BUDGET DEFICITS AND INTEREST RATES: EVIDENCE FROM JORDAN

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عجز الموازنة العامة وسعر الفائدة: دراسة تطبيقية عن الأردن

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ملخص

تهدف هذه الورقه الى دراسة العلاقة بين العجز في الموازنة العامة وسعر الفائدة في الأردن . وقد استخدمت الدراسة لهذا الغرض سلسله زمنية للفترة 1965-2002، وذلك لتقدير معادلتين اقترحتهما الورقة على أساس نظرية الأموال القابلة للإقراض . وتشتمل المعادلتان على سعر الفائدة كدالة في عدة متغيرات تشمل عرض النقد ، ودورات الاعمال ، والتضخم ، والمخاطر المالية ، وعجز الموازنة . وقد اقترحت الدراسة طريقة لقياس عجز الموازنة المتوقع ، واستخدمت ذلك في المعادلة الخاصة بمعدل الفائدة طويل الأجل، في حين تم استبدال العجز المتوقع بالعجز الفعلي في المعادلة الخاصة بمعدل الفائدة قصير الأجل، كما تم تقدير المعادلتين باستخدام طريقة المربعات الصغرى .

وبناء على نتائج تحليل الإنحدار فقد تم رفض الفرضية الصفرية التي تنص على وجود علاقه طردية بين عجز الموازنة وسعر الفائدة . مما يعني أن الدراسة تؤيد نظرية ريكاردو التي تنص على عدم وجود أي تأثير لعجز الموازنة على سعر الفائدة وبالتالي على الاستثمار .

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ABSTRACT

A loanable funds model is used to estimate the relationship between budget deficits and interest rates. Two equations are formulated and estimated using data from the small open economy of Jordan. A measure of expected deficits is constructed and used in the estimated equation for long-term interest rates. Expected deficits are replaced by actual deficits in the estimated equation for short-term interest rates. The statistical evidence obtained does not support the crowding out hypothesis, which argues that deficits have an impact on interest rates. It instead supports the Ricardian Equivalence Theorem, which suggests that the method of financing deficits has no impact on interest rates.

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I. INTRODUCTION

The relationship between deficits and interest rates has been the subject of wide interest since the early 1980s. The fact that the higher interest-rate level in the U.S. was associated with a huge budget deficit has created the impression that large budget deficit is responsible for driving interest rates up. This hypothesis, however, remains highly controversial. The traditional view suggests that given the level of government expenditure, a substitution of public debt for tax financing has a positive effect on aggregate demand. The financing of the deficit through government bonds produces a perceived increase in the private sector wealth. The increase in wealth raises current and future consumption at the expense of savings and therefore a rise in aggregate demand would be realized. But since, in equilibrium, private savings rise by less than public debt, the (real) interest rate rises and some form of crowding out of private investment would take place.

The above proposition has been very controversial and still attracts much attention. A few notable studies (such as Barth et al. 1985, Tanzi 1985, Thomas and Abderrezak 1988, and Vamvoukas 1997) tend to support the crowding-out proposition. On the other hand, a large body of the literature (e.g. Barth et al. 1986; Belton and Cebula 1995; Darrat 1989, 1990, 2002; Evans 1985, 1987; Giannaros and Kolluri 1989; Ibrahim and Kumah 1996; Ostrosky 1990; and Plosser 1987;) aggressively challenges the above proposition and tends to support the Ricardian equivalence theorem. The theorem contradicts the above classical paradigm. It argues that the method of financing deficits has no impact on wealth, once discounted future tax liabilities are taken into consideration. Therefore if wealth is the channel through which deficits affect interest rates, the impact of deficits on interest rates is negligible. The theorem explains that since consumers perceive that current deficits would eventually result in higher taxes, they would have an incentive to increase their current savings. Thus, additional government borrowing would not create any noticeable pressure on credit markets, and consequently, interest rates would not react to increased budget deficits.

