FINANCIAL INTERMEDIATION AND ECONOMIC GROWTH: A CGE MODEL FOR TURKEY

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Abstract

The aim of this paper is to analyze the relationship between financial development and economic growth. In growth literature, it is indicated that financial intermediation has a positive impact on economic growth. On the other hand, there are multiple number of studies, which claim that credit booms are important indicators of financial crises and economic downturns. Therefore searching for the structure of the preclaimed causal relationship between financial intermediation and growth will help to design effective policies for obtaining a stable growth path. In order for economic modeling, a CGE model, which includes a representative household, a representative firm and a representative bank, is constructed. Since financial intermediaries in Turkey are mostly banks, it is intended in the paper to present the rate of improvement in financial intermediation by the growth of total private credit volume. Following the calibration results of the model, which includes variance decompositions and impulse response functions, an empirical estimation of the relationship between financial intermediation and growth using the causality tests and VAR methodology is presented. The paper concludes with a brief summary of the theoretical and empirical findings.

1.INTODUCTION

The views of positive effects of financial development on economic growth can be traced to schumpeters work(1911) . It was the first attempt in the beginning of twentieth century. In which he suggested that the expansion of financial services were promoting economic growth. He argued that entrepreneurs requires firstly credit in order to realise their production needs

This suggestion emerges from the idea that economic growth requires investment and for realisation of investment, credit services are necessary. Depending on these views, many economist among them Gurley and Shaw (1955) and Goldsmith (1969) defended that financial intermediation stimulate economic growth by improving resource allocation and investment opportunities.

Contrary to these views, some economist questioned the direction of causality relationship between economic growth and financial development. For example Chick (1986) argued that in less developed financial systems credit expansion can have a negative effect on economic growth, whereas in more complicated financial systems credit expansion stimulates economic growth.

McKinnon (1973) and Shaw (1973) argued that financial development could cause economic growth especially via the effective resource allocation channel, unless the government has direct interventions on financial system that degenerates the resource allocation.

More recent works, including Greenwood and Jovanovic (1990),Bencivenga and Smith (1993), Levine (1991,1992) King and Levine (1993a,b), Levine, Loayza, and Beck (2000), focused on the role of intermediation in cases of market intervention by their services of risk pooling and transmission of information among economic agents in an endogenous framework. Furthermore they insisted on the positive effect of financial development on economic growth through the finance of R&D expenditures.

On the other hand, banking and currency crises literature finds that credit expansion is an important predictor of financial crises. For instance, Demirgüç-Kunt and Detraiache (1998) and Kaminsky and Reinhart (1999) declared that there existed a lead-lag relationship between credit expansion and crises by their empirical findings.

One of the important oppositions to the argument of positive impact of financial intermediation on economic growth comes from recent currency crises literature. In third generation models, it is the argued that moral hazard leads banks to take unhedged foreign exchange positions, in order to fulfil the domestic over-borrowing demands stimulated bye the recovery phase of business cycle. The banks implicitly transferring most of the currency

$$V_0 = \int_0^{\infty} \upsilon(x_t)\exp(-\mu t)dt \qquad (1)$$

risk to the government through the deposit insurance scheme. This process usually ends with a currency crises, which threatens stability of economic growth.

In section 2 a dynamic CGE model based on Ramsey-Keynes approach is represented. There are households who consume goods and accumulate their savings in the form of bank deposits, while they earn a wage income and a deposit interest income. The labour supply is assumed to be inelastic and wages are determined by a competitive labour market. The banks are characterised a representative bank which is collecting deposit from households, give some of this capital to private firms and hold the rest as excessive reserves. The basic intuition is that, the banks are risk averse and they have some degree of liquidity preference. The firms make their production decisions where marginal productivity of capital is equal credit interest rate. In section 3 the data and methodology are summarised. In section 4 an unrestricted VAR is estimated in order to explain the bidimensional relationship between the credit expansion and economic growth. Section 5 presents a brief conclusion of the paper.

