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THE CROWDING-OUT EFFECT OF FISCAL POLICY
IN CANADA: AN EMPIRICAL EXAMINATION

by

Sadegh Bakhtiari

Supervisor:
Defense Held:

Mario Seccareccia
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UNIVERSITÉ D'OTTAWA

FACULTÉ DES SCIENCES SOCIALES

DÉPARTEMENT DE SCIENCE ÉCONOMIQUE

UNIVERSITY OF OTTAWA

FACULTY OF SOCIAL SCIENCES

DEPARTMENT OF ECONOMICS

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Sadegh Bakhtiari

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Supervisor : Professor Mario Seccareccia

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INTRODUCTION

The large increase in federal government budget deficits since 1975 and the subsequent increase in the size of the public debt have raised much concern over the potential effects of budget deficits.

One of the principal issues in the macroeconomic literature is the "crowding-out effect" of fiscal policy. Crowding out refers to the displacement of private economic activity by public economic activity. Generally the term "crowding out" is used in popular discussion to convey the notion of a displacement of private investment by a rise in government expenditure, brought about, by an accompanying increase in interest rates.

In this paper we shall discuss the general form of crowding out and the possible decline in private investment and consumption, that can presumably result from the existence of budget deficits. The discussion consists of five sections to be presented in the following order:

- a- the first section contains a brief historical review of crowding out in the economic literature.
- b-In the second part, a brief review of some related issues in the crowding-out debate will be presented such as on the question of debt neutrality and the problem of the burden of the public debt.
- c-The third section is a short survey of the empirical work which has been done in this area during the recent past.
- d- The empirical evidence resulting from the econometric

application of various models to Canadian data is described in the fourth section.

e- Finally, in the last section, we provide some concluding remarks.

PART-1

A BRIEF HISTORICAL REVIEW OF CROWDING OUT

In reviewing the literature, one is struck with the fact that the term crowding out is used broadly to describe different situations which at times are not even compatible with one another(1). For the sake of clarity we shall define crowding-out as a situation in which an increase in the budget deficit leads to a rise in the share of government spending and a fall in the share of private spending. The mechanism through which this decline in private spending takes place is normally through a rise in the rate of interest. A rise in the rate of interest, as we shall see below, directly brings about a fall in private investment and, within the classical and neoclassical theory, could also bring about a decline in the share of household consumption through an increase in the flow of saving. In the case of an open economy, in which the external sector has a

(1)For a quasi-exhaustive listing of these definitions of crowding out, see Arestis (1985, p. 98), Buiter (1977, p. 311), Friedman(1978, pp. 595-596) and Carlson et al (1975, p. 16).

major role to play in the determination of aggregate private spending, it is often suggested that crowding-out can also occur through the impact of the budget deficit on net exports. Once again, however, the mechanism by which crowding-out takes place is through a change in the rate of interest which brings about a movement in the exchange rate.

The dominant view, before the publication of Keynes's General Theory, was not in favour of government spending, especially for stabilization purposes. For example, Adam Smith was opposed to government involvement in economic activities. He condemned any policy that would transfer resources from the private sector to the public sector either through taxation or by borrowing funds from the public to finance government spending.(1) In fact, Adam Smith was one of the supporters of the crowding out phenomena. To many classical writers this opposition to government involvement hinged upon the belief in Say's Law, in which "supply creates its own demand", and which is an elementary case of crowding out. Within the framework of Say's Law, only the supply-side of production is considered. Indeed, it is hypothesized that total demand would always be sufficient to purchase the output of firms since the act of producing the good would generate an amount of demand equal to the value of the goods produced. In this case there cannot be any overall excess demand or excess supply in the economy. More specifically, if the supply of goods and services is

(1)Adam Smith(1937), p. 878

determined by the behaviour of profit-maximizing producers, within the context of competitive labor and commodity markets, and a given state of technology, then relative prices will tend automatically to adjust so as to eliminate a deficiency or an excess of demand. In an economy in which Say's Law is operating, any attempt by the government to increase total spending by raising government expenditures, merely induces a change in relative prices.

R.G.Hawtrey, among others, is one of the more well known neoclassical economists who argued that an increase in government expenditures financed out of taxes or loans would be offset by a reduction in private expenditures. He even rejected the idea of financing government expenditures through the banking system because, according to his view, the result of such a policy would be to drive up prices and threaten the stability of the exchange rate under the Gold Standard. In this case the central bank would thus be forced to raise the bank rate and bring about a reduction in domestic investment. This view was called the "Treasury View" in the early 1930s just prior to the publication of Keynes's General Theory (1)

(1) P. Arestis (1985), pp. 102-3. More detailed discussion is to be found in Klein (1968), pp. 45-46

The traditional neo-Keynesian analysis of crowding out within an IS-LM framework is based on a set of structural equations which postulate a given behaviour about economic units. This system of equations is finally reduced to two equations, one for IS and one for LM. The IS equation is the combination of interest rates and levels of income such that the goods market is in equilibrium ($I=S$) and represents the underlying equilibrium relationships within the real sector of the economy. The other equation (LM) contains various combinations of Y and r at which demand for money is equal to the supply of money ($M_d=M_s$) and represents the financial sector of the economy. This system can be solved to determine the equilibrium values of Y and r .

Crowding out can be demonstrated graphically within the IS-LM model for both closed and open economies. For simplicity of exposition, let us first examine a closed economy model, which ignores imports, exports and capital flows. In a classical case of crowding out we can see that the LM curve is vertical because it is assumed that demand for money is not sensitive to interest rate changes.

This idea is illustrated graphically in figure (1) where the LM curve is vertical (drawn for a given price level, P) and reflects a zero interest-elasticity of demand for and supply of money. In this framework any increase in government spending which shifts the IS curve to the right can only increase the interest rate, with the aggregate demand curve in the P - Y space

remaining unaffected (1) (as shown in the figure).

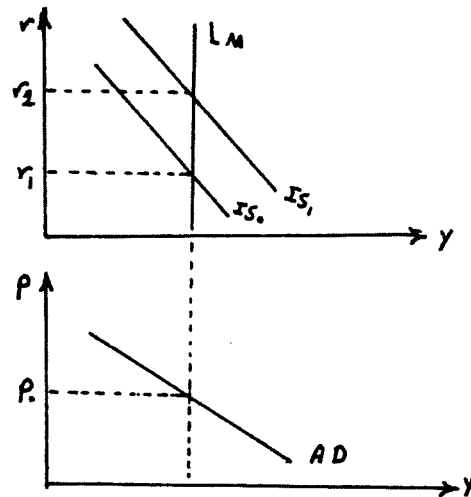


Figure-1

As a result, with aggregate demand failing to shift in response to the increase in government expenditures, crowding out will occur and private spending in the form of interest-sensitive investment expenditures falls to offset the increase in the deficit.

Another extreme case of the IS-LM relationships is one in which the rate of interest is assumed to be totally insensitive to aggregate spendings. In this situation, the LM curve must be depicted horizontally.

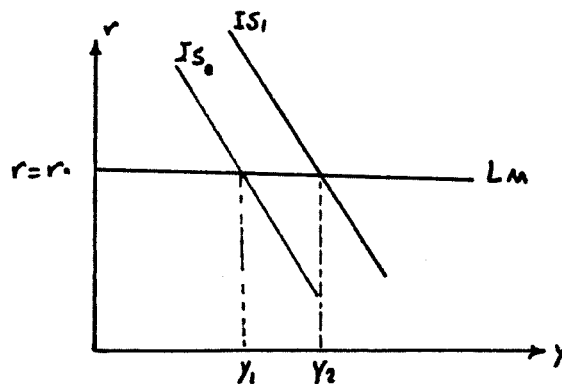


figure-2

(1) This view is associated with the classical "quantity theory of money" which argues that prices are determined by the quantity of money. This means that, as long as the income velocity remains unaffected by changes in the money stock and/or interest rates, any increase in government spending merely affects the composition of aggregate demand, not its level.