While any review of the literature on this topic is beyond our scope, one comprehensive study is worth some attention. The study is that of

Muller and Price, 1985. The authors point out that the most frequent result found in the literature on this subject is a negative correlation between interest rates and the size of the budget deficits. Building on work by others, they showed that in addition to cyclical factors, at least four domestic factors have a significant impact on interest rates: expected inflation, monetary policy, the relation of the budget deficit to the flow of private savings, and the level or rate of change in public debt in relation to wealth or gross national product (GNP). The most important point the authors raised is that once the deficit and debt variables are used in a cyclically adjusted rather than nominal form, the relationship between deficits and interest rates becomes positive rather than negative. This result was also confirmed for the United States where the authors found that a large proportion of the rise in the long-term rate between 1979-1983 could be accounted for by both the debt and the deficit variable.

However, a recent survey of the literature by John Seater concluded that the evidence found by the majority of empirical studies is "inconsistent with the traditional view that government debt is positively related to interest rates."[1]

Confronted with this evidence, some began to argue that it is not actual deficits that affect interest rates, but rather anticipated deficits are what affect interest rates. This view was widely held by officials of the Reagan and Clinton administrations in the United States.

II. MODEL SPECIFICATION

Our main focus in this paper is on the impact of anticipated budget deficits on real long-term interest rates in Jordan. The null (H_0) and alternative (H_a) hypotheses in this paper may be stated as follows:

H_0: "Expected budget deficits have a significant positive impact on long-term interest rates."

H_a: "Expected budget deficits have no significant impact on long-term interest rates."

The paper distinguishes itself from other papers in two aspects: First, it examines the impact of expected rather than actual deficits on interest rates. Second, it constructs a rational expectations measure of expected deficits and uses it in the estimation.

A time series covering the period 1965 through 2002 are used. In order to have a higher number of degrees of freedom, quarterly, or monthly data should be used. However, annual data are used due to data

limitation; quarterly observations of some variables in the model (in particular, GDP or GNP) are not available. As in Hoelscher 1983, Tanzi 1985, and Darrat 1989, long-term, rather than short-term interest rates are the focus because of the importance of the long-term rates in transmitting the real effects of budget deficits. In particular, major components of private investment such as business equipment and residential construction are sensitive to long-term interest rates.

In order to examine the link between expected budget deficits and real interest rates, one has to look at long-term real interest rates. One way to do this is to assume rational expectations and use ex post data on real interest rates. This method, however, is not effective because observations on a ten-year ex post real interest rates, for example, will not be available until after ten years from now. Therefore the most recent ex post real interest-rate data available for 2003 are 1993 data. This, clearly, involves an unacceptable truncation of the sample period. Thus, we have to look for an alternative to this method, which means that we have to find a proxy for long-term inflationary expectations in order to compute the real interest rates.

Several proxies for expected inflation have been adopted in the literature. One proxy involves using a moving average of distributed lags of actual inflation rates.[2] This approach is criticized on the grounds that it is ad hoc, and has unattractive features, and is inconsistent with other empirical work. Because these proxies change slowly over time, they suggest that long-term real interest rates are likely to move in connection with long-term nominal interest rates. But this behavior is inconsistent with empirical findings regarding short-term real interest rates and therefore proxies that produce this kind of behavior for long-run real rates are subject to suspicion.

A second proxy for inflationary expectations is survey data. This proxy is not accurate either because people who respond to the survey questions do not have an incentive to answer correctly. In addition, economic agents who eliminate unexploited profit opportunities determine the behavior of market expectations. Therefore, market expectations are unlikely to be well measured by the average expectations of survey respondents.[3]

In addition to these criticisms, proxies, in general are likely to be subject to measurement errors. The errors, however, could be small and thus the proxy would not necessarily bias the results.

