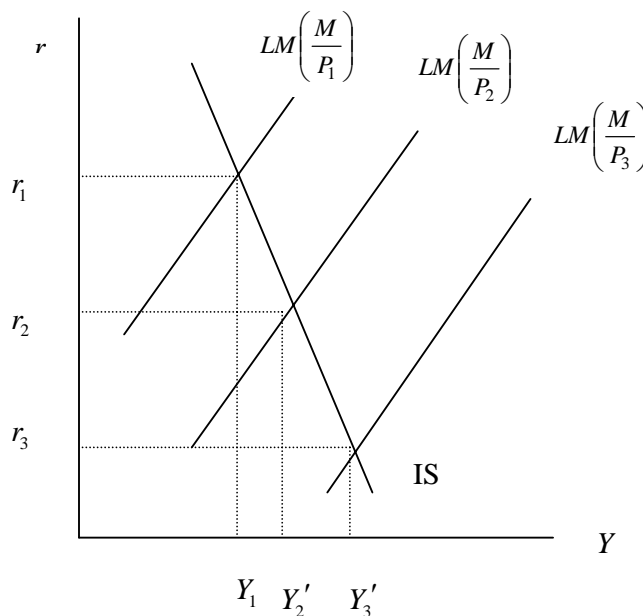
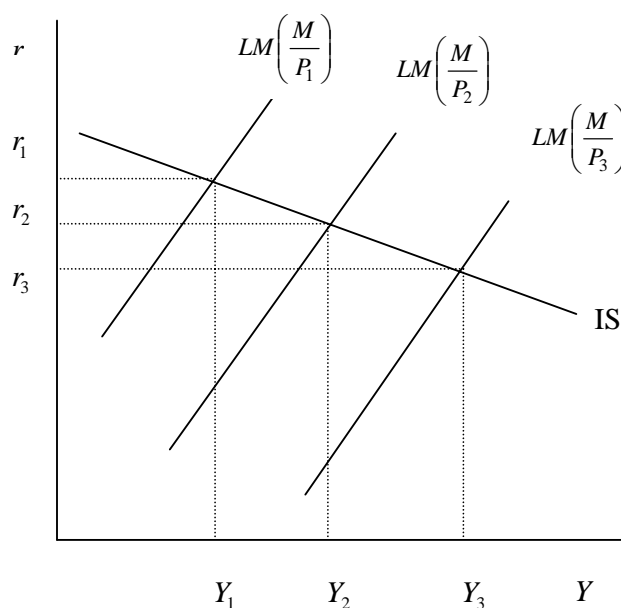


Chapter 8 Review Questions

1. Using the IS-LM model what affect does the following have on the shape of the aggregate demand curve:

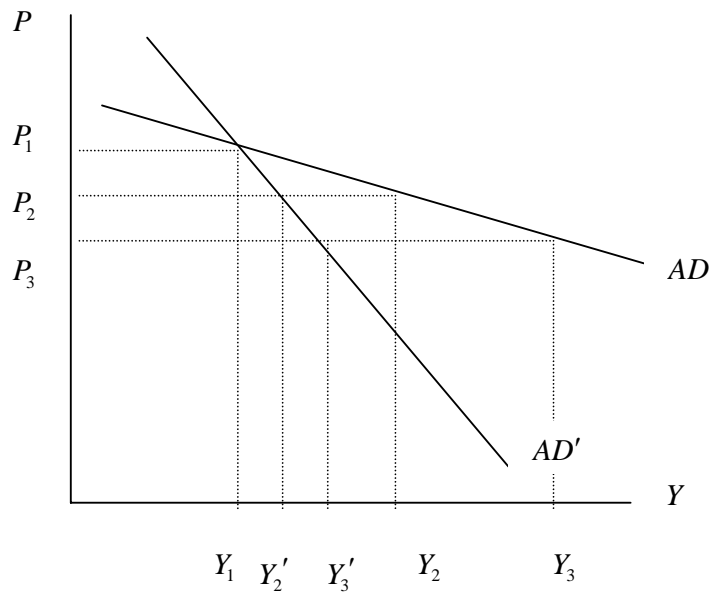
a. A high interest elasticity of investment

Changes in the price level impact on the real money supply. A fall in prices leads to an increase in money supply, as a result interest rates fall, and investment rises. The slope of the AD curve depends on how interest sensitive investment is. If investment is interest elastic then the IS curve is relatively flat and the real money expansion has a significant impact on equilibrium output.



