Money Shocks and Output:
A Contemporary Money Demand Approach[*]

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Abstract

We analyze the short-run effects of money shocks on output in the contemporary world. As our benchmark case, we visit Bernanke (1983) for the Turkish economy over the monthly period 2002M1-2006M10. We show that money shocks affect output with a lag of one month. After that, we introduce our contemporary model in which we include the effects of the usage of bank cards (i.e., credit and debit cards) into our analysis. Our contemporary model suggests that money shocks affect output for longer periods compared to the results obtained by the method of Bernanke (1983).

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1. Introduction

There is now an enormous literature on the relation between monetary surprise and output. Early studies in this area include Barro (1978) and Bernanke (1983), among many others. In the next section, we visit these studies by applying them on the Turkish economy over the monthly period 2002M1-2006M10. In Section 3, by considering the developments in money demand equations, we extend our analysis through searching for the effects of money on output in the contemporary world. Section 4 concludes.

2. Benchmark Model

Bernanke (1983) defines short-run money shocks (i.e., realized money growth minus expected money growth) as the residuals obtained from a regression of the rate of growth of money on four lags of the growth rates of industrial production, prices and money itself. By using these residuals, Bernanke analyzes the effects of money shocks on the output by regressing the rate of growth of industrial production on three lags of money shocks together with two lags of growth of industrial production itself. We are going to accept this approach as our benchmark case, and compare it with our results coming from our contemporary model in the next section. The benchmark results for the Turkish economy are depicted in Table 1.

[Table 1 is about here]

As is evident by Table 1, a money shock affects output only with a lag of one month. This result remains the same even if we consider different lags of money shocks as our independent variables. In particular, a one percent money shock has a positive effect of 0.35 percent on the Turkish output. This is consistent with the results of Barro (1978) and Bernanke (1983) in terms of showing the positive effects of money shocks on the output.

TABLE 1

Benchmark Growth Equations

Variables	**Dependent Variable:** y_t							
y_{t-1}	-0.53* (0.13)	-0.60* (0.13)	-0.60* (0.13)	-0.59* (0.14)	-0.59* (0.14)	-0.60* (0.13)	-0.59* (0.13)	-0.59* (0.14)
y_{t-2}	-0.27** (0.13)	-0.33** (0.13)	-0.33** (0.13)	-0.33* (0.14)	-0.35* (0.14)	-0.33* (0.13)	-0.33* (0.14)	-0.35* (0.14)
ε_t^B	-	0.01 (0.19)	-	-	-	0.01 (0.18)	-0.01 (0.19)	-0.01 (0.20)
ε_{t-1}^B	-	-	0.35*** (0.18)	-	-	0.36*** (0.18)	0.36*** (0.19)	0.38*** (0.20)
ε_{t-2}^B	-	-	-	-0.04 (0.20)	-	-	-0.04 (0.20)	-0.04 (0.20)
ε_{t-3}^B	-	-	-	-	0.09 (0.20)	-	-	0.10 (0.20)
R-bar sqd.	0.23	0.26	0.31	0.26	0.26	0.29	0.28	0.27

Notes: y_t denotes growth rate of industrial production at time *t*, and ε_t^B denotes the money shock defined as the residual at time *t* obtained from the regression defined by Bernanke (1983). *, ** and ** indicate significance at the 10%, 5% and 1% levels, respectively. Standard errors are in parenthesis. Estimation is by OLS. The sample size in each equation is 54.

3. Contemporary Model

Following Yazgan and Yilmazkuday (2007), we estimate the following money demand equation, which is in first-order (semi) log-linear form, by using Generalized Method of Moments (GMM):[1]

$$\Delta m_t = \lambda\beta_0 + \lambda\beta_c \Delta c_t + \lambda\beta_d \Delta d_t + \lambda\beta_r \Delta r_t + \lambda\beta_p \Delta p_t + \lambda\beta_y \Delta y_t + (1-\lambda)\Delta m_{t-1} + \varepsilon_t^C \qquad (1)$$

where $\varepsilon_t^C = -\beta_r \left(r_t - E\left(r_t\right)\right) - \beta_p \left(p_t - E\left(p_t\right)\right) - \beta_y \left(y_t - E\left(y_t\right)\right) + \mu_t$.

