Macroeconomics: BSc Year One
## **Aggregate Supply**

Theories of aggregate supply try to answer the question of what determines the quantity of goods and services that firms wish to produce. It is vital to look at the labour market when considering supply.

The Classical View of Labour Supply

When people are thinking about how much labour to supply (that is, how long they wish to work), there are many factors, but most are slow-moving and vary little. The principal factor from empirical studies appears to be the wage rate, which can vary considerably over relatively short periods of time.

People offer themselves for work because they wish income in order to buy goods, and so, intuitively, labour supply (N^s) will vary with the real wage rate, $\frac{W}{P}$, with supply increasing as the wage does:
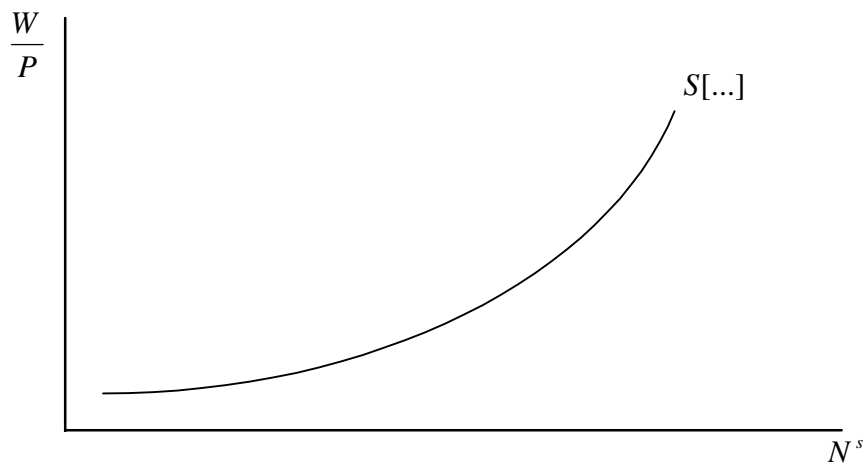
It is possible, of course, to plot a graph of nominal wages (*W*) against labour supply, and it can be derived that, using the shape of graph above, the slope of the curve will increase as the price varies; using the point $\frac{W}{P} = 2$ as an example, $P = 1$ gives $W = 2$, but if $P = 2$, $W = 4$. A doubling in prices leads to a doubling in the slope of the nominal supply curve.

The Classical View of the Demand for Labour

The quantity of labour the i'th firm wishes to employ has a downward relationship with the wage paid by that firm divided by the price of its own good; this gives a standard demand curve on the $\left. \dfrac{W_i}{P_i}, N_i^d \right|$ axes.

Imagine we are dealing with a firm producing output by combining labour with capital. In the short term, the amount of capital a firm has is fixed, and so the firm must adjust its labour force to suit its needs. Output is a function only dependent on the labour force, $q(N_i)$. From examination, we can see:

$$q'(N_i) = \frac{\partial y_i}{\partial N_i} > 0$$

and also:

$$q''(N_i) = \frac{\partial^2 y_i}{\partial N_i^2} < 0 \,.$$

This is the mathematical expression for the law of diminishing returns. Firms wish to maximise profits, and so wish to employ labour when:

