Note that output ($Y$) has not increased by the full open-IS-LM-model multiplier, since the higher price level has reduced real money supply ($M^s/P$) and hence the demand for commodities.

### 5.2 The rising nominal wage rate and the arrival at long-run equilibrium

But although firms will cop the combination of real GDP ($Y$) and price index ($P$) associated with point C, workers will not: at the higher price level ($P_1$) of point C, their real wages have dropped from $W_0/P_0$ to $W_0/P_1$, which gives workers no joy.

Now, each short-term supply curve SAS is derived for a particular nominal wage rate. As workers bargain their nominal wage up from $W_0$ to $W_1$ in an attempt to regain their earlier, higher real wage, ($W_0/P_0 = W_1/P_1$), the SAS curve moves up too, and with it the intersection with the AD curve (from C to D), and so the price level rises, while

real GDP falls.

A real wage of $W_1/P_1$ occurs only at $B'$ (corresponding to a higher price level but the original real GDP, $Y^N$), but this is not on the aggregate demand curve AD, and so is unsustainable: at $B'$, real GDP would be too low to keep the commodity and money markets in equilibrium. Inventories would be drawn down, production would rise, and the economy would move to point $D$, the new intersection of the AD and SAS curves.

But at $D$ the workers are upset again: the price level increase has outstripped the nominal wage rate increase, and the real wage is again down. They bargain up the nominal wage.

The end of this process is point $E$, where the real wage rate is at its equilibrium value ($W_0/P_0$) with initial GDP ($Y^N$) and initial employment ($N_0$). Whenever the economy is to the right of $Y_0 = Y^N$, there is upwards pressure on the nominal wage rate, and SAS will shift up.

That's why the initial GDP level ($Y_0$) is labelled $Y^N$: it's the natural level of real GDP, with no pressure on the real wage rate.

At the natural rate of real GDP ($Y^N$) the actual real wage rate is equal to the equilibrium real wage rate. The vertical line at $Y^N$ shows all the possible combinations of the price index ($P$) and the natural real GDP.

## 5.3  Short- and long-run equilibria

The economy is in *short-run equilibrium* (where AD crosses the short-run aggregate supply curve) when:

- the level of output ($Y$) produced is sufficient balance the demand for commodities — at any point on AD — and

- the price level ($P$) is sufficient to induce firms to produce the level of output specified along the AD curve.

These imply a short-run supply curve (SAS) for a particular nominal wage ($W$).

The economy is in *long-run equilibrium* (where labour input is the amount voluntarily supplied and demanded at the equilibrium real wage rate) only when the two short-run conditions are met, plus • the real wage rate is at its equilibrium value.  Only where AD, SAS, and $Y^N$ intersect. Adjustment takes time, as workers and prices respond with lags.

## 5.4  The business cycle

So:

- What factors make workers willing to supply more or less employment than indicated along their labour supply curve?

- Is there evidence of a *countercyclical* movement of the real wage opposite from the movement of the real GDP?  No — which is a worry for the theory.  If the actual real wage returned to its equilibrium level immediately, the output

expansion would be short and transitory and real-wage-rate movement would be countercyclical. But adjustment is not immediate or even fast.

Then several questions about the sources of business cycles:

- Is it rational for workers to agree to work more in a business-cycle expansion in order for output to increase?

- Will output increase as workers *know* that the source of the increase in aggregate demand is a deliberate attempt by government to stimulate demand (through fiscal or monetary policy)?

- Is such stimulation seen by workers and firms as effective (raising $Y$) or as ineffective (raising $P$ alone)?

Several theories on these issues: the *Classical Model*, the *Keynesian Model*, *Friedman's "fooling model"*, the *New Classical Model*, the *Real Business Cycle Model*, the *New Keyesian Model* (Gordon, Chapters 7 and 8) and the *Monetarist Model* (Gordon, Chapter 16).

