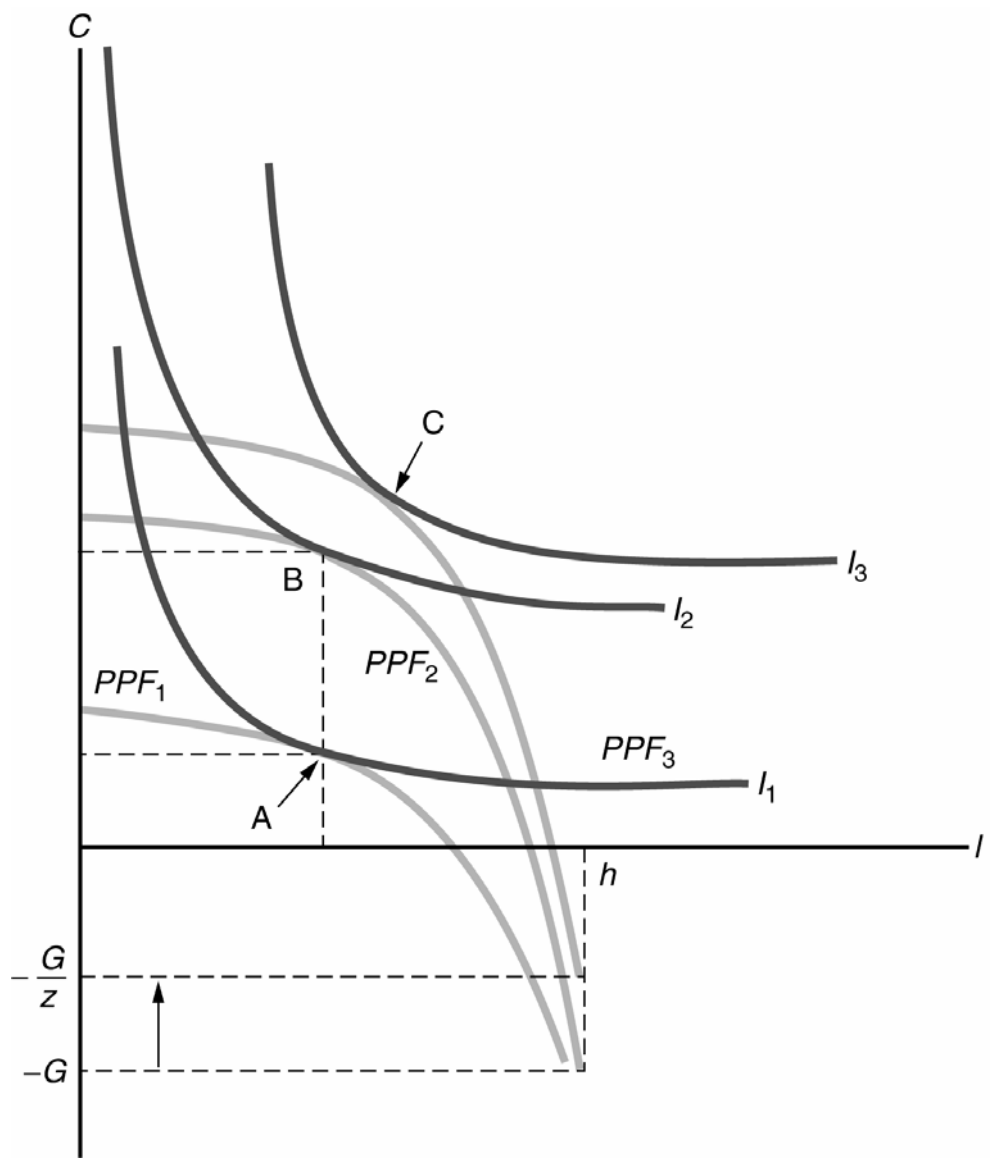


Chapter 5 – Problem 4

First consider the benchmark case in which $z = 1$, and there is no effect of changes in z on government activities. Now suppose that z increases. This case of an increase in z is depicted in the figure below. The original production possibilities frontier is labeled PPF_1 and the competitive equilibrium is at point A. If the increase in z only affects the economy through the change in $zF(K, N)$, then the new production possibilities frontier is PPF_2 .