Because of these problems associated with finding an appropriate proxy for expected inflation, the critical long-term real interest-rate variable is very difficult to measure with accuracy, and whenever it is measured, is subject to substantial measurement error. This type of error tends to bias the coefficient toward zero and reduce the statistical significance of its effect (when the real long-term interest rate is used as an explanatory variable).[4] To reduce this bias, we pursue a strategy of using nominal instead of real interest rates in this paper. Marris, 1985, presents a convincing argument in favor of using nominal rather than real interest rates in the context of his analysis of the U.S. dollar appreciation between 1980-1985. He states that

"Discussing the rise in the dollar in terms of high real interest rates or real rates of return can be misleading. The layman, trying to understand the reasons for the strong dollar, may get the impression that real rates of interest are more real-and hence more meaningful-than nominal rates, and that real rates of interest are more or less the same thing as real rates of return.

The first point is that most of the capital flows that finance current balances are financial in nature...Financial investors are not directly interested in real rates of return or real interest rates because they are not investing in real assets. They are interested in two variables, nominal interest-rate differentials and future exchange rates."[5]

The next step is to construct a measure of anticipated deficits because, as we indicated above, there is a reason to believe that anticipated, rather than actual deficits strongly affect long-term interest rates. Two common procedures are usually adopted in constructing anticipated budget deficits: The first is to use actual deficits as a proxy for currently expected deficits. The second is to construct an ARIMA model for deriving measures of expected deficits. The latter measure seems inappropriate since it fails to take into account the impact of important political and economic decisions and other "news" on expectations of future deficits. In dealing with this problem, we adopt a procedure, which assumes that agents have perfect foresight of actual deficits, one, two, or three years in the future. However, deficits in the future depend not only on tax rates and legislated expenditures in place but also on cyclical conditions as well. The forecasting of these conditions is notoriously difficult even for professionals. Therefore the assumption of perfect foresight seems inappropriate. Instead we utilize a methodology similar to that of Feldstein, 1986. He used the average of five-year forward structural deficits as a measure of anticipated deficits. Our measure assumes that

agents correctly foresee the simple moving average of budget deficits in the forthcoming year. This methodology is consistent with the rational expectations hypothesis. Our measure consists of the ratios of the simple moving average of structural deficits to GDP in two years forward. We also experimented with three and four-year forward moving averages as proxies for anticipated deficits. There seems to be little discrepancy in the estimates after a time span of no longer than two years. We therefore employ the two-year forward moving averages of deficits as proxies for anticipated deficits.

In addition to the budget deficits and interest rates, other macro variables are included in the analysis to avoid biasing the results due to the omission of relevant variables. The additional variables are those suggested by theory to be potential determinants of interest rates and are found in most empirical studies of interest rates and budget deficits. Some of these variables are suggested by the loanable funds theory. They include money growth, expected inflation, the change in real GDP and the expected real short-term interest rates. Friedman and Strongin's (1989) recent emphasis on financial risk and the focus of the expectations theory of the term structure of interest rates on the role of expectations on as a determinant of interest rates, makes the addition of the volatility of interest rates necessary.

Long-term interest rates are measured here by the long-term yield on government bonds. Data on long-term interest rates are taken from various issues of The Central Bank of Jordan Statistical Bulletin.

The level of economic activity is measured by the rate of change in the real gross domestic product (GDP). Liquidity growth is measured by the rate of change of the broad money definition (M2). Expected inflation is proxied by the actual rate of inflation as measured by the rate of change in the consumer price index (CPI). The expected real short-term interest rates are the annual average rates on short-term lending minus the expected rate of inflation. Data for the four variables are taken from The International Financial Statistics. The volatility of long-term interest rates is measured by the standard deviation of the change in the annual long-term interest rates over the previous two years.