Given a horizontal LM curve, an increase in the government deficit shifts the IS curve to the right and moves the economy to a new equilibrium at a higher level of output. In fact, in this situation there is no crowding out. (1)

Both of the two cases mentioned above represent two extreme slopes of the LM curve. What is concluded by examining them is that the less sensitive the demand for and supply of money is to interest rate changes, the steeper will be the slope of the LM curve. It follows that the crowding-out effect is dependent on the slopes of the IS and LM curves and on the relative shift of the two schedules. For example, if the LM curve is steeply sloped as shown in figure (3), the increase in government spending, reflected in the rightward shift of the IS curve, results in a sharp rise in the interest rate (from r_1 to r_2).

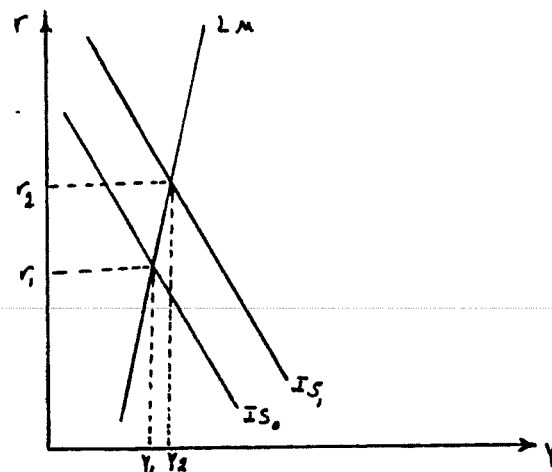


figure-3

(1) Variants of this kind of formulations are to be found in the following references:

a) Dornbusch et.al. (1982) pp .119-120 . b) Carlson (1975) p. 5
 c) Chick (1977) p. 24 . d) Arastis (1985) p. 105. e) Spencer et.al. (1970) p. 17

Naturally, the same could be said of the IS relationships. For instance, in the case in which investment spending is totally insensitive to the rate of interest (involving a vertical IS curve shown in figure-4 below), a rise in government spending will bring about an increase in the rate of interest without having any impact on investment expenditures.

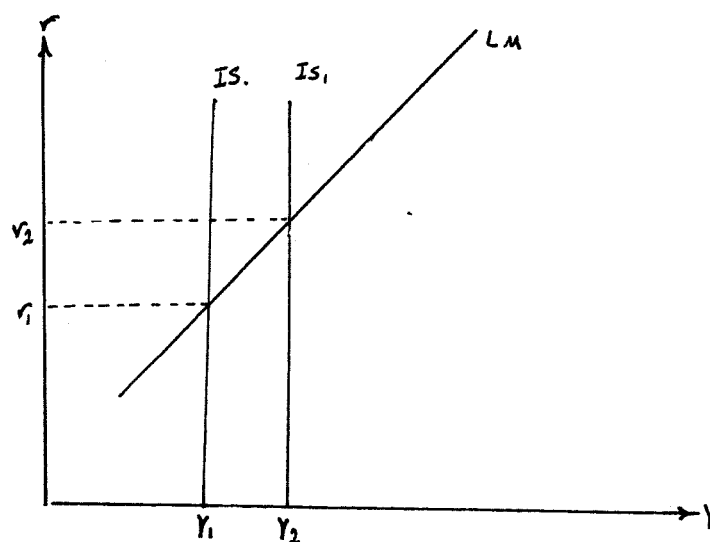


figure-4

In this latter case, crowding-out on the investment side cannot exist since investment spending is not related to the interest rate.

The analytical framework of our presentation of the IS-LM relationship has assumed, thus far, a fixed price level. Yet, it is clear that prices do change over time. For example, if the economy's resources are fully employed when the government adopts an expansionary fiscal policy, output cannot be increased further and so prices will rise.

The change in the price level could have effects on both the IS and LM curves. In particular when the price level goes up it could lead to a leftward movement of the IS curve depending on the changes in the real wage (W/P). If wages rise less quickly than prices, because of the existence of say, long-term wage contracts, the fall in real wages would modify the propensity to consume and therefore, reduce the impact of the government spending through a decline in the multiplier effect.

Moreover, an increase in prices would have a direct impact on the LM relationship. An upward movement in the price level brings about an increase in the transaction demand for money and causes a leftward shift in the LM curve (as shown in figure-5 below).

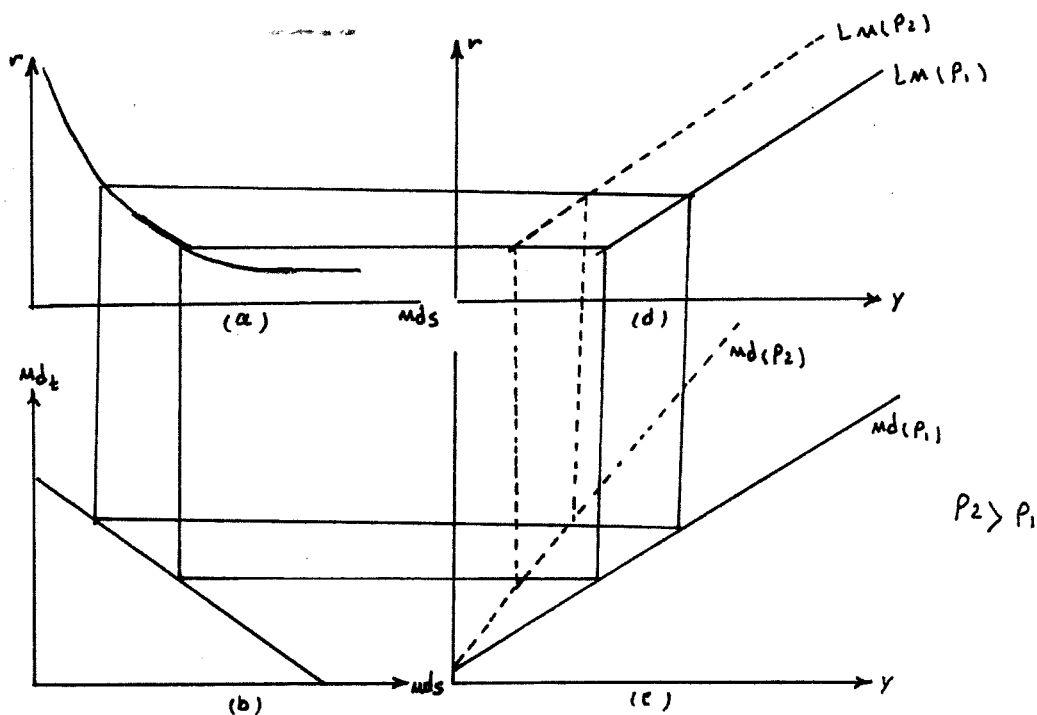


figure-5

It follows that the ultimate effect of a change in prices on the equilibrium level of Y and R depends on the price elasticity of the demand for money and on the degree of responsiveness of the community's propensity to save to changes in the distribution of income brought about by the increase in prices. Although it could be argued that the final effect of the change in prices cannot be a priori determined, it may be said that the movement of the LM relationship would more than outweigh the impact of price changes on the IS curve. This would mean that some crowding out through the investment side would take place, but less than if the changes in prices had no impact on the economy's propensity to save.

The above analysis of crowding out, in which imports, exports and capital flows were ignored, applies solely to a closed economy such as the United States, whose foreign trade sector is small relative to the domestic sector. Given the inappropriateness of this model to the Canadian case, it is desirable to introduce a degree of "openness" to the said framework. To do this let us first begin by explaining the meaning of "small" and "open" economies.

For our purpose, an open economy is simply one in which domestic residents are free to purchase foreign goods and assets, and also foreigners are able to buy domestic goods and assets. Smallness refers to the fact that the economy is too insignificant a demander or supplier of internationally-traded goods and assets to be able to affect their prices.

Using a Mundell-Fleming type model for a small open economy, one can show that under perfect capital mobility and a flexible exchange rate, a deficit does not have any impact on the real rate of interest. For example, Canadian interest rates cannot deviate from interest rates prevailing in the rest of the world. If Canadian bonds are priced too high, both domestic and foreign holders will exchange their Canadian bonds for cheaper foreign assets. This will drive prices of Canadian bonds down to the prevailing world level, and therefore equalize the real interest returns. Conversely if the price of financial assets are low relative to the world level the opposite scenario would apply.

