Discussion of the multiplier (continued):

The logic behind the multiplier process: Why is the equilibrium level of RGDP rising more than the rise in autonomous spending?

Suppose autonomous spending rises in the economy due the government spending $100000 more in the economy to construct roads. Let us this money goes to pay workers who construct this road. Now, in turn, these workers spend some portion of this $100000 they have earned building these roads on goods like cars, DVD players, etc. Now, the manufacturers of these goods that the workers buy (with the extra wages they earn due to extra spending by the government) use a part of their extra earnings to buy extra goods & services as well. This goes on throughout the economy. So the extra spending of $100000 by the government has generated an extra spending of more than $100000 in the economy, and that raises the change in equilibrium spending & RGDP by more than $100000.

Let us look at this from a mathematical point of view.

Let agent 1 increase his autonomous spending in the economy by $\Delta A$, which accrues to agent 2 as addition to his income. Let agent 2’s MPC be 0.8, i.e. he spends 80% of his earnings and saves the rest. So agent 2 spends 0.8* $\Delta A$ from his additional income. Now, let agent 2’s spending of 0.8* $\Delta A$ accrue as income to agent 3. Let agent 3’s MPC also be 0.8. Thus he spends 0.8*(0.8* $\Delta A$). Agent 3’s spending, in turn, accrues as income to agent 4, who again spends part of it. This process goes on ad infinitum in the economy.

So, the total amount of extra spending generated by the initial increase in autonomous spending of the magnitude $\Delta A$ is given by the infinite geometric sum:

$$S = \Delta A + 0.8\Delta A + 0.8^{2}(\Delta A) + 0.8^{3}(\Delta A) + \ldots \ldots$$

$$= \Delta A + 0.8\Delta A + 0.8^{2}(\Delta A) + 0.8^{3}(\Delta A) + \ldots \ldots$$

Using the formula for infinite geometric sum,

$$S = \left[1/(1-0.8)\right] \Delta A = \left[1/0.2\right] \Delta A$$

$$= \left[1/(1 - \text{MPC})\right] \Delta A = \left[1/\text{MPS}\right] \Delta A$$

Thus, the $S$ seen here is actually $\Delta Y^*$. This clarifies the logic behind the multiplier process.
An interesting question:

In the demand-driven Simple Keynesian framework, if the government were to reduce lump-sum taxes on households by $100 (give a tax-cut), but also reduce its spending by $100 (as it loses $100 worth of revenues), what effect would this policy have on equilibrium RGDP? (For simplicity, let this be a closed economy, and one without income taxes).

The change in equilibrium RGDP from the change in government spending:

\[ \Delta Y_1^* = \Delta G / (1 - b) = -100/(1-b) \] (since there has been a decrease in government spending)

The change in equilibrium RGDP from the change in lump sum taxes:

\[ \Delta Y_2^* = -b \Delta T / (1 - b) = -b(-100)/(1-b) \] (since there has been a decrease in taxes)

So total change in equilibrium RGDP from the change in the government’s policy:

\[ \Delta Y^* = \Delta Y_1^* + \Delta Y_2^* = -b(-100)/(1-b) + [-100/(1-b)] \]

\[ = (b100/(1-b) - (100)/(1-b) \]

\[ = [100/(1-b)](b - 1) < 0 \]

(Since \([100/(1-b)] > 0\) and \((b - 1) < 0\), as \(0 < b < 1\))

Thus overall effect of this policy is to reduce equilibrium RGDP.

Why is this happening?

This is because every dollar of the $100 is adding to aggregate spending if the government spends it itself. However, if it reduces its spending and hands it over to households, then all of the $100 does not get spent. The households spend a part of it depending on their MPC (for example, if MPC is 0.8, then they spend $80), and retain the rest. This represents a leakage from the aggregate demand (expenditure) side of the economy and this reduces equilibrium RGDP. Another interpretation of this exercise is that the ‘tax multiplier’ is not as effective as the ‘government spending multiplier’ in boosting equilibrium RGDP, in the Simple Keynesian framework.