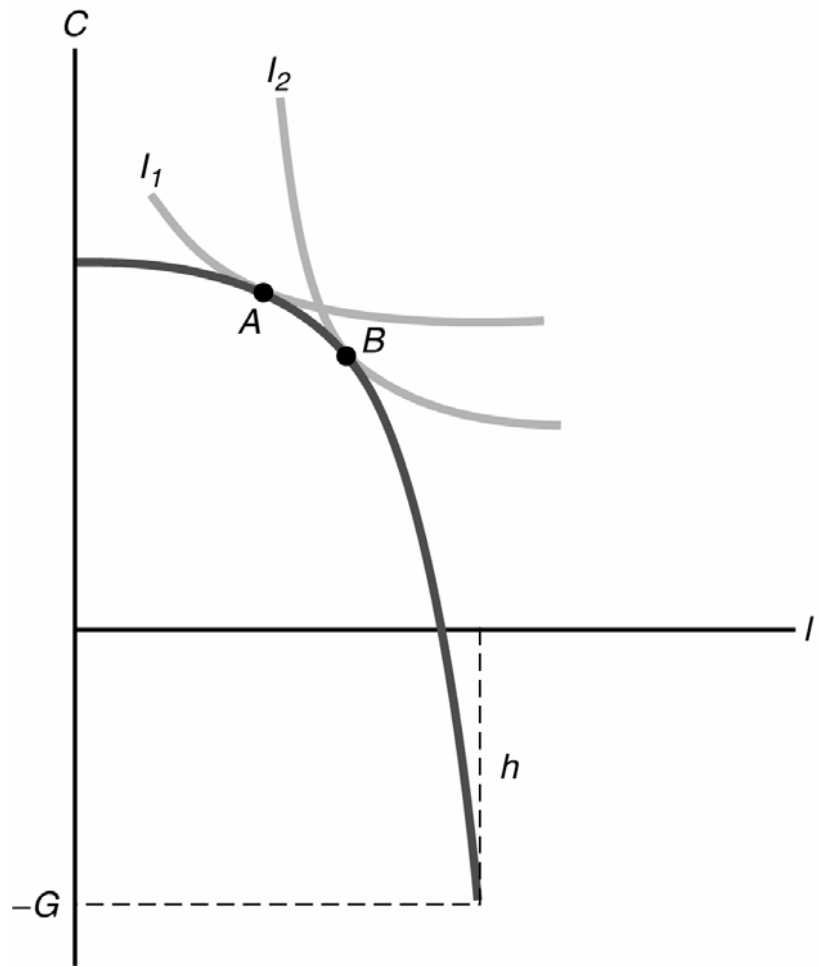
The diagram shows a case in which the income and substitution effects on leisure exactly cancel out, and the economy moves to point B. The equation for the production possibilities frontier is $C = zF(K, h - l) - T$. In the benchmark case, $T = G$ and so we have $C = zF(K, h - l) - G$. For this problem, $T = G/z$, and so the production possibilities frontier is given by $C = zF(K, h - l) - G/z$. When $z = 1$, the two $PPFs$ coincide. When z increases, the vertical intercept of the PPF increases by $G/\Delta z$. Therefore, the new PPF is PPF_3 in the figure below.

The competitive equilibrium is at point *C*. There is an additional income effect that provides an additional increase in equilibrium consumption, and a reinforced income effect that tend to make leisure increase. Therefore, relative to the benchmark case, there is a larger increase in consumption, and either a smaller decrease in leisure or a larger increase in leisure.