2.THE MODEL

The model economy is decentralised and there are two factor markets: labour and capital markets. The rental price of labour is the real wage, denoted by $\mathbf{w}_t$: and the real credit interest rate, $\mathbf{r}_{\mathbf{Ct}}$, is the rental price of capital. There is a banking system, which collects deposits from households and pays real deposit interest rate, $\mathbf{r}_{\mathbf{Dt}}$. The typical representative bank is risk averse and holds some of the deposits as excess reserves in order to meet sudden withdrawals. The rest of the deposits are lent to the firms as credit, and the bank earns an interest income over the real credit interest rate, $\mathbf{r_{Ct}}$. The banks have the same liquidity preference function where $\mathbf{x_t}$ is per capita excess reserves and it can be seen in equation (1):

There are many identical households, each with a welfare function given by equation (2), where $\mathbf{c_t}$ is per capita consumption:

$$U_0 = \int_0^{\infty} u(c_t)\exp(-\theta t)dt \qquad (2)$$

Each decides, at any point in time, how much they consume, and how much deposit they accumulate. It is assumed that they save by making deposits in the banking system. On the other hand they earn a wage income with respect to their labour services, which they supply inelastically and an interest income with respect to their deposits.

There are many identical firms with the same technology and this is described in equation (3):

$$y = f(k) = k^{\lambda}; \quad 0 < \lambda < 1 \qquad (3)$$

The constant returns to scale assumption means that the number of firms is of no consequence, provided the firms behave competitively, taking the factor prices facing them as given.

In the whole economy, the total expenditures are characterised by equation (4):

$$y_t = c_t + \dot{k} + nk \qquad (4)$$

The symbol (**.**) shows the time differential of the relevant variable. Equation (4) represents a basic national income identity where total expenditure is equal to national income.

One of the key assumptions is that the households, the firms and the banks have perfect foresight. This means that there is no uncertainty facing any of the economic agents.

Households

The household's welfare function in equation (2) is the discounted sum of instantaneous utilities u(ct). The function u(.) is known as the instantaneous utility function or as "felicity". This utility function is represented by Cobb-Douglas functional form and it presents the required features as mentioned in Blanchard and Fischer, (1989, pp.39). The households maximise the welfare function with respect to consumption and subject to a budget constraint. The model presents a Ramsey problem, which is first introduced by Frank Ramsey, (1928). The equation (5) gives the instantaneous utility function:

$$u(c_t) = c_t^{\alpha}, \quad 0 < \alpha < 1 \qquad (5)$$

"α" represents the intertemporal elasticity of substitution of consumption. "θ", in equation (2), is the rate of household's time preference, or the subjective discount rate. The budget constraint, which is facing the households and with subject to which welfare function will be maximised, can be seen in equation (6):

$$c_t + \dot{d}_t + nd_t = w_t + r_{Dt}d_t \qquad (6)$$

In the maximisation process the control variable is per capita consumption, c_t, and the state variable is per capita deposits, d_t. "n" is the rate of growth of labour force. The relevant Hamiltonian is shown in equation (7):

$$H_t = u(c_t)\exp(-\theta t) + \varphi_1[w_t + (r_{Dt} - n)d_t - c_t] \qquad (7)$$

Necessary and sufficient conditions for the path of c_t to be optimal under the assumptions on the utility function made here can be shown in (8):

$$H_c = 0; \quad \varphi_1 = u'(c_t)\exp(-\theta t)$$
$$-H_d = \dot{\varphi}_1 = (n - r_{Dt})\varphi_1 = (n - r_{Dt})u'(c_t)\exp(-\theta t)$$
$$\lim_{t\to\infty} d_t\varphi_1 \exp(-\theta t) = 0 \qquad (8)$$

The equilibrium solution for households can be summarised as follows:

$$r_D{}^* = \theta + n; \quad c^* = w^* + \theta d^* \qquad (9)$$

As equation (9) suggests, equilibrium deposit interest rate is equal to the households' subjective discount rate plus the rate of growth of labour force. It is similar to the original result of Ramsey, (1928), with only one exception: the interest rate is the not unique and therefore it may not be equal to the rental rate of capital. This gives only the equilibrium level of real deposit interest rate. The equilibrium level of consumption is equal to the equilibrium level of real wage plus real effective interest income earned on equilibrium level of deposits.

Nevertheless, equilibrium levels of real wages and deposits will be solved in the later steps of the model.

