

# Macroeconomics: an Introduction

## Chapter 11

### ***Keynesian Fiscal Policy and the Multipliers***

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## ***Preview***

Very few individuals have had the impact that John Maynard Keynes has had on how we view the world around us. Just as Isaac Newton's laws of motion have become common knowledge and hardly anyone doubts Sigmund Freud's basic idea that we have a subconscious, Keynes' framework of macroeconomic analysis pervade our thinking without our knowing it. Most fundamentally, Keynes saw GDP as being determined in the short run by aggregate demand, a concept we have already encountered. Recession or depression was due to demand falling short of the productive capacity of the economy, and the remedy was to stimulate demand. That is the viewpoint of almost all macroeconomic analysis today, and is certainly reflected in this book. We have already discussed the role of the Fed in nudging aggregate demand in the right direction by pushing interest rates up or down. Keynes' emphasis was on the potential for government spending and taxation to influence aggregate demand. By boosting spending, for example, Congress could add to aggregate demand and thus pull the economy out of a recession.

This chapter presents the basic model that was developed to explain how that kind of discretionary fiscal policy would work. We will see that the model has an algebraic simplicity that is highly appealing and leads to some surprising implications. One is that changes in government spending or taxation are multiplied in their effect on the economy. The key element in this multiplier effect is how consumers respond to changes in their incomes. While some of Keynes' followers may have been too optimistic in seeing fiscal policy as a panacea, the legacy of Keynes' ideas is very much with us today.

### ***11.1 Lord Keynes and the Great Depression***

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When the economies of the world were mired in the deep and prolonged recession of the 1930s known as the Great Depression, British economist John Maynard Keynes, later Lord Keynes, declared that governments should increase spending and cut taxes to boost their economies. This was considered heretical since the prevailing view at that time was that a market economy would recover on its own, automatically, without government action. Keynes, in contrast, argued that an economy could languish indefinitely with high unemployment if aggregate demand is inadequate.

Keynes contended that monetary policy was powerless to boost the economy out of a depression because it depended on reducing interest rates, and in a depression interest rates were already close to zero. Increased government spending, on the other hand, would not only boost demand directly but would also set off a chain reaction of increased demand from workers and suppliers whose incomes had been increased by the government's expenditure. Similarly, a tax cut would put more disposable income in the wallets of consumers, and that too would boost

demand. Keynes contended, then, that the appropriate fiscal policy during periods of high unemployment was to run a budget deficit. These ideas flew in the face of the conventional wisdom that budget deficits were always bad.

The governments of Britain and the U.S. did not embrace the policies advocated by Keynes and instead continued to try to balance their budgets until the outbreak of World War II. His ideas had an enormous impact, however, on the field of macroeconomics after the war and, to some extent, on actual fiscal policy. Keynesian fiscal policy, the management of government spending and taxation with the objective of maintaining full employment, became the centerpiece of macroeconomics both in academic research and in the public debate over national policy. The Employment Act of 1946 committed the federal government in the U.S. to use fiscal policy "to promote maximum employment, production, and purchasing power." Indeed, a course in macroeconomics until quite recently was typically devoted almost entirely to the ideas of Keynes.

### ***U.S. Experience with Fiscal Policy***

At the high tide of belief in Keynesian fiscal policy in the 1960s, some macroeconomists claimed that we had acquired the ability to "fine tune" the economy, keeping it humming along at full employment. The 1970s and 1980s, however, saw a renewal of interest in the role of money in economic fluctuations and a decline in the perception of fiscal policy as an important tool of macroeconomic policy among both economists and the public. Why did this drastic reassessment of fiscal policy occur?

Certainly one factor is simply that Congress has proved to be too slow-moving to take significant action on spending or taxation in the short time frame of recent recessions. The most notable achievement of Keynesian fiscal policy was the tax cut enacted under President Kennedy to combat the recession of 1959-60. Even then, the cut came after the economy was already showing signs of recovery. Since that time, Congress seems to have become more prone to deadlock, so the idea of Congress acting promptly to execute counter-cyclical fiscal policy has become less credible. The Reagan tax cut of 1981 was motivated not by the idea that it would stimulate demand, but by the idea that lower taxes would enhance incentives to work and invest.

