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CROWDING-OUT HYPOTHESIS VERSUS RICARDIAN EQUIVALENCE PROPOSITION: EVIDENCE FROM LITERATURE

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ABSTRACT

The size of government expenditure in an economy grows over time. To finance these expenditures, public incomes must grow as well. Given that tax revenues are not sufficient for such spending and levying new taxes and/or increasing current tax rates are not politically desirable, the only option left is to borrow. The purpose of this paper is to survey the two most important approaches, “crowding out hypothesis” and “Ricardian Equivalence proposition”, in the literature, and evaluate the economic consequences of public borrowing.

Key Words: Crowding out, Crowding in, Ricardian Equivalence, Government expenditure, Public borrowing.

1. INTRODUCTION

It is historically known fact that government role in the economy has been questioned in one way or the other ever since it came into existence. In a socialist economy, the role of government is very high; almost every economic activity is planned by central government planning institutions and it is implemented accordingly. No private sector in such economy theoretically may be allowed to operate. In a capitalist economy, on the other hand, government’s role in the economy is very limited. Almost every economic activity left to the private sector except a few fundamental services, namely, education, healthcare, justice, police services, and national defense. Thus, to do these functions, government must have sufficient resources.

There are mainly three sources that every government uses to finance its activities. They are taxes, printing money and borrowing. Historically and practically, tax revenues are the main sources of government expenditures. If tax revenues are equal to government expenditures no problem exists at all.

However, for one reason or the other, government expenditures often exceed its tax revenues, and therefore the excess spending must be financed. Assuming government will not reduce its spending, then there are three sources available to finance this deficit: by levying new taxes or rising the existing tax rates, printing money, or borrowing. Since it is

politically hard and undesirable to raise the tax rates or levy new tax, and since the printing money option to finance this excess spending is not desirable for fear of leading high inflation. It is the borrowing option that available for a government to finance this extra spending (deficit).

It is, therefore, the borrowing option that has been extensively studied to see if there exists any negative impact on the economy as a consequence of using it to finance deficit. In this paper, I will examine the two main views, crowding-out hypothesis and Ricardian equivalence proposition, and review empirical evidence in the literature to see which one of these supported by empirical studies.

2. THE THEORY

Government spending generally exceeds the tax revenues, therefore, this excess spending is called budget deficit. To finance the deficit, government usually chooses to borrow. Since there are limited amount of funds available in the economy, it is logical to think that government borrowing will have some effect on the private sector. Thus, our objective is to see what impact does government borrowing (excess spending) have on the private sector, namely, private investment.

There are mainly two views in the literature that provides theoretical basis. They are “crowding out hypothesis” and “Ricardian equivalence proposition”.

3. CROWDING-OUT HYPOTHESIS

The public debt issue has always been a hot subject of theoretical economists, empirical economists as well as political economists and scientists (Boskin, 1987, 255). Despite this popularity, “the effect of government debt and deficits on the economy is not obvious from either economic theory or statistical evidence” (Seater, 1993, 142). There always has been more than one view about the public debt’s effect on the economy. Those who claim that there has to be some government debt effects on private sector support the crowding out hypothesis. Those who claim that no government debt has net effect on private sector, support Ricardian equivalence proposition.

It is important to note that under the assumption that government borrows to finance the deficit is subject of crowding out, and Ricardian equivalence proposition. We are not considering an increase in government spending effect that financed by either taxes or printing money or any combination of them. Therefore, the central issue about crowding out hypothesis and Ricardian equivalence proposition is that government finances its budget deficit by borrowing from private sector.

In general crowding out “refers to the displacement of private economic activity by public economic activity” (Buiter, 1990, 163). For our purpose, we can simplify the definition as follows: reduction in the

