical studies in the literature available.

Keynesian Absolute Income Hypothesis states that current consumption depends on current income by the degree of marginal propensity to consumption. Dusenberry's consumption theory mentions the role of being a member in a society and defines the consumption as a dependent variable to the society or club's rules in which individual behavior has been identified. Modigliani's Life-Time Income Hypothesis, Freidman's Permanent Income Hypothesis and Random Walk Hypothesis of consumption indicate that today's consumption is determined by expected average income that will be earned through life. As Modigliani call this life-time income, Friedman defines this permanent income and Hall employs Friedman' permanent income in his consumption model with rational expectations. Decomposition of permanent and temporary parts of income and consumption are defined explicitly in the Friedman's permanent income hypothesis. Then, later, in the consumption studies, the main topic has become mainly the issue of relative importance of permanent part to the temporary part of income in explaining the consumption behavior.

This work goes however not to the field of theoretical disputes but rather to the time series analyses to try to explore the numerical values of, if exists, the permanent and temporary parts of income and consumption. In time series analyses there are some univariate and multivariate methodologies in obtain the permanent part of series such as ARIMA, ARCH, GARCH, Exponential Smoothing, Hodrick-Prescot and VAR models. VAR models, unlike

univariate models, employs more than one endogenous variables which comprise contemporaneous and lagged effects for each other.

This work goes first some empirical evidence to see the results of decompositions of the series then employs a VAR model using Blanchard and Quah (1989) methodology to obtain short run, long run parameters or, in other words to say, temporary and permanent parts of the consumption and income series of the Turkish economy.

II. Literature Evidence

Pistoresi (1997), using two-variable Vector Auto Regression (VAR) and Vector Error Correction Model (VECM), employs USA quarterly data of 1947:1 to 1991:4 with the variables of total disposable income and consumption of non-durables and services. He reaches an empirical result that the permanent part of private consumption explains the much of consumption variance, whereas that of income explains the less of variance of income. In other words, in consumption change, trend dominates the consumption variance, in income change, cycle dominates the income variance.

Corugeda, Price and Blake (2007) employ four variables; non-durable consumption, non-asset income, wealth and relative price of durable goods in a VECM model. Their VECM model runs quarterly UK data ranged from 1975:1 to 2001:2 and has the conclusion that permanent shocks are the dominant effects on both consumption variance and income variance. In their conclusion, forecast error in wealth and relative price of durable goods are also dominated by the permanent components of the series. This later result is inconsistent with the conclusion of Lettau and Ludvigson (2004)'s work in which variance of assets is affected mostly by the transitory shocks (Corugeda, Price and Blake 2007: pp, 12-13).

Berument (2007) runs impulse response and decomposes the forecast error variances from a VAR model that employ the variables of industrial production, prices, commodity prices and exchange rate, spread (between Turkish Central Bank's interbank interest rate and depreciation rate of local currency) and money aggregates(M1 and M2 plus repo). His monthly Turkish data of 1986:5 to 2000:10 has the following conclusion that a positive shock in the spread gives rise to permanent effects on prices, commodity prices, exchange rates but temporary effects on income (output).

Pichetee (2004) proceeds VECM model for the data of Canada, ranged from 1965 to 2003. They include the variables of consumption, disposable income, human wealth (depending o present value of current and future disposable income and expected interest rate), non human wealth (excluding the stock market wealth and housing wealth), stock market wealth and housing wealth. They conclude that most of the variability of consumption, disposable income, housing wealth and non human wealth are determined mainly by permanent shocks while the stock wealth and human wealth variations are affected mostly by transitory shocks.

Blanchard and Quah (1989) consider GNP and unemployment fluctuations and they decompose the shocks into permanent (supply shock) and transitory (demand shock) parts from two variable VAR system. They use quarterly USA data for the period of 1950:2 through 1987:4. After searching the dynamic effects of demand and supply disturbances, they reach the conclusion that demand shocks have hump-shaped effect on output and unemployment and those positive supply disturbances have positive effects on output and unemployment.

Hecq, Palm and Urbain (2000) observe three quarterly USA variables from 1954:1 to 1996:4. These variables are personal consumption expenditures, gross private domestic investment and the output (GDP less the government expenditures). Using VAR

methodology, they decompose permanent and transitory parts of the variables considering several criteria. Considering also, weak and strong reduced forms, some of their findings throughout their work can be stated as that consumption is smoother than output, investment is more volatile than output.