Further, the emergence of a chronic deficit of alarming proportions during the last decade, and political pressures to contain it, have made it practically impossible for Congress to conduct discretionary fiscal policy. Note the lack of enthusiasm from a skeptical electorate for Presidential candidate Bob Dole's proposed 15% tax cut, even though Dole claimed that spending cuts would offset the revenue loss. Any proposed act of Congress that had the *intention* of increasing the deficit would surely be met with a firestorm of opposition. Indeed, the recent recession of 1990-91 was notable for the almost complete absence of any inclination in Congress towards fiscal action to combat it. President Clinton's tax

increase of 1993 was not an attempt to slow down the economy by taking disposable income away from consumers, but rather it was proposed as a measure to reduce the deficit and, hopefully, free some savings for productive investment.

Another factor in the reduced emphasis on discretionary fiscal policy has been the reexamination of the causes of the Great Depression. Historical research pioneered by Milton Friedman and Anna Schwartz has convinced many economists that the Depression was mainly the result of inept monetary policy in both Britain and the U.S. rather than the inability of monetary policy to influence the economy. Many economists had expected a resumption of the Great Depression when World War II ended, but instead the U.S. economy experienced an era of spectacular growth. To the surprise of almost everyone, the most aggravating problem of the post-war economy has been inflation, while recessions have been relatively brief and mild.

Reappraisal of the Fed's role in the Great Depression and the emergence of inflation as a serious problem in the post war economy have caused attention to become focused on monetary policy. In retrospect, the Great Depression is seen largely as a failure of an inexperienced Federal Reserve, founded only 16 years before the Crash of 1929, to do its job of providing liquidity to the banking system. Instead the Fed stood by while thousands of banks failed. Money is the oil that lubricates the wheels of commerce and when the oil leaks out the machine creaks to a halt.

Further, there has been a general disillusionment since President Kennedy's day in the efficacy of *discretionary* policy of any kind, whether fiscal or monetary. For reasons discussed above, Congress seems unlikely to take discretionary fiscal action. As discussed in Chapter 9, the record of the Fed does not inspire great confidence in its ability to fine-tune the economy either. Instead, many economists now feel that the Fed's attempts to conduct counter-cyclical monetary policy have often aggravated business cycles and inflation rather than controlling them. The emphasis now is on maintaining a stable and predictable monetary environment in which the actors in the economy can make their decisions. Economists recognize that the economy will nevertheless experience business fluctuations and to some extent these are normal and even healthy.

### ***The Legacy of Keynes***

What, then, is the legacy of Keynes and his analysis of fiscal policy? The concept of aggregate demand which has proved so useful in understanding the macroeconomy comes out of Keynes' analysis. It is also surely true that if the economy were again to experience a depression, there would be broad agreement that under those circumstances aggressive fiscal stimulus is warranted.

Another legacy of Keynes is our understanding of how the income tax system provides the economy with an automatic stabilizer. Here is how it works. During a recession, tax revenues shrink, as we saw in Figure 10.1, both because incomes are shrinking and because taxpayers are moving down the progressive tax rate schedule. These two factors effectively provide an automatic tax cut that puts some of those lost income dollars back in the pockets of households, cushioning the fall in their disposable incomes.

It seems clear that households will not cut back as sharply on consumption spending as they would if their tax burden remained unchanged. Indeed, Figures 10.1 and 10.2 show that falling tax revenue is generally sufficient to produce a federal budget deficit during a recession, thereby carrying out Keynes' prescription for fighting recession, but doing so automatically!

### ***Exercises 11.1***

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A. Contrast the motivations behind the tax changes of the Kennedy, Reagan, Clinton, and G. W. Bush administrations.

B. What was the concept of "fine-tuning" and seems to be the status of this idea today?

C. Compare the automatic stabilizing effect of a progressive income tax, one that taxes higher incomes at a higher rate than low incomes, with a "flat tax" system that would tax all income at one rate.

### ***11.2 Government Spending and Tax Multipliers***

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The followers of Keynes believed that fiscal policy can be a powerful lever to move the economy because the effect of an increase in spending or a cut in taxes would be multiplied by stimulating additional demand for consumption goods by households.

Imagine that in the midst of a recession Congress appropriates \$100 million for new highway bridge construction. Idle workers and machines will be put to work on bridge construction, resulting in an increase in GDP of \$100 million over the period of construction. In addition, construction workers and firm owners will find that their incomes have risen by \$100 million. (Recall from Chapter 2 that GDP always represents both spending on one hand and income on the other.) These people will spend at least part of that \$100 million on additional consumer goods and services, but they will also save some of the additional income. This sets off a chain reaction in which additional spending boosts the income of sellers of goods and services who, in turn, spend more on other goods and services.