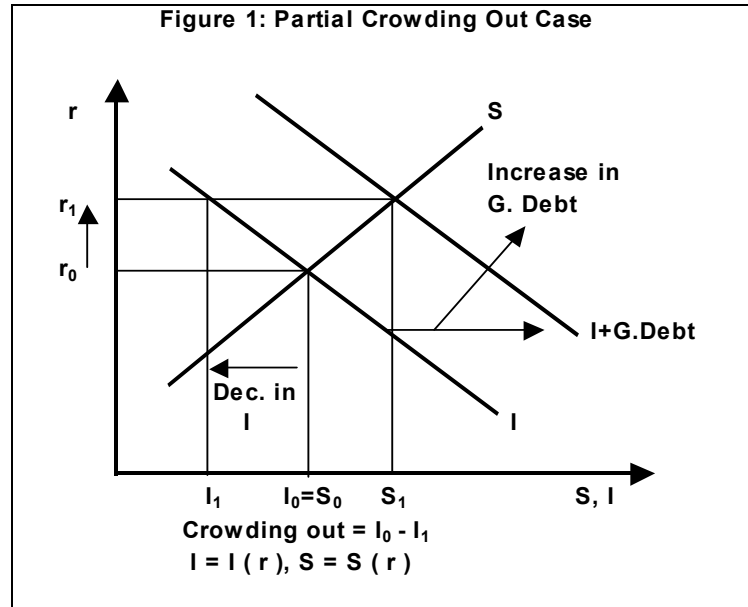
amount of private investment caused by government borrowing from private sector.

To understand the crowding out effect I use figures that cover all possible combinations.

In explaining crowding out hypothesis graphically, it is assumed that private investment is only a function of interest rate, $I=I(r)$. The relationship is negative: as interest rate decreases more and more investment projects are profitable to undertake. It is also assumed that saving is either positively related to interest rate so that an increase in the rate of return to saving will increase private saving or insensitive to rate of return so that change in rate of return will have no effect on saving. Mathematically, $S=S(r)$, $S'(r) > 0$ and $S=S_0$, respectively.

Figure 1 illustrates the first case where $I=I(r)$, $S=S(r)$, $I'(r) < 0$, and $S'(r) > 0$. Government debt issue in size ΔD causes interest rate to increase from r_0 to r_1 . Increase in interest rate causes private investment to decrease from I_0 to I_1 , and therefore, this reduction in private investment, $I_0 - I_1 = -\Delta I$, has been called partial crowding out of deficit financing. It is partial because the amount of crowding out of private investment is less than the amount of government debt issue, $-\Delta I < \Delta D$. The reason would be that increase in interest rate (rate of return on saving) increases saving and therefore, increased portion of saving offsets corresponding amount of private investment reduction.

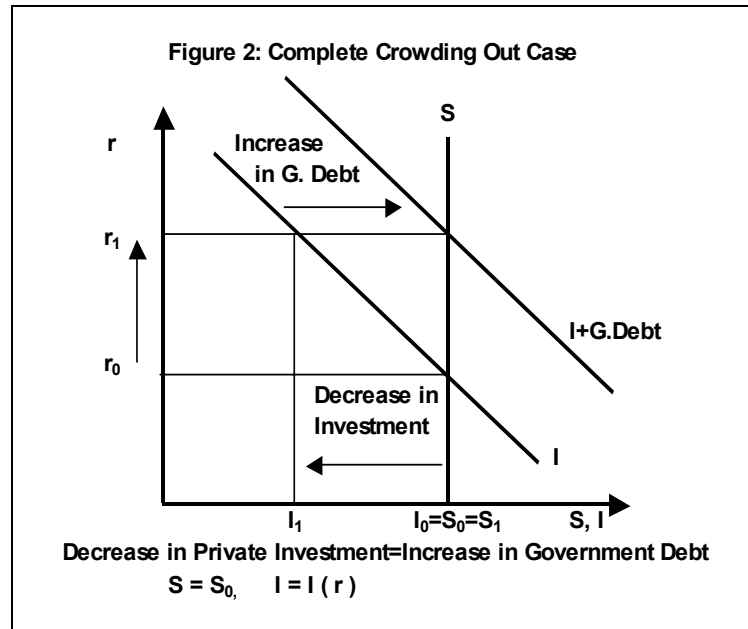
If $S=S_0$ that saving is not a function of interest rate, in another words, change in interest rate does not change saving, then we have complete crowding out effect as shown in figure 2.



In this extreme case, saving is assumed to be insensitive to interest rate, then the same amount of government debt issue, ΔD , causes interest rate to increase from r_0 to r_1 . However, since saving is insensitive to interest rate, saving level will remain the same, $S_1 = S_0$, and thus government debt, will crowd out private investment by the same amount, $\Delta D = -\Delta I$. In this case we have full or complete crowding out that the amount of government borrowing completely displaces the same amount of private investment.