The model under consideration therefore takes the form:

$$I_t = a + b\,M_t + c\,P^e_t + d\,GDP_t + e\,S_t + f\,V_t + g\,D^e_t + U_t \qquad (1)$$

Where I is the long-term nominal interest rate, M is the rate of change of the money stock, P^e is the expected rate of inflation, GDP is the rate of

growth of real GDP, S is the volatility of long-term interest rate, D^e is the anticipated budget deficit as a ratio to GDP, U is the error term, and t is a time subscript.

III. EMPIRICAL RESULTS

Equation (1) was estimated using the ordinary least squares (OLS) method. Preliminary estimation of the equation shows a value of (0.75) for the Durbin-Watson statistic, which indicates a significant serial correlation in the errors. The estimates have been corrected for serial correlation using the Cochrane-Orcutt transformation method. The results are reported in Table (1).

The slope of the monetary liquidity factor (M_t) does not have the expected negative sign. It is positive but is not statistically significant. This could be explained by the fact that the Central Bank of Jordan targets interest rates as a monetary policy objective and does not target the money supply. Therefore, changes in the money supply would not necessarily affect interest rates.

The slope of the expected inflation coefficient (P^e_t) displays a strong Fisher effect and is positive and statistically significant at the five percent level. The cyclical factor (GDP_t), and the uncertainty factor (V_t), both display a clear positive and statistically significant influence in both cases.

The interest rate substitutability effect as represented by the real short-term interest rate (S_t), shows a powerful positive impact on long-term interest rates. This implies that factors, which affect the behavior of short-term interest rates, have an impact on long-term interest rates also.

The explanatory power of the model is relatively good with R squared value of 0.76, which means that our model captures seventy six percent of the variation in the interest rates.

Of particular interest to us is the coefficient of the expected deficit variable. The estimated coefficient has a value of (-0.02) but is conventionally not significant at the five percent level.

Based on this evidence, particularly, the coefficient of the expected deficit variable, we can conclusively reject the hypothesis that anticipated budget deficits influence interest rates.

Table (1)
Estimation of Long-Term Interest Rate Model (Equation 1)
(1965-2002)

Intercept	0.10 (3.21)
M	0.01 (1.2)
P^e	0.42 (2.76)
GDP	0.02 (2.58)
S	0.41 (2.64)
V	0.53 (2.2)
D^e	-0.02 (-0.34)
R^2	0.76
S.E.	0.01
D.W.	1.35

OLS, 38 observations. The t-statistics are in parentheses; S.E. is the standard error of the regression; D.W. is the Durbin-Watson statistic.

IV. DEFICITS AND SHORT-TERM INTEREST RATES

One may wonder about a possible impact of budget deficits on short-term interest rates and whether this impact is similar to that of budget deficits on long-term interest rates. Before we investigate this relationship, it is important to draw attention to a fundamental difference between long-term and short-term interest rates in their relationship to budget deficits. While it is the anticipated budget deficits that matter in the case of long-term interest rates, it is CURRENT structural deficits that matter in the case of short-term interest rates. Therefore my focus in this section is on the possible effect of current deficits on short-term interest rates.

It is usually argued in the literature that deficits have no significant effect on short-term interest rates. The variability of the latter is usually attributed to other factors, such as changes in monetary policy, expected inflation, or changes in economic activity.

One explanation for the absence of such effect is possibly the small size of short-term government borrowing relative to the existing stock of short-term liquid assets. Consequently, the supply of short-term credit is more interest-elastic than the supply of long-term credit. Another explanation could be that high inflation may convince many savers to switch to short-term rather than long-term securities. If this is the case, then the change in preferences could amplify the link between deficits and long-term interest rates at the expense of a potential relationship between short-term yields and deficits.

V. MODEL SPECIFICATION

Our model here differs from the one we estimated earlier for long-term interest rates in three aspects. First, anticipated deficits are replaced by current deficits. The coefficient of the current deficit variable is expected to be non-negative. Second, The real short-term interest rate is replaced by a lagged value of short-term interest rates so as to allow for partial adjustment of interest rates to changes in explanatory variables. Finally, the variability of long-term interest rates is replaced by the variability of the rate of growth of the money supply to capture the possibility that lenders may opt for the short end of the market, given expectations) of higher long-term interest rates. The sign of the coefficient of this variable is expected to be positive.