In Equation (1), m_t is a (log) measure of currency held at the beginning of period; c_t is a (log) measure of credit card usage; d_t is a (log) measure of debit card usage; r_t is a measure of interest rate; p_t is a (log) measure of price level; y_t is a (log) measure of income during period t; $0 \le \lambda \le 1$ is a measure of speed of adjustment; E is the expectation operator; and β_0 is a constant that captures the technological progress in transaction technology.

For the purpose of this paper, the important part of Equation (1) is the error term, ε_t^C, which reflects the shocks to the growth of money in the *contemporary* world after assuming monetary market equilibrium. As is evident, these shocks depend on the expectation errors of the interest rate, price level and output. Instead of the money shocks determined by the method of Bernanke (1983), we use the money shocks obtained as the residuals from the estimation of Equation (1) in our contemporary model. By using exactly the same sample period as we have used to obtain the results in Table 1, we obtain the results for our contemporary model in Table 2.

[Table 2 is about here]

[1] We use exactly the same methodology and data set. See Yazgan and Yilmazkuday (2007) for the details of the estimation together with the data description and the results.

TABLE 2

Contemporary Growth Equations

Variables	**Dependent Variable:** y_t							
y_{t-1}	-0.53* (0.13)	-0.52* (0.12)	-0.47* (0.13)	-0.48* (0.12)	-0.58* (0.14)	-0.46* (0.13)	-0.41* (0.12)	-0.46* (0.14)
y_{t-2}	-0.27** (0.13)	-0.23** (0.12)	-0.24*** (0.13)	-0.33* (0.12)	-0.27* (0.13)	-0.21*** (0.12)	-0.27** (0.12)	-0.26** (0.16)
ε_t^C	-	-0.19* (0.09)	-	-	-	-0.19* (0.09)	-0.13 (0.09)	-0.13 (0.08)
ε_{t-1}^C	-	-	0.13 (0.09)	-	-	0.13 (0.09)	0.14** (0.09)	0.15** (0.08)
ε_{t-2}^C	-	-	-	-0.25* (0.09)	-	-	-0.22** (0.09)	-0.20** (0.10)
ε_{t-3}^C	-	-	-	-	-0.01 (0.10)	-	-	-0.03 (0.10)
R-bar sqd.	0.23	0.28	0.25	0.31	0.24	0.29	0.34	0.34

Notes: : y_t denotes growth rate of industrial production at time *t*, and ε_t^C denotes the money shock defined as the residual at time *t* obtained from the regression defined by Equation (1) in the text. *, ** and ** indicate significance at the 10%, 5% and 1% levels, respectively. Standard errors are in parenthesis. Estimation is by OLS. The sample size in each equation is 54.

As is evident by Table 2, money shocks affect output with lags of up to two months. Notice that the current money shocks also have their effect on the output according to the second and the sixth columns of Table 2. Nevertheless, we achieve the best explanatory power in the seventh column of Table 2 in which the money shocks affect output with lags up to two months. Compared to the results in Table 1, money shocks have longer effects on output according to our contemporary model. Moreover, the results in Table 2 have higher explanatory powers compared to the results in Table 1.

4. Conclusions

We analyzed the short-run effects of money shocks on output in the contemporary world. As our benchmark case, we visited Bernanke (1983) for the Turkish economy over the monthly period 2002M1-2006M10. We showed that money shocks affect output with a lag of one month. After that, we introduced our contemporary model in which we include the effects of the usage of credit and debit cards into our analysis. Our contemporary model suggests that money shocks affect output for longer periods compared to the results obtained by the method of Bernanke (1983).

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