

CHAPTER 3

LITERATURE REVIEW

3.1 The Theory

Many past researches have been done to investigate the relationship between budget deficits and interest rates. However, the results of these studies remain inconclusive. While some detected a positive relationship between the two, others found no significant effect between deficits and interest rates. Essentially, there are two main schools of thoughts which are being widely discussed and debated, namely the Keynesian proposition and the Ricardian Equivalence Theorem.

The Keynesian proposition generally states that an increase in government budget deficits will lead to higher interest rates. There are several theories as to how budget deficits could lead to higher interest rates. Cheng (1998) summarized two possible explanations. The first, the classical loanable funds hypothesis, describes that an increase in the budget deficit will increase government borrowing and thereby increasing the supply of bonds issued by the government and subsequently raise interest rates. This was further elaborated by Vamvoukas (1997) who remarked that a rise in the deficit will result in the government issuing bonds to finance the deficit. The income from interest will generally increase the consumption expenditure of the bondholders and thus leads to an increase in aggregate demand. A rise in consumption would mean less savings and in order to restore equilibrium between national savings and investment, interest rate is expected to rise.

Secondly, the IS-LM framework states that high budget deficits as a result of expansionary fiscal policies will cause demands for output, money or credit to increase and therefore raise interest rates. According to Parkin (1994), an expansionary fiscal policy increases autonomous and aggregate planned expenditure which eventually leads to a multiplier effect that causes the real Gross Domestic Product (GDP) to rise. This will increase the demand for money and hence raising the interest rate.

Bernheim (1989) provided a different theory as he considered individuals planning their consumption over entire life cycles. Budget deficits increase current consumption if taxes are shifted to the future generation, assuming there is full employment. Increased consumption would imply a decrease in savings and in order to bring equilibrium to capital markets, interest rates must be raised. This theory is known as the Neoclassical paradigm.

The Keynesian proposition on the relationship between budget deficits and interest rates can potentially lead to the 'crowding-out' effect theory. Parkin (1994) defined it as the tendency for an expansionary fiscal policy to increase interest rates and therefore result in a decline in investment. Seater (1993) mentioned that public debt, which is accumulated by budget deficits, would compete with private debt for available funds. Hence, this causes interest rates to rise and could potentially 'crowd-out' private investment. Gupta (1992) singled out the increase in interest rates that is caused by high and persistent budget deficits as the most common mechanism that will lead to the 'crowding-out' effect.

Another established school of thought, the Ricardian Equivalence, was first proposed by a nineteenth-century economist, David Ricardo. It was then further developed by Robert Barro in the 1970s. Barro (1989) argued that an increase in government spending, which increases the budget deficits, would have no effect on the interest rates as a cut in today's taxes would be evened out by a corresponding increase in future taxes. This is because the total present value of receipts is fixed by the total present value of spending. Parkin (1994) extended Barro's argument by stating that the people will be smart enough to anticipate an increase in taxes later if taxes are cut in the present as the government increases its expenditure. Therefore, the people will cut their consumption now and save for later. This implies that deficits do not have any impact on interest rates.

Long-term rates and short-term rates are important in their different ways and should be analyzed separately. This is due to the fact that long-term rates are influenced by anticipated future events while the short-term rate is largely determined by current influences (Turnovsky and Miller, 1984). Another important issue that has to be considered is to how different means of deficit financing would affect interest rates. According to Turnovsky and Miller, if government deficits are money financed, an increase in government expenditure would result in a temporary decrease in the long rate and followed by a corresponding increase in the short rate. As for bond financed deficits, an increase in government expenditure would cause a rise in the long rate that is more significant than the short rate increase in the short run. In certain circumstances, the short rate might even fall.

On top of that, Turnovsky (1989) also summarized the relationship between unanticipated temporary and permanent government expenditure on the term structure of interest rates. An increase in unanticipated temporary and permanent government expenditure would increase both short term and long term rates (nominal and real). However, a greater effect can be seen on real and short rates for the temporary fiscal expansion whereas for the permanent increase in expenditure, a greater impact on nominal and long term rates can be observed.

3.2 Past studies

Many different methodologies and various frameworks were applied in studies concerning the relationship between government budget deficits and interest rates. Most of the earlier studies applied various macroeconomic variables in trying to explain this relationship in a regression-based model. Among the more popular methods was the Ordinary Least Squares (OLS) technique.

3.2.1 Correlation-based Analysis

One of the most influential papers to dwell on this subject was the one written by Paul Evans in 1985. He wrote extensively on whether large deficits produced high interest rates in the United States (US) for four significant periods of time; during the Civil War, World War I, World War II and the postwar experience. For all the four periods mentioned, Evans found no evidence of large deficits producing higher interest

rates. He strongly reiterated that the rise in budget deficits was never associated with higher interest rates in the US for over a century and therefore, would have little effect on economic growth and capital accumulation.