Similarly, if Congress enacted a tax cut, households would find themselves with additional disposable income. Their inclination to spend a portion of that additional income would set off a chain reaction of spending, increased incomes, and more spending.

The key element in this process is that households respond to having additional disposable income by spending at least a part of it on additional consumption. The fraction of an additional dollar of disposable income that is spent on additional consumption is called the marginal propensity to consume. The term "marginal" is used in economics to mean the response to an incremental change, so it is being used in the sense of "at the edge" rather than "unimportant."

***The Marginal Propensity to Consume and the Multiplier***

Let's build a simple model to see how the marginal propensity to consume determines the impact of a change in government spending on GDP. We begin with a hypothetical \$1 increase in government purchases of goods and services in an economy which consists of households having identical marginal propensity to consume which we will abbreviate mpc. To simplify the model, households in our model provide goods or services directly to the government, so we can imagine that the government pays the \$1 to one household, say household #1. Now household #1 will spend the fraction equal to its mpc of that additional income to purchase consumption goods, and for simplicity we suppose that the purchase is made directly from household #2. Seeing its disposable income rise by \$1 times mpc, household #2 will purchase additional consumer goods worth mpc times that amount, say from household #3. We see that the additional consumption spending at each step of this chain reaction is mpc times the amount at the prior step.

We summarize this process in a table that shows the incremental spending by each household, abbreviated HH, at each step:

□ **The Impact of Government Spending on GDP (in Dollars)** □

**The Impact of Government Spending on GDP (in Dollars)**

The gov't purchases □	1 □	\$ which is income to □
HH #1 which spends □	$mpc \cdot 1$ □	\$ which is income to □
HH #2 which spends □	$mpc \cdot mpc \cdot 1$ □	\$ which is income to □
HH #3 which spends □	$mpc \cdot mpc \cdot mpc \cdot 1$ □	\$ which is income to □
HH #4 which spends □	$mpc^4 \cdot 1$ □	\$ which is income to □
.. and so on ..	.. and so on ..	.. and so on ..
Adding all these up : □	$1 + mpc + mpc^2 + etc.$ □	dollars □
which just equals	$1/(1-mpc)$	dollars in total.

This table depicts a chain reaction of spending which continues on indefinitely as it produces ever smaller increments to GDP. To add up all the increments we used the fact that for any fraction such as  $mpc$ :

$$(1 + mpc + mpc^2 + \dots) = \frac{1}{(1 - mpc)}$$

The quantity  $1/(1-mpc)$  is called the government spending multiplier.

It is clear from this algebraic result, and from our intuition, that the larger is the  $mpc$  the larger will be the impact of additional government spending on GDP. For example, if the  $mpc$  is .5 then the impact of each additional dollar of government spending on GDP is,

$$\frac{1}{(1 - mpc)} = \frac{1}{(1 - .5)} = 2$$

while if the  $mpc$  is .9 the impact on GDP is,

$$\frac{1}{(1 - mpc)} = \frac{1}{(1 - .9)} = 10$$

or \$10 of GDP for every dollar of increased government spending! Clearly, the marginal propensity to consume is a crucial parameter in this analysis, and we will discuss what is known about the value of the  $mpc$  in the next section.

### ***How About a Tax Cut?***

Congress can also provide stimulus to the economy during a recession by cutting taxes. A tax cut or rebate of \$1 would set off a chain reaction of increased household income and consumption spending as in the table above, but it would not include the initial \$1 of government spending. The total impact of a \$1 cut in taxes would therefore be equal to  $(mpc + mpc^2 + mpc^3 + \dots)$  which is the same as the spending multiplier excepts that it lacks the first term "1+".

Keeping in mind that a tax cut is a negative change in taxes, we have the result that the tax cut multiplier equals minus the spending multiplier less one, or  $[1/(1-mpc)]-1$ . It is easy to remember that the tax cut multiplier is always exactly one less than the government spending multiplier. The tax cut multiplier may also be written as  $[mpc/(1-mpc)]$  which is equivalent. Because the tax cut multiplier is always smaller than the spending multiplier, tax cuts are regarded as less potent in boosting the economy during a recession than are spending increases.

Finally, what will happen if Congress increases spending by \$1 billion, but pays for it with a tax *increase*. Since the new tax exactly offsets the

effect of the added expenditure on disposable income, there is no multiplier effect. You can verify that if you subtract the tax multiplier from the spending multiplier that the result is exactly 1 regardless of the value of the mpc. This balanced budget multiplier is always equal to one.