We can now show these results graphically (see figure 6). If the economy is initially in equilibrium at point (A) with the world rate of interest $r=r_f$, an increase in the government deficit tends to shift the IS curve to the right (IS_1) raises real income and that, in turn, increases the demand for money and raises the interest rate to r_1 for a given money supply.

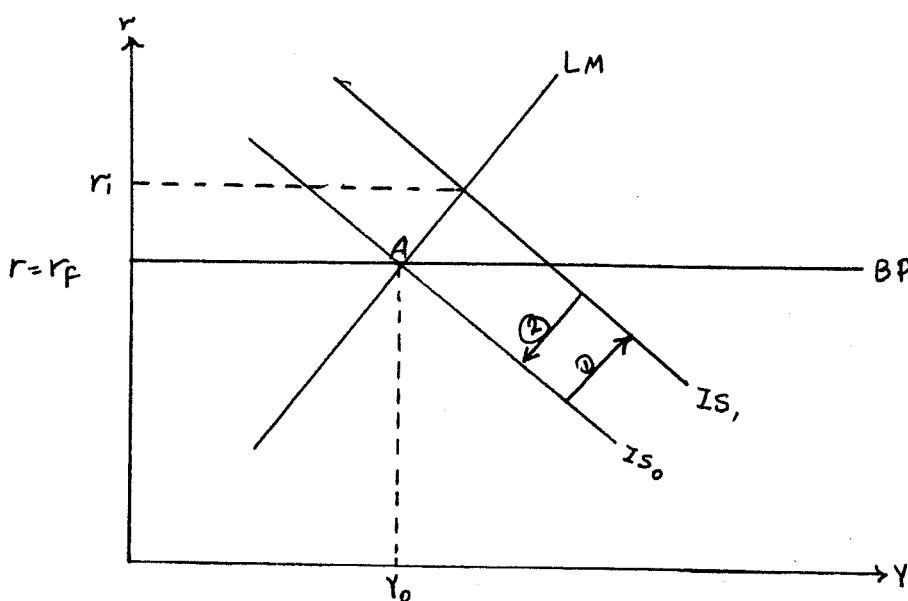


figure-6

When the domestic rate of interest is higher than the world interest rate, there is an inflow of capital. This induces the asset holders to switch from foreign bonds to domestic bonds. The resulting capital inflow places downward pressure on the exchange rate of the domestic currency in terms of the foreign currencies. As the domestic currency appreciates, the foreign demand for exports falls and domestic demand shifts towards imports. This shifts the IS curve back to its initial position with the same aggregate real output and the same real interest rate. In the latter situation, the reader will notice that while crowding out on the investment side does not occur because of an unchanged interest rate, crowding out will take place in the export market. Specifically an increase in government spending now squeezes out net export while leaving private domestic spending unchanged.

While the IS-LM analysis is very popular in macroeconomics, it is not an acceptable framework for all macroeconomists. Some of the assumptions that the IS-LM model depends upon are highly questionable, among others, the exogeneity of both government expenditure and the money supply is an assumption that remains unacceptable to numerous economists; government spending is comparable to private spending in its effect on demand and output.

Thus, if the above-mentioned criticism holds, the theoretical propositions that result from this scheme are open to serious questions. One may be of the opinion that the IS-LM framework

is too limiting in its scope and unreliable to serve as an analytical representation of the actual world, but this consideration is left to the reader.

CROWDING OUT IN A SECTORAL APPROACH

Another framework which is usually considered in budget deficit analysis employs a basic accounting identity.

As it is commonly discussed in conventional macroeconomic analysis, government expenditures on goods and services (G) plus the export of goods and services (X) plus gross private investment (I) must be equal to government revenue net of transfer payments (T) plus imports of goods and services (M) plus gross private saving (S), or:

$$G+X+I=T+M+S$$

Economist often refer to the left hand side of this equation as injections because all these expenditures inject funds into the income stream. The variables on the right hand side are called withdrawals because they are components of income which are not being returned to the income stream.

This identity can be rearranged as:

$$(G-T)+(X-M)+(I-S)=0$$

Each bracket shows the financial situations of each sector in the economy.

If the resulting value in each bracket is positive, then that sector is a borrower from the other sectors and if it is negative, it is a lender to the other sectors (i.e., business, government and the rest of the world).

H.P.F.Saarbrucken(1985) argues that many prominent advocates of the crowding out effect such as M. Feldstein, focus on these sectoral financial balances. By limiting themselves to these simple identities, they draw a number of what are deemed to be highly equivocal conclusions. For instance, they argue that whenever the budget deficit rises (or the budget surplus falls) without an increase in the foreign sector's net acquisition of financial assets by an equivalent amount the net borrowing of the business sector must necessarily fall. One however cannot automatically draw a conclusion concerning the strength of investment spending only from the business borrowing, because the link between these two is more complex than it appears in this single identity. This is because the previous identity is a mere truism that says nothing about the actual intersectoral financing of spending. In particular, any discussion using this framework implicitly assumes that there is no monetary creation nor a banking sector. This means that they assume the most ultra-classical principle of Say's Law, previously discussed.

CROWDING OUT IN THE INTER-GENERATIONAL TRANSFER APPROACH

Another approach which does not confirm crowding out on the investment side is what is sometimes called the inter-generational transfer model and discussed by Robert Barro(1). He argued that households have "operative altruistic intergenerational transfer motives" and they know that the current deficit, in present value terms, equals the taxes required to service the extra debt.

That is to say, households today discount the present value of future taxes and, therefore, through a negative wealth effect they reduce their present consumption. The implication of what appears to be a questionable assumption about household behaviour is nevertheless important for this analysis. If it is true that households increase their saving rather than their consumption when they are confronted with budget deficits, neither aggregate demand nor interest rates may rise and therefore there will be no crowding-out effect on the investment side. On the other hand, we would still have crowding-out but, in this case, only on the consumption side.

A discussion of this problem will be carried out in greater details below.

(1) BARRO, R. (1974), "Are Government Bonds Net Wealth?" Journal of political economy, 82, and his Macroeconomics, ch-15.

CROWDING OUT IN A KEYNESIAN FRAMEWORK

The critical variable in Keynes's framework of analysis is the level of investment spending. Investment expenditures are largely autonomous in Keynes's model and they are primarily determined by the profit expectations and the degree of optimism of investors about future returns. There is thus a strong relationship between investment decisions and expected profit. Indeed, an investor who holds strong expectations about future return would not be much influenced by changes in the rates of interest, unless such changes were of a very great magnitude, and as long as "Animal Spirits" remain high. In algebraic form, this would suggest:

$$I = I(\pi)$$

That is, investment is primarily autonomous (or at least not much affected by interest rate changes) and dependent principally upon expectations of profits(π).

Expectations of profit, however, have sometimes been proxied within the textbooks by various variables. One of these, which we believe is completely compatible with the Keynesian model, is the simple accelerator relationship, whereby

$$I = v(\Delta Y)$$

and where v is the accelerator coefficient, ΔY is the change in aggregate spending which indicates expected future profitability for firms. It can now be seen that an increase in aggregate spending, if perceived to raise future profit will stimulate investment through the accelerator-type relationship. It also

follows from this, that an increase in government spending which raises the overall level of spending will tend to stimulate investment and therefore "crowd in" private investment through the accelerator effect.(1) However this is not the complete Keynesian analysis. Much of the previously-discussed literature on crowding out identifies the issue in terms of a problem of financing. That is to say crowding out exists because investment is largely constrained by saving, as in the sectoral approach. Keynes clearly rejected this classical assumption of a saving fund and argued that the level of investment spending determined savings and not that saving was somehow a precondition for investment.

Since investment is not constrained by saving, the banking sector enters within the Keynesian model to validate spending. In a monetary economy, the existence of credit breaks the classical link between investment and saving, and allows firms to undertake expenditures that are governed instead by their "Animal Spirits". Once again, crowding out, in this framework, would not apply, since there is no fixed pool of funds in the economy within which the government competes with private firms.