However, when investment is interest inelastic the IS curve is relatively steep. The same increase in the real money supply will lead to a smaller expansion in equilibrium output.

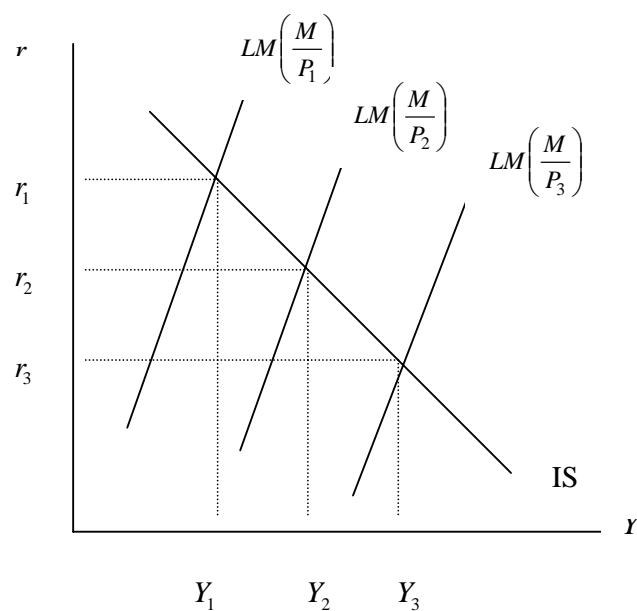
The AD curve can be formed by plotting the combinations of price levels and output where the economy is in equilibrium (i.e. where $IS = LM$). It can be seen from above, that when the IS curve is relatively flat then the corresponding AD curve will also be relatively flat.



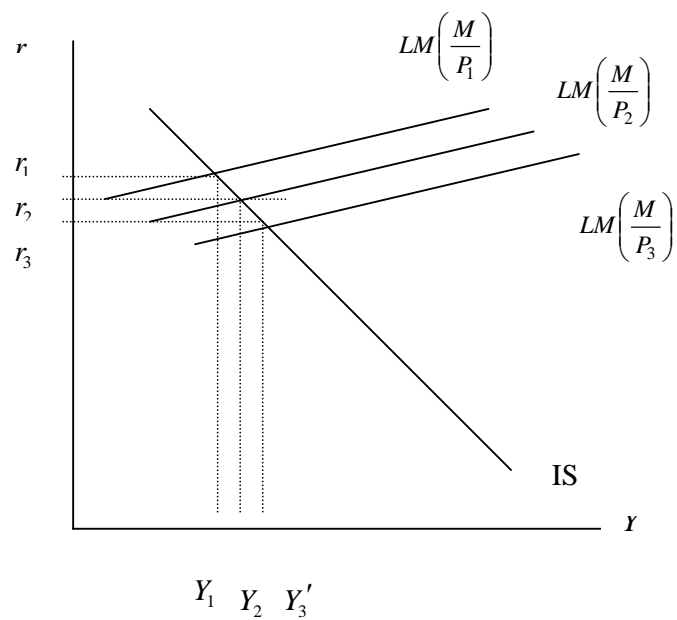
b. A low interest elasticity of money demand

The impact of the interest elasticity of money demand on the shape of the AD curve can be investigated in the same way.

When the demand for money is interest inelastic, then an expansion in the real money supply will lead to a large fall in equilibrium interest rates. This is because the interest rate would have to fall significantly to encourage the private sector to hold the excess real money holdings. In this case the LM curve is relatively steep, and changes in the real money supply lead to larger reductions in equilibrium interest rates, so the LM curve shifts downwards by a large magnitude.



When the demand for money is interest elastic only a small reduction in interest rates is required to remove excess supply from the money market following a rise in real money stocks. As a result, the LM curve is flatter and shifts to a smaller extent.