Chen (2006) applies a VECM model to reach permanent and transitory parts of the variances by running quarterly Swedish data for the period of 1980:1 to 2004:4. He has the findings that consumption variance can be explained mainly by permanent part and that movements of disposable income and financial wealth are also determined mainly by permanent parts and that, on the other hand, variance in housing wealth is mostly due to the transitory shocks.

Korenok and Radchenko (2006) follow the trend of fluctuations of US economy by observing the monthly data spanning from 1959:01 to 2002:12. They employ index of industrial production, personal income less transfer payments, manufacturing and trade sales and civilian labor force employed in nonagricultural industries. Their underlined result is that transitory part can play more important role in determining total volatility of economic series than the permanent part can do.

Below are some other related studies that consider the permanent-transitory confusion, short run-long run effects and common deterministic trend in more brief scale in literature evidence. Lage (1997) employs a Kalman Filter to decompose permanent and transitory parts of income to test permanent income hypothesis. They impose permanent-transitory confusion to the household decision model and receive better results in comparison without imposing the restriction. Yang, Bessler and Fungs (2004) investigate the long-run information rule of open interest in futures market. The cointegration and long-run causality test they run, they reach the evidence of long run relation between open interest and futures prices for storable commodities. Their result might be considered in the models of

decomposition of consumption. Fisher (2006) indicates that orthogonal shocks obtained from VECM model would give permanent and transitory parts and compares his results with another decomposition method of Gonzalo Ng (2001). Sakarya, Yurtoğlu and Duvan (1999), in measuring core inflation of Turkey, find that all series they observed show strong common deterministic trend.

The several other studies also might be extended to this literature analyses above presented. However, the main lines and the methodologies would, on average, remain same. Of course one should ask himself or herself if it would really remain same or not? This study concerns, after literature presentation, the Turkish economy case; whether main macro variables of consumption and income are permanent driven or transitory driven. The next section will question this issue and employ necessary time series analyses.

III. Empirical Evidence from Turkey

In section III.1, VAR, Moving Average Representation of VAR and Blanchard and Quah decomposition method are introduced. Section III.2 covers the information for the data and III.3 gives the results of decompositions of permanent and transitory parts of the series.

III.1 Methodology

The Blanchard and Quah methodology is used in this section to decompose the related series into permanent part and transitory part. Then the related equations of the decomposition procedure are given Equations (1) through (8) as explained and depicted by Blanchard and Quah (1989) and Enders (1995: 331-334). The compact form and 2x2 representation of a first order VAR model can be represented by Equations (1) and (2) respectively.

$$X_t = A(L)X_{t-1} + \eta_t \tag{1}$$

where X_t is column vector of stationary variables for consumption (c) and income (y). *A(L)* is a square matrix of A_{ij} and η_t is an 2×1 vector of error terms which are unanticipated component of the series. Then, the following Equation (3) is bivariate moving average representation of VAR in a compact form without intercept term.

$$\begin{bmatrix} c_t \\ y_t \end{bmatrix} = \begin{bmatrix} A_{11}(L) & A_{12}(L) \\ A_{21}(L) & A_{22}(L) \end{bmatrix} \begin{bmatrix} c_{t-1} \\ y_{t-1} \end{bmatrix} + \begin{bmatrix} \eta_{1t} \\ \eta_{2t} \end{bmatrix} \tag{2}$$

$$\begin{bmatrix} c_t \\ y_t \end{bmatrix} = \begin{bmatrix} C_{11}(L) & C_{12}(L) \\ C_{21}(L) & C_{22}(L) \end{bmatrix} \begin{bmatrix} u_{1t} \\ u_{2t} \end{bmatrix} \tag{3}$$

In Equation (3), u_{1t} and u_{2t} are white-noise disturbances with constant variances. Equation (4) shows the instantaneous effect of one unit change in $u_{1,t}$ on y_t. The cumulative effect of unit change in $u_{1,t}$ on y_t through time is given by Equation (5).

$$\frac{\partial y_t}{\partial u_{1,t}} = C_{21}(L) = c_{21}(3) \tag{4}$$

$$\sum_{i=0}^{\infty} \frac{\partial y_{t+i}}{\partial u_{1,t}} = \sum_{i=0}^{\infty} C_{21}(L)^i \tag{5}$$