The Banks

There are many banks, which have exactly the same risk preferences. The risk preferences are modelled by a Cobb-Douglas form and the bank's instantaneous utility function, $\upsilon(x_t)=x_t^{\beta}$, where "$\beta$" belongs to the range of (0,1), shows that there is a level of excess reserves, which satisfy the liquidity preferences of the bank. Equation (1) shows the bank's sum of discounted utilities coming from holding excess reserves. The optimal path of excess reserves and credits can be obtained by maximising the intertemporal utility of banks subject to the budget constraint, which is shown in equation (10):

$$\dot{k}_t + nk_t = r_{Ct}k_t - r_{Dt}d_t \qquad (10)$$

As deposits are the sum of excess reserves and credits, equation (10) can be reorganised as:

$$\dot{k} = (r_{Ct} - r_{Dt} - n)k_t - r_{Dt}x_t \qquad (10')$$

Equation (10') is the bank's budget constraint. Depending on this information, the relevant Hamiltonian for the optimal choice of bank is shown in equation (11):

$$H_{2t} = \upsilon(x_t)\exp(-\mu t) + \varphi_2[(r_{Ct} - r_{Dt} - n)k - r_{Dt}x_t] \qquad (11)$$

Necessary and sufficient conditions for the path of x_t to be optimal under the assumptions on the utility function made here can be shown in (12):

$$H_x = 0; \quad \varphi_2 = \frac{\upsilon'(x_t)}{r_{Dt}}\exp(-\mu t)$$

$$-H_k = \dot{\varphi}_2 = (r_{Ct} - n - r_{Dt})\varphi_2 = (r_{Ct} - n - r_{Dt})\frac{\upsilon'(x_t)}{r_{Dt}}\exp(-\mu t)$$

$$\lim_{t\to\infty} k_t\varphi_2 \exp(-\mu t) = 0 \qquad (12)$$

The equilibrium solution for banks can be summarised as follows:

$$r_C* = \mu + r_D * + n = \mu + \theta + 2n; \qquad (13)$$

As "μ" in equation (13) represents the bank's coefficient of time preference, it can be interpreted as an indicator of bank's trust to the future of the economic system. If they have more pessimistic expectations and, thus, "μ" is higher, then credit interest rate increases. Equation (13) also gives the bid-ask spread between credit and deposit interest rates, (**r_{Ct} - r_{Dt}**). The equilibrium rate of interest profit for the representative bank is the sum of bank's subjective discount rate plus the rate of growth of labour force. It will later be seen that this equilibrium rate of credit interest is crucial since it determines the credit, or equivalently capital investment, level and consequently the steady state values of all other endogenous variables.

The Firms

The firms are operating in a competitive environment and they take the factor prices from the market as given. The production function, given in equation (3), is the same among all the firms and the optimal demands for factors of production are such that marginal products of capital and labour equal to their real rental prices, $\mathbf{w_t}$ and $\mathbf{r_{Ct}}$. Equation (14), shows the representative firm's profit maximisation levels of factor demands:

$$f'(k_t) = \frac{\lambda}{k_t^{1-\lambda}} = r_{Ct};$$
$$f(k_t) - r_{Ct}k_t = f(k_t) - f'(k_t)k_t = (1-\lambda)k_t^{\lambda} = w_t \qquad (14)$$

The Steady State

In steady state, all the endogenous variables are in their equilibrium levels, and therefore their time differentials are equal to 0. Solving the equations in (14) for the equilibrium values of k and w:

$$k^* = \left(\frac{\lambda}{\mu + \theta + 2n}\right)^{\frac{1}{1-\lambda}}$$
$$w^* = (1-\lambda)k^{*\lambda}$$
$$y^* = k^{*\lambda} \qquad (15)$$

Depending on the equilibrium values in equation (15), the steady state levels of consumption, deposit and excess reserves can be seen below:

$$c^* = k^{*\lambda} - nk^*$$
$$d^* = \left(\frac{\theta + \mu + n}{\theta}\right)k^*$$
$$x^* = \left(\frac{\mu + n}{\theta}\right)k^* \qquad (16)$$

If banks are pessimistic about the future, or, if their subjective discount rates are higher, then the higher are the excess reserves and the lower are the credits, or, in other words the level of capital investment. Higher production means higher wage and deposit income and this, in turn, causes a higher credit and capital investment level. On the other hand higher capital causes higher output. Therefore, there is a bi-directional relationship between production and credit expansion. This model proposes that capital expansion causes economic growth. The behavioural foundations behind this result are presented. Nevertheless, the empirical findings may be opposite.

