

**DOLLAR FOR DOLLAR CROWDING OUT
IN THE TEXTBOOK KEYNESIAN CROSS
MODEL WHEN THE ECONOMY IS
BELOW FULL EMPLOYMENT**

By

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ABSTRACT

In this paper, it will be demonstrated that a “dollar for dollar” crowding out of national investment caused by increased government spending is not just something that occurs within classical macroeconomic models. The reason for this is that in a closed economy Keynesian cross model which ignores money, national savings, or $Y - C - G$, is equal to national investment, or I . Such an “equilibrium” does not provide the national savings needed to finance a purely fiscal increase in government spending in a closed economy. Any additional government spending would have to occur at the expense of an already low level of capital spending and thus make the government expenditures multiplier equal to zero.

I. INTRODUCTION

Herbert Stein once remarked that “It may seem a shocking thing to say, but most of the economics that is usable for advising on public policy is at the level of the introductory undergraduate course.” In recent years, fiscal policy has made a comeback in the practice of macroeconomic policy. As monetary policy has had its difficulties in stabilizing the economy, policymakers have once again resorted to such fiscal tools as tax cuts and increases in government spending. The massive increases in government spending that have been proposed by President Barack Obama have a number of economists using the word “multiplier” again and discussing the “crowding out effect” in such places as the *Wall Street Journal* and in blogs. Economists who are partial towards the Keynesian school tend to have some degree of sympathy for the idea that an increase in government spending financed by borrowing can cause real gdp to rise while those identified with some version of the Classical model say that the “crowding out effect” weakens any such influence, sometimes totally.

A debate has opened up recently in which such economists as Paul Krugman, Eugene Fama, and John Cochrane have been debating the issue of whether or not an increase in government spending financed by increasing the public debt has a zero multiplier. This debate has been succinctly summarized by Arnold Kling in his blog. According to Kling, “..Fama says that national savings equals national investment. So, if the government deficit goes up and private savings is unchanged, then investment must go down. Therefore, the argument runs, a government deficit crowds out private investment and does not raise output.” Kling argues that this “story” only applies when the economy is at full employment. “In the Keynesian story, if investment declines (due to a drop in ‘animal spirits’), saving declines to match investment. They re-equate at a low level of total output, at which there is unemployment.”

A continuation of the “Keynesian story” would be that the government could increase its spending and bring the economy back to full employment through the Keynesian multiplier effect. However, in the simple textbook Keynesian Cross

model, in a closed economy with money ignored, where many generations have been introduced to Keynesian economics, the macroeconomic “equilibrium” real gdp occurs where the C+I+G curve crosses the 45 degree line. This is of course the graphical representation of the $Y = C + I + G$ equilibrium condition, which is mathematically equivalent to $Y - C - G = I$. In other words, a Keynesian “equilibrium” occurs in this model where national savings is equal to national investment. However, if investment is low because the economy’s animal spirits are depressed, then national savings are necessarily low. The low level of national savings, however, is being entirely absorbed by the low level of capital spending in this “equilibrium. An increase in government spending can only occur if national investment were to fall by one dollar for each dollar that government spending increases due to the “expansionary” fiscal policy in this equilibrium. We thus would have dollar for dollar crowding out of investment expenditures by increases in government spending even though the economy is below full employment. The multiplier effect of increased government spending would be nullified.

II. THE SIMPLE TEXTBOOK KEYNESIAN MODEL

Macroeconomic models at the undergraduate level tend to be presented primarily with two dimensional graphs. One of the problems with the conventional graphical presentations of macro models is that they are confined to the explicit presentation of only the two variables on the horizontal and vertical axes. All of the other variables beyond those on the axes are held constant (*ceteris paribus*) and changes in those variables are represented by shifts in curves. Among the variables which are almost never used to label axes are policy variables such as government spending and taxes. In this paper, a flow chart will be presented in place of the standard Keynesian cross graph. The advantage of the flow chart is that the relationship between government spending, taxes, budget deficits, private savings, national savings, and investment expenditures are out in the open rather than tucked away into the mind's eye. It is hoped that these flow charts will help clarify the debate over dollar for dollar crowding out of government expenditures. The model being used, however, is the standard Keynesian cross model.

Figure 1 depicts a flow chart with boxes which represent firms, households, government, and financial markets. This model is a closed one, although it would be easy to add a foreign sector, and the presence of money is ignored.