### ***Exercises 11.2***

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A. Consider an economy in which the typical household tends to spend about three quarters of each additional dollar of income it receives: (1) what is the mpc in this economy? (2) what is value of the government spending multiplier? (3) the tax cut multiplier? (4) why do they differ?

B. Suppose that you want to do something to boost the economy out of recession. How could you conduct a personal fiscal policy aimed at this objective? Are both spending and "tax" policies possible? If so, what would the multipliers be?

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### ***11.3 How Large Are the Multipliers?***

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The government spending and tax cut multipliers depend on the marginal propensity to consume, the fraction of each additional dollar of disposable income that households will spend on consumption. If the mpc is large then the multipliers are large, but if the mpc is zero, then government spending will have no multiplier effect on the economy and a tax cut will have no effect at all. The key parameter is the mpc and the key question is: how large is the mpc?

#### ***How Large Is the MPC?***

Let's start this investigation by looking at the fraction of disposable income that households spend on consumption. In 1996 the total disposable income of U.S. households was about \$5,550 billion, out of which they spent about \$5,300 billion on consumption and saved about \$250 billion. Thus the fraction of income consumed was .96. Does that mean that the mpc is .96? It does only if consumers would spend 96¢ out of an *additional* \$1 of income.

What we do know is that consumers spend an *average* of 96¢ out all of their dollars of income. This fraction is called the average propensity to consume, abbreviated apc. While the apc can be measured very easily, it does not help us much in figuring out the value of the mpc. Here is how to see that.

The relationship between the income of a household and its consumption expenditures is called the consumption function. The simplest example of a consumption function is the linear relation,

$$C = a + b \cdot Y$$



where "C" denotes consumption expenditures, "Y" denotes disposable income, and where "a" and "b" are the intercept and slope respectively. Now, how much more will this household spend if its income increases by one dollar? The answer is that a one dollar increase in Y results in an increase in C of \$b, so b is clearly the mpc. If you are not convinced, see what the difference is in C if Y is \$10,001 instead of \$10,000.

We have then,

$$mpc = b$$

The parameter "a" can be interpreted as the level of consumption when income is zero since it is the intercept in the consumption function.

The apc is the fraction of income that is consumed or C/Y which is

$$apc = \frac{C}{Y} = \frac{a + b \cdot Y}{Y} = \frac{a}{Y} + b$$

We see from this expression that the apc depends on both parameters of the consumption function, "a" and "b". We can readily compute the *apc*, but we cannot solve this *one* equation for the *two* unknown parameters, *a* and *b*. Consequently, we cannot deduce the value of the mpc, or b, just from the *apc*. That's too bad, since apc is something we can easily observe.

For example, the *apc* of .96 for U.S. households in 1996 when Y was \$5,550 billion could equally well have been the result of an *mpc* of .96 and an "a" of zero, or an *mpc*, or "b," of zero and a value of \$5,300 billion for "a." At one extreme, the implied value of the government spending multiplier is 25 and at the other it is 1! In the language of econometrics, the methodology of making inferences from economic data, the *mpc* is just not "identified" from knowledge of the *apc* alone.

### ***The Solution to an Important Puzzle***

The solution to this puzzle was discovered in the late 1950s by Milton Friedman and by the team of Franco Modigliani and Richard Brumberg. Friedman called his solution the permanent income theory of consumption and Modigliani/Brumberg called theirs the life-cycle theory of consumption. While the two theories differ in exposition and detail, the basic idea behind both theories is that consumption expenditures depend mainly on the household's perception of its income over a long time horizon into the future rather than on just its disposable income today. This is because people seek to smooth their consumption over time since a steady level of consumption is preferred to feast followed by famine.

For example, imagine that one friend of yours won \$10,000 in the lottery while another friend won \$10,000 per year for the next twenty years. The incomes of both have increased by \$10,000 this year. Now you

are asked to guess how the consumption spending of each will change *this year*. The permanent or life-time income of the first friend has changed little as a result of the lottery since investing the \$10,000 would produce an income stream of only a few hundred dollars per year. However, the income of the second is increased by \$10,000 per year over a long horizon into the future.