As a matter of fact, Evans (1985) found that for all his samples, increasing the deficit ratio while keeping the federal spending ratio constant actually lowers interest rates significantly. One possible explanation that he offered was lower tax rates associated with a larger deficit raised the after-tax real return to saving which subsequently result in the increase of saving. Thus, private saving rose substantially to lower aggregate demand and interest rates.

Another renowned economist, Barro (1987) studied the effect of temporary military spending on long-term interest rates, the price level, quantity of money and budget deficits through 1701 to 1918 in the United Kingdom. He found that temporary increases in government purchases, which were represented by military spending in wartime, had positive effects on long term interest rates. On the other hand, temporary government spending was also heavily financed by budget deficits and that both these elements moved together. However, in an effort to segregate both these components to individually study the separate effects on interest rates, Barro concluded that he was unable to separate the effects of spending from the effects of budget deficits. He also added that it was because of this close relation, no conclusion could be made as to whether interest rates react to temporary spending alone or to budget deficits.

One common theoretical framework used by researchers to analyze the effects of deficits on interest rates is by regressing the loanable funds model of the interest rate.

Hoelscher (1983) analyzed quarterly US data for the period 1952:3 to 1976:2. His model consists of Treasury bill rates as the dependent variable, unemployment, United States borrowing, real purchases of security by the central bank and a lagged value of Treasury bill rates as independent variables. He concluded that there was no significant relationship between Federal borrowing and short term interest rate.

Although Hoelscher (1983) opined that federal budget deficits do not affect short term interest rates, there was strong evidence that larger deficits induce higher long term interest rates, as proven in his research in 1986. One explanation he advanced was that the supply of short-term credit is much more interest elastic than the supply of long-term credit. Another important observation brought up in Hoelscher's paper was that regarding the use of quarterly or monthly data rather than annual data to investigate long-term rate behaviour and deficits. He explained that the periodicity of the data could strongly affect the outcome the tests because the correlation between monthly or quarterly data could be weakened, hence causing no significant relationship.

Evans (1987a) was particularly intrigued by the fact that most of the studies that found no evidence of a positive relationship between nominal interest rates and budget deficits were confined to the US data. Therefore, Evans decided to analyze data from five countries, namely Canada, France, Germany, Japan and the United Kingdom. These results were then compared with that of the US. By using OLS on a few sample periods spanning through 1974 and 1985, he did not find any positive significant relationship between budget deficits and interest rates in all the five countries. In fact, there were more negative associations than positive ones, although only one was statistically significant, which was for the United Kingdom. This proved that the scenario of no

positive association between nominal interest rates and budget deficits is not confined to the US but does occur in other countries as well.

Evans (1987b) advocated the use of expected future budget deficits in his study on several samples of monthly US data from 1908 to 1984. He believed that one of the reasons why past studies showed no evidence of a positive association between interest rates and current as well as past deficits was that interest rates were more related to the expectation of future deficits. Evans also added that if periods when expectations of future budget deficits were changing in a known direction can be identified, then the residuals from the equation he proposed can be used to directly test the posited structural links. His investigations led to the conclusion that none of the past, current and expected future deficits are related to interest rates.

Plosser (1987) investigated the behaviour of the term structure of returns to Treasury securities and forward interest rates while considering several key macroeconomic variables like real public debt and real military spending. By using measures of expected future deficits and OLS, he did not find any evidence of future deficits raising interest rates, which were represented by the six-month Treasury bill and the ten-year bond portfolio. In fact, he found that the future deficits actually reduced interest rates. In addition to that, there is also not much association between real interest rates and deficits. On the whole, Plosser concluded that 'these results do not offer much support for the conventional view regarding important wealth effects of public debt on interest rates' (Plosser, 1987: 366).

On the other end of the spectrum, many others found a significant relationship between deficits and interest rates. In 1988, Khan H. Zahid used a simple portfolio balance model of the financial sector as the theoretical basis in his study on quarterly data during the period 1971 – 1980 in the US. One of the issues he considered was using non-cyclical deficit. He reasoned that interest rates tend to move pro-cyclically while budget deficits move counter-cyclically. He also separated the GNP variable into a cyclical and a trend variable, with the non-cyclical deficit being the residual from regressing the deficit on the cyclical variable. As a result, he found that there has been a significant positive impact of deficits on real interest rates in the US.