This extreme case could occur. For instance “in an open economy with a freely floating exchange rate and facing perfect international capital mobility, crowding out is complete” (Buiter, 1990, 74). The reason would be that “A bond-financed tax cut stimulates domestic spending but also induces a nominal and real exchange rate appreciation which crowds out net exports by a matching amount, leaving aggregate demand unaltered” (Buiter, 1990, 74).

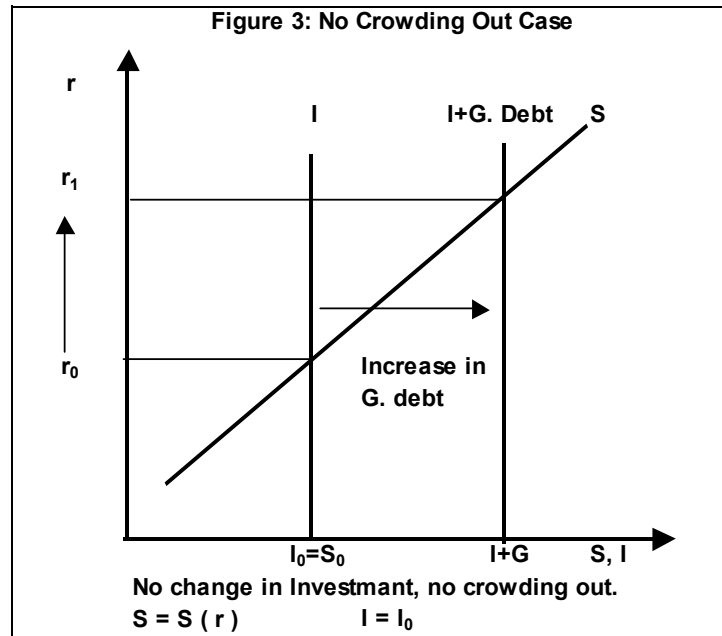
Moreover, we have seen in both figures that we have crowding out effect on the theoretical basis. Buiter claims that “some degree of direct crowding out is definitely a theoretical and practical possibility—along each of the many dimensions. ...The degree of crowding out along each dimension is an empirical matter that will have to be settled if accurate policy-oriented models are to be constructed” (Buiter, 1990, 179).



Therefore, it is the subject of empirical studies to validate the hypothesis. I will review some of the important empirical results in the empirical section.

There is another possibility that may occur. If we assume that private investment demand is insensitive to the rate of interest, $I = I_0$, then, there would have no crowding out. Figure 3 illustrates this possibility. Here we also assume that $S = S(r)$, and $S'(r) > 0$. Issuing government debt of size ΔD causes interest rate to go up from r_0 to r_1 . Because of insensitivity nature of private investment demand schedule, no change in private investment occurs, $\Delta I = 0$. Thus, there is no crowding out effect of government borrowing, everything else held constant.

One last extreme theoretical case would also lay within the possibility. That is, assuming the private investment function is not only sensitive to the rate of interest but it also depends positively on income level. Symbolically, new investment function is $I = I(r, y)$, assuming $I'(r) < 0$, and $I'(y) > 0$. Given that $S = S(r)$, and $S'(r) > 0$, then, effect of government borrowing positively alters the private investment, called "crowding in" effect. Figure 4 illustrates this case. Before government borrowing, point a represents the investment and saving equilibrium at the rate of interest r_0 . Issuing debt in size of ΔD causes interest rate increase to