$$\Pi_i = P_i y_i - W_i N_i - F = P_i . q(N_i) - W_i N_i - F$$

is maximised (where Π_i are the profits of the firm, and F is a measure of fixed costs). Since we assume a perfectly competitive firm, prices and wages are given, and the firm can only affect the amount of labour employed.
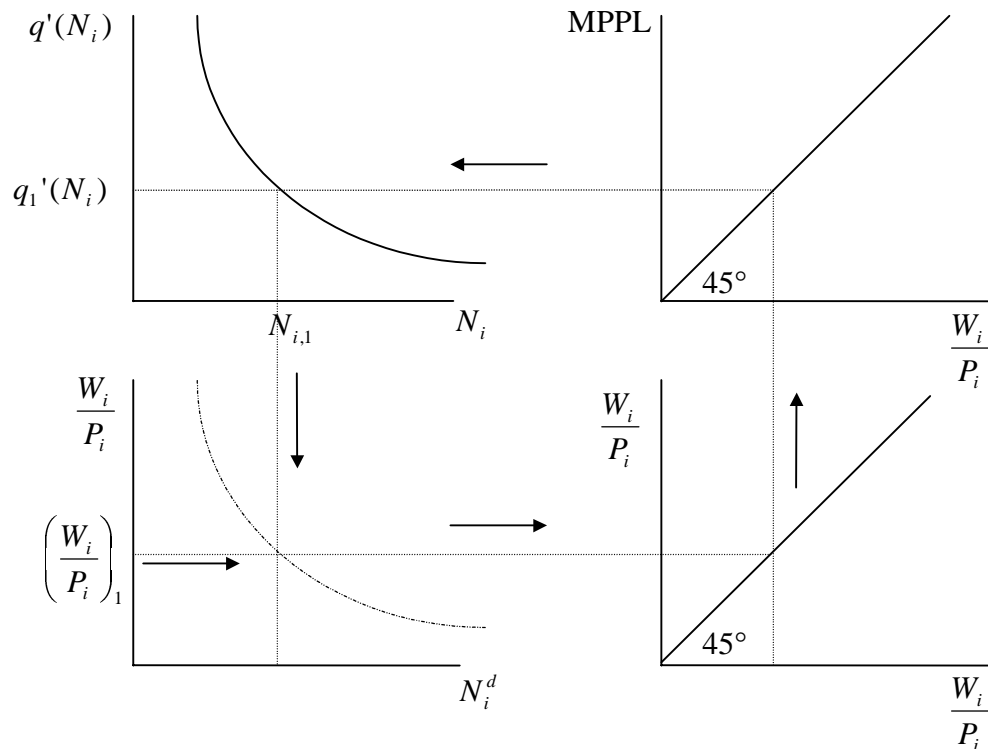
At maximum profits,

$$\frac{\partial \Pi_i}{\partial N_i} = 0 = P_i . q'(N_i) - W_i \,,$$

and so we can find an equation for the marginal physical product of labour,

$$q'(N_i) = \frac{W_i}{P_i}$$

This gives a downward sloping graph on the $\left. \dfrac{W_i}{P_i}, N_i \right|$ axes, and from this we derive the demand for labour.