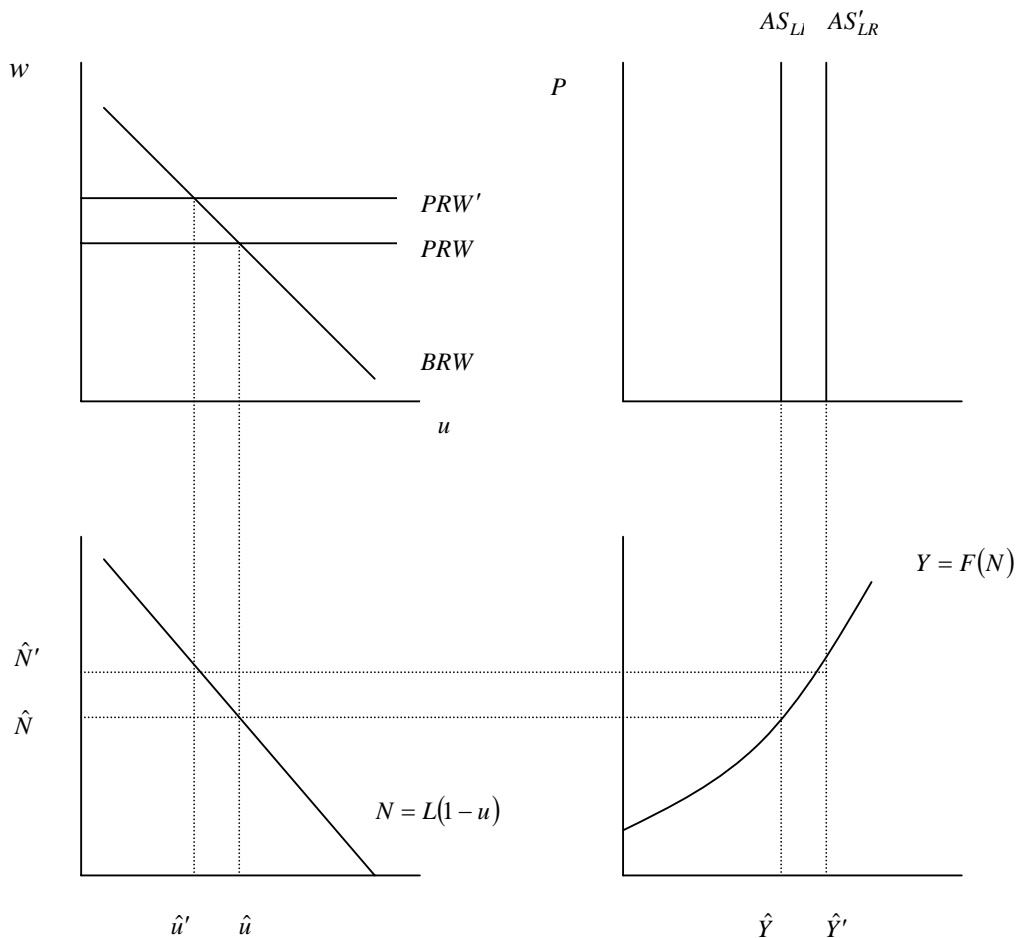
Once again the AD curve can be traced by plotting the equilibrium level of output at each level price level. It is clear that when the demand for money is interest elastic, the AD curve will be relatively steep.

c. A small marginal propensity to consume

The marginal propensity to consume is a key determinant of the multiplier, and hence the impact of changes in autonomous expenditures on output. If the marginal propensity to consume is low, then a fall in the interest rate will increase investment and raise output, but the subsequent response of consumption to the higher output will be low. Therefore, the IS curve will be relatively steep, and an expansion in the real money supply will have a limited impact on equilibrium output. In part a. it was observed that when the IS curve is relatively steep; the corresponding AD curve will also be relatively steep. Hence the larger the marginal propensity to consume, the flatter the AD schedule.