Chapter 5 – Problem 5

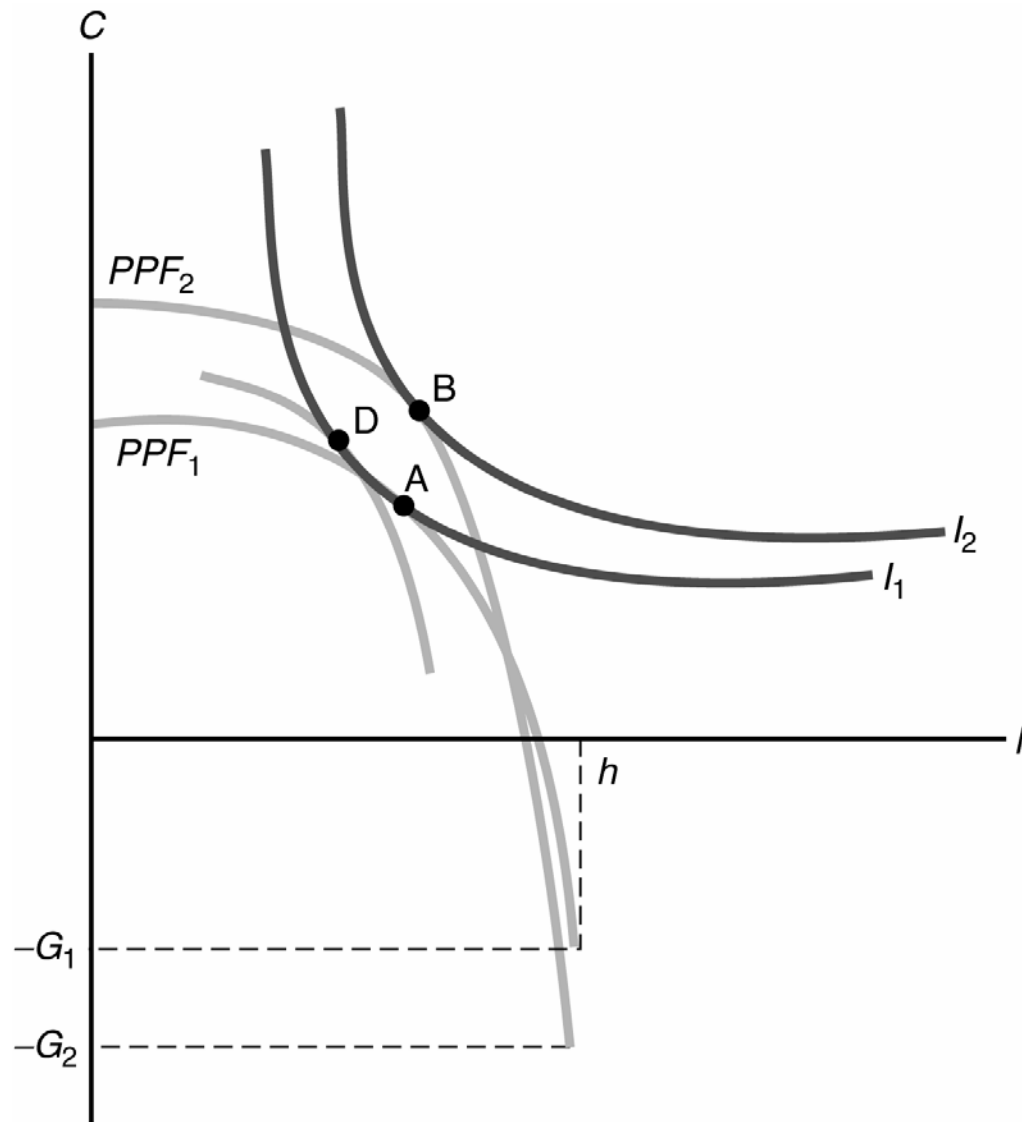
- (a) At the margin, the consumer decides that leisure is more preferred to consumption. That is, the consumer now requires a bigger increase in consumption to willingly work more (consume less leisure). In more intuitive language, the consumer is lazier.
- (b) To work out the effects of this change in tastes, we refer to the figure below. The production possibility frontier in this example is unchanged. The consumer now picks a new point at which one of the flatter indifference curves is tangent to the production possibilities frontier. That is, equilibrium will shift from point A to point B. Consumption falls and leisure rises. Therefore, the consumer works less and produces less. Because employment has fallen, it also must be the case that the real wage increases.



(c) This disturbance, which some might characterize as a contagious outbreak of laziness, would have the appearance of a recession, as output and employment both fall. The consequent reduction in consumption is also consistent with a typical recession. However, in this case the real wage would rise, which is inconsistent with the business cycle facts. Therefore, this type of preference change is not a cause of recessions.

Chapter 5 – Problem 6

(a) The increase in government spending in this example has two separate effects on the production possibilities frontier. First, the increase in government spending from G_1 to G_2 implies a parallel downward shift in the production possibilities frontier. Second, the productive nature of government spending is equivalent to an increase in total factor productivity that shifts the production possibilities frontier upward and increases its slope. The figure below draws the original production possibilities frontier as PPF_1 and the new production possibilities frontier as PPF_2 . If the production-enhancing aspects of the increase in government spending are large enough, representative consumer utility could rise, as in this figure.



(b) There are three effects at work in this example. First, there is a negative income effect from the increase in taxes needed to pay for the increased government spending. This effect tends to lower both consumption and leisure. Second, there is a substitution effect due to the productive effect of the increase in G , which is drawn as the movement from point A to point D. This effect tends to increase both consumption and leisure. Third, there is a positive income effect from the increase in G on productivity. This effect tends to increase both consumption and leisure. In the figure above, the movement from point D to point B is the net effect of the two income effects. In general, consumption may rise or fall, and leisure may rise or fall. The overall effect on output is the same as in any increase in total factor productivity. Output surely rises.

2) The answer is to maximize the following function:

$$\begin{aligned}G &= wt(24 - l) \\ &= wt(24 - 4 - 25t) \\ &= wt(20 - 25t) \\ &= 20wt - 25wt^2\end{aligned}$$

which would then imply a tax rate of $0.4 = 40\%$.

The government revenue would be 40 units.

3) The tax rate would have to satisfy the following equation

$$20wt - 25wt^2 = 30$$

Since $w = \$10$, we can write:

$$250t^2 - 200t + 30 = 0$$

and the solution would be $t = .2$, and $t = .6$.