In Blanchard and Quah representation, u_{1t} is an aggregate demand shock and u_{2t} is a supply shock. In general form, Equation (3) can be decomposed into Equations (6a) and (6b)

$$c_t = \sum_{i=0}^{\infty} c_{11}(i)u_{1,t-i} + \sum_{i=0}^{\infty} c_{12}(i)u_{2,t-i} \quad (6a)$$

$$y_t = \sum_{i=0}^{\infty} c_{21}(i)u_{1,t-i} + \sum_{i=0}^{\infty} c_{22}(i)u_{2,t-i} \quad (6b)$$

VAR residuals η_{1t} and η_{2t} in equation (2) are composites of u_{1t} and u_{2t} given in Equation (3). Blanchard and Quah expect that an aggregate demand shock has no long run effect on GDP (here represented by y) hence, cumulated effect of u_{1t} shock on y_t sequence must be equal to zero as depicted by equation (7). Then the Equation (8) becomes the representation of permanent changes in y_t sequence.

$$\sum_{i=0}^{\infty} c_{12}(i)u_{1,t-i} = 0 \quad (7)$$

$$y_t = \sum_{i=0}^{\infty} c_{22}(i)u_{2t-i} \quad (8)$$

III.2 Data

The data used throughout this study employ private consumption (from now on CONS) and GDP of Turkish economy spanning from first quarter of 1987 to last quarter of 2006 at 1987 constant prices. Since Blanchard and Quah methodology requires stationary forms of the variables (Blanchard and Quah, 1989; Enders, 1995: 332), unit root analyses are conducted first. Table 1 shows the results of DF/ADF and indicates that variables are found I(1) in levels but found I(0) in differences. Therefore from now on first differenced CONS (DCONS) and first differenced GDP (DGDP) are employed for rest of the study. In the VAR analyses to be run, lag length (L) test are done for12, 10, 10, 8, 6 and 4 lags by Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hannan-Quinn Criterion. For each VAR of different lags, the centered seasonal dummy and intervention dummies for 1994 April, 2000 December and 2001 February are also included into the systems. At all horizons, lag length is determined as 4 by SC. Finally VAR with 4 lags is chosen by all criterions. In VAR (4) system, dummies 1994:4 (D1994) and 2001:2 (D2001) are found significant.

Table 1a: Unit Root Tests

In Levels		*DF/ADF*	*%5*	*L*	*p(Q)*
CONS	**a**	1.424	-1.945	4	0.274 (19)
	b	-0.421	-2.900	4	0.289 (19)
	c	-3.250	-3.470	4	0.371 (19)
GDP	**a**	3.273	-1.945	6	0.081 (18)
	b	1.339	-2.901	6	0.075 (18)
	c	-1.717	-3.471	5	0.077 (18)

Table 1b: Unit Root Tests

In Differences		*DF/ADF*	*%5*	*L*	*p(Q)*
CONS	**a**	-2.891	-1.945	3	0.234 (19)
	b	-3.300	-2.900	3	0.276 (19)
	c	-3.327	-3.470*	3	0.279 (19)
GDP	**a**	-1.111	-2.597	7	0.811 (18)
	b	-3.918	-2.901	4	0.064 (19)
	c	-4.143	-3.471	4	0.059 (19)

a $\Delta X_t = \alpha X_{t-1} + e_t$

b $\Delta X_t = a + \alpha X_{t-1} + e_t$

c $\Delta X_t = a + bt + \alpha X_{t-1} + e_t$

* Significant at -3.162 (%10)