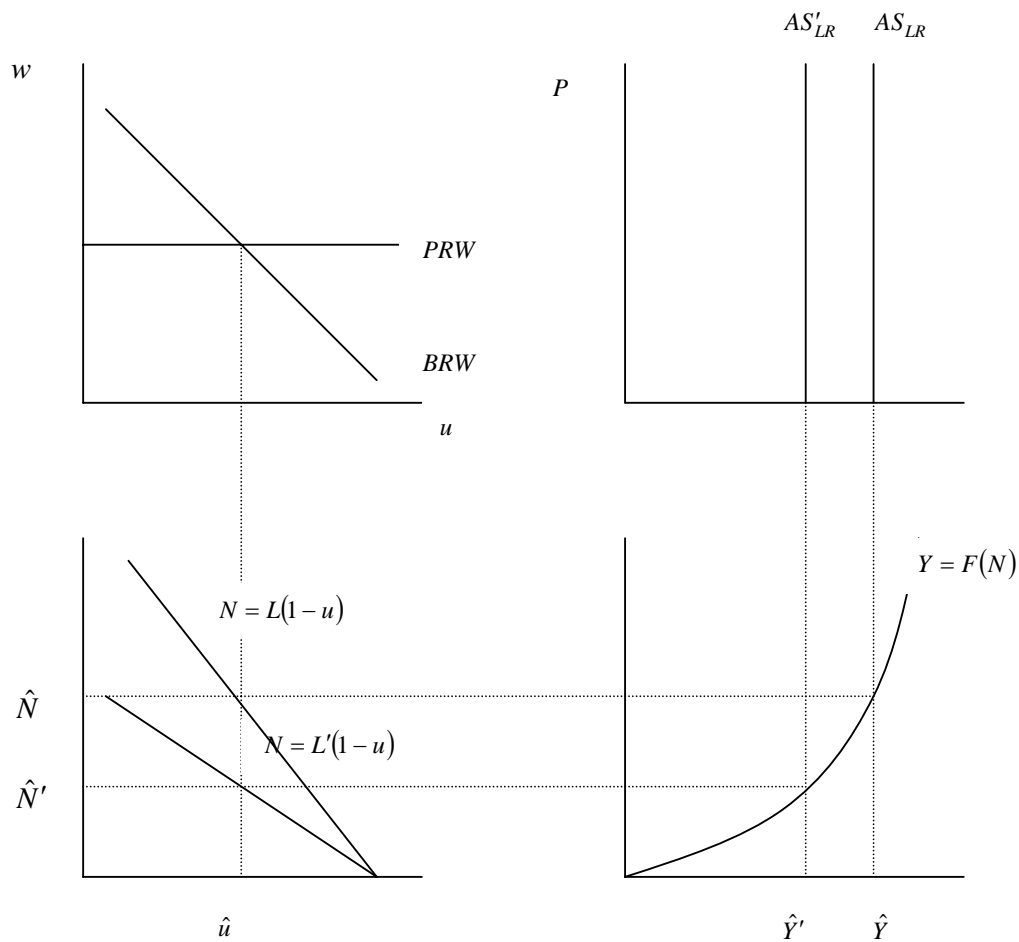
2. Explain how the following will influence the non-accelerating inflation rate of unemployment (NAIRU) and the long run aggregate supply curve:

a. A subsidy on new capital goods.



The subsidy would be expected to encourage investment which might improve labour productivity. The price determined real wage will therefore rise and the NAIRU will fall because unemployment can be held at a lower level without inducing an increase in wages and prices. For a given level of the workforce, the lower unemployment rate would represent a stronger labour input into production and long run aggregate supply will shift rightwards.