(1) There was a special case for Keynes in which the budget deficit adversely affects the confidence of the private sector and crowding-out of private investment. Keynes, himself considers this effect when he argues that "with the confused psychology which often prevails, the government programme may, through its effect on 'confidence', increase in liquidity -preference or diminish the marginal efficiency of capital, which, again may retard other investment unless measures are taken to offset it. J.M Keynes General Theory, p. 120

Another framework of analysis, which follows the Keynesian tradition and further supports the case against crowding out, is the work of Kalecki. As in the Keynesian analysis, the Kaleckian version emphasizes the relationship between investment and profit. Unlike Keynes, however, Kalecki develops a model that identifies the determinants of profit directly(1). For instance, in chapter 7 of his "Selective Essays on the Dynamics of the Capitalist Economy", Kalecki derives an equation of profit of the following type.

$$\pi = I + X - M + D - S_w + C_c$$

Where:

π =Gross Profit

I= gross investment

X-M=export surplus

D=budget deficit

S_w =workers' saving

C_c =capitalists' consumption.

To understand this relationship, it should be emphasized that it is analogous to the view which Keynes held. In the General Theory Keynes argued that investment is the causal variable determining saving through the standard multiplier analysis. In this Kaleckian version, the approach is effectively

(1)For a more detailed discussion of this view, see Seccareccia (1985)

the same. Whenever investment (I) rises, ceteris paribus, this increase in income, less the amount saved by workers, will be realized in an increase in the flow of profit. The flow of profit is thus, by definition, merely the volume of saving undertaken by firms. That is to say, by bringing Sw and Cc on the left hand-side of the equation, we get the usual macroeconomic relationship found in the textbooks:

$$Sw + \pi - Cc = I + (X-M) + D$$

where by definition, $Sw + \pi - Cc$ is the gross flow of saving in the economy. Naturally, the terms on the right hand-side of this equation are the flow of net spending or injections usually defined in macroeconomic textbooks.

If we accept this Kaleckian approach it ensues that an increase in the budget deficit directly raises the level of profits in the economy. Presumably, if this makes firms more optimistic by feeding on their expectations of profit, then it will result in an increase in incomes. Once again, we have a case in which there is 'crowding in' rather than 'crowding out'. At last, it may be argued that, whether or not 'crowding in' exists, crowding out cannot take place in these Keynes-Kalecki type approaches.(1)

Among the various advocates of this approach there is Saarbrücken(1985) who has specified a profit equation of the

(1)A comprehensive profit equation and more detailed discussion of this view can be found in Seccareccia(1985), pp. 258-260.

Kaleckian type and has concluded that for the period 1981 through 1984 crowding in rather than crowding out existed for the United States.(1)

PART-2

CROWDING OUT AND DEBT FINANCING

It has been argued that the exact nature of the crowding out effect depends on the method chosen by the government to finance its increased expenditures. Raising more taxes and selling more bonds are two important ways of financing any government expenditure.

Do tax and debt financing have the same effect on private economic activity or not? That is a question which has been a subject of debate since David Ricardo. In recent years topics such as "Ricardian Equivalence Theorem" or "Debt Neutrality", "Ultrarationality", "Are Government Bonds Net Wealth ?" and "Burden of the Public Debt" have shown there to be much debate on the issue.

(1)As Saarbrucken points out, during the period IV/1982 and III/1984 in which the U.S. budget deficit rose tremendously (more specifically, it doubled between 1981-82 and then increased by almost another 100 percent in 1983 which brought the U.S. deficit to a record level of \$200 billion), gross private domestic investment increased by almost 70 percent in real terms and that, real non-residential fixed investment during this period witnessed its highest growth during the postwar history of the United States. (Saarbrucken, p. 136,139).

In one approach, in which it is assumed that bonds are net wealth, a deficit financed through issuing new bonds raises households' wealth. Thus, when people feel they are wealthier, their consumption demand increases. However according to this analysis aggregate supply also decreases because of the increase in wealth. The typical person prefers more leisure, which means less work and hence less output.

When aggregate demand increases and aggregate supply decreases, the real rate of interest will rise and consequently, the budget deficit crowds out private investment.

Another line of argument is based upon the fact that bonds issued by the government are not wealth for those who hold them, because in countries like Canada and the United States, bonds are redeemed either by increases in taxes or monetized by printing new money. In both cases the people (taxpayers) are assumed to carry this weight. This future tax liability offsets, at least in part, the wealth effect embodied in holding bonds.

Also in the case in which bonds are monetized in the future, the money created to redeem them will create future inflation and thus will reduce the future purchasing power of money and offset some part of the wealth embodied in bonds. In fact in this kind of analysis, it is assumed that economic behavior of the individual is affected by considering the events beyond their expected lifetime. Barro (1974) argues that, so long as the individuals are concerned with the welfare of their descendants and think that the welfare function of their children is the same

as their own welfare function, rational individuals may be expected to set aside savings to pass on as bequest in order that their beneficiaries might meet tax liabilities resulting from past deficit financing. Barro mentioned that "households would act as though they were infinitely lived, and, hence that there would be no marginal net wealth effect of government bonds, so long as, there existed an operative chain of inter-generational transfers which connected current to future generations." (1) Barro's argument is based upon infinite life and he believes that people effectively plan with an infinite horizon even though they live only for a finite time.

Since this approach apparently is very similar to the comments made by David Ricardo on the subject, it is called Ricardian Equivalence Theorem (2). In sum, according to this theorem, any increase in current taxes has the same effect on the economy as an equal increase in the government deficit.

By discounting the increase in future periods' taxes, Barro has shown that there is no change in the present value of aggregate real taxes. Following his analysis, it is assumed that the government has a balanced budget and it then decides to run a deficit of one dollar in order to cut taxes by a similar

(1) Barro (1974), p. 1119.

(2) - James Tobin (1979) argues that Ricardo did not agree with this theorem. Tobin mentioned "...he thus refuted rather than upheld the notion that the form of financing is irrelevant in fact, after giving a clear statement in his "PRINCIPLES" of the "Ricardian Equivalence Theorem" Ricardo proceeds to deny emphatically its validity", p. 40.

amount. The current aggregate disposable income will then rise by one dollar. Now suppose that the government wants to restore this public debt in the next period. It has to raise taxes enough to pay off the principal and interest on the one dollar debt which is issued at the previous period. Accordingly, the aggregate of next period disposable income will decrease by $(1 + R)$ dollar, and consequently there is no difference between one dollar tax at period 1 or $1+R$ dollar tax at period 2. The net effect on the present value of aggregate real taxes is determined by (1)

$$(1/P) \cdot (-1 + (1+R)/(1+R)) = 0$$

Where:

R = nominal rate of interest

P = Price level.

In other words, the net effect on the present value of aggregate real taxes is zero. Thus, shifts between taxes and deficits do not generate aggregate wealth effect. (1)

This argument can be presented within the IS-LM framework. According to the previous analysis, shifts between taxes and deficits do not generate aggregate wealth effect and

(1) Additional discussion can be found in Barro (1984), pp. 380-5.

(2) Generally it can be proven that, the result in the case of CONSOL debt is the same as mentioned, because in this case the stock of the debt stays constant over time, and government must finance only the interest rate equal to R dollars in each period, and so:

$$(1/P) (-1 + R(1/(1+R) + 1/(1+R) + \dots)) = -1/P (-1 + (R/(1+R))((1+R)/R)) = 0$$

consequently the position of the LM curve does not change. Also as we explained, supporters of the Ricardian Equivalence Theorem believe that any increase in the deficit is offset by an equivalent rise in private saving, and a decrease in private spending. Therefore the position of the IS curve does not change and consequently the rate of interest remains unaffected by a change in the deficit. In this case crowding out occurs that is not through the effect of higher deficits on the interest rate but rather through the direct impact of deficit financing on the consumption-saving decisions of rational individuals.

