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THE IMPACT OF GOVERNMENT DEFICITS ON MONEY DEMAND: EVIDENCE FROM SAUDI ARABIA

Key Words

*Deficits;
Money Demand.*

Abstract

This study examines the effect of budget deficit on money demand in Saudi Arabia. The Cointegration test indicates the existence of a long run equilibrium between money demand and its determinants; namely, gross domestic product, government expenditure, interest rate, inflation rate, and budget deficits. The Error Correction Model shows that 40% of the disequilibrium in money demand is corrected each year. The coefficient of the budget deficit is statistically significant but negative in both long and short runs. This result does support neither the Keynesian-Neoclassical point view nor the Ricardian hypothesis. This result may be attributed to two reasons: first, the ratio of budget deficit to GDP is very small. Therefore, the results may differ if the ratio of budget deficit to GDP increases over time. Second, government bonds are not part of the household's wealth since government are held only by commercial banks. However, the results may change if government allows the public to hold government's bonds.

Introduction

Economists have been long concerned with the relationship between budget deficits and a number of macro-variables in the economy. In particular, the relationship between

budget deficits and money demand has received considerable attention in recent years. Economists have different views regarding the impact of government deficits on money de-

mand. On the one hand, neoclassical and Keynesian models maintain that budget deficits have a positive impact on money demand. On the other hand, Ricardian models hold that budget deficits have no effect on money demand. This debate over the impact of the budget deficits on money demand is a part of a much wider discussion over the validity of the Keynesian and Ricardian paradigms.

The purpose of this paper is to investigate the effect of budget deficits on money demand in the Kingdom of Saudi Arabia. Section II of it will be devoted to theoretical arguments and to some previous empirical works regarding the effect of the budget deficit on money demand. Section III discusses the methodology used to test the effect of budget deficit on money demand and presents the empirical results. Section IV concludes the paper.

Theoretical Background

The relationship between government budget deficits and money demand in the neoclassical, Keynesian, and Ricardian models can be explained by using a simple IS-LM model.

Keynesians and neoclassicists explain their view of the relationship between budget deficits and money demand as follows. At less than full

employment level of output, the engagement of expansionary fiscal policy, either by increasing government expenditure or by tax cut, will widen the budget deficit. The increase in the budget deficit will, in turn, have a positive impact on aggregate demand which depends on the multiplier's magnitude. The rise in aggregate demand will, in turn, increase the demand for money for transaction purposes. Moreover, when a government decides to keep its expenditure level, which is financed through the issuance of bonds rather than through taxation, net worth rises. The holding of government bonds by the private sector redistributes the wealth from the public sector (Whose net worth falls) to the private sector (whose net worth rises) because of interests payments on bonds (Harris, 1985). As net wealth of the households rises, consumption also rises since consumption is the function of net wealth. The high consumption expenditure will stimulate the national income through the multiplier process. The rise in national income will in turn increase the demand for money for transaction purposes. Therefore, money demand rises as people hold more government bonds since money demand is the function of wealth. (Gulley, 1994). If the money supply is held constant⁽¹⁾,

(1) In fact Joines (1985), believes that there is no relationship between non-war budget deficit and the growth of high powered money.

i.e. the budget deficit is financed through the issuance of government bonds, interest rates must rise too (Bernheim, 1989). The over all effects of budget deficits is to increase money demand which in turn will increase interest rates. The rise in interest rates ultimately crowds out private investment.

The increase in the household wealth caused by the budget deficit will cause IS curve to shift outward. LM curve, on the other hand, will shift inward since the increase in the budget deficits will cause money demand for transaction purposes to increase as long as money supply remains constant. The magnitude of the two shifts will determine the new equilibrium points of interest rate and the national income which will be higher than their original equilibrium. The increase in the interest rate will in turn reduce investment demand which partially offsets the initial increase in national income. However, Eisner (1989) argued that budget deficits do not have to crowd out investment. This is due to the fact that as income increases, the demand for capital goods increases too to maintain the new level of output as long as output is under full employment level of output. (Eisner, 1989).