To test for these results, a VAR is estimated between credit and income growth in the next section.

3.THE DATA AND METHOLOGY

The data are consisted of monthly real credit and real GNP series within the period January 1987 and March 2002. Before estimation the series were deseasonalised and detrended. As it is well known, most of the monthly economic series seem to have high seasonal effects. In order to get rid of the seasonal component, NBER's Census X-11 program, which is one of the most common methods in recent economic literature, is used. The advantage of this program is that it can capture the changes in seasonal effects by time. The traditional method in deseasonalising was that one could estimate the coefficients of monthly dummies on relevant time series. However, by time, there may be changes in the magnitudes of these monthly effects, which can not be captured by dummies. That is exactly what X-Census 11 do.

In order to detrendise time series, the most common approach in recent economic literature was to use Hodrick-Presscott Filter. The advantage of this filter is that it does not fit a linear trend but it fits an optimal, smoothed and the most likely a non-linear trend. This gives the researcher the opportunity to clear the effects of long-term persistent shocks on trend.

4.EMPRICAL ANALYSES

The Cross Correlations

Before estimating the empirical relationship between the credit expansion and the real income growth, it is intended to see the cross correlations between the two variables. This attempt will maintain the lead-lag relationship that is sought.

The cross correlations can be computed as follows:

$$r_{ky}(l) = \frac{\gamma_{ky}(l)}{\sqrt{\gamma_{kk}(l)}\,\sqrt{\gamma_{yy}(l)}}, \qquad l = 0, \pm 1, \pm 2, \ldots \qquad (17)$$

where

$$\gamma_{ky}(l) = \frac{\sum_{t=1}^{T-l}(k_t - \bar{k})(y_{t+l} - \bar{y})}{T}, \qquad l = 0,+1,+2,\ldots$$

$$= \frac{\sum_{t=1}^{T+l}(y_t - \bar{y})(k_{t-l} - \bar{k})}{T}, \qquad l = 0,-1,-2,\ldots \qquad (18)$$

where

l is the number of lags,

T is the number of observations,

and $\gamma_{ky}(l)$ is the cross covariance between ***k*** and ***y*** of order ***l***.

Table.1 in Appendix shows the cross correlations between the deseasonalised and detrendised credit and national income series. The lag periods are chosen as 40 to include all possible effects. The correlations of lagged values of **y** and current value of **k** are significant and positive between 5 and 17 months lags and the highest cross correlation among them is in 10-month-lag period, ($\gamma_{ky}(-10)$ = **0.5424**). Between 20 and 35 months lags, the cross correlations are significant and negative. The highest one among them in absolute value is in 25-month-lag period, ($\gamma_{ky}(-25)$ = **- 0.4142**).

The correlations of lagged values of **k** and current value of **k** are significant and negative between 1 and 7 months lag period where the highest one among them in absolute value is in the second lag, ($\gamma_{ky}(-2)$ = **- 0.3041**).The cross correlation values are significant and positive between 14 and 20 months lags and the highest cross correlation among them is in 18-month-lag period, ($\gamma_{ky}(-18)$ = **0.1671**). Between 29 and 38 months lags, the cross correlations are significant and negative. The highest one among them in absolute value is in 35-month-lag period, ($\gamma_{ky}(-35)$ = **- 0.2350**).

As seen in Table.1 in Appendix, there can be a feedback relationship between two variables. But carefully note that the proposition of credit expansion lead by economic growth is much strongly supported by empirical evidence. This is because the cross correlations show that national income can influence the credit volume much strongly than credit volume can influence it.