We will begin by assuming that the aggregate output of the economy is normalized to \$100 and that this represents a full employment level of production. The level of gross domestic product, a measure of production, will always appear within the box labeled “firms” in each of the flow charts below and will be bolded. Aggregate expenditure, the sum of consumption, investment, and government spending on goods and services, will appear in equation form below the flow chart. Each of the gdp components will also be bolded in the flow chart.

Since the level of final output is assumed to be \$100 in Figure 1, the households receive \$100 of gross income. Hence, \$100 of gross income flows from the firms to the households as depicted by an arrow from the firms box to the households box. This income has to be split up between consumption, private savings, and taxes. Let us assume that aggregate taxes are \$20. Hence, we have an arrow that runs from the households box to the government box which represents \$20 of taxes. That leaves the household sector with \$80 of after- tax income. If we assume that consumption is equal to one half of after tax income, [i.e. $C = 0.5*(Y-T)$], then consumption is \$40. This expenditure is represented by an arrow from the households box to the firms box. The private savings of the household sector, or S_p , is the residual [i.e. $S_p = Y-C-T$] or also \$40. This is represented by an arrow between the households box and the financial markets box. Hence, on the right hand side of this diagram we see that the \$100 of gross income is equal to consumption plus private savings plus taxes [i.e. $Y = C + S_p + T$].

We now turn to the left hand side of the diagram. Government expenditures are assumed equal to \$30. Since tax collections have been set at \$20, the government has to borrow \$10 from the financial markets. An arrow from the financial markets box to the government box is labeled as $D = G - T = \$10$. That leaves \$30 available to the firms to borrow from the financial markets. This sum is called national savings in the macroeconomics literature. National savings can be represented as the difference between the number in the private savings arrow (i.e. $Y - C - T$) and the deficit arrow (i.e. $G - T$). National savings can be represented by the arrow between the financial markets box and the firms box. This arrow also represents intended national savings when inventory change is zero.

We thus have a picture of full employment equilibrium in Figure 1. \$100 is produced and \$100 is purchased. Consumption is \$40, government spending is \$30, and by coincidence, business firms are assumed to want to purchase \$30 of capital goods. The motivation for this purchase of capital goods is “animal spirits.” In the Keynesian cross model, the level of national investment expenditures is an exogenous variable, with the value of this variable being determined by the animal spirits and independent of the level of gdp. By coincidence, and only by coincidence since this is a Keynesian world, this amount matches national savings. Thus, firms can borrow \$30 of national savings to purchase \$30 of capital goods. Hence, we have a macroeconomic equilibrium at full employment. Production is \$100 and aggregate demand, or $C+I+G$ is also \$100. In the classical model, investment would necessarily be equal to national savings because interest rates would adjust until this happened. And in the long run, this would happen whether we were in the Keynesian or the Classical world. But in the short run Keynesian world, full employment macroeconomic equilibrium occurs by coincidence.

Let us now move to Figure 2 where we will tell a Keynesian story of recession. Firms become “depressed” and a decline in autonomous investment expenditures occurs. Investment falls by \$10 from \$30 in Figure 1 to \$20 in Figure 2. Government spending is still fixed at \$30, and taxes are still fixed at \$20. In a classical world, interest rates would adjust until investment was equal to national savings again at full employment as in Figure 1. However, this is the Keynesian world, not the classical world. Investment must remain at \$20 because the animal spirits of firms dictate that it must be \$20. Also, national savings do not depend on interest rates in the Keynesian cross model. So the equality of national savings and investment must occur through a decline in real gdp. Since the marginal propensity to consume is 0.5, the multiplier for investment is $1/(1-.5)$ or 2. The decline in investment of \$10 results in a reduction in real gdp by \$20 from \$100 to \$80. . Only at an \$80 level of real gdp will the sum of consumption (i.e. $0.5*[\$80 - \$20]$, or \$30) , investment (i.e. \$20), and government purchases (i.e. \$30)) match the quantity of aggregate production. The process by which this occurs is the standard multiplier story of principles textbooks.

