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Economics 202

Solving for Equilibrium Real GDP in the Aggregate Expenditure model

The Aggregate Expenditure (AE) model consists of a set of equations that describe how individuals within an economic system spend money. What we want to determine is how much expenditure (and output) is needed for this economy to be at equilibrium.

Assumptions of the AE model

As we state above, the AE model consists of a set of equations that describe expenditure within a given economy, but in order for us to keep the math simple, we need a simple economy. I.e., we will make a series of simplifying assumptions about the economy where we will explain or predict economic events. E.g., we assume that capital doesn't depreciate, that there are no indirect business taxes, and that all income currently earned is currently received. This series of assumptions makes GDP, Net Domestic Product, National Income and Personal Income all equal to one another (which means we can ignore national income accounts like NDP, NI and PI). If we deduct personal taxes from GDP, we get disposable income (DI). Disposable income and GDP are the only two measures of income left for us to discuss.

There are some additional simplifying assumptions we can make here, again with the intention of keeping the math relatively simple. First, we assume that the price level is fixed in this economy. This would be consistent with an economy that has prices which are not easily changed (e.g. prices set in menus, catalogs or even contracts). Not entirely realistic, but at least somewhat possible in the short run.

Second, we assume that consumption is a function of only disposable income, and that all other forms of expenditure are pre-determined. E.g., when GDP is rising individuals do not automatically start investing more or buy more imports. Third, we assume that the only taxes are those which also do not vary with income (i.e. no income taxes). We have what we could call a "head tax", a tax that is based on whether you have a head, so it's independent of your income. These assumptions are not necessary, but again, they do allow the math we'll be performing to be a bit more on the simple side. Note that when our goal is to simply show how to find an equilibrium level of GDP, this set of simplifying assumptions doesn't really affect us.

Equations of the AE model

Now that we've set up our assumption, we can write out the equations which describe spending within this economy. The areas we reflect are Consumption, Investment, Government spending and net exports. Those equations are provided below.

C = 0.8(DI) + 4800	(C = Consumption Expenditure, DI = Disposable Income)
I = 5000	(I = Investment Expenditure)
G = 4000	(G = Government Expenditure)
X = 1000	(X = Expenditure on Exports)
M = 1000	(M = Expenditure on Imports)
T = 1000	(T = Tax Revenues)
DI = Y - T	(Y = real GDP)

These equations tell us that consumer spending would be at $4800 if consumers had no disposable income at all, and that for every $1 in disposable income consumers receive, they will spend 80¢. We also observe that $5,000 is spent on investment (purchase of machinery and equipment), and that the government spends $4000, while receiving $1000 in taxes. We note further that this economy exports as much as they import (i.e. net exports are zero).

Finding equilibrium

We know that if you sum up each of the expenditure equations, you get the aggregate expenditure for this economy. I.e., AE = C + I + G + (X - M). We also know that if AE and Y are not equal, we will either get rising or falling inventories – which tells us that we do not have an equilibrium. E.g., if inventories are rising, then this economy will want to reduce output. This tells us that AE = Y is a condition for equilibrium in this model.

If we substitute each of the expenditure equations above into the equation for AE, (i.e. AE = C + I + G + (X – M)), including our equation for DI, then we get the following:

AE = [0.8(Y - 1000) + 4800] + 5000 + 4000 + (1000 – 1000)

Using our equilibrium condition that AE = Y at equilibrium, we can substitute a Y for the AE.

Y = [0.8(Y - 1000) + 4800] + 5000 + 4000 + (1000 – 1000)

If we solve for Y, then we get Y*. Our value for Y* is equilibrium real GDP.

Y* = 65000