If these lottery winners are typical consumers, they will plan their expenditures with their average future income level in mind. Consequently, we would expect the first to spend only a small part of the lottery prize and save the rest. In contrast, we would expect the second friend to spend a large fraction or nearly all of the \$10,000 because that is permanent income. Keep in mind that the purchase of a durable good such as a new refrigerator is mostly savings, the amount consumed only being the amount that the durable depreciates.

The implication of this theory is that the mpc out of a change in income depends on whether it is perceived to be a change in permanent income or whether it is regarded as just transitory income. The mpc for permanent income should be high, actually the same as the apc. However, the mpc for transitory income should be very low, because most people will want to smooth out their consumption over time. Statistical studies based on the response of consumption to income changes over time and across households support these predictions.

With the distinction between permanent and transitory income in mind, let's consider again the likely impact of a government spending increase or a tax cut. Taking a tax cut first, if the tax cut is perceived to be temporary, the resulting increase in disposable income will be seen by households as transitory, so the mpc will be small. One reason that a tax cut might be seen as transitory, is if people anticipate that their taxes will have to be raised in the future to pay for the additional government debt that has been incurred as a result of the tax cut. If they fully anticipate the need to pay those future taxes, the tax cut may have no effect at all on their consumption spending since it leaves permanent income unchanged.

In the case of a spending increase that is not accompanied by higher taxes, households may well see it as a temporary increase in their income. And, again, if they expect that the resulting deficit will have to be made up sometime in the future by higher taxes, they have even more reason to restrain their spending.

To sum up, the mpc out of transitory income changes is small. This suggests that the multipliers for fiscal policy are much smaller than would be the case if the *marginal* propensity to consume were as large as the *average* propensity to consume.

### ***Exercises 11.3***

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A. If the *mpc* were equal to the *apc* for the US, what would be the value of the government spending multiplier? the tax cut multiplier?

B. A family has the consumption function  $C = \$4,000 + 0.5 \cdot Y$ .  
1) What is the *mpc*? 2) the value of consumption at an income of zero? 3) the *apc* at an income level of \$10,000?

C. Suppose that the Anderson household spends .9 of what it perceives to be its permanent income. In 1993 the Andersons anticipated that their household income would average \$30,000 per year. However, in 1994 their actual income increased to \$40,000 which caused them to revise their estimate of their average income in the future upward by \$1,000. What was the Andersons' 1) permanent income in 1993, 2) consumption in 1993, 3) permanent income in 1994, 4) consumption in 1994. Write down the consumption function for the Andersons as of 1994, relating actual consumption to actual income.

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### ***11.4 The Keynesian Expenditure Model***

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From the perspective of Keynes, in an effort to understand the Depression, GDP is reasonably thought of as being determined by aggregate demand. When the unemployment rate is 20%, there is plenty of aggregate supply, so it seems reasonable to assume that firms will supply as much as is demanded. To put it another way, GDP in that situation is determined not by limitations on the supply of goods and services but rather by the limited demand for them.

The components of aggregate demand are consumption, investment, government purchases, and net exports. Let's denote aggregate demand by AD. Thus we have,

$$AD = C + I + G + X$$

where X stands for net exports. In the Keynesian model, aggregate supply, denoted AS, is just equal to the actual value of GDP that we observe. Thus:

$$AS = GDP$$

Setting aggregate supply equal to aggregate demand, we have,

$$GDP = C + I + G + X$$

This equation should look familiar; it is the accounting identity for GDP that we studied in Chapter 2. But in the context of the Keynesian model, it is also a statement about *how GDP is determined*. It says that GDP is determined by the sum of demand from the four sectors of the

economy. Economists sometimes characterize the Keynesian model by saying that in it GDP is "demand determined."

The consumption function that we discussed in the previous section says that the consumption component of aggregate demand can, in turn, be expressed as a function of disposable income which we called Y. Let's write disposable income as,

$$Y = \text{GDP} - T$$

where we can think of T as taxes net of transfer payments. In the simplest version of the Keynesian model presented here, we treat T as a lump sum amount, not as a function of GDP. A more sophisticated model would allow T to be a function of GDP, so that we could study the effect of a change in the tax rate.