Mehra (1992) investigated the relationship between long term nominal interest rates and budget deficits over the period of 1959 to 1990 in the US. One of the key findings to his research was that long-term rates are cointegrated with deficits if a one-year ahead inflation forecast series is used to measure long-term expected inflation. However, this evidence weakens when inflation forecasts over longer horizons are used. This result indicates that a one-year ahead inflation forecast series does not efficiently measure long-term expected inflation and therefore the link found earlier between deficits and long term rates using one-year inflation forecast series is spurious. With that, he concluded that the effect of deficits on long term rates is sensitive to the proxy used for long-term expected inflation and that deficits do influence the behaviour of long term rates.

While many of the studies have covered the effect of budget deficits on a variety of interest rates including Treasury bills and government bonds, research on interest rates of commercial banks have largely been neglected. Considering this, Cebula (1992)

examined the impact of federal budget deficits in the US on the cost of deposits to banks and prime rate of interest charged by banks for the period 1963 – 1995. By adopting a model in the mould of the well-known loanable funds model and estimating two equations (one with cost of deposits as the dependent variable and the other with prime rate of interest), Cebula concluded that the US federal budget deficit has raised the cost of deposits of banks but not their prime rate of interest.

Besides that, Cebula also investigated this relationship on various other definitions of budget deficits and interest rates. In his study in 1988, he analyzed structural deficits which he classified as the difference between total deficit and the cyclical deficit. Therefore, the structural deficit approximates the exogenous component of the total deficit. This is to avoid total deficits, which are counter-cyclical, producing biased estimates on the effect of the deficit on the interest rate structure when combined with the pro-cyclical movement of the interest rates. After analyzing the federal budget deficits on four different nominal interest rate measures by applying OLS and 2SLS methods on a model based on the loanable funds model, Cebula concluded that the federal budget deficit has a positive significant effect on the nominal interest rate.

Up until Cebula's paper in 1993, there has not been much research on the effect of budget deficits on interest rates that directly affects the Savings and Loans (S&Ls) in the US. The three measures of interest rates that affect the S&Ls used were the average cost of funds to S&Ls, the average yield on new home mortgages and the average S&L mortgage portfolio yield. Once again he applied the loanable funds model and OLS. Cebula concluded that the US federal budget deficits did raise the three different measures of nominal interest rates that directly affect the US S&L industry. To

consolidate the validity of this conclusion, Cebula directly investigated the effect of budget deficits on the S&L failure rate and found that the effects did not affect the S&L failure rate.

Cebula along with Belton in 1993, incorporated closed and open systems in their IS-LM framework to examine the effects of government budget deficits on short term and long term interest rates in the US. Knowing that results vary with different specification of budget deficits, interest rates and choice of period studied, multiple definitions of these three aspects were considered. Certain macroeconomic variables were also divided by the seasonally adjusted level of GNP based on the assumption that government purchases, budget deficits and open market operations be assessed relative to the size of the economy. Generally it was found that nominal short term rates were unaffected by the budget deficits for all the three periods studied. However, deficits seemed to affect longer term rates through a positive significant relationship in two of the periods studied but deficits do not affect these rates for the latest period of the study.

In 2000, Cebula investigated the effect of budget deficits on *ex post* real long term interest rates in the US as there have not been many researches done on this particular specification. He stressed on the importance of this study as long term rates often influence the real economy through the effects of budget deficits. Cebula investigated this relationship over the 1973 – 1995 and concluded that structural budget deficits have a positive significant effect on the *ex post* real interest rate yield on ten-year Treasury notes.

In 1989, Laumas empirically analyzed the effects of anticipated and unanticipated budget deficits along with monetary policy on the rate of interest over two sample periods, 1964:2 to 1975:2 and 1975:3 to 1986:2 in the US. He believed that the technique of assessing the impact of deficits on interest rates within the framework of rational expectations models would provide a different perspective on this issue. In addition to that, he used real cyclically-adjusted deficit scaled by real middle-expansion trend GNP in order to avoid being biased to changes in expenditures and tax receipts due to the automatic stabilizing aspects of fiscal policy. As a result, he found that only unanticipated budget deficits along with anticipated and unanticipated monetary policy affected the interest rate for the period 1964:2 to 1975:2 while for the period 1975:3 to 1986:2, both anticipated and unanticipated budget deficits did increase the level of interest rate.