Heretofore, we have been developing static models of the equilibrium price level ($P$), output level ($Y$), and interest rate level ($r$). These models don't explain the determination of the *equilibrium inflation level* and the *transition path* followed by the economy towards the long-run rates of inflation and output (Gordon, Chapter 9).

# Thumbnail Sketches of Some of These Models

## 1.  The Classical Model

The Classical Model assumes that economic agents possess perfect information and that markets clear, i.e. are typified by perfectly flexible wages and prices.  The upshot of these assumptions, when applied to the short run with a fixed capital stock, is that output is totally determined by autonomous supply factors.  In this model, money is the major determinant of real aggregate demand, which in turn determines the price level.  The real interest rate is explained by the loanable funds theory.  The nominal interest rate also reflects changes in inflationary expectations.  Expectations play an important role: are they accurate or not?  For a more detailed explanation of the Classical Model, see Gordon, Chapter 7.

## 2.  The Keynesian Model

The Keynesian Model removes the assumptions of perfect information and quickly clearing markets.  Thus, output is influenced by demand as well as supply factors.  Government policy variables (in addition to money) and other non-policy aggregate demand variables affect aggregate demand, output, and employment.  Furthermore, Keynesians tend to have a preference for fiscal over monetary policy.

These outcomes are the result of special assumptions made about certain crucial elasticities in the Keynesian model.  These

assumptions are used to model special behaviour and may be highly applicable in cases where unemployed resources are plentiful. The elasticity assumptions in the Keynesian model include:

- labour supply is relatively insensitive to changes in the price level;

- aggregate demand is relatively insensitive to changes in interest rates ($f/h$ is large, $h$ is small in the money-demand equation); and

- money demand is highly sensitive to changes in interest rates. ($f$ is large in the money-demand equation)

In this model (and in the Monetarist and New Classical Models) Private Sector Demand replaces the Real Interest Rate (of the Classical Model) as a major autonomous non-policy variable. Although workers have imperfect information in the short run, they are assumed to learn over time. They do not learn very quickly and, therefore, short-term factors have effects which are distributed over more than a single time period. See Gordon, Chapters 3 through 6, for more details about the Keynesian model.

## 3. The Monetarist Model

The Monetarist Model behaves very much like the Classical Model in the long run. While aggregate demand factors have short-run effects on output and employment, these effects are temporary and tend to be offset over time. The short-run effects occur because, as in the Keynesian Model, workers suffer from money illusion (labour supply is

insensitive to changes in the price level). These short-run effects are reversed because the workers learn quickly about changes in real buying power over time. Monetarists tend to believe that monetary policy is more potent than fiscal policy because they reverse the special Keynesian elasticity assumptions (discussed in the introduction to the Keynesian Model). These assumptions may be more fitting for an economy with low unemployment. In the long run, this model behaves much like the Classical Model. See Gordon, Chapter 16, for more information on the Monetarist Model.

## 4. The New Classical Model

The New Classical Model brings together three developments:

- market clearing,

- rational expectations, and

- imperfect information.

Rational Expectations is an idea that economic agents form expectations of variables which are important to them. If they do, then policy makers have less room to manœuvre. For example, if a change in the money supply is fully anticipated, then it has no effect on output and employment. Thus, anticipated aggregate demand changes may only affect nominal variables like price, wages, and market interest rates. The upshot of this is that only unanticipated policy changes affect output and employment. In this model, households have formed rational expectations

about the key autonomous policy and non-policy variables.  The policy-maker, however, doesn't know the precise values of these expectations—although he or she may discover them through trial and error.  These expectations may be constant and so not change through time, or they may vary in response to government policies and other changes.  Supply-side economics is brought into the model with two tax rates.  The government is assumed to levy two taxes on the value of the contribution of the worker—one paid by the worker and the other paid by the firm.  An increase in these tax rates is assumed to have disincentive effects:  the workers desire to work fewer hours and the firm wants to hire fewer workers.  Lowering these tax rates can have positive effects on employment and output.  See Gordon, Chapter 7.