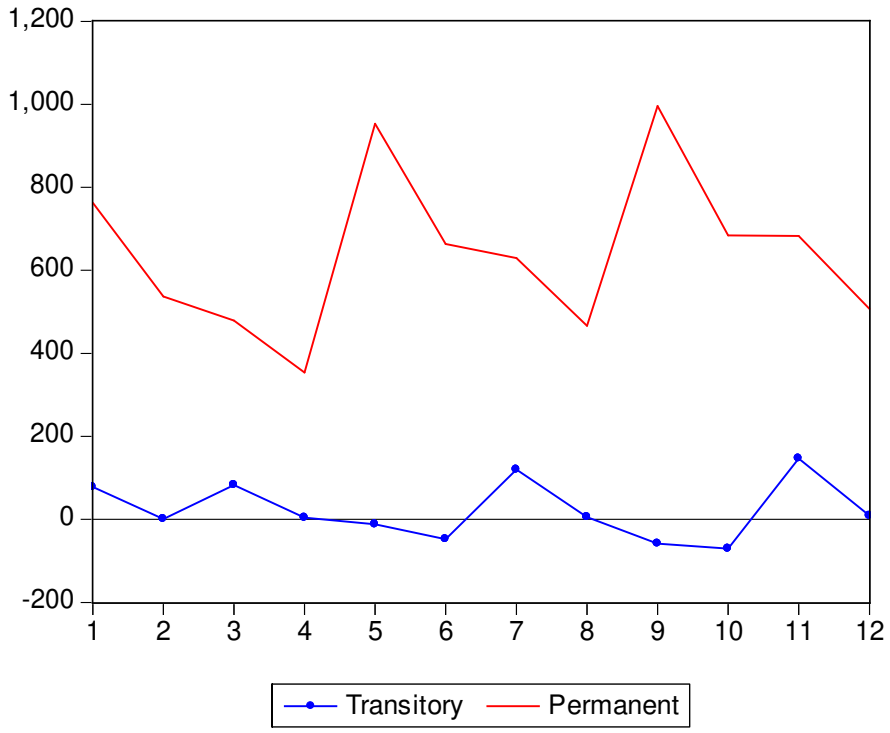
III.3 Obtaining Permanent and Temporary Parts of the Variables

Below Table 2 and Table 3 are the accumulative responses of DCONS and DGDP.

Tablo 2: Accumulated Responses

Accumulated Response of DCONS			Accumulated Response of DGDP	
Period	Transitory	Permanent	Transitory	Permanent
1	78.21643	762.5602	-179.4814	1044.404
2	0.541665	536.8614	-63.39743	754.9810
3	82.92108	478.8824	86.05704	533.6846
4	4.095462	353.5780	46.58651	438.7210
5	-11.90564	953.2254	-171.3626	1299.837
6	-47.78815	663.7180	-67.87393	954.8715
7	119.8799	629.2227	144.2564	673.0658
8	5.717272	466.3314	64.60883	582.4586
9	-58.60529	995.7166	-170.0055	1356.596
10	-70.62238	684.0420	-78.29909	1007.853
11	146.6992	682.9665	174.2795	707.5409
12	8.593191	506.6849	66.33155	640.8303

Figure 1: Accumulated Response of DCONS to Structural One S.D. Innovations



The variables' responses correspond to the transitory shocks and permanent shocks, respectively. Figure 1 and Figure 2 are the plots of these responses. The solid line refers the permanent shock whereas the line with dots represents the transitory shocks. Considering Figure 1 and Figure 2 which

are the graphs of Table 1 and Table 2, one can indicate that the transitory parts of DCONS and DGDP fluctuate around zero means, while permanent parts of these variables fluctuate much more above than zero means permanently.