Vamvoukas (1997) studied the relationship between budget deficits and interest rates of Greece in 1997. He examined the cointegratedness of the time series and estimates the implied Error-Correction (EC) interest rate model on the annual Greek data from 1950 – 1993. This period was chosen because the State Budget had consistently run a deficit since 1950. In this paper, Vamvoukas included additional economic variables which would have a significant effect on budget deficits and interest rates. Vamvoukas' model with one-year Treasury bill rates as the dependent variable showed that the coefficient for budget deficits and the EC term were statistically significant. As a result of the correlation-based analysis, Vamvoukas' resultant Error-Correction model indicated the existence of both short-run and long-run relationships between interest rates and the budget deficit. Therefore, he concluded that the results seem to support the empirical framework of the Keynesian proposition.

Studies on the relationship between deficits and interest rates were mainly confined to developed countries, with the majority of them done in the US and Europe. In an effort to shed more light on this subject, Gupta (1994) investigated the data of nine Asian countries, including Malaysia, as part of his research on budget deficits and the economic activity in Asia in the 1970s and 1980s. His model was based on the simple loanable funds model. He compared the effectiveness of using current budget deficits and expected future deficits on all the nine countries and decided that the expected future deficits was much more reflective in revealing the relationship, as he initially pointed out. His investigations revealed that future budget deficits had a positive effect on interest rates in six of these countries, namely India, Pakistan, Sri Lanka, Thailand, Indonesia and the Philippines while there is no evidence of such effect whatsoever in Malaysia, South Korea and Singapore. He concluded that while it was clear that the results were sensitive to the measures of interest rate and deficit used, the outcome of this relationship remains inconclusive even in developing countries.

3.2.2 Causality-based Analysis

In more recent studies, newer innovations and techniques were incorporated in order to obtain more concrete and conclusive results on the relationship between budget deficits and interest rates. One of the techniques to gain prominence is the causality-based analysis.

Ali F. Darrat was one of the first to introduce the concept of causality in studies pertaining to this subject. He pointed out that that the direction of causality between two

variables can be categorized into i) budget deficits cause interest rates, ii) interest rates cause budget deficits, iii) bidirectional causality and iv) causal independence. He rejected the regression-based analysis and opined that 'a statistically significant coefficient on the deficit variable in an interest rate equation is not a reliable evidence to support the conventional view that high budget deficits have caused rising interest rates' (Darrat, 1989: 365). He also added that there should be a more appropriate investigation to delve into the direction of causality instead of simply testing on the correlation between them as most past studies have.

As a response to Vamvoukas' study in 1997, Darrat (2002) had come up with another study regarding the effect of budget deficits on interest rates in Greece. He used the exact annual data and examined it on the exact period as investigated by Vamvoukas. He also used identical variables and model structure used by Vamvoukas for the sake of comparability. However, Darrat focused on the cause-and-effect relationship between interest rates and the deficit instead of Vamvoukas' correlation-based (single-equation) analysis. Darrat reasoned that Vamvoukas' approach might have invoked the possibility of a simultaneity bias and thus led to a reverse-causality problem. Darrat also pointed out that interest rates are also capable of inducing changes in budget deficits due to several reasons. In his investigations, Darrat found that budget deficits did not Granger-cause interest rates but instead interest rates did Granger-cause budget deficits. According to Darrat, this explained the high correlation between interest rates and budget deficits in Vamvoukas' study which did not necessarily imply that budget deficits would lead to high interest rates but could also turn out to be the other way round.

In 1989, Darrat had focused on the causal relationship between budget deficits and long-term interest rates in the United States annual data from 1946 to 1986. His study emphasized the need of applying Granger-type causality tests and Akaike's minimum final prediction error (FPE) criterion to determine the number of lags for all the variables. Three different specifications of deficits; namely the national income account version of federal budget deficit, the deficit according to the national income account that includes borrowing from all levels of government, and change in the real par value of privately held federal debt (Darrat, 1989: 365); were used to further add weight to his study. He had also pointed out the importance of differentiating the effects of interest rates of a bond-financed deficit and a money-financed deficit as the resulting outcome could be different. As a conclusion, he found that all three measures of budget deficits have not caused significant changes in long term interest rates but long term rates have caused budget deficits instead.

In 1990, Darrat examined the relationship between structural Federal deficits and interest rates in the US using quarterly data over 1955:1 to 1984:4. The interest rates were measured by Moody's Aaa-rated corporate bond rate. In addition to the Granger-type causality test and Akaike's (FPE) criterion for his study in 1989, he also applied the Dickey-Fuller unit root test and subsequently Engle-Granger cointegration tests for his study this time. As a result, he found no significant causal relationship between structural federal deficits and interest rates.