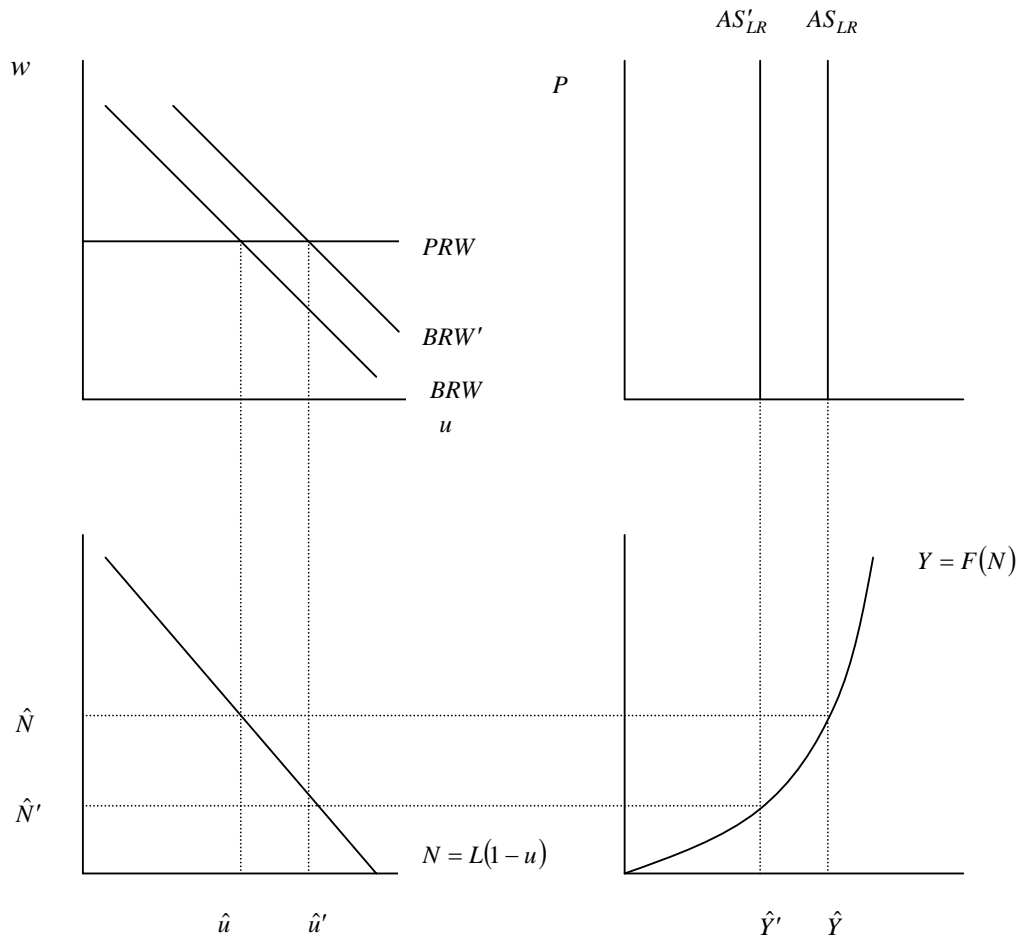
b. A tax on child care workers



There would be no direct effect on the elements of the wage bargain; hence the NAIRU will remain unchanged. However, it might be a factor in determining labour participation and hence the size of the workforce. If child care costs are high, then there will be a substitution away from work towards the self-provision of child care services. At a given rate of unemployment (the NAIRU), a fall in the labour force will generate lower employment and output. The long run aggregate supply will shift to the left.