Figure 2: Accumulated Response of DGDP to Structural One S.D. Innovations

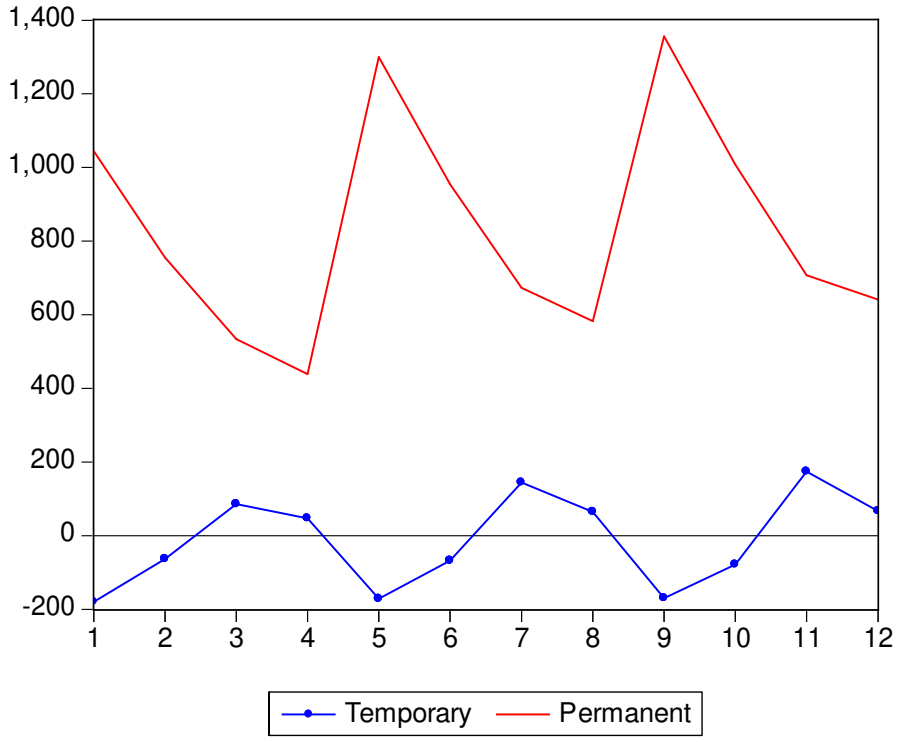


Table 3: Variance Decomposition

Variance Decomposition of DCONS			
Period	S.E.	Transitory	Permanent
1	766.5611	1.041124	98.95888
2	802.8632	1.885104	98.11490
3	809.1583	2.892389	97.10761
4	822.5885	3.716982	96.28302
5	1018.079	2.451272	97.54873
6	1059.050	2.380075	97.61992
7	1072.795	4.762159	95.23784
8	1091.080	5.698680	94.30132
9	1214.431	4.880365	95.11964
10	1253.845	4.587547	95.41245
11	1272.540	7.370254	92.62975
12	1292.094	8.291317	91.70868
Variance Decomposition of DGDP			
Period	S.E.	Transitory	Permanent
1	1059.713	2.868546	97.13145
2	1104.642	3.744286	96.25571
3	1136.460	5.267011	94.73299
4	1141.104	5.343877	94.65612
5	1446.078	5.599118	94.40088
6	1490.252	5.754340	94.24566
7	1531.426	7.367807	92.63219
8	1536.170	7.591191	92.40881
9	1736.131	7.769424	92.23058
10	1773.185	7.715588	92.28441
11	1816.086	9.289652	90.71035
12	1820.514	9.596110	90.40389

Table 3 states that transitory part of DCONS explains at most 8 percent variations of DCONS, whereas permanent part of the same variable explains above 90 percent variations of itself.

Figure 3: Variance Decomposition of DCONS

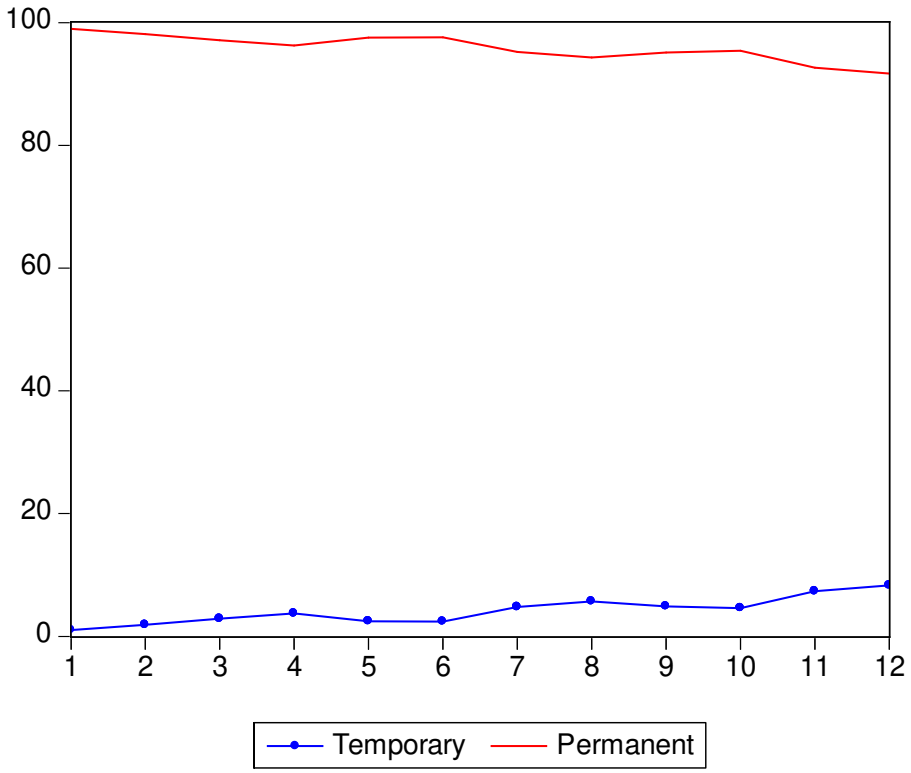


Table 3 concludes as well that, transitory part of DGDP explains at most roughly 10 percent variations of itself, and permanent part of the same variable explains above 90 percent variations of the same variable.