The consumption function is then,

$$C = a + b \cdot Y = a + b \cdot (\text{GDP} - T)$$

Substituting for C in the expression for GDP we get

$$\text{GDP} = a + b \cdot (\text{GDP} - T) + I + G + X$$

which we can solve for GDP. The result is,

$$\text{GDP} = \frac{1}{(1-b)} \cdot [a + I + G + X] - \frac{b}{(1-b)} \cdot T$$

This equation tells us how the level of GDP will change in response to a change in any of the autonomous components of spending, those that do not depend on GDP, at least according to the assumptions of this model. We can see that a one dollar change in either a, I, G, or X will result in a change of  $1/(1-b)$  dollars in GDP. Of course, this is just the spending multiplier again, but we see that it applies not just to government spending but also to any increase in spending by any sector. The tax cut multiplier is still  $b/(1-b)$ , keeping in mind that a tax cut is a negative increase in T.

### ***How Does it Work? An Example.***

The Keynesian expenditure model is illustrated by a hypothetical example in Figure 11.1. It is assumed that consumption function is given by,

$$C = 2 + 0.5 \cdot Y$$

so consumption demand is \$2 trillion (the "a" parameter) plus 0.5 (the mpc or "b" parameter) times disposable income. In words, the household sector will consume half of its income plus \$2 trillion. To calculate Y from GDP we need to know T.

Let's assume that the government sector collects taxes of \$1 trillion and that taxes do not depend on the level of GDP. Consumption demand is given then by

$$\begin{aligned}C &= 2 + 0.5 \cdot (\text{GDP}-1) \\ &= 1.5 + 0.5 \cdot \text{GDP}\end{aligned}$$

This is gray line in Figure 11.1. Notice that if GDP were zero, households would still want to consume \$1.5 trillion. At a level of GDP of \$3 trillion, households would consume all of GDP, and at levels of GDP above \$3 trillion consumption demand is less than GDP.

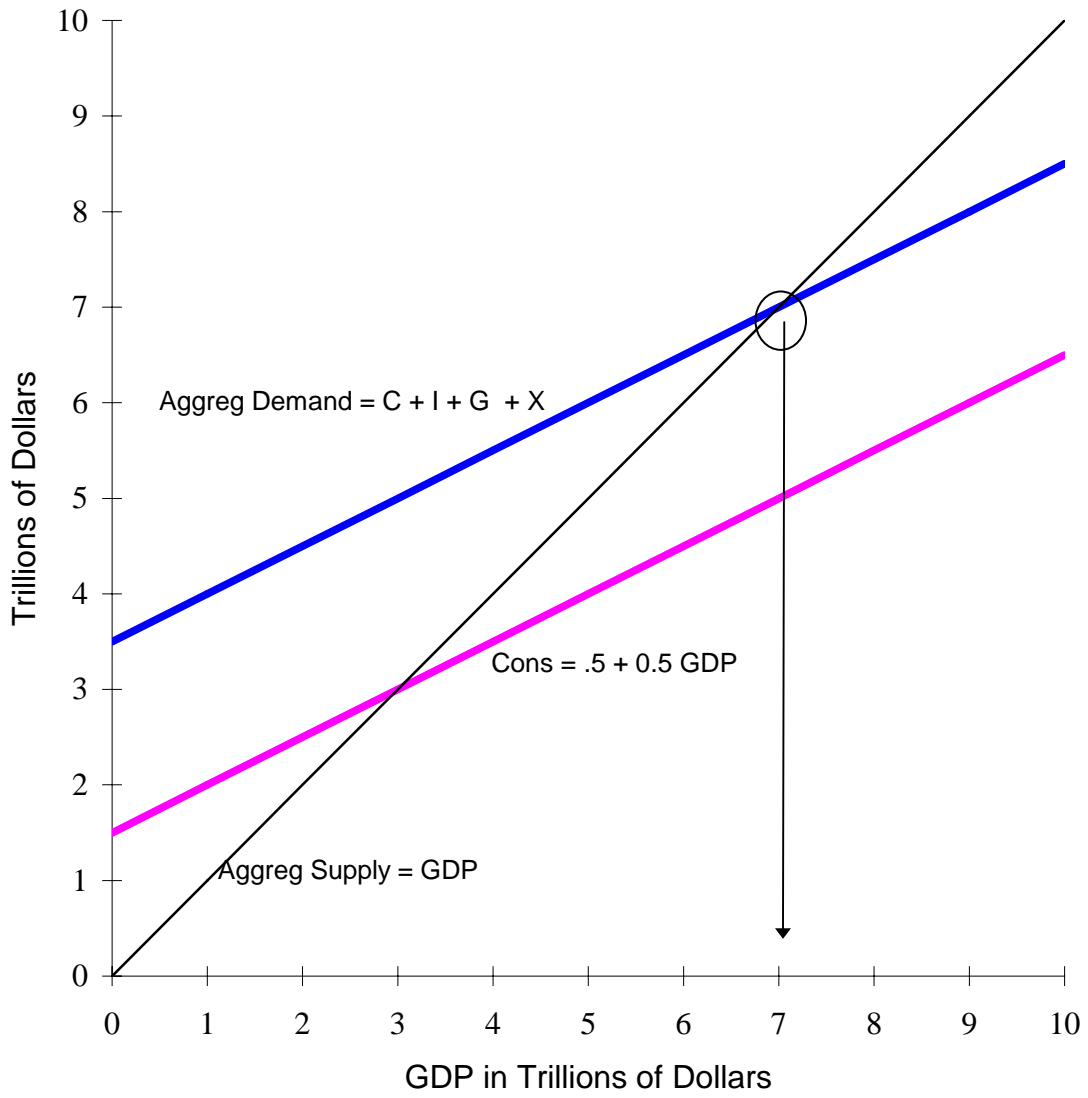
To obtain aggregate demand, we now add \$1 trillion in investment demand by firms for capital goods, \$1.1 trillion in demand for goods and services by the government sector, and a net \$-.1 trillion in demand from the ROW. The latter reflects a trade deficit of \$100 billion. Adding these to consumption demand we get the thick black line in Figure 11.1. Now we assume that aggregate supply is just the amount of GDP, so it is the thin line that goes through the origin and has a slope of one. Aggregate demand and supply intersect at a GDP of \$7 trillion, and that is the same value one obtains by plugging our assumed values for the variables into the equation above for GDP.