How do we get back to full employment? Figure 3 presents the standard story of the use of fiscal policy to accomplish this. Government spending is raised from \$30 in Figure 2 to \$40 in Figure 3 with taxes still equal to \$20 and investment remaining at the depressed level of \$20. Since the government spending multiplier in this model is also $1/(1-.05)$, or 2.0, this rise in government spending of \$10 raises “equilibrium” real gdp by \$20, which brings us back to full employment at \$100. Only at \$100 is $C+I+G$ (i.e. $0.5*($100-$20) + $20 + 40) once again equal to the full employment level of production. Curiously, however, in this “equilibrium”, firms are still depressed because their level of investment expenditures remains at \$20 even though full employment has been restored. Nevertheless, this is the Keynesian world and we must play by the Keynesian rules.

III. DOLLAR FOR DOLLAR CROWDING OUT BELOW FULL EMPLOYMENT

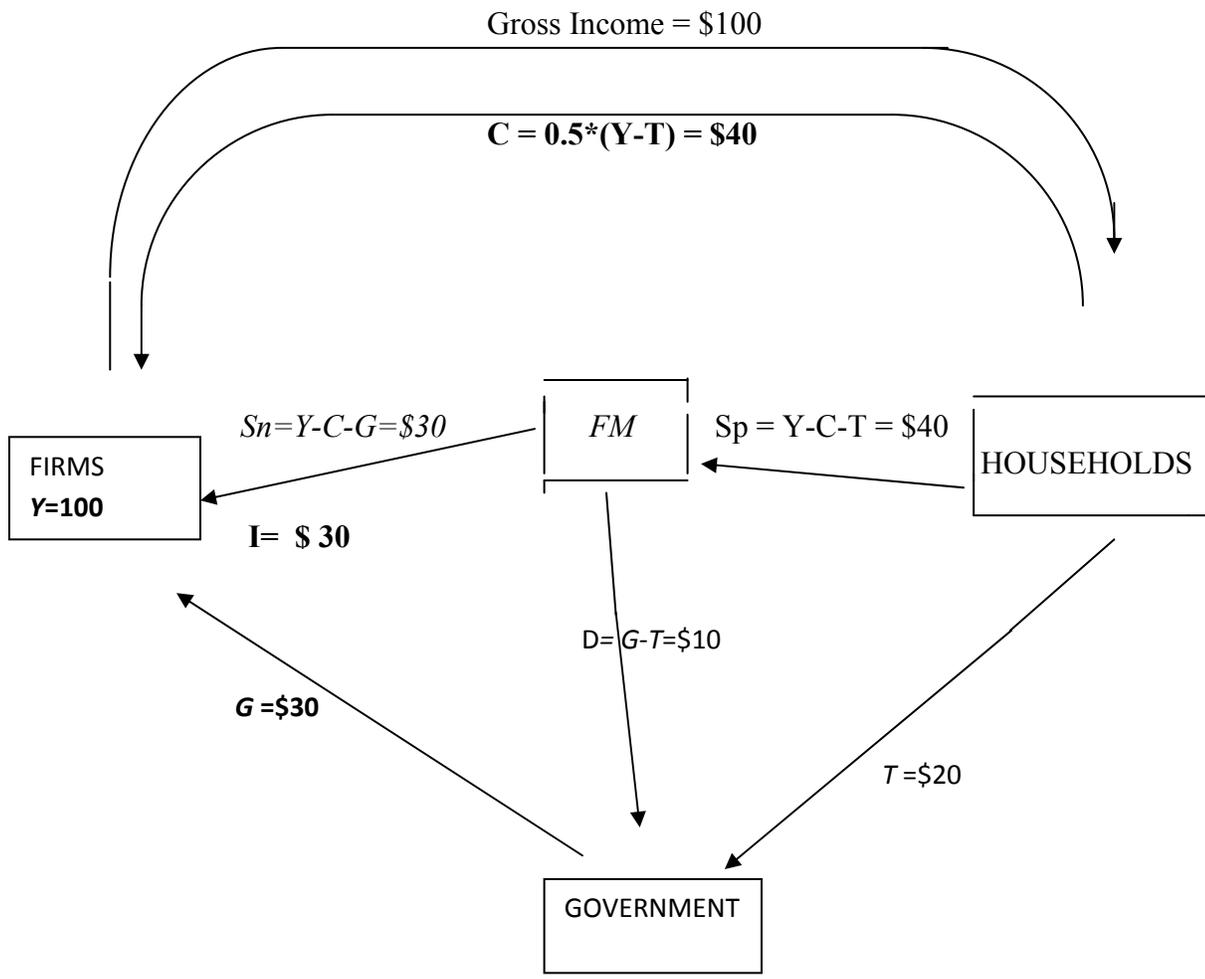
Going from Figure 1 to Figure 2 to Figure 3, we have the standard Keynesian Cross textbook story of prosperity, depression, and prosperity. Investment falls by \$10, real gdp falls by \$20, policymakers raise government expenditures by \$10, and real gdp rises by \$20 to restore full employment. However, there may be a problem with this fiscal policy tale. If we begin at an “equilibrium” level of real gdp of \$80 in Figure 2, notice that the level of national savings is \$20. That \$20 is being used to finance the depressed level of capital spending of \$20. If the government, using its power as the 800 pound gorilla of the financial markets, were to decide to go to the financial markets for an additional \$10 of financing, this would have to come from the \$20 being used by firms to finance their anemic level capital spending of \$20. If government spending were to rise by an additional \$10, that would leave the firms with only \$10 of national savings to finance their capital budgets. Hence, their capital investment would fall \$10. So now if government spending were to rise by \$10 capital investment would have to fall \$10, and macro equilibrium would have to remain at \$80. In other words, *we would have dollar for dollar crowding out in a textbook Keynesian cross world below full employment.*