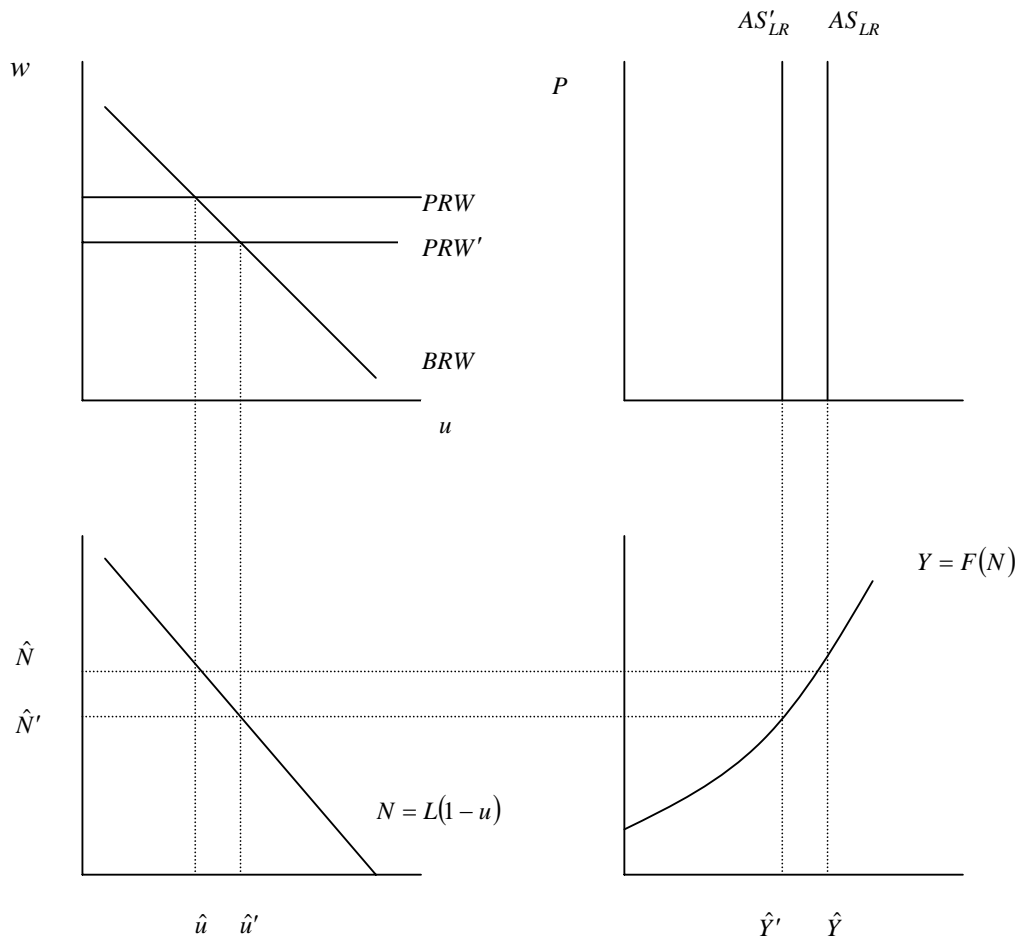
c. An increase in the national minimum wage

If legally enforced then workers might be able to bargain for higher real wages at each level of unemployment. As a result the bargained real wage will shift upwards and the NAIRU will rise. As the equilibrium level of unemployment is now higher and the labour force remains unchanged, equilibrium employment will fall. Given lower levels of input into firm production, output will fall and the long run aggregate supply curve will shift to the left.



d. An increase in value-added sales tax

An increase in the sales tax rate has the same impact as an increase in the mark up—both drive a wedge between goods prices and the marginal cost (the ratio of nominal wages to productivity) of labour. Because market prices are now higher, the feasible real wage at each level of unemployment is lower given the productivity of labour and firm's product market conditions. The price determined real wage will shift downwards and the NAIRU will increase. Consequently, employment and output will fall and the long run aggregate supply curve will shift leftwards.