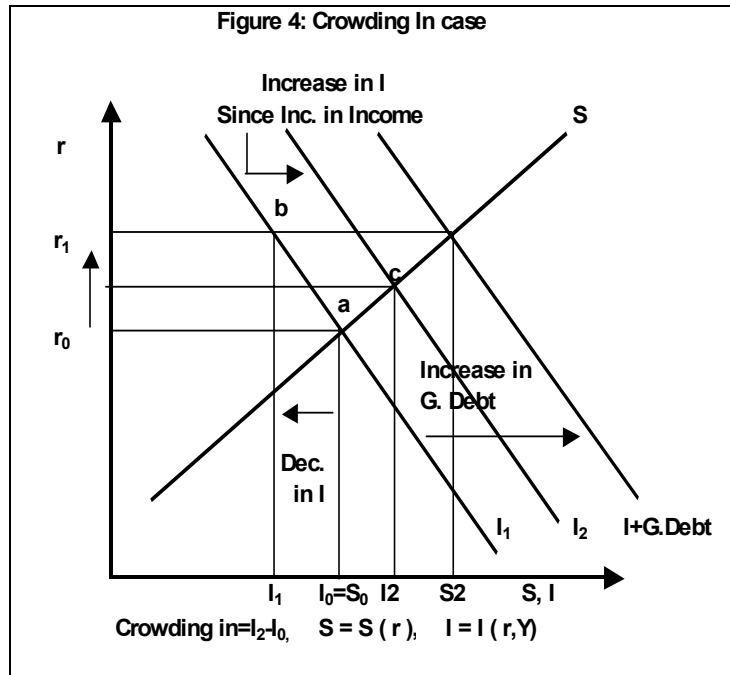


r_1 . This reduces private investment, and point b shows the new equilibrium. At this point, the income effect enters into equation. Issuing ΔD results higher income level which, in turn, affect private investment positively, implying a new equilibrium point at c. Thus, government borrowing, ΔD , through dynamic nature of multiplier, causes a high level of private investment, an increase of I_0 - I_2 . This is so called “crowding in” effect of government deficit.

4. RICARDIAN EQUIVALENCE PROPOSITION

To see the opposite view that there is no crowding out effect, which is based on Ricardian Equivalence proposition, figure-5 is illustrated. Before explaining the figure, the general concept of the Ricardian Equivalence should be introduced. The terms “Ricardian Equivalence” was first given by Buchanan (1976) when he stated a close relationship between David Ricardo’s work and Barro’s proposition.

When economists do not agree with other economists on a theory, they generally develop a new theory or model and test it empirically. Since government debt has many other consequences along with crowding out effect, Robert Barro (1974), along with many other economists, does



Increase r implies going from a to b.
Increase in Y implies a shift from I_1 to I_2 which implies going from b to c.

not believe that government debt would result net wealth. Hence, he developed a model to deal with this issue. In his famous article Barro (1974) developed a model to show that government bonds are not net wealth. In his model, he goes into more technical detail and makes a number of assumptions to theoretically prove the Ricardian equivalence proposition. He concludes that “there is no persuasive theoretical case for treating government debt, at the margin, as a net component of perceived household wealth” (Barro, 1974, 1116).

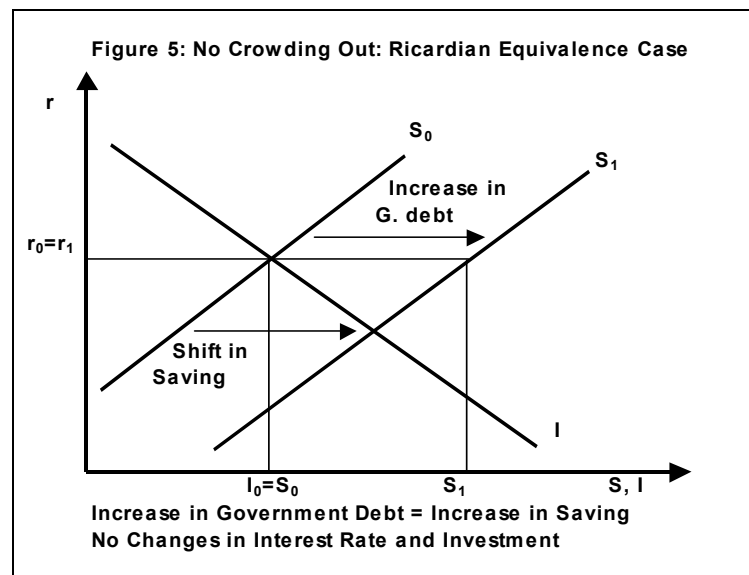
Canto and Rapp (1982) summarize Barro’s view, Ricardian equivalence proposition, in a simple example that “suppose the government reduces the current tax bill of every taxpayer by one dollar and finances this tax reduction by issuing bonds which bear the market rate of interest. A lump-sum tax equal to one dollar plus interest will be levied on each taxpayer next year in order to retire the current bond issue. Will taxpayers feel wealthier today as a result of this transaction? Will

they therefore increase their consumption and lower private capital accumulation?” (Canto and Rapp, 1982, 33).