Notice that in Figure 3 where real gdp has been restored to \$100, it appears that there is no problem. Government spending is up by \$10, real gdp is up by \$20, and full employment has been restored. However, we are not beginning at the full employment level of gdp, which is \$100. We are beginning the multiplier story at \$80. If we could get to a gdp level of \$100, private savings would be \$40 which would be high enough to finance both the \$20 level of national investment and the \$20 budget deficit, which is up by \$10 due to the increase in government spending. However, we are beginning at the depressed sub full employment level of real gdp which is \$80, where national savings (i.e. \$20) is just enough to finance the exogenous level of investment which firms desire. Every additional dollar that government obtains must somehow come at the expense of capital investment expenditures. The result is thus “dollar for dollar crowding out” when the economy is below full employment in a textbook Keynesian world.

IV. CONCLUSION

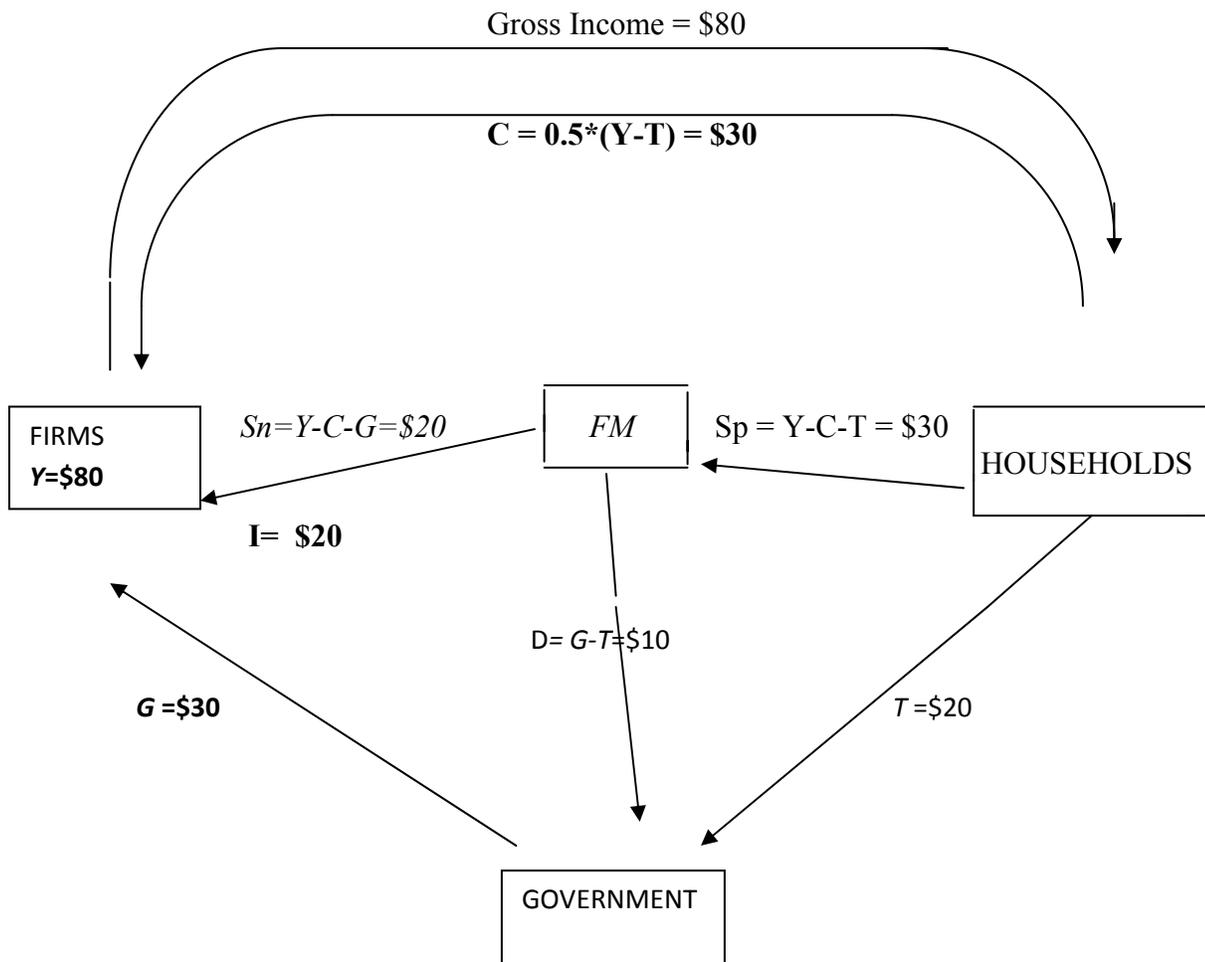
In section III above, the debate “over dollar for dollar” crowding out is interpreted as the inability of a *ceteris paribus* increase in government spending to get the textbook multiplier process going when the economy is stuck below full employment. With reference to the Krugman diagram which appeared in an article in his blog which is comparable to Figure I V, a *ceteris paribus* rise in G causes I to fall by an equivalent amount because there is not enough national savings at GDP^* to finance an addition to G since all of the national savings is going to I before the government attempts to grab a share of the national savings. If only real gdp could rise to GDP^{**} , enough savings and tax revenue would exist to finance the increase in government spending to get the multiplier process going. But a *ceteris paribus* pure fiscal policy by definition does not allow any alternative means of financing from opening up, like an increase in the money supply or borrowing from world financial markets.. So the macroeconomy is caught in a fiscal Catch-22 situation. We cannot have full employment without more national savings and we cannot have more national savings without having full employment.¹