Although, the neoclassical-Keynesian model has similar views regarding the effect of the budget deficit in the

short run, the neoclassical model is different from that of the Keynesian model in the long run since the neoclassical model assumes that all resources are fully employed. At full employment level of output, the level of output is independent of the budget deficit since the increase in the household's wealth means a reduction in other private expenditure. Hence, the budget deficit has no impact on money demand in the long run (Yellen, 1989).

On the other hand, the Ricardian equivalence hypothesis, which is largely attributed to Barro (1974), holds that budget deficits have no impact on real variables including money demand in both short and long runs since government bonds are not considered net wealth to bondholders (Vamvoukas, 1998). The Ricardian equivalence hypothesis assumes that the government keeps its expenditure level fixed over time. Therefore, when the government cuts taxes, budget deficits must rise. But, the tax cut at present means high future taxes which have the same present value as the initial tax cut, since governments equate its total spending in each period with its total revenues from taxes and government bonds. Hence, the present value of government expenditure determines the present value of taxes and other revenues. Thus, the present value of taxes and other revenues will not change as long as the

present value of government expenditures remains unchanged. (Barro, 1989). The issuance of government bonds to finance its expenditures is considered as assets to bondholders, but at the same time it represents liabilities to households as the government increases taxes in the future in order to redeem the bonds. If the assets and the liabilities are equal, the net wealth of the society will remain unchanged. Since wealth does not change, consumption will not change also. As a result, aggregate demand would not be affected too (Vamvoukas, 1998). On the other hand, government savings would decline as government deficits rise, but that would be matched by an equal increase in private saving since individuals have to pay the anticipated higher taxes in the future. Therefore, the net change in national saving sum-up to zero. Thus, interest rate will not change as saving and investment maintain their equality. Since budget deficits have no impact on saving and in turn on interest rate, money demand will not be affected by the budget deficit (Barro, 1989). According to the Ricardian equivalence hypothesis, IS-LM curves will not shift as budget deficits rise. Therefore, the budget deficits have no impact on consumption, saving, interest rate, investment, and, ultimately, on money demand (Vamvoukas, 1998,).

Previous Empirical Works:

Extensive empirical works have been done to test the neoclassical-Keynesian proposition and the Ricardian equivalence hypothesis. But these works are not conclusive. Some empirical findings gave support to the neoclassical-Keynesian proposition, where some supported the Ricardian equivalence hypothesis. Hamburger and Zwick (1981), Hoelscher (1986), Yellen (1989), Tanner and Devereux (1993), Vamvoukas (1998), and Abizadeh and Yousefi (1998) among others found that budget deficits have a significant positive impact on money demand. Therefore, their findings support the neoclassical-Keynesian proposition. On the other hand, Joines (1985), Barnhart and Darrat (1988), and Gully (1994) among others found that money demand is independent of the budget deficits. Hence, their findings are consistent with the Ricardian equivalence hypothesis.

The Methodology and the Empirical Results

In order to assess the effect of the budget deficits on money demand, the following money demand equation is estimated:

$$M_t^d = \alpha_0 + \alpha_1 GDP_t + \alpha_2 R_t + \alpha_3 BDEF_t + \alpha_4 INF_t + \alpha_5 G_t + U_t \quad (1)$$

Where:

M_t^d = money demand.

GNP_t = gross domestic product.

R_t = interest rate.

$BDEF_t$ = budget deficit.

INF_t = inflation rate.

G_t = government expenditure.

U_t = which noise disturbance term

The annual data employed in this study cover the period from 1969-2002 obtained from the thirty ninth annual report of Saudi Arabian Monetary Agency (SAMA, 2003).

According to the economic theory, the gross domestic product and government expenditure in real terms are expected to influence money demand positively. On the other hand, interest rate and inflation are expected to influence money demand negatively. According to the Ricardian equivalence hypothesis, budget deficit is expected to have no effect on the money demand i.e. $\alpha_3 = 0$. on the other hand, under Keynesian-neoclassical proposition, deficit is expected to influence the money demand positively, i.e. $\alpha_3 > 0$.