It should be mentioned that there are some empirical studies which confirm Barro's hypothesis(1). But Tobin(1979) argues that, current theoretical models and empirical evidence are not enough for a decisive conclusion and "further empirical work is urgently required, however, before any conclusion can be more than tentative"(1). Meanwhile on the importance of debt neutrality he mentions:

"To the economic theorist debt neutrality raises fundamental issues about interrelationship of

(1)For instance, in a study by L.A.Kochin(1977), he used annual data for the United States from 1952 to 1971, his estimated relationship is as follows:

$$C_t = 5.56 + .28Y_{dt} - .22FD_t + .64C_{t-1}$$

(1.8) (3.8) (2.6) (5.12)

²
R² = .99 DW = .68

where:

C_t and C_{t-1} = current and previous consumption expenditure

Y_{dt} = disposable income for period t.

FD_t = federal deficit at period t.

A negative and significant coefficient of FD indicates that when the budget deficit increases, consumption expenditures decrease or private saving increases.

(1)Tobin(1979), p. 57.

private and public economic activity. The subject of public finance, macroeconomics, monetary theory, corporate finance and international finance each contribute their varied perspective to our understanding of the issues involved. To the applied economists and economic policy makers the debt neutrality debate is of the utmost importance. From a long-run perspective it concerns the consequences of alternative public sector financing rules for the growth of the domestic capital stock. From a short and medium-term point of view the usefulness of deficit financing as a stabilization instrument is at stake". (1)

Opponents of debt neutrality also mention that this theorem is based upon assumptions which are highly unrealistic. For example, Barro implicitly assumes:

- a) Perfect capital markets (-i.e.; the government and the public borrow freely at the same rate), perfect foresight, and a closed economy;
- b) Tax changes are of the lump-sum tax variety;
- c) Does not consider the possibility of structural or permanent deficit.

Once again, the conclusions to be derived from Barro's work are left to the reader.

PART-3

SOME EMPIRICAL WORK RELATED TO THE CROWDING OUT EFFECT

A lot of empirical work has been done on the crowding out

(1), Tobin (1979), p. 58

effect. Most of this empirical work has involved econometric tests of the impact of government budget deficits on interest rates. It should be mentioned that the results are not the same and any comparison of the result of these studies is very difficult, especially with respect to the number of differences among them. The studies vary according to the definition of the variables employed; the time period examined; the theoretical assumptions; the econometric methods; and the data used to measure the variables.

However, given the extensive research that has been done in this area of economic analysis, we will explain some of the empirical work which is felt to be more representative of the literature. We will also try to present some of the ensuing controversies and show how different authors draw alternative conclusions even when applying the same model. Let us begin with the work of B. Friedman (1978). Friedman mentions in his discussion of fiscal policy that the term "crowding out" has several diverse meanings. Friedman explains that the objective of his article is to show that the prevailing view of the economic consequences of financing government deficits, reflects some misunderstanding in recent economic literature. According to his view debt financed deficits in some cases may cause crowding in rather than crowding out.(1)

(1)Friedman (1978),p. 597

In his endeavour to show this, he examines two different financial market phenomena and distinguishes "transaction crowding out" from "portfolio crowding out". Regarding this former phenomenon which leads to transaction crowding out, he explains by means of the standard IS-LM approach that increases in budget deficits stimulate aggregate demand. Higher aggregate demand, in turn increases the demand for money, consequently, the rate of interest rises and the transaction crowding out ensues. According to his view, in the short run, transaction crowding out is minor, because of the different income-elasticities of the public's demand for time and demand deposits.(1)

Friedman also mentioned that the portfolio effect caused crowding out or crowding in depending on whether portfolio bonds are closer substitutes for money or for capital assets. He suggests short-term and long-term government bonds may have different degrees of substituteability with cash and capital assets. To him short-term treasury bills are like money, while long-term government bonds are similar to capital assets.

In his article he argues that financing the deficit with very short term, rather than long-term, securities would be less likely to crowd out private investment. However, there are no conclusive findings as to whether the actual public behaviour results in portfolio crowding out or portfolio crowding in.

(1)Friedman(1978) p. 598

Another empirical study to be found in the literature is that of G.HOELSCHER(1983) which analyzes the effect of federal government borrowing on short-term interest rates. His model is based on an IS-LM framework and has two equations and one equilibrium condition. By solving the model he derives a reduced form equation for the interest rate in the following way:

$$i=f(P,UNEM,USB,M)$$

where:

i = nominal interest rate

P = expected rate of inflation.

$UNEM$ =unemployment rate.

USB = real borrowing by the federal government.

M = monetary variable which is defined as: net acquisition of credit market instruments by the federal reserve system, in constant dollars, an average of current and preceding quarters. The variable USB is used for real federal deficits and as a direct measure of borrowing. He used United States quarterly data for the period III/1952 to II/1976. Hoelscher's results, from estimating this model, are as follows with the t values listed in parentheses,

$$TBILL = 2.35 + .31P - .26UNEM + .0041USB - .048M + .63TBILL_{t-1}$$

(3.5) (3.15) (1.02) (2.16) (6.8)

$$R^2 = .93$$

Where $TBILL$ and $TBILL-1$ are the current and lagged values respectively of the quarterly average of monthly rates on new issues of three-month Treasury bills. Other variables are defined as before.

The coefficient on federal government borrowing (USB) is positive but it is not significant. He also estimates the same equation after changing USB to USGB as real budget deficit per GNP. He does this because it is sometimes argued that the absolute size of government borrowing does not matter, but rather borrowing as a proportion of GNP is more relevant to the size of the economy which must finance it.(1) The results of this regression were as follows:

$$TBILL_t = 2.30 + .32P_t - .26UNEM_t + .034USBG_t - .05M_t + .64TBILL_{t-1}$$

(3.6) (3.13) (.98) (2.1) (6.96)

$$R^2 = .93$$

The results are quite similar to the previous equation. The coefficient on federal government borrowing per GNP is still insignificant and does not confirm the crowding out effect, or as he explains, "The regression results indicate that there is no significant correlation between federal borrowing, whether measured in absolute terms or as a percent of GNP, and short term interest rates" (2).

James R. Barth, George Iden and Frank S. Russek (1985) have done another empirical work concerning the relationship between deficits and interest rates. Actually they reexamine the result of some studies which did not confirm the crowding out effect. The authors demonstrate that with some change in model specification, a significant relationship between deficits and

(1)Hoelscher,G,P. (1983)p. 324

(2)Hoelscher,G,P. (1983)p. 325.

interest rates could be established.

One of the models which was reestimated by these authors was Hoelscher's model which was explained above. They obtain rather different results when using the combination of two components of budget deficits, namely structural budget deficits and cyclically-adjusted budget deficits.

They found a positive and significant coefficient for the structural budget deficit and a significant but negative coefficient on cyclically-adjusted budget deficits. The results of their estimation are as follows;

$$TBILL = .58 + .01SD - .03CD + .84TBILL_{t-1} - .09M - .17P$$

(2.21) (4.2) (19.1) (4.2) (3.45)

Where:

TBILL, TBILL-1, M, P are defined as before, and where,

SD= structural component of budget deficit

CD= cyclically component of budget deficit.

Another work done in this area is by Dennis Palcone, Holley Ulbrich and Myles Wallace with the title "The Crowding out Debate: It's Over When It's Over and It Isn't over yet" (1). They reestimate a model similar to that developed by Hoelscher and tested it over the time period I/1965-II/1982.

They used the same variables as in the previous analysis but for the monetary variable, they tested three forms of M, namely

(1) Dennis Palcone et.al(1985), p. 90.

FBOND which represents the change in real seasonally-adjusted federal debt held by federal reserve banks, BASE for reserve change-adjusted monetary base and M1 which represents the average of the current and lagged change in the monetary variables. They also used the percentage change in real GNP as a new variable. They used the simple ordinary least squares method but also estimated the same equation in weighted and LOG forms. We just mention the result of their OLS estimations here. A full listing of all their results are in the appendix.

$$TBILL = .44 - 4.72USB + .86TBILL_{t-1} - 41.79FBOND + .11P + 18.2Y$$

(1.46) (11.1) (2.3) (1.1) (1.8)

$$TBILL = -.88 - 13.9USB + .87TBILL_{t-1} - 126.3BASE + .3P + 11.3Y$$

(-3.8) (11.45) (2.8) (3.8) (1.69)

$$TBILL = -.40 - 12.77USB + .83TBILL_{t-1} + 36.2M1 + .3P + 3.4Y$$

(-4.02) (11.45) (3.5) (4.4) (.33)

What is interesting is that they consistently found negative and in most cases significant correlations between budget deficits and short -term Treasury bill rates. These negative and significant signs indicate "crowding in" instead of "crowding out"!

