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Economics 202

The Aggregate Expenditure Model

Aggregate Expenditure (AE) is defined as the sum of expenditures on all final goods and services produced in a given period within the nation's borders. This is a fixed price level model, so we also assume that price level is constant, or fixed.

Let's consider each expenditure category more directly, beginning with consumption and moving to the other expenditure categories in turn.

Consumption

Consumption includes the purchase of final goods and services like food, clothes, personal care items, etc., but doesn't include things like the purchase of a home (or, residential investment, which as the name implies, is considered part of investment).

Our goal is to create an equation that describes (mathematically) how much a given individual or group of individuals will spend on consumption. To do this, we must ask about variables that could directly affect consumption expenditure. An obvious candidate is disposable income. That is, we know that changes in disposable income lead to subsequent changes in consumption spending. While there may be other variables which also affect consumption expenditure, we'll keep things simple here and assume that consumption varies with changes in disposable income and nothing else. That said, let's divide consumption expenditure into two categories:

- variable consumption expenditure - consumption expenditure that changes with changes in one's current disposable income
- non-variable consumption expenditure - consumption expenditure that does not change with changes in one's current disposable income – consumption expenditure that is independent of disposable income (e.g. a subsistence level of consumption, or consumption that depends on the income of previous periods). As this latter type of consumption expenditure does not automatically change whenever our income changes, we call this fixed consumption expenditure, or use the term autonomous consumption expenditure - where autonomous means independent of income.

When we consider variable consumption expenditure, let's further assume that the relationship between changes in disposable income and consumption expenditure is constant. In other words,

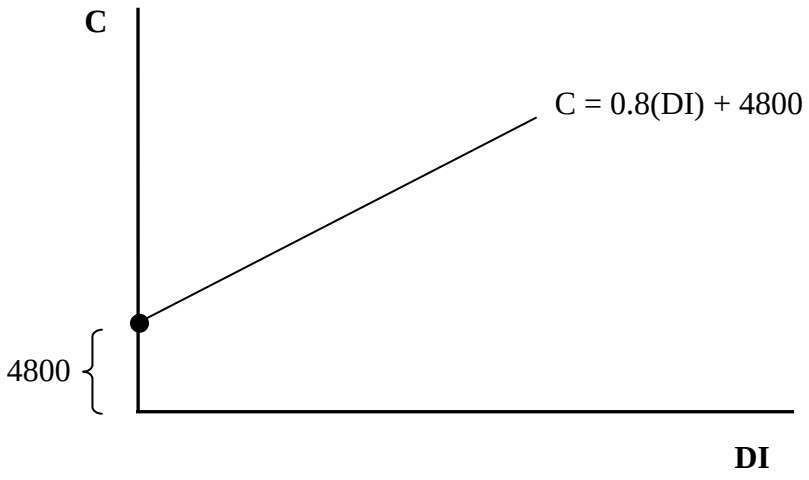
any given increase in disposable income will always have the same effect on consumption in that every dollar increase in disposable income causes consumption expenditure to increase by some set amount. Note that in reality, the consumption expenditure of every individual probably does not vary at a constant rate with any change in disposable income. E.g., giving $1 to someone with a high income will probably lead to a smaller change in consumption expenditure than giving $1 to someone with a low income. We'll call this relationship between changes in consumption expenditure and disposable income the marginal propensity to consume (MPC). In thinking about what the MPC represents, we also know that this value cannot be negative, and cannot exceed a value of 1 (i.e. $0 \leq MPC \leq 1$).

With this information, here is our consumption expenditure equation: $C = m(DI) + b$

where:
m = marginal propensity to consume
DI = disposable income
b = autonomous consumption expenditure

We'll assume that for every dollar increase in disposable income, consumption expenditures rises by 80 cents. That is, let's assume that the MPC = 0.8. Similarly, we can assume that $4800 is the amount of autonomous consumption. That would allow us to write out our consumption expenditure equation (our consumption function) as $C = 0.8(DI) + 4800$

If we graph this equation, using DI as the independent variable (x-axis) and C as the dependent variable (y-axis), then our Consumption function looks like this (where the intercept of our Consumption function is 4800, and the slope is 0.8):



Investment

Investment expenditure can fall into several different categories as well. The first category involves capital expenditures. This includes expenditure on residential housing, buildings, equipment, etc. The second category involves changes in inventory. Note that although unlikely, if individuals spend nothing on capital and inventories are falling, then investment expenditure would be negative (at least in theory). No other type of expenditure has this characteristic.

In reality, investment expenditure varies with changes in interest rates and possibly income, but here we will assume that this does not occur. We make this assumption in order to keep our model simple. Although this assumption does not allow us to full examine the impact of certain macroeconomic policies, this assumption does allow us to find equilibrium using simpler math. Here, we are assuming that investors determine their level of investment in advance of the current period. We call this pre-planned investment by another name, autonomous investment expenditure. It's possible for autonomous investment to change during a given period, but when this occurs, it is not because of a change in income.

Government Spending

Government expenditure will include all expenditure by each level of government. The primary way that governments make expenditure is by providing public goods like national defense, fire and police protective services, parks, etc. Just as with investment, we will assume that the government makes all of its expenditure decisions in advance. That is, government expenditure does not vary with changes in GDP or income, it is pre-planned and we'll call it autonomous government expenditure. One obvious problem with this assumption is that we're saying governments will spend the same amount of money, no matter whether the economy is in a recession or not. In reality, this is incorrect. Nevertheless, we will retain this assumption to keep our model more simple to work with.