¹ I owe this point to Sebastian Buttet



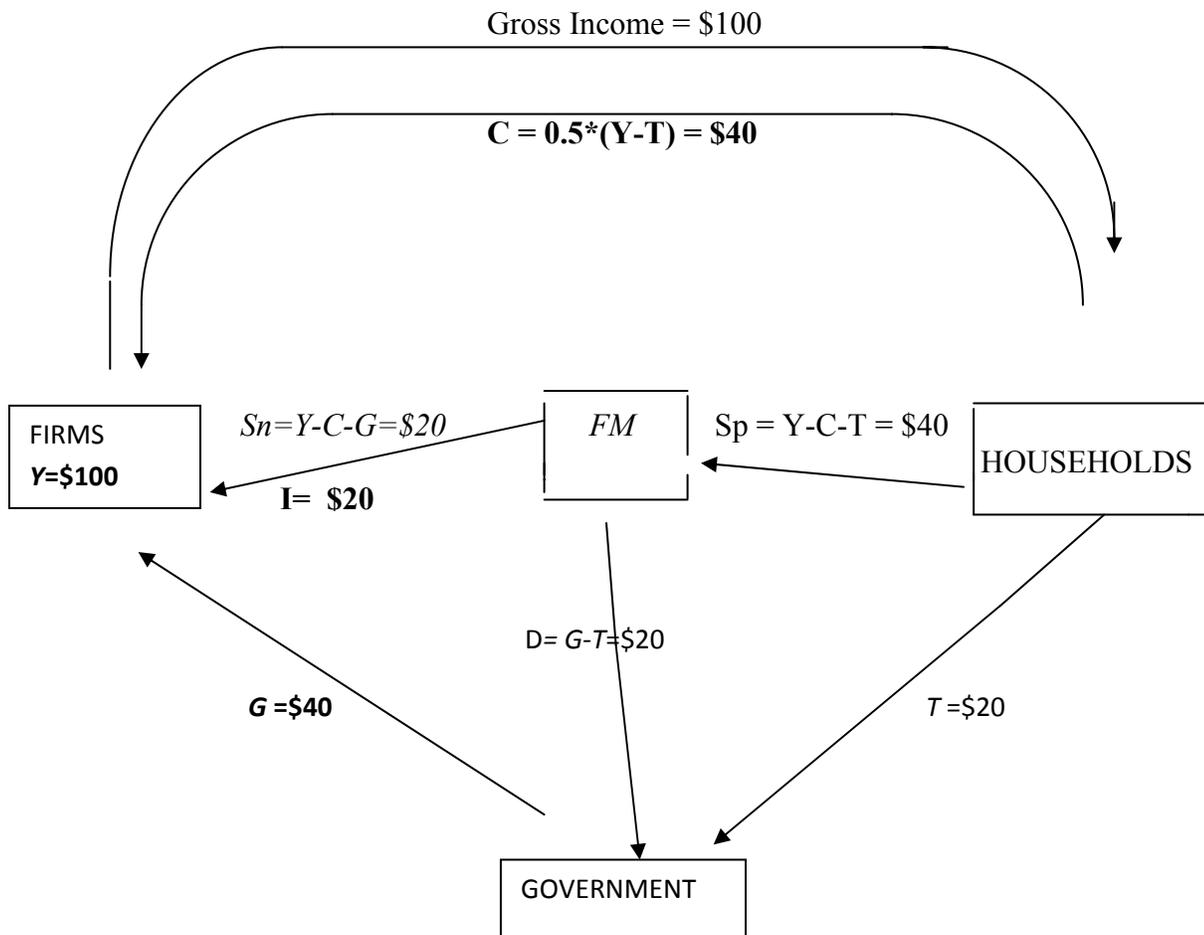
$C + I + G = 100$

FIGURE 1: THE ECONOMY AT FULL EMPLOYMENT



$C + I + G = \$80$

FIGURE 2 : THE ECONOMY IN EQUILIBRIUM BELOW FULL EMPLOYMENT



$C+I+G = \$100$