They say if people behave rationally, the answer is no. People will save the dollar they currently receive so as to be able to meet their increased future tax liabilities. As a result, current saving will increase by the amount of the government debt issue, $\Delta S = \Delta D$. Hence, they conclude that private capital accumulation will not be crowded out. Therefore, Ricardian equivalence proposition essentially uses rational expectations approach to explain the issue.

Figure 5 illustrates the Ricardian equivalence proposition. The only difference in figure 5 is a rightward shift in saving function. Since this rightward saving shift is equal to government debt issue, $\Delta S = \Delta D$, no crowding out occurs. Under this view, there is no change both in rate of return, r , and in private investment.

According to this view, crowding out can be avoided only if the private sector takes complete account of the future tax liabilities implied by government bonds, and thus regards these bonds as a substitute for claims on physical capital (Canto and Rapp, 1982, 35). Ricardian equivalence is unlikely to hold. There are many scholars who argue that the assumptions that the equivalence is based are unrealistic. Buiter, in this respect, expresses that “the possible neutrality of public debt and deficits is little more than a theoretical curiosum” (Buiter, 1990, 73).



This figure is adopted from Canto and Rapp (1982, 34).

Since the assumptions of Ricardian equivalence proposition have severely been criticized on both theoretical and empirical ground, there have been some researchers who claim that the equivalence proposition approximately holds. Seater states that “Theoretically, we can be almost certain that Ricardian equivalence is not literally true: it simply requires too many stringent conditions to be believable. Nevertheless, equivalence appears to be a good approximation” (Seater, 1993, 184). He concludes his article by stating, “Empirical success and analytical simplicity make Ricardian equivalence an attractive model of government debt’s effects on economic activity” (Seater, 1993, 184). See surveys on this topic done (by Seater, 1993; and by Bernheim, 1987).

5. EMPIRICAL EVIDENCE

Since the crowding out hypothesis is related with less or more of each of the variables that saving, private investment, public debt, budget deficit, interest rates, and credit market, many scholars have examined different aspects of the issue. It is not subject of this study to review all the studies but most important studies in the relevant literature.

In less developed and developing countries, credit markets may not be developed well enough so that government borrowing in these countries can hurt private investment more severely than it would be in developed market economies.

There is an empirical study that examines this aspect. Specifically, Gochoco argues that less developed countries have underdeveloped capital markets and the crowding out effect would be higher in these countries (Gochoco, 1990, 331). In her paper, she tests crowding out effect for Philippines. She points out that “whether bond-financed deficits result in a “crowding out” effect or not is an empirical question” (Gochoco, 1990, 331). She further argues that “crowding out is believed to be relevant in LDCs” (Gochoco, 1990, 331). She uses Huang (1986) methodology to estimate the crowding out effect. Her test results indicate “The ‘crowding out’ effect is relevant in the case of the Philippines” (Gochoco, 1990, 333). She, therefore, concludes “in LDCs with underdeveloped capital markets, government issuance of debt can add to wealth. The inability of countries like the Philippines to finance budgetary deficits via money creation because of fears of inflation, or via borrowing from abroad given the external debt overhang, means that ‘crowding out’ will remain a problem. The resulting high interest rates, above that due to the removal of interest ceilings may interfere with reforms in other areas. High interest rates may lead to capital inflows which could rise the value of the domestic currency and derail export expansion efforts” (Gochoco, 1990, 333).

It might be more thoughtful to see direct relationship between government deficit and interest rate. Canto and Rapp (1982) have examined this empirically. They try to find direct relationship between

budget deficit and interest rate. Moreover, their approach is somewhat different from the others in formulating and testing the relationship. They performed two tests to determine what effect, if any, changes in the budget deficit have on interest rates (Canto and Rapp, 1982, 35). These tests are Granger (1969) and Sims (1972) tests. Based on Granger test their “empirical results indicated that increasing budget deficits were not necessarily associated with increased interest rates. There was no conclusive evidence that information on changes in past budget deficits combined with changes in past interest rates provided more accurate forecasts of changes in current interest rates than information on past interest rates alone” (Canto and Rapp, 1982, 36).