While many of the previous researches on this subject were focused on the US, Benjamin S. Cheng's paper studied the causality between budget deficit and interest rates (long term and short term) in Japan. His study used annual Japanese data spanning

over two periods; 1966 – 1993 and 1955 – 1993. By applying the Engle-Granger two-step cointegration test, this study found no cointegration relations for two models. The first consists of budget deficits and long-term interest rates and the second model consists of budget deficits and short-term interest rates. He also found no evidence of causal linkage between budget deficits and long term interest rates in Japan but concluded that short-term interest rates and budget deficits were linked by a feedback causal mechanism. Cheng reasoned that public debt is generally short-term and therefore budget deficits, which are financed by short-term debt, should affect short-term rates and not long-term rates.

In the context of a small open economy, Ibrahim and Kumah (1996) studied the comovements of various macroeconomic variables including structural budget deficits and interest rate differentials, which was defined as the difference between the domestic three-month Treasury bill discount rate and the Federal Funds Rate of the US; in the United Kingdom (UK), Sweden, Germany and Japan. By applying the Johansen cointegration procedure and considering the impulse responses, this paper uncovered that a shock to the budget deficit increases interest rate differentials in the Japanese and UK data. The effect is slightly weaker in Sweden but the Germany data does not appear to capture the effect at all. Overall, Ibrahim and Kumah concluded that ‘one of the main factors that influences the risk premium associated with domestic interest rates is the budget deficit.’ (Ibrahim and Kumah, 1996: 128)

3.2.3 *Government Deficit Announcements*

A rather newer approach has approached in light of contradicting results on this subject. This approach, known as the ‘announcement effect methodology’, involves the examination effects of budget deficit announcements, instead of actual deficits, on interest rates. Hypothetically, information on any interest rates determinants should be absorbed into observed rates in an efficient market. In other words, unanticipated announcements of a rising deficit should have an impact on financial markets (Krot & de Haan, 1999).

One of the advantages propagated by those who favour this method is that it avoids various econometric problems of a reduced-form equation (Wachtel & Young, 1987) and that this method gives an alternative insight to reach a more conclusive agreement on the relationship between budget deficits and interest rates. Moreover, deficit announcements are exogenous, unlike actual budget deficits.

One of the first papers to focus on the application of the ‘announcement effect methodology’ is by Wachtel and Young in 1987. Having studied future and current deficit projections effects on daily closing rates in the US, they found that on the whole, financial markets respond to these announcements. An increase in projected deficits does raise interest rates, particularly so for longer term yields.

Quigley and Porter-Hudak (1997) later studied the similar announcement effect on daily rates in the US but with a different technique known as the intervention analysis. It is claimed that this analysis is better in a sense that it can be used for various forms of

deficit announcement episodes and could provide a better insight into deficit announcements (Quigley and Porter-Hudak, 1997). The results were found to be more robust but the outcome remained the same, that a rise in deficit announcements caused interest rates to rise.

One of the few studies to be done outside of the United States was the one investigated by Knot and de Haan (1999) for Germany from 1987 to 1993. The framework developed by Wachtel and Young were adopted in order to test this relationship. By using deficit projections from the Ministry of Finance of Germany and two other major financial institutions, a positive relationship between 'news' of the government budget deficit and long-term interest rates has been found. However, the relationship was not significant for deficit projections provided by the Ministry of Finance.

3.3 Conclusion

Although it is widely believed that high budget deficits should raise interest rates, this theory is not unanimously agreed upon by those who had studied this relationship. In fact, up until today, studies could not arrive to a concrete conclusion as to what impact does government budget deficits have on interest rates and vice versa and it continued to draw interest as a subject of research. This could be due to several factors and reasons.

The outcome of the investigations varies with the definition of the variables used. As reviewed earlier, various definitions of deficits were used, namely structural deficits,

cyclical deficits, expected future deficits and even budget deficit announcements while there were short term and long term interest rates of various government securities and financial institutions. For instance, a majority of the studies on short term rates found no significant relationship but deficits appear to raise long term rates.

Other reasons attributed to the inconclusiveness of this relationship include time periods and different economies. Any outstanding events occurring in the time period of study could influence the outcome the investigations. However, Evans (1987) and Gupta (1992) found out that effects of deficits on interest rates were not distinguishable geographically and economy-wise. The positive relationship between deficits and interest rates is not confined to developed or developing countries as proven in the earlier studies. This is also true for the case of deficits not affecting interest rates.

Different techniques used also churn out different results. This was particularly evident as Darrat used causality-based analysis to Vamvoukas' regression-based analysis and both the results varied. Vamvoukas had earlier found a positive relationship between deficits and interest rates but Darrat found that deficits do not have any effect on interest rates. While there appeared to be a fair share of those who found no relationship and those who claimed a positive relationship when using the correlation-based analysis, a majority of those who used the causality-based analysis rejected the notion that deficits raise interest rates.