One of the supporters of the crowding out effect is Richard Cebula. He has published at least five articles in economic journals and all these papers involved empirical tests aimed at trying to prove this phenomenon.

Cebula (1985-c) does an empirical study, relating the impact of the budget deficit to interest rates. In his view, the

crowding out of private investment by the budget deficit through the interest rate is very reasonable. Because "growth in deficit financing leads to a rising effective interest rate yield on treasury bills, the rising T-bill rate in turn may induce an increased net flow of funds out of the private sector into the public sector, which leads to an increase in the rate of growth of private interest rates and resultant decrease in the growth of private spending".(1) The Ordinary Least Square estimates of Cebula's model are as follows:

$$PR = 3.336 + .32INF - 3.24MS + .68TB$$

$$(1.35) \quad (-2.8) \quad (8.75)$$

$$R^2 = .66 \quad DW = 1.86$$

where;

PR= rate of change of the prime rate of interest

INF= rate of change of the consumer price index

MS= Rate of change of money stock(M1)

TB= Rate of change of the interest rate yield on three-month T bills.

Cebula suggested that in order to avoid causality problems between PR and TB he used a two-stage least square system.(1)

His estimation results are as follows:

$$PR = 3.48 + .33INF - 3.27MS + .50TB$$

$$(1.4) \quad (-1.7) \quad (2.7)$$

(1) Cebula(1985-c), p. 305.
 (1) Cebula(1985-c) p. 307.

$$TB=2.17 +.002D/Y +3.77MS + .90PR$$

$$(1.5) \quad (2.58) \quad (2.94)$$

He drew the conclusion that there is a bidirectional relationship between PR and TB and inferred that the results in the above mentioned equations are evidence of financial crowding out. According to Cebula's view, the reason for the different result between his study and Hoelscher's work is that these two estimations are for two different periods of time. Also Cebula claims that Hoelscher's analysis is merely static, because he deals with the levels of these variables rather than their rate of change.

Cebula (1978) tested empirically the impact of the federal government budget deficit on private investment. For this purpose, he estimated the following regression for the United States and Canada with annual data for the 28 years from 1949 through 1976.

$$I_t = 52.9 + 5.27U_t - .20I_t - .6DN_t \quad \text{U.S.}$$

$$(2.2) \quad (1.9) \quad (2.9)$$

$$R^2 = .68 \quad DW = 1.90$$

$$I_t = 29.46 + 4.0U_t - .18I_t - .61DN_t \quad \text{CANADA}$$

$$(2.1) \quad (1.9) \quad (2.9)$$

$$R^2 = .67 \quad DW = 1.97$$

where:

I_t = gross private domestic investment in non-residential structure and producers' durable equipment, in real terms.

U_t = Capacity utilization rate

DN_t = net change in the federal government outstanding debt in real terms.

The results indicate that the level of private investment in both the United States and Canada is significantly influenced by the size of the current budget deficit. In other words, budget deficits crowd out private investment.

Recently Cebula(1985-a) corrected his estimation and used a new regression equation with some new variables. For this estimation he used quarterly data from I/1969 through quarter II/1982.

The ordinary least squares results are:

$$I_t/Y_t = 8.3 - .08D_t/Y_t - .003P_t + .012CP_t - .017F_t$$

$$(-2.8) \quad (-2.5) \quad (2.13) \quad (-2.20)$$

$$\bar{R}^2 = .49 \quad \bar{R}^2 = .44 \quad DF = 49 \quad DW = 1.98$$

where:

I/Y = ratio of aggregate investment in new plant and equipment to GNP

D/Y = ratio of aggregate government budget deficit to GNP

P = rate of change in the consumer price index

CP = corporate profit rate (after tax), expressed as a percentage rate of return on stockholders' equity.

F = an index of expected versus actual selling price and retail

trade.

The negative and significant coefficient on the deficit variable (D/Y) implies that government budget deficits do in fact "crowd out" private investment.

However the weak R^2 in this estimation shows that Cebula's model does not explain all the variations in the dependent variable. But in yet another version of this model (Cebula 1985-b), the author has re-estimated the equation for the time period I/1970 -II/1982. Curiously nothing has changed in his empirical results, except the R^2 which improved by a mere one percent. However, while the author applied his original model for both the United States and Canada, it appears questionable why he has applied his modified model to the U.S. data alone.

In another study of crowding out, by Evans(1985) further doubt is cast on the Cebula evidence. Evans assumed a linear reduced form in which the nominal rate of interest is a function of government spending, the real deficit, the real money stock and the expected inflation rate. He used United States data to estimate the impact of budget deficits on the nominal rate of interest. He mentioned that in surveying the US history "there are three periods during which the federal deficit has exceeded 10 percent of national income. In none of these periods did interest rates rise appreciably. Regression analysis applied to data from these three periods has not uncovered a positive

association between deficits and interest rates."(1). In other words, according to his analysis, in the last century of US history, large deficits have never been associated with high interest rates.

As if this overwhelming evidence against crowding out is not enough, Tatom (1984), a St. Louis monetarist, regresses changes in the short term interest rates on the current and lagged ratio of the US-high employment deficit and actual deficit to GNP. He examined the period II/1955 to III/1983 and the subperiods II/1955 to IV/1969 and I/1970 to III/1983. In all of his nine regressions he found an inverse relationship between the budget deficit and the level of interest rates. In some cases his estimation is significant at the 99 percent level of confidence. A full listing of all his results are in an appendix.

Also in the U.S. Treasury Department (1984), a dozen of empirical studies for the United States on the relationship between deficit and interest rates are mentioned. These findings show, once again, that the evidence is ,at best, inconclusive. Some of them confirm the crowding out effect while others did not confirm it.

(1)Evans(1985)p. 68

SOME EMPIRICAL WORK
USING CANADIAN DATA

Since most of the empirical work has been done for the United States, in this section we shall try to estimate some of the above-mentioned models with Canadian data.

In applying Hoelscher's model for Canada we examined the period I/1971 to II/1984. The result of this regression analysis are as follows:

$$\text{TBILL} = .82 + .92D - .16M + .47P + .85\text{TBILL}_{-1}$$

(.09) (-.9) (1.44) (10.6)

$$R^2 = .88$$

$$DW = 1.48$$

Where:

D=federal government budget deficit per GNP.

P=inflation rate

M=rate of change in money supply (M1), in real terms.

TBILL and TBILL-1= current and lagged variable of three months treasury bill rates.

The coefficient of D is positive which suggests an element of crowding out, but statistically there is no significant relationship between the budget deficit and interest rates. The sign on the coefficient of M is negative which is consistent with the standard theory but this coefficient is also insignificant. The coefficient of the inflation rate is positive and as expected, but it is

insignificant.

In another estimation, instead of the deficit, we used the proportion of the real total federal government borrowing to GNP. The results are as follows:

$$TBILL = 1.01 + 6.5TFB - .16M + .68P + .8TBILL_{t-1}$$

(1.03) (-.9) (2.03) (10.6)

$$R^2 = .89$$

$$DW = 1.51$$

TBILL, M, P and TBILL-1 are as defined before.

TFB= total federal government borrowing per GNP in real terms.

The result of this estimation is very similar to the previous regression analysis except for the coefficient of the inflation rate which is positive and significant.

Certain authors like Barth et.al. used cyclically-adjusted budget deficits. However since the cyclically-adjusted budget deficit, which is estimated by the federal Department of Finance, is in annual form (1), we used annual data for the time period 1953 to 1984. The results of this regression using cyclically-adjusted budget deficits are as follows:

$$TBILL = .24 + .00007CD + .002M + .002TBILL_{t-1} + .37P$$

(.93) (1.63) (5.73) (4.08)

$$R = .86$$

$$DW = 1.997$$

where

(1) Department of Finance (1985), table 53 .

TBILL, TBILL-1, M and P are as defined before.