Exports and Imports

Export and import expenditures make up net exports. Exports are added to aggregate expenditure, while imports are deducted. As with investment and government spending, we'll assume again that export and import expenditures do not vary with changes in GDP or income, they are pre-planned and we will call them autonomous export expenditures and autonomous import expenditures. This is obviously the case for exports, although exports will certainly change with changes in foreign income, but with imports this is less realistic. Our desire to import goods is related to changes in our income – just as we observed with consumption. Once again, however, simplicity suggests that we ignore this relationship for now.

Back to the overall AE model

AE is the sum of all expenditure. If we define Consumption expenditure as C, Investment

expenditure as I, Government expenditure as G, expenditure on Exports as X and expenditure on Imports as M, then Aggregate Expenditure can be expressed as AE = C + I + G + (X - M).

Just as we did with consumption, let's assume we're looking at a specific country that embodies the various assumptions we've made about each of these expenditure categories. Building on what we've already assumed about consumption, let's assume the following:

C = 0.8(DI) + 4800
I = 5000
G = 4000
X = 1000
M = 1000

Our goal is to graph AE, but in order to do so, we need to rearrange the consumption equation into something that has a C and Y, rather than C and DI. Noting that DI is the difference between GDP (income) and taxes, we can rewrite the equation as (where Y = GDP, or income, and T = taxes):

C = 0.8(Y - T) + 4800

In the spirit of continued simplicity, we'll assume that taxes are also autonomous. Sometimes this type of tax is called a lump sum tax, but the idea here is that taxes do not vary with changes in income. I.e., there is no income tax, which isn't too realistic. Instead, the taxes paid by each individual are set, or fixed. One way to look at this is to think of these taxes as a head tax. If you have a head, then you pay a certain amount in taxes. If there are different income individuals in our economy, this would clearly be a regressive tax (i.e. the proportion of one's income paid in taxes is higher for lower income people than higher income people).

If we assume that T = 1000, then we can rewrite our Consumption function as C = 0.8Y + 4000.

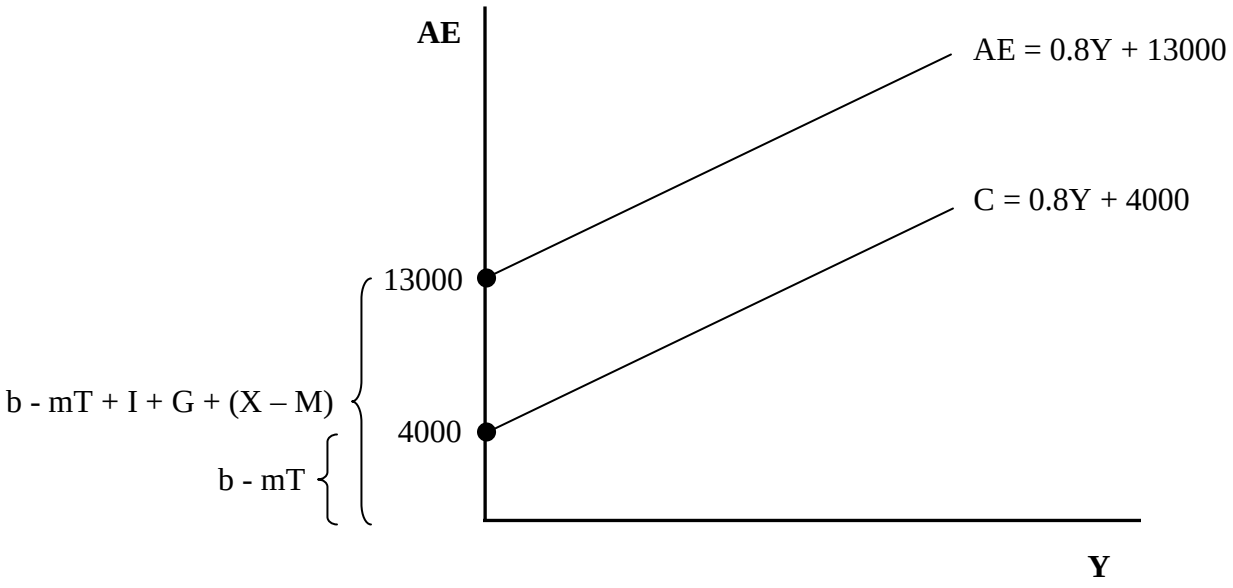
Now, when we put everything together, plugging our most recent equation for C, along with our equations for I, G, X and M, into our AE equation above, we get:

AE = [0.8(Y) + 4000] + 5000 + 4000 + (1000 - 1000)

Simplifying this equation, we have: AE = 0.8Y + 13000

It is this equation that we'll use to represent aggregate expenditures. Note that on a graph, we have something that looks very similar to the consumption equation graph above.

The AE graph appears as follows:



Note that our rearranged Consumption function was also placed on the graph, and that we obtained our AE function by simply adding I, G, and (X – M) to the intercept of that equation. The slope of both functions is clearly the same, both have a slope of 0.8.

Going back to some of our assumption, one impact of moving closer toward reality would be not assuming I, G and (X – M) are autonomous. If any of these variables (e.g. M) is suddenly a function of Y as well, then the slope of the AE function changes. The MPC would continue to be the slope of the consumption function, but would only be a part of the slope of the AE equation.

Note also that if this economy simply chooses to produce a certain output level, we know that AE will be less than, equal to, or greater than that value for Y. E.g., if this economy decides to produce Y = 70000, and we plug this value into our AE equation, we get: AE = 69000. If AE = Y, then too much is being produced and we tend to think of this leading to an increase in inventories. As producers notice their inventories are rising, we know that they will want to change how much they produce. This would imply that AE < Y does not lead to an equilibrium, since there's a tendency for producers to make changes after that outcome. The topic of equilibrium, however, will be left to a different handout.