Econometric Methodology and Results:

Most economic time series have been found to be non-stationary, since

they contain stochastic elements as many studies indicated including, Nelson and Plosser (1982) and as proved by Stock and Watson (1987). Thus a misspecification of trend element may result in incorrect tests. To test for this possibility, the study applied Augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979, 1981) which is specified as follows:

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \sum_{j=1}^p \beta \Delta Y_{t-j} + \varepsilon_t \quad (2)$$

The null hypothesis states that the variable under investigation (Y) has a unit root. The null hypothesis should be rejected if the calculated test statistic is negative and less than the critical value.

The ADF test is conducted to check for a unit root for all variables in both levels and first differences. These tests are presented in Table (1), which reveals that the null hypothesis of a unit root cannot be rejected for all variables in levels. The results further suggest that taking first differences remove these roots from the series implying that these variables at their first difference are stationary, i.e., $I(1)$.

Table 1
Augmented Dickey-Fuller (ADF) Unit Root Tests

Variables	ADF in levels	ADF in Differences
M_t	-2.35	-4.62**
GDP_t	-3.03	-5.49**
$BDEF_t$	-3.028	-5.26**
G_t	-3.09	-5.40**
INF_t	-2.88	-4.66**
R_t	-3.42	-4.91**

** Significant at the (1%) level.

Cointegration Estimate and Tests:

Having determined the stationarity of the time series and the degree of integration, the next step is to test for possible long run relation that might exist between the variables included in the model. According to Engle and Granger (1987), the non-stationary series with the same order of integration may be cointegrated if there exist some linear combination of the series that can be tested for stationarity i.e. $I(0)$. In this sense, the cointegration test is a test of possible long run stable relationship among levels of non-stationary eco-

nomic variables although they may be in disequilibrium in the short-run.

Two different tests of cointegration have been used to test for long run equilibrium relationship. First, Engle and Granger two-step method test is applied. It involves estimating equation (1) by the Ordinary Least Squares (OLS) and testing residuals for stationarity. If the residuals are integrated of degree zero, then the linear combination of the variables in the demand for money relation is cointegrated.

The estimation of equation (1), the money demand relation, gives the following integration equation:

$$M_t = -0.95 + 0.12GDP_t - 0.004BDEF_t + 0.79G_t - 0.03INF_t - 0.31R_t \quad (3)$$

$(-1.62) \quad (2.12) \quad (-2.75) \quad (14.91) \quad (-5.09) \quad (-3.29)$

$R^2 = 0.98 \quad F = 198.32 \quad D - W = 1.35$

The estimated parameters of equation (3) indicate that gross domestic product and the government expenditures affect money demand positively while the rate of inflation and the interest rate have negative effects on money demand which is in accordance with the economic theory. However, the effect of budget deficit on money demand is negative which does not support either the Keynesian-Neoclassical preposition or the Ricardian hypothesis. Theoretically, this result may be attributed to the fact that government bonds are held only by commercial banks. Therefore, they are not considered a part of the household's wealth. Since net wealth of the households does not change, money demand will not change too. As Al-Batil (2002) indicated, financing government expenditure in Saudi Arabia through borrowing leads to crowding out of private investment. This may increase interest rate which in turn has a negative effect on money demand. However, domestic interest rate is not determined through money market. Saudi Arabian Monetary Agency (SAMA) has been following a conservative monetary policy, in order to keep the inflation rate always down; by controlling monetary aggregates. Alshebel and Al-Hassan (2001) noted that price stability is one of the most important goals of the monetary policy.

ADF test for residuals of equation (3) which equals (-4.05) suggests the rejection of the null hypothesis at (1%) level. This result implies that residuals are stationary and there exists a long run relationship between money demand and its determinants in Saudi Arabia. Moreover, the existence of the cointegration is an indication of stable money demand function.