### ***What Happens If Government Spending Jumps \$0.5 Trillion?***

We know that the multiplier in this model is 2, since that is  $1/(1-0.5)$ . That implies that GDP will rise by \$1 trillion. This can also be seen graphically in Figure 11.2 where the aggregate demand line is shifted up by \$0.5 trillion. The new aggregate demand line intersects the aggregate supply line at \$8 trillion, indicating that GDP rises by \$1 trillion.

Note that the same change in GDP would occur no matter what the source of the jump in aggregate demand; it could come from investment, net exports, or even consumption if the parameter "a" shifts. It is said that the economy boomed in 1955 because the public fell in love with the wrap-around windshield that was introduced that year! Similarly, an investment boom based on a new invention or just on optimism, what Keynes called the "animal spirits" of entrepreneurs, would have the same multiplier effect on GDP as does a boost in demand from government. A surge in the demand for our exports, due perhaps to a boom in Europe, would also have the same multiplier effect on our economy. Demand for computer and telecommunications related products is helping to fuel the strong growth of the late 1990s.

**Figure 11.1: The Keynesian Expenditure Model**



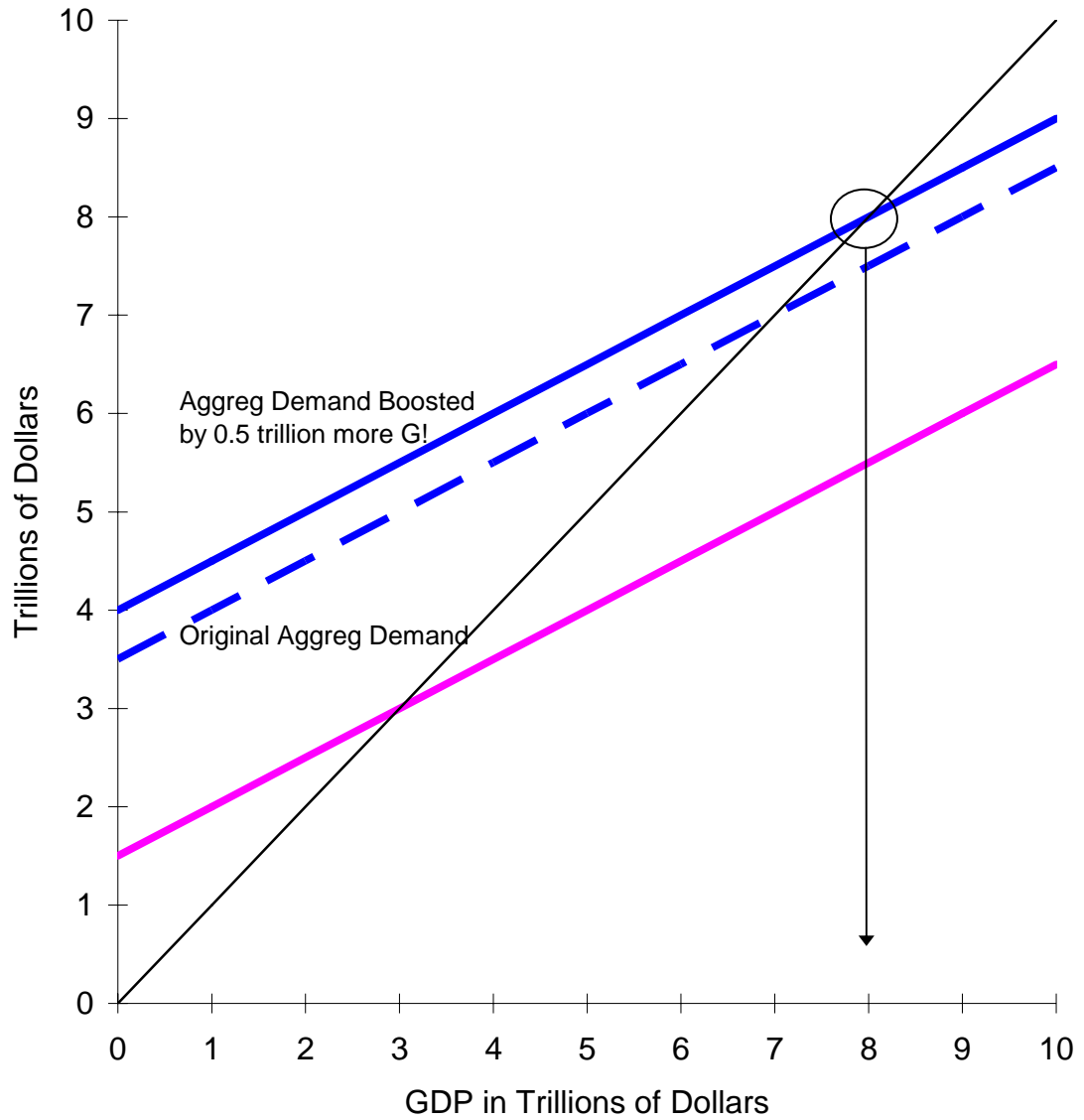
### ***Are There Limits?***

Taken literally, this model seems to imply that we can achieve an unlimited level of income simply by legislating more government spending! That seems just too good to be true, but what is the catch? The catch, of course, is the assumption that the economy will produce as much as is demanded, that supply is "infinitely elastic." Keep in mind that Keynes was analyzing a depression, not normal times.

We discussed in Chapter 8 what happens when individual industries and the economy approach full capacity: higher output requires higher prices and wages and output above a certain level cannot be sustained. More purchases by government would result in a crowding out of private purchases in an economy that is already producing near full employment. There are just so many workers and factories to be divided among alternative uses, and more of one use requires less of another. Recall that in Chapter 2 when we introduced the government sector into an economy operating at full employment, it meant that less was produced for consumption and less for capital investment.