The VAR Estimation

To estimate the bidirectional relationship empirically, an unrestricted Vector Autoregression, where the endogenous variables are national income and credit volume series and where there are 25 lags, is estimated. It is intended to use 25 lags, since cross correlations give this approximate number. In Table.2 in Appendix, it is seen that the equation for income growth represented by DY, have a strong explanatory power since the adjusted R^2 is at about 70%. The significancy of the whole model can not be rejected since the F statistic is approximately 8.35. There are 50 parameters and 7 of them are significant: the 7th, 13th, 18th and 23rd lags of credit volume, of which signs are positive; and the 1st, 12th and 13th lags of income where 1st and 13th ones are positive and 12th one is negative. In the second equation for credit volume, which is represented by DK, it is observed that there are again seven significant parameters among the fifty. The coefficient estimates for the 1st and 7th lags of credit are positive and those for the 5th and 16th lags of credit are negative. The coefficient estimates for the 7th and 9th lags of national income are positive, whereas the one for the 15th lag is negative. The results say that both variables influence each other, although the income growth affects credit expansion more strongly than the credit expansion affects it. The magnitudes of the significant parameters give strong evidence in behalf of this proposition. Furthermore, the adjusted R^2 is approximately 71.82%, which is higher than that of the first equation. Also, the F statistic is 9.00 and, therefore, higher than that of the first equation. These results can maintain the researcher some clue about the true nature of the relationship. But to have a more clear understanding, it is necessary to see the variance decompositions and impulse responses.

The Variance Decompositions

The variance decompositions enable the researcher to see the percentage shares of innovations of each variable in the variance of relevant variable. This shows how much each innovation is responsible for the deviations in the endogenous variable. In Table.3-A in Appendix, the variance decompositions of **y** is given for 40 periods. In 25 periods 79.48% of the variance of **y** is explained by the innovation in **y** and 20.52% of the variance is explained by the innovations in credit volume. In 40 periods the share of **y** innovations becomes 78.29% and the share of **k** innovations becomes 21.78%.

In Table.3-B, the variance decompositions of **k** is given for 40 periods. In 25 periods 68.30% of the variance of **k** is explained by the innovation in **k** and 31.70% of the variance is explained by the innovations in **y**. In 40 periods the share of **k** innovations becomes 64.99% and the share of **y** innovations becomes 35.01%.

It is apparent that there is a feedback relationship between credit expansion and income growth, but the impact of income growth on credit expansion is greater than the impact of credit on income.

The Impulse Responses

The impulse responses show the dynamic effects of the innovations to each of the endogenous variables, in this case **k** and **y**. In this paper, the impulse responses are computed by Monte Carlo simulations with 10,000 iterations each time. The results are shown in Figure.1 in Appendix. The positive impulse responses of **y** to an innovation in **k** are between 5^{th} and 16^{th} lag periods and the highest one among them is in the 8^{th} lag and its magnitude is 0.004590. The positive impulse responses of **k** to an innovation in **y** are between 2^{nd} and 19^{th} lag periods and the highest one among them is in the 12^{th} lag and its magnitude is 0.01431. These results confirm that there is a bidirectional relationship between credit expansion and economic growth, but they also imply that economic growth has a higher impact on credit expansion than the impact of credit expansion on economic growth. Conclusively, it can be interpreted that the credit expansion, though it is partly demand driven, stimulates economic growth.

5.CONCLUSION

In this paper, the relationship between the credit expansion and economic growth is examined. The theoretical model proposes that credit expansion stimulates economic growth until it reaches its steady state level. The results of the empirical estimation shows that there is a bi-directional relationship between credit expansion and economic growth in Turkey. Although both variables seem to have impacts on each other, the effect of income growth on credit expansion is greater than the effect of credit expansion on economic growth. The estimation results, variance decompositions and impulse response analysis confirms these findings. These results are similar to Robinson (1952) and some other Keynesian economists. Therefore it can be interpreted that even the credit expansion partly demand driven, the improvement of financial sector will stimulate economic growth.