Johansen--Juselius (1990) procedure is used to further confirm the existence of cointegration between money and its determinants obtained from Engle-Granger two step method. A Vector Autoregressive Model (VAR) with K lags that can be expressed as

$$X_t = \sum_{i=1}^k A_i X_{t-i} + \mu + e_t \quad (4)$$

Where X_t is a column vector of all variables in the model i.e.

$$X_t = \begin{bmatrix} M_t \\ GDP_t \\ R_t \\ BDEF_t \\ INF_t \\ G_t \end{bmatrix}$$

Equation (4) can be rewritten as:

$$\Delta X_t = \Pi X_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta X_{t-i} + \mu + e_t \quad (5)$$

Where Δ refers to the first difference, $\Pi = \sum_{i=1}^k A_i - I$ is a $P \times P$ matrix, $\Gamma_i = \sum_{j=1}^k A_j - I$, and μ is the constant or drift term.

The long-run relationship between series is determined by the rank of Π . There are three possible cases for the rank of Π . If $\text{rank}(\Pi) = 0$, then $\Pi = 0$, all of the processes in X_t are non-stationary. If $\text{rank}(\Pi) = P$, then all of the variables in X_t are stationary in levels. If $1 \leq \text{rank}(\Pi) < P$, then all of

the variables in X_t are cointegrated with one or more cointegrating vectors.

Table (2) presents the cointegration test based on Johansen and Juselius of possible long-run equilibrium relationship between money demand and its determinants.

The results of table (2) indicate the existence of one cointegrated vector between money demand, gross domestic product, budget deficit, inflation rate, government expenditure, inflation rate, and interest rate.

Having established the existence of a stable long run relationship between money demand and its determinants based on Engle-Granger two steps and Johansen and Juselius procedure, a short-run relationship between the two time series is investigated using the Error Correction Model (ECM):

Table 2
Johansen Cointegration}

Eigenvalue	Likelihood Ratio	Critical values at (5%)	Critical value at (1%)	No. of CE
0.48420	86.82	59.46	66.52	$\gamma \leq 0$
0.519786	35.88	39.89	45.58	$\gamma \leq 1$
0.306278	16.07	24.31	29.75	$\gamma \leq 2$
0.159958	6.20	12.53	16.31	$\gamma \leq 3$
0.053802	1.49	3.84	6.51	$\gamma \leq 4$

Estimation Results of the Short-Run Dynamic:

Since all variable are stationary in their first differences and are cointegrated, $I(0)$, the dynamic short-run relationship is estimated as follows:

$$\begin{aligned} \Delta M_t = & -0.03 + 0.05\Delta GDP_t - 0.003\Delta BDEF_t + 0.64\Delta G_t \\ & (2.30) \quad (2.75) \quad (-2.86) \quad (7.92) \\ & - 0.07\Delta INF_t - 0.09\Delta R_t - 0.40\mu_{t-1} \quad (6) \\ & (-1.83) \quad (-1.32) \quad (-3.25) \\ R^2 = & 0.80 \quad F = 13.97 \quad D - W = 2.21 \end{aligned}$$

Where all variables are in first differences and μ_{t-1} is the lagged value of the residual from the long-run regression, equation(3).

Equation (6) presents the error correction model estimations. The lagged error term coefficient is negative and statistically significant. The value of the coefficient of the lagged error term indicates the speed of adjustment of any disequilibrium towards a long-run equilibrium. 40% of the disequilibrium in money demand is corrected each year. The estimated coefficients of gross domestic product, budget deficit, government expenditure, and inflation rate are all statistically significant with expected signs. However, the estimated coefficient of the interest rate is not statistically significant which means that the interest rate has no significant effect on money demand in the short run. The estimated coefficient of budget deficit is negative

which confirms the findings of the long-run equilibrium.