Taking these changes into consideration, equation 1 becomes of the form:

$$SI_t = a + b\,M_t + c\,P^e_t + d\,GDP_t + e\,S_{t-1} + f\,VM_t + g\,D_t + U_t \qquad (2)$$

Where SI is the short-term interest rate, M is the rate of change of the money stock, P^e is the expected rate of inflation, GDP is the rate of growth of real GDP, S_{t-1} is the short-term interest rate lagged one period, VM is the variability of the rate of growth of money supply, D is the ratio of budget deficit to GDP, U is the error term, and t is a time subscript.

The variables M, P^e, and GDP are measured here as in the case of long-term interest rates. Short-term interest rates are measured by interest rates on short-term loans. The variability of the rate of growth of the money supply is measured by the standard deviation of the rate of growth of the annual money supply over the last two years.

VI. EMPIRICAL RESULTS

Equation (2) was estimated using the ordinary least squares (OLS) method. Preliminary estimation of the equation shows a value of (1.58) for the Durbin-Watson statistic. The estimates have been corrected for serial correlation using the Cochrane-Orcutt transformation method. The results are reported in Table (2). The coefficient of the growth rate of money supply is, as expected, negative but not statistically significant.

Expected inflation shows a positive impact on interest rates as suggested by Fisher. The coefficient is positive and is significantly different from zero with a t-value of 2.38.

The lagged short-term interest rates have a powerful impact on current interest rates as indicated by the table. The coefficient is positive, statistically significant, and its magnitude is 1.03. This indicates that, on average, a one-point increase in the lagged short-term interest rates will increase current short-term interest rates by approximately 103 points.

The coefficients of the cyclical factor, as measured by the rate of growth of real GDP, and the variability of the money supply, show negligible impact on interest rates. Both coefficients are positive but statistically insignificant.

Finally, and most importantly is the coefficient of the current deficits. First, we note that the sign of the coefficient is negative. Second, the coefficient is not statistically significant with a t-value of (-0.78). These

findings suggest that deficits do not have any notable impact on short-term interest rates.

Table (2)
Estimation of Short-Term Interest Rate Model (Equation 2)
(1965-2002)

Intercept	-0.01 (-0.98)
M	-0.001 (-0.08)
P	(0.07) (2.38)
GDP	0.002 (0.003)
S_{t-1}	1.03 (9.46)
VM	0.001 (0.05)
D	-0.03 (-0.78)
R^2	0.82
S.E.	0.006
D.W.	1.90

OLS, 38 observations. The t-statistics are in parentheses; S.E. is the standard error of the regression; D.W. is the Durbin-Watson statistic.

VII. SUMMARY and CONCLUSIONS

A loanable funds model is used to estimate the relationship between budget deficits and interest rates. Two equations are formulated and estimated. One equation is estimated for the long-term interest rates; the second is estimated for the short-term interest rates. Data from the small open economy of Jordan are used to estimate both equations of the model. A measure of expected deficits is constructed and used in the estimated equation for long-term interest rates, while current deficits are used in the equation for short-term interest rates. In both cases, the statistical evidence obtained does not support the crowding out hypothesis which argues that deficits have an impact on interest rates. It instead supports the Ricardian Equivalence Theorem, which indicates that the method of financing deficits has no impact on interest rates.

NOTES

1. Seater (1993), p.176.
2. See, for example, Frankel (1986), and Sachs (1985).
3. Mishkin (1981), p.299.
4. This problem is not avoided completely since we still need to use a proxy for inflationary expectations in the measurement of short-term real interest rates, which is one of the explanatory variables in our model.
5. Marris (1985), p.20.

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