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APPENDIX

TABLE.1

Date: 07/29/02 Time: 22:47
Sample: 1987:01 2002:03
Included observations: 183
Correlations are asymptotically consistent approximations

DK,DY(-i)	DK,DY(+i)	i	lag	lead
**|. |	**|. |	0	-0.2286	-0.2286
.*|. |	***|. |	1	-0.0995	-0.2727
. |. |	***|. |	2	-0.0034	-0.3041
. |* |	***|. |	3	0.0706	-0.2899
. |* |	**|. |	4	0.1215	-0.2408
. |** |	**|. |	5	0.1738	-0.1919
. |** |	**|. |	6	0.2336	-0.1777
. |*** |	**|. |	7	0.3465	-0.1564
. |**** |	**|. |	8	0.4363	-0.1499
. |***** |	.*|. |	9	0.5250	-0.1224
. |***** |	.*|. |	10	0.5424	-0.0787
. |***** |	. |. |	11	0.5329	-0.0039
. |***** |	. |* |	12	0.4668	0.0590
. |**** |	. |* |	13	0.4135	0.1231
. |*** |	. |* |	14	0.3449	0.1313
. |** |	. |* |	15	0.2429	0.1466
. |** |	. |* |	16	0.2143	0.1386
. |* |	. |* |	17	0.1358	0.1396
. |. |	. |** |	18	0.0372	0.1671
.*|. |	. |* |	19	-0.0764	0.1557
**|. |	. |** |	20	-0.1507	0.1565
**|. |	. |* |	21	-0.2290	0.1307
***|. |	. |* |	22	-0.2766	0.1263
***|. |	. |* |	23	-0.3323	0.1179
****|. |	. |* |	24	-0.3783	0.0576
****|. |	. |. |	25	-0.4142	-0.0061
****|. |	.*|. |	26	-0.4072	-0.0487
****|. |	.*|. |	27	-0.3946	-0.0797
****|. |	.*|. |	28	-0.3920	-0.1062
****|. |	**|. |	29	-0.3718	-0.1597
***|. |	**|. |	30	-0.3220	-0.1984
***|. |	**|. |	31	-0.2943	-0.2188
***|. |	**|. |	32	-0.2508	-0.2274
**|. |	**|. |	33	-0.2197	-0.2279
.*|. |	**|. |	34	-0.1411	-0.2187
.*|. |	**|. |	35	-0.0436	-0.2350
. |. |	**|. |	36	0.0078	-0.2240
. |* |	**|. |	37	0.0938	-0.2049
. |* |	**|. |	38	0.1506	-0.1618
. |** |	.*|. |	39	0.1967	-0.1272
. |** |	.*|. |	40	0.2300	-0.0639

TABLE.2: The Estimation Results

Date: 07/29/02 Time: 15:41
Sample(adjusted): 1989:02 2002:03
Included observations: 158 after adjusting Endpoints
Standard errors & t-statistics in parentheses

	DY	DK
DY(-1)	0.737010 (0.09353) (7.88015)	0.293923 (0.19071) (1.54117)
DY(-2)	0.069777 (0.11759) (0.59340)	0.071556 (0.23978) (0.29843)
DY(-3)	0.064442 (0.11555) (0.55768)	-0.306286 (0.23563) (-1.29988)
DY(-4)	-0.096885 (0.11602) (-0.83505)	0.097240 (0.23659) (0.41101)
DY(-5)	-0.007234 (0.11601) (-0.06235)	-0.029776 (0.23656) (-0.12587)
DY(-6)	0.044534 (0.11565) (0.38506)	-0.241761 (0.23583) (-1.02513)
DY(-7)	-0.027491 (0.11535) (-0.23833)	0.420734 (0.23521) (1.78878)
DY(-8)	-0.084834 (0.11515) (-0.73673)	-0.124778 (0.23480) (-0.53141)
DY(-9)	-0.044057 (0.11532) (-0.38205)	0.559841 (0.23515) (2.38082)
DY(-10)	0.079238 (0.11756) (0.67402)	-0.168865 (0.23972) (-0.70442)
DY(-11)	-0.158134 (0.11736) (-1.34746)	0.217815 (0.23931) (0.91020)
DY(-12)	-0.313034 (0.11971) (-2.61487)	-0.172399 (0.24411) (-0.70624)
DY(-13)	0.214391 (0.11938) (1.79583)	0.148945 (0.24344) (0.61184)
DY(-14)	0.078366 (0.11286) (0.69433)	0.198922 (0.23015) (0.86433)
DY(-15)	0.043431 (0.11338) (0.38304)	-0.406129 (0.23121) (-1.75656)
DY(-16)	-0.156265 (0.11693) (-1.33636)	0.290802 (0.23844) (1.21960)
DY(-17)	0.086388 (0.11685) (0.73933)	0.073601 (0.23826) (0.30890)