Based on Sims test they find that “changes in the “current year’s” budget deficit had no statistically significant association with changes in future interest rates taken as a group” (Canto and Rapp, 1982, 36). They also used these two tests to determine if interest rate increases can explain increases in deficit. The results indicate that “an increase in interest rates contributes to a larger budget deficit through higher interest expense in the future” (Canto and Rapp, 1982, 37).

Over all they conclude that “Budget deficits have not been a consistently accurate predictor of interest rates. Changes in interest rates cannot be shown to have caused changes in real budget deficits. Changes in interest rates have, however, partially explained changes in nominal budget deficit (Canto and Rapp, 1982, 37)”.

They do not state explicitly whether their results support the crowding out hypothesis. Based on their test, they conclude, “using the past as our guide, the relationship between deficits and interest rates has not been a consistent one” (Canto and Rapp, 1982, 37).

However, in another study, Boskin (1987) states in his article that “Increases in deficits do indeed lead to an increase in interest rates” (Boskin, 1987, 273). So he finds the crowding out effect.

Dwyer also investigates the relationship between interest rates and deficits. He concludes, “No evidence is found that larger government deficits increase interest rates” (Dwyer, 1982, 327).

Like Dwyer, Makin tests for crowding out and found no evidence (Makin, 1983, 382).

One other possibility to examine is to test both hypotheses together. Gupta (1992), for instance, tests both crowding out hypothesis and Ricardian equivalence proposition for developed countries. After introducing crowding out and the equivalence proposition, Gupta lists the assumptions of Ricardian equivalence proposition. They are; (1) Capital markets are perfect with no constraints on borrowing by consumers, (2) Taxes are non-distortionary, (3) Economic agents are fully aware about the path of future fiscal policies, and (4) Both public and private sectors have equal planning horizons (Gupta, 1992, 19).

Then he mentions that violations of one or more of these assumptions could lead to deviations from the equivalency proposition. He uses Aschauer's (1985) model to test these two hypotheses. The variables that he uses are in real per capita terms and the time period covered is from 1960 to 1985, for ten developing countries in Asia (Gupta, 1992, 20).

The evidence he finds on crowding out hypothesis is that "government expenditure is a poor substitute for private expenditure so that even if the mode of financing is irrelevant, government expenditures can be expected to exercise significant expansionary effects on aggregate demand in the countries in the sample. This evidence thus refutes the alleged fears about massive crowding out effects in these countries" (Gupta, 1992, 25). For the Ricardian equivalence proposition, he finds that it holds for some countries, and does not hold for others (Gupta, 1992, 25).

Plosser (1982) also studied crowding out hypothesis. He develops a model under rational expectations approach, and tests the crowding out hypothesis. His results find no significant relationship between deficits and interest rates.

Since we assume theoretically that increase in government debt causes interest rates to increase, it gives us more insights to study what determines interest rates. Even though there might many determinants, we could examine for our purposes to see if deficit is an important determinant of interest rates.

There is a small handy book written by Davit T. King (1990) who examines this interest rate determination and links it to crowding out hypothesis. He points out that "interest rates are determined in the financial sector by (a) the interaction of the borrowing and lending plans of the sector's "outside" the financial sector and (b) central bank actions affecting bank liquidity "inside" the financial sector" (King, 1990, 21). He distinguishes between outside and inside interest rate determination by stating "outside interest rate determination refers to changes in financial supply and demand initiated by changes in borrowing and lending plans of the real sector. Inside interest rate determination refers to changes within the financial sector brought about by central bank policy, which then influence the real sectors' borrowing and lending" (King, 1990, 21). He, then, links the interest rate determination and the crowding out hypothesis. He states "the validity of the credit market pressure model of interest rate determination is important to the crowding out issue. Crowding out commonly refers to credit market pressure created by excessive government borrowing" (King, 1990, 23). Based on his study, he claims that "in fact, the conditions for crowding out have never existed in modern U.S. economic history: whenever the government borrowing requirement was high, the private sector borrowing requirement was low, and vice versa. However, in 1983 for the first time in the postwar era, both government and private borrowing as a percent of GNP increased at the same time. And the government-borrowing requirement is projected to

stay at unprecedented levels even as private sector borrowing continues to grow with economic expansion in 1984-89" (King, 1990, 23-24).