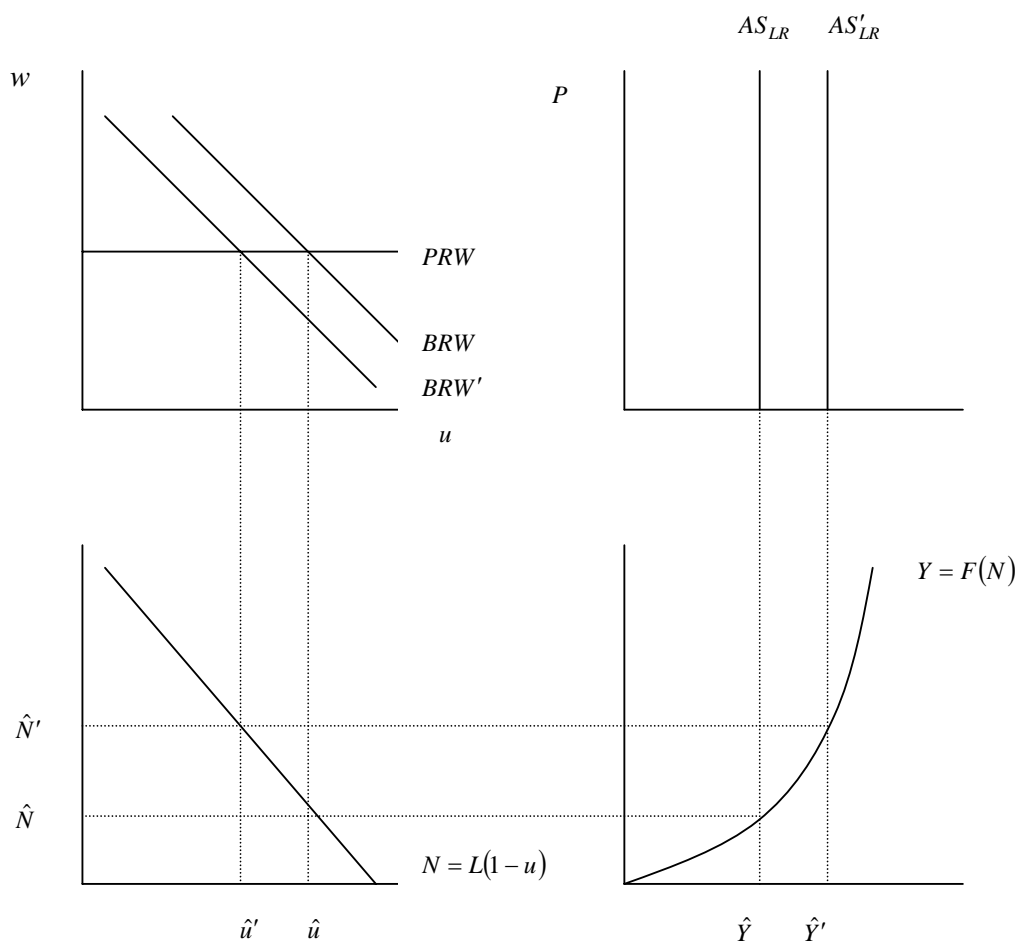


e. A fall in the rate of tax on corporate profits

This could have a number of effects. Lower profits taxes might increase the availability of cheap sources of internal finance available for investment with a positive effect for labour productivity. It may also lead to a fall in the mark-up as firms can achieve similar profit levels with a lower profit margin. Both of these effects would be expected to increase the price-determined real wage, lower the NAIRU and expand long run aggregate supply. This is shown diagrammatically in the response to part a.

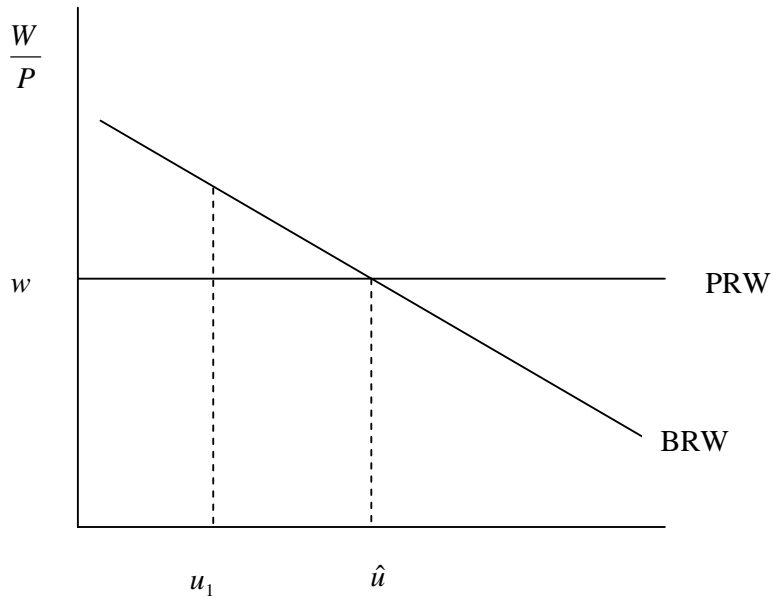
f. A cut in mandatory redundancy payments

By making it cheaper to fire labour workers would be expected to wield lower bargaining power. Therefore, the bargained real wage would be lower at each level of unemployment and the BRW schedule will shift downwards. The NAIRU will fall, employment will rise and the long run aggregate supply curve will shift to the right.



3. What factors account for an upward-sloping short-run aggregate supply curve?

In the long run the aggregate supply curve is judged to be fixed at the level of output consistent with the NAIRU. This represents the level of output where there is no pressure on prices to change. Explaining the dynamics of the aggregate supply curve therefore requires a description of the labour market and the determination of the NAIRU.