DY(-18)	-0.084802 (0.11735) (-0.72265)	-0.091666 (0.23929) (-0.38308)
DY(-19)	0.003093 (0.11752) (0.02632)	-0.256110 (0.23964) (-1.06871)
DY(-20)	-0.071686 (0.11802) (-0.60739)	0.346380 (0.24066) (1.43927)
DY(-21)	0.024763 (0.11927) (0.20762)	0.117033 (0.24321) (0.48120)
DY(-22)	-0.115273 (0.11899) (-0.96875)	0.203019 (0.24264) (0.83672)
DY(-23)	0.110760 (0.11957) (0.92628)	0.046253 (0.24383) (0.18970)
DY(-24)	-0.126609 (0.11925) (-1.06173)	-0.288217 (0.24316) (-1.18529)
DY(-25)	-0.040329 (0.10398) (-0.38784)	0.032095 (0.21204) (0.15137)
DK(-1)	-0.009249 (0.04832) (-0.19141)	0.717925 (0.09853) (7.28662)
DK(-2)	0.002103 (0.05866) (0.03584)	0.010757 (0.11962) (0.08993)
DK(-3)	-0.018531 (0.05832) (-0.31773)	0.058118 (0.11893) (0.48867)
DK(-4)	0.048267 (0.05783) (0.83458)	0.025246 (0.11793) (0.21408)
DK(-5)	0.040973 (0.05734) (0.71462)	-0.235008 (0.11691) (-2.01011)
DK(-6)	-0.047954 (0.05782) (-0.82933)	-0.163712 (0.11791) (-1.38848)
DK(-7)	0.104631 (0.05803) (1.80304)	0.209120 (0.11833) (1.76724)
DK(-8)	-0.070867 (0.05956) (-1.18976)	-0.053812 (0.12146) (-0.44305)
DK(-9)	0.010793 (0.05956) (0.18122)	0.008731 (0.12145) (0.07189)
DK(-10)	0.017718 (0.05814) (0.30471)	-0.029108 (0.11856) (-0.24550)
DK(-11)	0.028458 (0.05810) (0.48979)	-0.194250 (0.11848) (-1.63954)
DK(-12)	-0.021753 (0.05859) (-0.37129)	-0.006922 (0.11947) (-0.05794)
DK(-13)	0.109106 (0.05862) (1.86121)	-0.001900 (0.11954) (-0.01590)
DK(-14)	-0.087091 (0.06059) (-1.43741)	0.086189 (0.12355) (0.69761)
DK(-15)	0.040835 (0.06133) (0.66579)	0.073541 (0.12507) (0.58802)
DK(-16)	-0.075646 (0.06206)	-0.237017 (0.12654)

	(-1.21901)	(-1.87308)
DK(-17)	0.027427	0.185079
	(0.06351)	(0.12950)
	(0.43188)	(1.42923)
DK(-18)	0.120402	-0.040411
	(0.06402)	(0.13054)
	(1.88081)	(-0.30958)
DK(-19)	-0.077679	-0.087281
	(0.06325)	(0.12897)
	(-1.22820)	(-0.67677)
DK(-20)	0.027504	-0.123918
	(0.06308)	(0.12863)
	(0.43602)	(-0.96340)
DK(-21)	-0.061236	0.141428
	(0.06175)	(0.12592)
	(-0.99166)	(1.12319)
DK(-22)	0.004168	-0.131395
	(0.06214)	(0.12672)
	(0.06707)	(-1.03690)
DK(-23)	0.154835	0.145004
	(0.06174)	(0.12590)
	(2.50783)	(1.15177)
DK(-24)	-0.047254	-0.115743
	(0.06388)	(0.13026)
	(-0.73971)	(-0.88853)
DK(-25)	-0.043357	0.044759
	(0.04973)	(0.10140)
	(-0.87191)	(0.44141)
C	0.000192	-0.000634
	(0.00146)	(0.00298)
	(0.13158)	(-0.21261)
R-squared	0.796105	0.807942
Adj. R-squared	**0.700827**	**0.718195**
Sum sq. resids	0.035537	0.147764
S.E. equation	0.018224	0.037161
F-statistic	**8.355597**	**9.002471**
Log likelihood	439.3901	326.8118
Akaike AIC	-4.916330	-3.491288
Schwarz SC	-3.927771	-2.502729
Mean dependent	-0.000496	-0.000844
S.D. dependent	0.033319	0.070003
Determinant Residual Covariance		2.08E-07
Log Likelihood		766.9367
Akaike Information Criteria		-8.416920
Schwarz Criteria		-6.439801