Linkage between the Keynesian-Cross & the AD-AS analysis: The Keynes-Classical Synthesis

As one might guess, shifts of the AE curve in the Keynesian Cross Diagram leads to a corresponding shift in the AD curve in the AD-AS diagram. We must now recall the assumption that was central to the Keynesian model: fixed prices. So, we must now draw
the AD-AS curves to take into account this assumption. We must also try to see whether we can attempt a synthesis between the Keynesian model and the Classical (fully flexible prices in all markets) model when we link the AE analysis to the AD-AS analysis. This will be done through a series of diagrams, as seen below.

**Diagram 1** (see class notes): Relation between the AE and AD curves.

In this diagram we see how a shift in the AE curve due to a change in its components shifts the AD curve.

**Diagram 2** (see class notes): The goods market aggregate supply curve.

This supply curve *(for the goods & services market)* is drawn:

1. With a Keynesian flat portion: In this stretch prices are inflexible in the goods market and labor. There is unemployment in the economy with the labor market being off equilibrium. Firms can increase supply without increasing their marginal costs since the prices of both labor and capital goods are fixed.  
2. An upward sloping intermediate portion: Prices are flexible in the goods market & money wages are still fixed in the labor market. The labor market is still off equilibrium. Firms can increase production by increasing the work force without raising money wages, but they face a higher price for capital inputs since the price level is variable.  
3. And a vertical long-run portion: When the economy reaches its potential production level with the labor market clearing at its full employment level. This stretch corresponds to the classical assumption of full price flexibility in both the goods & labor market.

In this diagram we can see how shifts in the demand curve changes price level in each of these stretches, or does not do so.

(Note: This diagram brings together the Keynesian assumption of fixed prices for lower levels of RGDP, when there might be unemployment in the economy, with the classical flex price model for a higher level of RGDP. Recall that in the latter model prices adjust to clear all markets over the long run).
Diagram 3 (see class notes): ‘Crowding-out’ (the effectiveness of fiscal policy in terms of the AD-AS diagram).

Definition of the term ‘crowding-out’: Reduction of private (households, firms, and ROW) spending due to increase in government spending, because this extra demand by the government raises the price level, and goods & services become more expensive for private agents. (This is not exactly how Parkin defines crowding-out, but we shall use this definition in our exposition).

In this diagram we see that when we are in the Keynesian stretch, fiscal policy is fully effective (increase in government spending does not crowd out private spending). In the intermediate stretch, fiscal policy is partially effective due to partial crowding out of private expenditure. In the long-run (full-employment) stretch there is full crowding-out. Fiscal policy is completely ineffective, and only raises price level over the long run, after full employment output has been reached.

Diagram 4 (see class notes): Effect of price rise on the AE curve.

In this diagram we can see how the AE curve shifts back due to price rise (remember that price was among the things we held ‘constant’ when we drew the AE curve). Over the Keynesian stretch of the AD curve, when increase in AE does not change prices, a rise in G is fully effective, as the AE curve would not shift back at all. For partial crowding out the AE curve shifts back, but not fully. For full crowding out (i.e., if the government were to increase spending when the economy is at full employment) prices rise so much that the AE curve shifts back over time to its original level over time. [Parkin’s diagrams and exposition of the effect of fiscal policy are a little different than mine. He looks at long run effectiveness of fiscal policy using a diagram where there is a short-run demand curve that shifts back due to increasing money wages, when fiscal policy moves the economy over the potential output level. The conclusions of Parkin’s analysis and mine are the same. I shall use the kind of diagrammatic framework Parkin uses when we will study the effectiveness of monetary policy in the next couple of lectures].

Note: For an upward sloping supply curve, because prices are not fixed in the goods market, if the government wants to raise output by a certain amount, then it should adopt policies to raise aggregate demand more than if the price level were fixed. The price rise dampens the effect of an increase in demand on the rise in equilibrium output.