CD=cyclically-adjusted budget deficit.

The coefficient of cyclically-adjusted budget deficit is positive as before but it is still not significant. The other variables have the same sign as in the previous estimates except that now the monetary variable has a positive and significant coefficient. The positive sign indicates that changes in the monetary variable are associated empirically with a higher interest rate. This is a conclusion totally at variance with the standard theory, yet comparable with the statistical findings of Placone et.al.

In re-estimating Cebula's(1985-c) model with Canadian data, we obtained the following results:

$$PR = .49 + 5.69P - 1.9M + .8TBILL$$

$$(2.8) \quad (-.17) \quad (19.1)$$

$$^2 \\ R = .95$$

$$TBILL = -.78 - 24.5D/Y - 4.9M - .9PR$$

$$(-5.4) \quad (-.5) \quad (28.1)$$

$$^2 \\ R = .96$$

where:

PR= 90 day prime corporate rate

P= rate of inflation.

M= rate of change of monetary stock (M1) in real terms

D/Y= rate of federal government budget deficit to GNP

TBILL= three-months treasury bill rate.

The only result of this estimation which differs critically from Cebula's findings for the United States is that the coefficient for the budget deficit is negative. A negative and significant sign of the coefficient of the budget deficit is suggestive of "crowding in" instead of "crowding out".

In much the same way, a re-estimation of Cebula's model (1985b and 1985c) was undertaken which attempted to examine the crowding-out phenomenon by relating the proportion of GNP devoted to investment (I/Y) to the ratio of the deficit to GNP (D/Y). Through the use of Canadian data for the period I/1971 to II/1984 the impact of total federal government borrowing to private investment was examined. The results of this regression are as follows:

$$I/Y = .03 - .01D/Y + .0004CUR + .9I/Y$$

$$(.22) \quad (2.73) \quad (23.1)$$

$$R^2 = .92$$

$$DW = 2.0$$

$$I/Y = .02 - .0008TFB/Y + .0004CUR + .9I/Y$$

$$(-.25) \quad (2.8) \quad (17.0)$$

$$R^2 = .92 \quad DW = 2.0$$

Where:

I/Y = ratio of business gross fixed capital formation to GNP (real terms)

D/Y = ratio of total federal government budget deficit to GNP (real terms)

TFB/Y = ratio of total federal government borrowing per GNP (in real terms)

CUR= capacity utilization rate.

The coefficients on D/Y (the budget deficit to GNP) and TFB/Y (the total federal government borrowing to GNP) are negative but both of them are statistically insignificant. One obvious explanation for the positive and significant coefficient on the capacity utilization rate(CUR) is that the greater the capacity utilization, the stronger the forces of demand for firms' output, and the greater the incentive for firms to expand capacity.

The evidence, thus provided, undeniably shows that the effect of crowding out in the Canadian economy is questionable and has very limited applicability. Possibly the reason for the lack of statistical significance of the budget-deficit variable in our previous empirical estimates may have to do with the possibility, strongly emphasized by Keynesians, that, in actual fact, the budget deficit is less of an exogenous variable than investment. To take into consideration this possibility of a reverse causality some of the previously-estimated equations of the Cebula variety were re-estimated by introducing the budget deficit as a dependent variable and investment as one of the explanatory variables. Two of these estimated relationships are displayed below, (using data for the period I/1971 to II/1984)

$$D/Y = 0.1 - 0.22I/Y - 0.01UR - .0006M$$

$$(-2.2) \quad (-13.1) \quad (-.06)$$

$$^2 \\ R = .83$$

$$D/Y = -.27 - .08I/Y + .002CUR + .17(I/Y)$$

$$(-.17) \quad (7.7) \quad (.37)$$

$$R^2 = .63$$

where:

D/Y = ratio of total federal government budget deficit to GNP (real terms)

I/Y = ratio of private investment to GNP (real terms)

CUR = capacity utilization rate

UR = unemployment rate

M = rate of change of monetary stock ($M1$) in real terms.

While these empirical estimates are not very strong or robust, they do show at least that D/Y is as much a variable determining investment as it is determined by it. Given the existence of this simultaneity, it could explain why the empirical evidence for both crowding in and crowding out is to say the least weak. Unfortunately, a complete analysis of the simultaneity problem is beyond the scope of this paper.

Another important possibility for the negative results of our previous empirical work has to do with the importance of the foreign sector and the existence of strong foreign capital mobility within the Canadian economy. It should be emphasized, however, that the assumption of high capital mobility is not specific to the Canadian economy and it could be just as easily applied to the U.S. economy. In this respect it could be argued that most of the U.S. studies previously discussed are also highly questionable and restrictive in scope. Although it is

beyond the scope of this paper to introduce a fully worked-out foreign financial sector, it is clear that the overwhelming theoretical evidence would not easily support the crowding-out phenomenon. This is because as soon as we introduce foreign interest rates in determining both domestic interest rates and the flow of domestic investment-spending, another variable (the domestic interest rate) no longer becomes determined within the domestic economy, and loses its sensitivity to domestic demand conditions. However, in a previous term paper, a model was worked-out that tried to introduce the foreign exchange markets within the framework of a modified IS-LM model that includes the foreign sector as briefly discussed in Part 1 of this memoire. While it is not our intention to go through in details the work that has already been done, a brief analysis of the salient features of the model accompanied by an empirical analysis, is warranted.

Following the work of, among others, A.Kia(1985), we shall assume that the Canadian economy fits the basic assumptions of a small open economy with the existence of unemployed resources and operating under a managed exchange rate system. Since the central bank intervenes in the foreign exchange market, the money supply becomes endogenous. In this case, the reaction function of the monetary authority may be written as:

$$M_s = f(\dot{E}) \quad f\dot{E} > 0 \quad (1)$$

where:

M_s = nominal supply of money

$\dot{E}$ = rate of change of the exchange rate. (we define exchange rate

as foreign currency/domestic currency). Since this analysis focuses on a small open economy with high capital mobility and perfect substitutability between domestic and foreign assets, a higher foreign rate of interest should lead to a higher domestic rate of interest due to the outflow of capital. Thus the domestic rate of interest would always be equal to the foreign rate of interest plus the expected rate of depreciation of the domestic currency(1),

$$R = R_f + a \quad (2)$$

Where:

R = nominal domestic rate of interest

a = expected rate of depreciation of the domestic currency.

Following Turnovsky(2) if we assume that the exchange rate changes are perfectly anticipated so that $a = \dot{E}$, in which case

$$R = R_f + \dot{E}$$

or

$$\dot{E} = R - R_f \quad (3)$$

by substituting (3) in (1) we can conclude that:

$$M_s = f(R_f, \dot{E}) \quad (4)$$

On the demand side, let us follow the above mentioned authors and hypothesize the following implicit function:

$$M_d/P = f(Y, R - P_e, W/P, P_e) \quad (5)$$

$$f_Y > 0, f_{R-P_e} < 0, 0 < f_{\frac{W}{P}} \leq 1, f_{P_e} < 0$$

where:

(1) It is implicitly assumed that the expected rate of inflation and taxes on capital gains are the same for both the foreign and domestic economies.

(2) Turnovsky(1977), p. 271

M_d/P = real demand for money

Y = real income

R = nominal rate of interest

P_e = expected rate of inflation

W/P = real wealth and defined as: (1)

$$W/P = (K + B + M_s)/P \quad (6)$$

where:

K/P = real capital stock

B/P = real value of domestic bonds held by domestic citizens.