Therefore, he says crowding out is unlikely to happen. His approach to the problem is a very different way from the existing literature in this area. Since he just look at borrowing requirement and interest rate.

Feldstein and Eckstein (1970) have undertaken one of the comprehensive studies. They actually investigated the fundamental determinants of the interest rate (Feldstein and Eckstein, 1970, 363). They state "Because government debt is a relatively close substitute in portfolios for corporate bonds, an increase in the quantity of government debt that must be absorbed by the public would be expected to raise the bond interest rate" (Feldstein and Eckstein, 1970, 367). Based on their test, they found that "changes in the outstanding public debt can have an important impact on the corporate bond rate. ...If real interest rate is 4.0 per cent, this implies an elasticity of the real rate with respect to the government debt of 0.7" (Feldstein and Eckstein, 1970, 367). Hence, they found a positive link between interest rate and government debt, which support the existence of the crowding out effect.

Bradley approach to the problem is also different from the others in the sense that he initially accept the crowding out effect, but he tries to find the main causes that results crowding out effect. More specifically, he asks the question that "government spending or deficit financing: which causes crowding out?" (Bradley, 1986, 203). Actually, he claims that there is confusion about the direct effects of government spending and indirect effect of how that spending is financed (Bradley, 1986, 203). He uses a simple dynamic model and finds that "increases in the stock of government bonds, by themselves, do not force up interest rates. When the debt increase is caused by a rise in spending however, we find, after a lag, both interest rates and monetary aggregates rise" (Bradley, 1986, 204). As a result, his empirical results also show that there is crowding out. However, he claims that it exists because of large government spending.

It is sometimes a good idea to find out what policy makers or businessmen think about this issue. President John J. Balles of the San Francisco Bank thinks "...private demands for credit would somehow get squeezed out, and interest rates would rise to astronomical levels" (cited in Weintraub, 1978, 360).

Elmendorf and Mankiw (1999) tests Ricardian equivalence proposition and found inconclusive results while Stanley (1998) came up with strong empirical evidence against the proposition.

Some researcher looked at the issue in a different angle by viewing a consumer's intertemporal maximization point. These scholars found support for the equivalence proposition (Evans, 1988; Haque, 1988; Haug, 1990).

One resent study mainly emphasized testing Ricardian proposition by using US data from 1980 to 1995. This study done by

Wheeler (1999) and found strong empirical evidence to support extreme case of the proposition.

More recently, Ricciuti (2003) emphasized the role of the permanent income hypothesis and the intertemporal government budget constraint in testing the Ricardian proposition (53). His conclusion shed light to the future researcher as he recommend "...we have tried to demonstrate that this debate is far from having achieved a univocal conclusion. A new wave of work, mainly empirical but also theoretical, is needed in the field."

6. CONCLUSIONS

As Mankiw expresses, economics science is incomplete. There are many unanswered issues as well as controversies that have not yet been solved. Crowding out hypothesis, unfortunately, among those issues. Although there have been enormous theoretical and empirical studies on this subject, no agreement has been reached.

As we have reviewed some of the important theoretical and empirical studies in this paper, we see that some researchers conclude that there is crowding out while some do not. Similarly, some study find support for Ricardian Equivalence proposition while some do not.

I think the problem seems to be empirical. The difficulty arises of constructing the model, measuring the relevant variables, as well as the availability of relevant data. Assumptions that are used in studies are also important factors. Nature of the credit and money markets, interest elasticities of investment and saving are all factors that affect the test results. This study concludes, therefore, that government budget deficit crowds out private investment through its effect on interest rates. While complete crowding out is only a theoretical possibility, partial crowding out is likely, and its magnitude or degree depends upon interest elasticities of saving and investment, and nature of the credit and money markets as well as the place of economy in the business cycles.

Future research direction should be to construct models that grasp the reality and flexible enough to include all relevant variables to empirically test the both hypotheses.

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