TABLE.3-A: Variance Decomposition of y

Period	S.E.	y	k
1	0.014997	100.0000	0.000000
2	0.018649	99.97721	0.022790
3	0.020791	99.95403	0.045966
4	0.022486	99.78600	0.213995
5	0.023268	99.78954	0.210458
6	0.023743	99.05692	0.943080
7	0.024163	98.72740	1.272598
8	0.024768	95.35512	4.644876
9	0.025127	92.91523	7.084770
10	0.025404	90.90682	9.093184
11	0.025671	89.05110	10.94890
12	0.026205	86.94629	13.05371
13	0.027812	87.13657	12.86343
14	0.029625	85.46711	14.53289
15	0.030663	84.66135	15.33865
16	0.031352	83.87068	16.12932
17	0.031645	84.16829	15.83171
18	0.031815	83.94639	16.05361
19	0.031971	84.08101	15.91899
20	0.032239	83.23147	16.76853
21	0.032435	82.32353	17.67647
22	0.032766	80.68553	19.31447
23	0.033055	79.28589	20.71411
24	0.033174	79.26879	20.73121
25	0.033474	79.47763	20.52237
26	0.033747	79.26494	20.73506
27	0.033848	78.85274	21.14726
28	0.033902	78.66018	21.33982
29	0.033909	78.65734	21.34266
30	0.033929	78.59964	21.40036
31	0.033935	78.60093	21.39907
32	0.033943	78.58218	21.41782
33	0.033952	78.57744	21.42256
34	0.033969	78.59848	21.40152
35	0.033974	78.57869	21.42131
36	0.034021	78.36453	21.63547
37	0.034054	78.22252	21.77748
38	0.034070	78.21389	21.78611
39	0.034107	78.25641	21.74359
40	0.034138	78.29335	21.70665

TABLE.3-B: Variance Decomposition of k

Period	S.E.	y	k
1	0.030581	0.925855	99.07415
2	0.037657	0.982199	99.01780
3	0.041319	2.886805	97.11319
4	0.043519	3.084543	96.91546
5	0.045165	3.470095	96.52990
6	0.045417	4.144991	95.85501
7	0.045807	4.115891	95.88411
8	0.045968	4.152188	95.84781
9	0.046167	4.150570	95.84943
10	0.047204	7.434624	92.56538
11	0.048450	10.88696	89.11304
12	0.051145	17.59997	82.40003
13	0.053448	21.96205	78.03795
14	0.055376	23.89296	76.10704
15	0.056493	26.16997	73.83003
16	0.056573	26.37336	73.62664
17	0.056739	26.79713	73.20287
18	0.057225	26.79943	73.20057
19	0.058220	25.99783	74.00217
20	0.058987	25.78896	74.21104
21	0.059259	26.33885	73.66115
22	0.060130	27.68568	72.31432
23	0.061034	29.01948	70.98052
24	0.061763	30.33723	69.66277
25	0.062465	31.70077	68.29923
26	0.063357	32.82713	67.17287
27	0.063746	33.48868	66.51132
28	0.064114	34.15837	65.84163
29	0.064381	34.66237	65.33763
30	0.064891	35.58767	64.41233
31	0.065293	35.85332	64.14668
32	0.065510	35.72361	64.27639
33	0.065542	35.68925	64.31075
34	0.065638	35.59789	64.40211
35	0.065762	35.46454	64.53546
36	0.065810	35.43762	64.56238
37	0.065831	35.41883	64.58117
38	0.066039	35.29413	64.70587
39	0.066455	35.00966	64.99034
40	0.066779	35.01451	64.98549

FİGURE.1: Impulse Responses