Assuming further, the usual equilibrium condition $M_s = M_d$, we could obtain a modified LM relationship of the following type:

$$R = f(Y, P_e, \dot{E}, R_f, B/P) \quad (7)$$

$f_Y > 0$, $f_{P_e} > 0$, $f_{\dot{E}} > 0$, $f_{B/P} > 0$ (if bonds are considered wealth)

Still furthermore, let us assume a standard IS relationship such as

$$R = f(Y, P_e, B/P, R_f, \dot{E}, G, D) \quad (8)$$

$f_Y < 0$, $f_{P_e} > 0$, $f_{B/P} > 0$ (if bonds are considered wealth)

$f_{\dot{E}} > 0$, $f_G > 0$, $f_D > 0$

where:

$R, Y, P_e, B, R_f, \dot{E}$ are defined as before, and

G = government expenditure

D = government budget deficit.

and finally borrowing the following aggregate supply function from Dornbusch which links the actual inflation with the

(1) Such a definition of wealth can be found in most of the macroeconomic texts, say Sargent(1979), p. 45, Turnovsky(1977), p. 37.

expected inflation and output: (1)

$$P = P_e - \alpha \left(\frac{\bar{Y} - Y}{\bar{Y}} \right) \quad (9)$$

where:

P = actual inflation rate

Y = actual output

$\bar{Y}$ = potential output

by substituting (P) from equation (9) into IS and LM relationships and identifying $Z = \frac{\bar{Y} - Y}{\bar{Y}}$ = output gap ratio,

we can find two semi-reduced forms of the model containing two endogenous variables R , Y and seven exogenous variables $P_e, B, R_f, \dot{E}, G, D, Z$, these various assumptions lead us to a final reduced form of the following type:

$$R = f(P_e, R_f, \dot{E}, Z, B, G, D) \quad (10)$$

This reduced form is similar to the reduced form which is introduced by A.Kia(2) for the Canadian economy but, in our opinion, this reduced form has a multicollinearity problem. For example G and D are highly collinear so that we can write $D = \alpha G$ or $G = \frac{1}{\alpha} D$. By substituting $1/\alpha D$ for G in equation (10) we thus totally eliminate G from the final reduced form. In much the same way we may drop B and Z which are also highly collinear with G , so that final reduced form for our empirical test will be:

$$R = f(P_e, R_f, \dot{E}, D) \quad (11)$$

Using quarterly Canadian data from 1/1971 to 11/1984 the following estimates were obtained for the three types of interest rates, i.e. the short-term Treasury bill rate (RTB), the 90-day

(1) Dornbusch, R., et.al(1982), p. 364.

(2) Kia(1985) p. 10.

prime corporate rate (RC), and the long-term 10-years and over Canadian federal government bond rate (RL).

$$RTB = -.98 + .64Pe + 1.9\dot{E} - 28.8ED/Y + 1.02RTBf \quad (12)$$

$$(1.81) \quad (.12) \quad (-2.8) \quad (11.6)$$

$$R = .85$$

$$RC = .14 + .62Pe - 11.2\dot{E} - 20.0FD/Y + .87RCf \quad (13)$$

$$(1.8) \quad (-.78) \quad (-2.8) \quad (13.0)$$

$$R = .86$$

$$RL = .34 + .33Pe - 4.1\dot{E} - 8.2FD/Y + .96RLf \quad (14)$$

$$(2.3) \quad (-.6) \quad (-1.6) \quad (19.4)$$

$$R = .94$$

where:

RTB=3month Treasury bill rate (Canada)

RTBf=3month Treasury bill rate (U.S.)

Pe=expected inflation rate which for our purpose could be assumed to be either rationally expected (as is normally discussed in the literature) or merely a naive first-order autoregressive expectation-generating model where $Pet = Pt - 1$.

$\dot{E}$ =rate of change in the exchange rate (\$U.S.)/(\$CN)

D= ratio of federal government budget deficit to GNP

RC=90-day prime corporate rate in Canada

RCf=90-day prime corporate rate in the United States

RL=Rate on 10-years and over Canadian federal government bonds

RLf=20-years U.S. federal government bond rate.

From this limited evidence, we can conclude once again that no crowding out exists. In fact, there appears to be crowding in

when incorporating changes related to the foreign sector and reflected in fluctuations in the exchange rate. The above mentioned empirical test confirms the view that, when allowing for capital mobility, an increase in the deficit cannot have an impact on interest rates. Curiously, the evidence suggests that whenever the deficit does increase in relation to national income it leads to such a major reaction by the central bank to avoid increases in the interest differential, that one tends to find an associated decline in the domestic rate of interest, all other things remaining equal. Moreover, and contrary to conventional wisdom, changes in the exchange rate have no significant effect on interest rates and actually have the wrong sign in two of three estimated relationships above.

PART-5

CONCLUSION

The object of this paper was to provide a general overview of both the theoretical and empirical work on the so-called crowding-out phenomenon and to test the empirical relevance of that hypothesis using Canadian data.

From the beginning we have seen that economists have supported the view that government spending can crowd out private investment. Whether it be Adam Smith or the modern new classical school, the underlying belief has been that there exists

crowding out. The only exception to this dominant view was the Keynesian School that denies formally its relevance.

Yet, as soon as we look at some of the empirical literature, the actual evidence becomes less clear and inconclusive. As highlighted by the work of Tatom(1984), even the modern-day monetarists are becoming less certain as to its applicability. Our own work of re-estimating some well-known empirical relations using postwar Canadian observations serves merely to strengthen the view that 'crowding out' does not have an empirical basis.

While these empirical findings do not appear at first glance to be intuitively obvious, they do at least fit the Keynesian theoretical approach. The evidence also confirms some facts as to why modern governments undertake public spending in the first place. For instance, much of government activity goes into the production of social overhead with a view to incite firms to increase (not decrease) their investment-spending. The building of roads, bridges and vast transportation and communication systems has been undertaken by governments not only to serve the consuming public, but also to provide direct incentives for firms to expand their productive capacity. Moreover, on the demand side, government spending could also be perceived as a further stimulus to investment spending in the Keynesian sense.

This lack of empirical support for the crowding-out hypothesis, as it has traditionally been discussed in reference to the investment side of the economy, does not eliminate the possibility discussed by Barro of a crowding out on the

consumption side. In fact, the evidence provided in the preceding chapter is completely consistent with the Barro hypothesis that deficits are neutral in their effect on both interest rates and investment spending. To deal with the Barro proposition, an attempt was made to produce the basic empirical test used by A. Kochin(1974) using Canadian observations. The following results were obtained by employing annual Canadian data from 1961 to 1984:

$$C_t = 3109 + .24Y_d - .18FD + .75C_{t-1}$$

$$(1.6) \quad (1.21) \quad (-1.16) \quad (2.7)$$

$$R^2 = .99$$

$$C_t = 4862 + .30Y_d + .04FD_a + .60C_{t-1}$$

$$(2.15) \quad (1.4) \quad (0.17) \quad (2.12)$$

$$R^2 = .99$$

Where:

C_t = personal expenditure on consumer goods and services in constant dollars.

Y_d = personal disposable income in constant dollars.

FD = actual federal government budget deficit in constant dollar terms.

FD_a = cyclically-adjusted federal government budget deficit also in real terms.

The results are definitely very weak. For instance, the sign of the coefficient of the deficit variable is either insignificantly positive or negative, depending on the variable used. It would

appear from the limited evidence depicting the Canadian postwar experience, therefore, that there exists inadequate empirical support for the crowding-out hypothesis regardless of whether it be on the investment side or on the consumption side.

A final consideration, not discussed previously, is the possibility of the crowding-out of net exports. In fact one can imagine a case, emphasized within the framework of the Mundel-Fleming model, previously discussed, in which increases in the budget deficit can be neutral on both the investment and consumption sides of the economy while still having a significant negative effect on net exports. As we have seen, this arises because of the impact that the interest differential has on capital mobility and the exchange rate.

In considering this possibility of an export crowding out, it should be pointed out that the result of our previous empirical work was not consistent with the Mundel-Fleming type of analysis for an open economy as that of Canada. All of our evidence from applying various models indicates that the impact of budget deficits on interest rates is generally negative (for example see the significantly negative coefficient of the budget deficit in relation to various kinds of interest rates, in equations 12,13 and 14 , p. 48) in the Canadian economy. To the extent that the impact of budget deficits on interest rates is negative empirically, this would imply an outflow of capital and a lower value for the domestic currency. A lower value of the Canadian dollar would thus have a stimulating effect on net exports. It

follows that the evidence would imply once again a 'crowding-in' rather than a crowding-out, in this case , through net exports. Finally, it could be argued that, if an increase in export demand has a further accelerator effect on domestic investment in the usual Keynesian sense, the result would be an additional 'crowding in' of private domestic investment.

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