The extra cost for a unit of labour is W_i, and the revenue gained from employing that unit of labour is the marginal physical product of labour (MPPL) times the price per good, given by $q'(N_i).P_i$. To maximise profits and minimise costs, these two expressions must be equated. Summing the resulting equation gives the shape of the aggregate demand for labour curve over the whole economy:
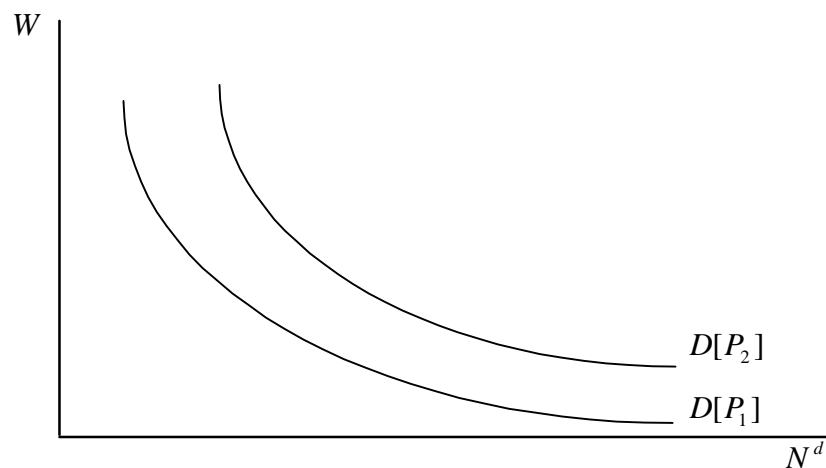
The Classical Theory of Aggregate Supply
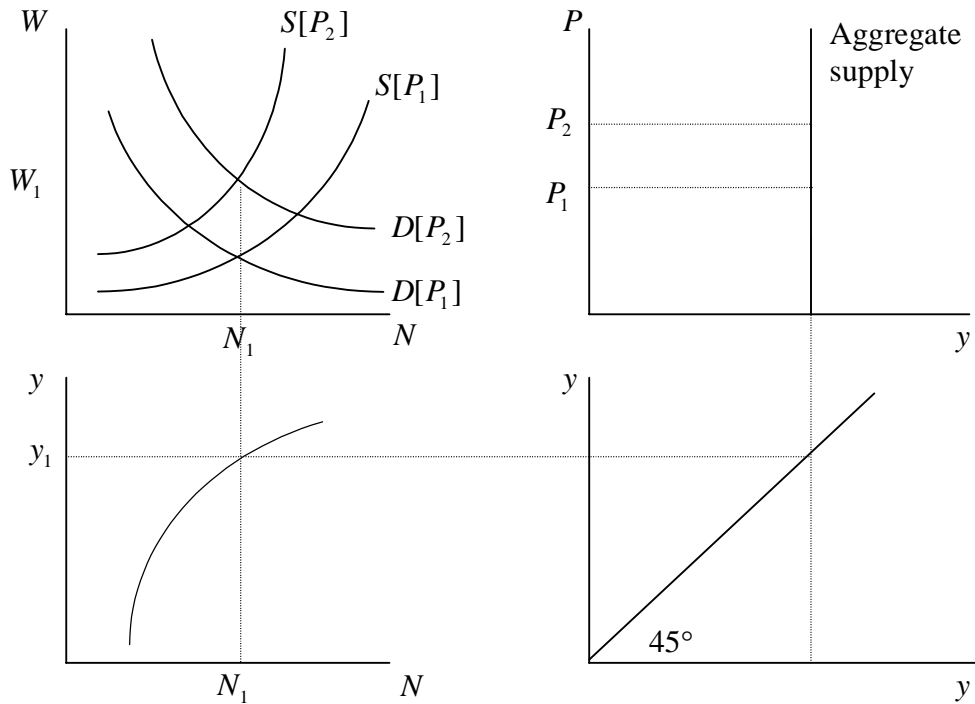
We can see clearly from the diagram above that the classical view gives a vertical supply curve, with the implication that the total output, *y*, is unaffected by any changes in aggregate demand. The price level will vary with demand, which, under the classical view, is influenced mainly by the money supply. This analysis can be tested using growth of money supply and price data on various economies.

Classical Conclusions

A key feature of this model is that if the money supply is increased, output does not change. Classical economists argue that if everyone were given a million pounds, they would be holding more cash than wanted, and would try to buy bonds. This demand for bonds would cause the interest rate to fall, investment to rise, and thus a rise in aggregate demand. The general price level would rise, meaning nobody was better off. Two conclusions can be drawn if this model is true:

- The standard of living will not improve with an increase in money supply, and governments will have to work with aggregate supply and labour markets to affect the county's output.
- Governments must have a sensible monetary policy in place in order to control inflation.

Classical economists put forward three testable propositions related to this:

- The rate of growth of nominal spending should equal the percentage rate of growth of the quantity of money; that is $\bar{\dot{P}} + \bar{\dot{y}} = \bar{\dot{M}}$

- The rate of growth of real output is independent and not related to the rate of growth of money; that is $\dot{y} = \bar{\dot{y}}$

- The rate of inflation should equal the rate of growth of money supply minus the exogenously determined rate of growth of real output; that is $\dot{P} = \bar{\dot{M}} - \bar{\dot{y}}$

All three hypotheses can be analysed by looking at time series evidence; this does follow the patterns suggested, but there are occasional glitches, especially in the second proposition.

This model, however, does not work in the short run. Variations in the money supply do vary output in the short term, so we must look elsewhere for an explanation of this.