Figure 4: Variance Decomposition of DGDP

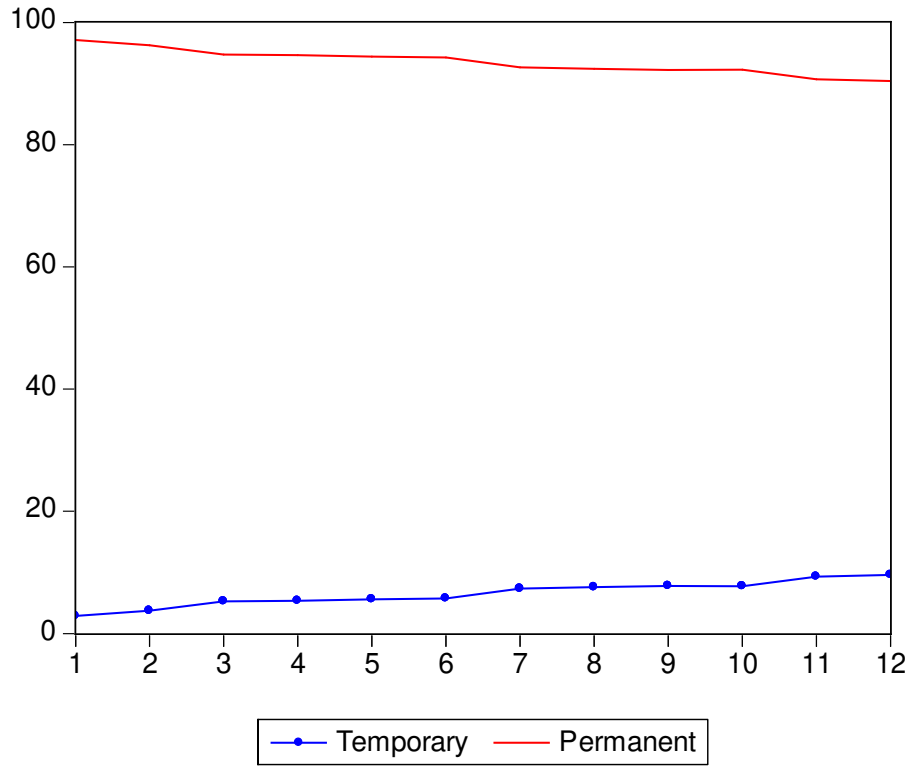


Figure 3 and Figure 4 are the graphical representations of Table 3 and Table 4, respectively. One might have the conclusion from these figures that both DCONS and DGDP can be explained by their permanent changes through all the period this article observed. As for the transitory shocks, in other words to say short term shocks or demand shocks; although they cumulate around the zero mean value, they tend to increase through time.

IV. Summary and Conclusion

This study aims at decomposing the income and consumption series of Turkish economy within a VAR model for the period 1987:1 – 2006:4 by employing Blanchard and Quah (1989) methodology to obtain transitory and permanent parameters. One may evaluate the findings obtained through empirical evidence of this work as follows:

1- The result that the permanent part of consumption dominates the change in consumption yields also conclusion that consumption is smoothed over time by Turkish consumers. This result also is confirmed by Bilgili (2006).

2- The conclusion that permanent part of income dominates the change in income implies that income has a constant and a trend parts having greater values than those of transitory part of income over the related period of Turkish economy.

3-Both results above also give rise to the inference that supply shocks have more considerable effects on consumption and income than the demand shocks.

4- When necessary, policy makers might apply short term public and/or monetary policies. Or when it is required, they could run the long term policies as well. But in any case, policy makers should observe the shocks from permanent and transitory parts of the related variables simultaneously.

5- The remark from 4th result comes from the statistical fact that short term parameters are obtained under the zero restrictions of long term parameters of demand shocks (or vice versa).

6- The main results presented above confirm the Classical and New-Classical results rather than Keynesian results for output level and consumption behavior.

One can mainly state by following the previous remarks that; i) the natural rate hypothesis of Classics dominates the simple Keynesian model of income-expenditure model (see also result 1) and ii) the consumption behavior is explained well by smoothness hypothesis of New Classics, which, in turn, supports the random walk hypothesis (see also remark 2).

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