GDP, Investment, Savings, Income Share

For a closed economy, GDP can be expressed as

$$Y = C + I + G.$$

Y is the supply side of the economy, output is a function F of capital K and labor L, that is, $Y = F(K, L)$. We assume that capital and labor are fixed, so therefore $Y = \overline{Y}$ is fixed. *(3.1.1)*

$C + I + G$ represents the demand side of the economy, that is, expenditures. We assume that $G = \overline{G}$ is fixed.

Consumption can be written as $C = mpc \cdot (Y - T)$, where mpc is the marginal propensity to consume and $Y - T$ is disposable income. (That is, whatever the government doesn't take away is your disposable income.) We assume that T and mpc are also fixed, so therefore $C = \overline{C}$ is fixed. *(3.1.5, 3.5)*

We can rewrite GDP as $I(r) = Y - C - G$. The amount of investment depends on the real interest rate r and the amount of loanable funds S (see below).

By subtracting and adding T, we can write $I(r)$ as

$$I(r) = (Y - T - C) + (T - G).$$

The term $(Y - T - C)$ is private savings (disposable income you have left after consumption). The term $(T - G)$ is public savings (how much the government has left after spending). Their sum is total savings S. Therefore $I(r) = S$, (which is why savings are sometimes called loanable funds), and furthermore

$$S = Y - C - G = Y - mpc \cdot (Y - T) - G.$$

From here we can see that savings will increase if Y or T increases; savings will decrease if mpc or G increases. (We are holding those all fixed for general analysis but we can still consider "what if" scenarios in which they might change.) *(3.2)*

The real interest rate r will always adjust so that $I(r) = S$. Because $I(r) = S$, it follows that $I(r) = Y - C - G$, and therefore $Y = C + I + G$. This is how we know that expenditure $C + I + G$ always equals production $Y = F(K, L)$. *(3.1.7, 3.8)*

You will want to know how changes in the savings curve and investment demand curve will affect each variable. Note that since an increase in G will decrease savings S, it will also decrease I — here we say that the increase in G is crowding out investment. *(3.4, 3.5, 4.3)*

In a competitive market, a profit maximizing firm will hire so that $MPL = w/P$ and $MPK = r/P$. The total output (and thus income) of the firm is then

$$Y = MPL \times L + MPK \times K.$$

The share of income that goes to labor is $MPL \times L$, and the share of income that goes to capital is $MPK \times K$. *(3.1.2, 3.6)*

Interest Rates, Money

The nominal interest rate is $i = r + \pi$, where r is the real interest rate and π is inflation. We can also write $i = r + \pi^e$ when we want to talk about expected inflation.

The equation of exchange is written as $MV = PY$. The quantity theory of money assumes that $V = \overline{V}$ is a stable constant.

The term M/P is the level (i.e. supply) of real money balances. The term $(M/P)_d = f(i, Y)$ is the demand for real money balances, i.e. how much money people want to hold in real terms. When i gets larger, $f(i, Y)$ falls; when Y gets larger, $f(i, Y)$ increases. (Higher i means that investing in bonds is relatively more attractive so people will want to have their funds in bonds instead of in money.) In equilibrium it must be the case that $M/P = f(i, Y)$. *(4.10, 4.11, 4.12)*

If i increases, then $f(i, Y)$ falls. Since people want to hold less cash, more money is moving around, so V increases. Because $\overline{M}/P = \overline{Y}/V$, a rise in V means that we must also have a rise in P so that this equality is maintained. (The central bank controls M so we assume that M is fixed unless stated otherwise.) Note that we are talking about the long term; this chain of events will not occur immediately. *(4.1, 4.2, 4.3)*

Because $P = MV/Y$, an increase in M or V will increase P, where as an increase in Y will decrease P. An increase in the expected money supply will increase π^e. *(4.1, 4.2)*

If the government is in a deficit, there are three ways they can try to get out of it. First is to increase taxes. Second is to borrow money. (The ability to borrow will depend on how credible the country is — no one is willing to loan North Korea money, for instance.) Finally, the government can just print money and pay with that. This is called seigniorage. Hyperinflation is usually caused by a government in a massive deficit printing money to pay for that deficit. *(4.10)*

The functions of money are: medium of exchange, unit of account, store of value. Some money is backed by a commodity like gold; fiat money is just make out of paper and is intrinsically worthless, but has value because people generally accept that it has value and thus will accept it as payment. *(4.8)*

The classical dichotomy says that the real part of the economy and the nominal part of the economy cannot interact with each other. But if we can show that a change in a real variable leads to a change in a nominal variable, then we have shown that the classical dichotomy can be violated. *(4.3, 4.14, 4.15)*

The Yield Curve

The yield curve shows the relationship between time to maturity of some security (like a treasury bill) on the x axis and the interest rate on the y axis. It normally has a concave shape. The idea is that a longer term security is a riskier one and thus people need a higher interest rate as incentive to actually buy it.

Sometimes the yield curve will become inverted so that interest rates are higher for shorter term securities. This implies that people expect more uncertainty in the short term than they do in the long term, which usually means that something bad is happening or is about to happen in the short-term (like a recession). People would rather "lock in" to a long term security with an okay interest rate than take the chance of having to buy really low interest rate short term security in a few years. *(4.13)*