The problem faced by most of the industrialized world today is not a lack of aggregate demand but rather it is on the aggregate supply side of the economy: rapidly aging populations and radical changes in the kinds of skills that are needed in an environment of new technologies of production and information. The countries of the former Soviet Union are faced with an unprecedented transformation of their economies from highly wasteful production of mainly military goods for their formerly communist government to the competitive production of goods that someone will actually want to buy. These are very different challenges from those facing the industrialized economies of the 1930s.

**Figure 11.2: The Effect of an Increase in Government Purchases**





### **Exercises 11.4**

A. Referring to the hypothetical example portrayed in Figure 11.1, what is the value  $mpc$ ? the  $apc$  when GDP is \$7 trillion? the government deficit?

B. Suppose that instead of an increase in  $G$  of \$0.5 trillion there was a tax cut of that amount in the hypothetical economy portrayed in Figure 11.1. What is the value of the tax cut multiplier in this model? How would the consumption function and aggregate demand lines in Figure 11.1 shift in response to the tax cut? Show algebraically and using the figure, how GDP would be affected by the tax cut. Why is the impact of a tax cut different than the effect of a spending increase of the same amount?

C. At a time when the unemployment rate is 4.2% Congress enacts a \$100 billion program of increased spending on road construction without a corresponding tax increase. You are asked to comment on the effect of this program on real GDP. How much of an increase in real GDP would you expect? What effect would you expect the program to have on the breakdown in the division of real GDP between consumption, investment, government purchases, and net exports?

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