Conclusion

The goal of this paper has been to investigate the determinants of the money demand function in the Kingdom of Saudi Arabia, particularly; the effect of budget deficit on money demand in the light of the debate between Keynesian-Neoclassic on the one side and the advocate of the Ricardian equivalence hypothesis on the other. Data properties were analyzed to determine the stationarity of the time series using ADF unit root tests which indicate that the null hypothesis of a unit root cannot be rejected for all variables in levels. The results further suggest that taking first differences removes these roots from the series implying that the first differences of these variables are stationary, i.e., $I(1)$. The results of the cointegration tests based on both Engle-Granger and Johansen-Juselius techniques indicate the existence of a cointegration between money demand and its determinants. Therefore, the variables have a long run equilibrium relationship although they may be in disequilibrium in the short run. Moreover, the existence of the cointegration is an indication of stable money demand function.

The estimated parameters of the money demand relationship indicate that gross domestic product and government expenditures influence money demand positively while the rate of inflation and the interest rate have negative effects on money demand which is in accordance with the economic theory. However, the effect of budget deficit on money demand is negative which does not support neither the Keynesian-Neoclassical point view nor the Ricardian hypothesis. This result may be attributed to the fact that government bonds are held only by commercial banks. Therefore, they are not considered a part of the households' wealth. Since net wealth of the households does not change, money demand will not change too. Error Correction Model indicates that (40%) of disequilibrium in money demand relationship is corrected each year. The estimated coefficients of gross domestic product, budget deficit, government expenditure, and inflation rate are all statistically significant with expected signs except the interest rate which is not statistically significant which means that the interest rate has no significant effect on the short run money demand. Although the estimated coefficient of budget deficit is significant, it is negative which confirms the findings of the long run equilibrium.

It may be concluded that the budget deficit has no impact on real variables including money demand in both the short and the long run. Since the budget deficit has no impact on money demand, interest rate will not be affected as well the other real variables. This result may be attributed to two reasons: first, the ratio of budget deficit to GDP is very small. Therefore, the results may differ if the ratio of budget deficit to GDP increases over time. Second, government bonds are not part of the household's wealth since government bonds held only by commercial banks. However, the results may change if government allow the public to hold government bonds.

However, we should take the results with some caution since the financial innovations and the behavior of financial institutions and their impact on money market in Saudi Arabia are not developed into the model. The impact of the financial innovations and the behavior of financial institutions in Saudi Arabia on money demand is worthy to be investigated in future studies taking into consideration the difference between deep financial market and shallow financial market.

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الملخص

أثر عجز الميزانية على الطلب على النقود في المملكة العربية السعودية

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هدف البحث إلى دراسة تأثير العجز في الميزانية الحكومية على الطلب على النقود في المملكة العربية السعودية باستخدام اختبار التكامل المشترك ونموذج تصحيح الخطأ؛ وذلك لتحديد اتجاه العلاقة بين المتغيرين في الأجلين الطويل والقصير. وقد دل اختبار التكامل المشترك على وجود علاقة توازنية طويلة الأجل بين الطلب على النقود ومحدداته المختلفة. كما أوضح نموذج تصحيح الخطأ أن ٤٠٪ من الاختلالات في التوازن قصير الأجل سيتم تصحيحها خلال سنة. وكانت قيمة معلم عجز الميزانية معنوية ولكنها سالبة، وهذه النتيجة لا تتفق مع النموذج الكنزي - النيوكلاسيكي ولا مع فرضية التساوي لريكاردو. ويمكن أن تعزى هذه النتيجة إلى سببين: أولاً أن نسبة عجز الميزانية إلى الناتج المحلي الإجمالي منخفضة جداً، وعليه، فإن نتائج الدراسة قد تختلف إذا زادت نسبة عجز الميزانية إلى الناتج المحلي الإجمالي على مدى الزمن. ثانياً، أن السندات الحكومية التي تحتفظ بها البنوك التجارية لا تعتبر جزءاً من ثروة القطاع العائلي. ولذا، فإن النتائج قد تختلف إذا سمحت الحكومة للجمهور بتملك السندات الحكومية.

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