FIGURE 3: THE ECONOMY RESTORED TO FULL EMPLOYMENT BY AN INCREASE IN GOVERNMENT SPENDING

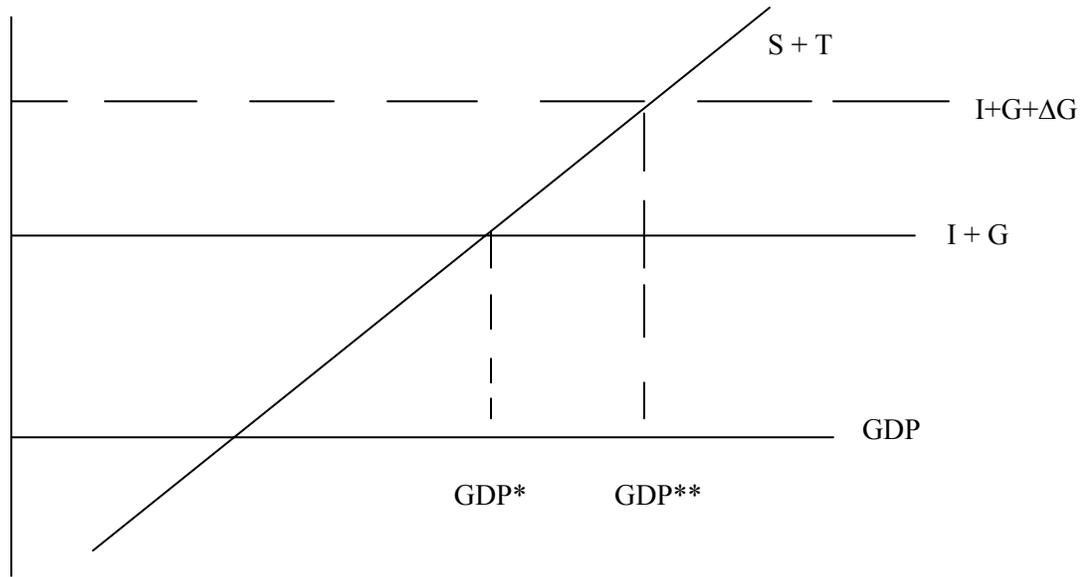


Figure 4 KRUGMAN'S VERSION OF THE KEYNESIAN CROSS (AMENDED)

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