The bargained real wage represents the expected real wage aspirations of workers at each level of unemployment; these are positively related to an external set of bargaining factors Z and negatively related to the rate of unemployment.

$$\frac{W}{P^e} = Z - \beta u$$

Firms set prices as a mark up on labour costs, given the level of labour productivity (LP) and product market conditions which determine the mark-up (μ), the price determined real wage is:

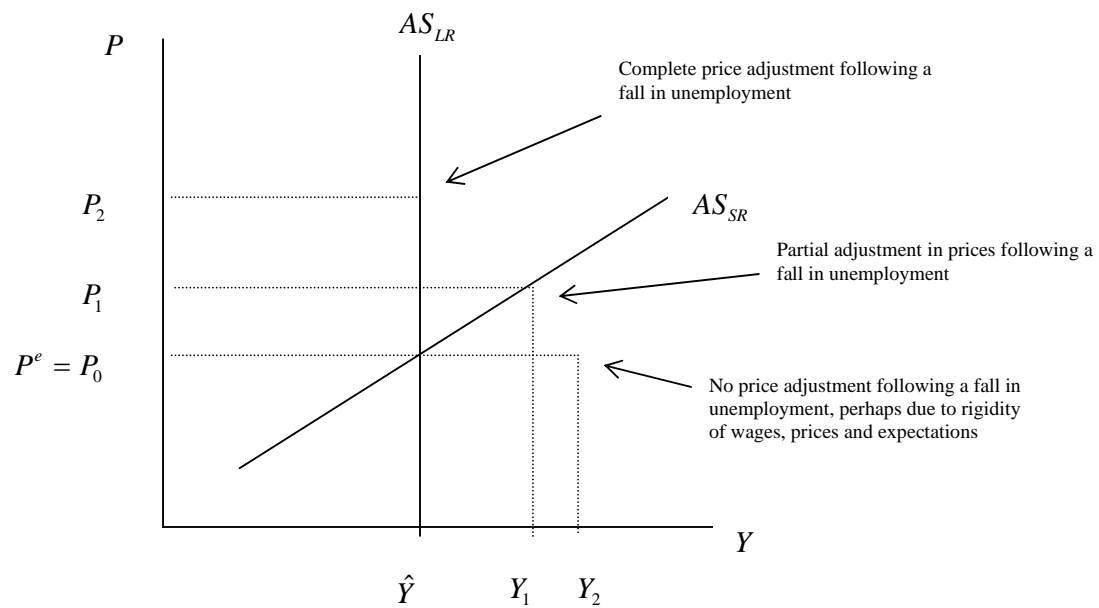
$$\frac{W}{P} = \frac{LP}{(1 + \mu)}$$

The PRW is commonly assumed to be independent of unemployment. The NAIRU is established where $BRW = PRW$.

If unemployment were to fall below the NAIRU ($u_1 < \hat{u}$) then $BRW > PRW$. Workers push for higher nominal wages, but firms respond by increasing prices in response to higher labour costs. The overall impact is to push nominal wages back towards equilibrium. As prices increase, aggregate demand will fall and unemployment will start to increase back towards the NAIRU.

The speed at which adjustment to equilibrium occurs is important. If wages and prices adjust quickly instantly, then unemployment cannot deviate from the NAIRU. In this case we cannot move away from the long run aggregate supply curve. However, if adjustment is slow, then prices do not fully adjust in the short run and output can

differ from its long run aggregate supply level. This justifies an upward sloping short run aggregate supply curve.



There are two factors which determine the speed of adjustment in the labour market, and hence the feasibility of a non-vertical short run aggregate supply curve.

First, if wage and prices are slow to adjust due to imperfections and impediments in the labour market.

Second, expectations formation is slow and backward-looking. If this is the case, when firms raise prices in response to the initial rise in nominal wages workers will continue to think that the real wage is higher than it is. This will prevent them from pushing for further increases in nominal wages which act to push the labour market back to equilibrium. Adjustment will therefore be slower.

4. At time t the expected price level is $P_t^e = 1$, whereas the actual price level is $P_t = 2$. If expectations are updated according to the rule $P_{t+1}^e = \lambda P_t + (1 - \lambda) P_t^e$.

a. Find the level of price expectations at times, $t+1$, $t+2$, $t+3$, $t+5$ and $t+10$, when $\lambda = 0.3$ and $\lambda = 0.8$.

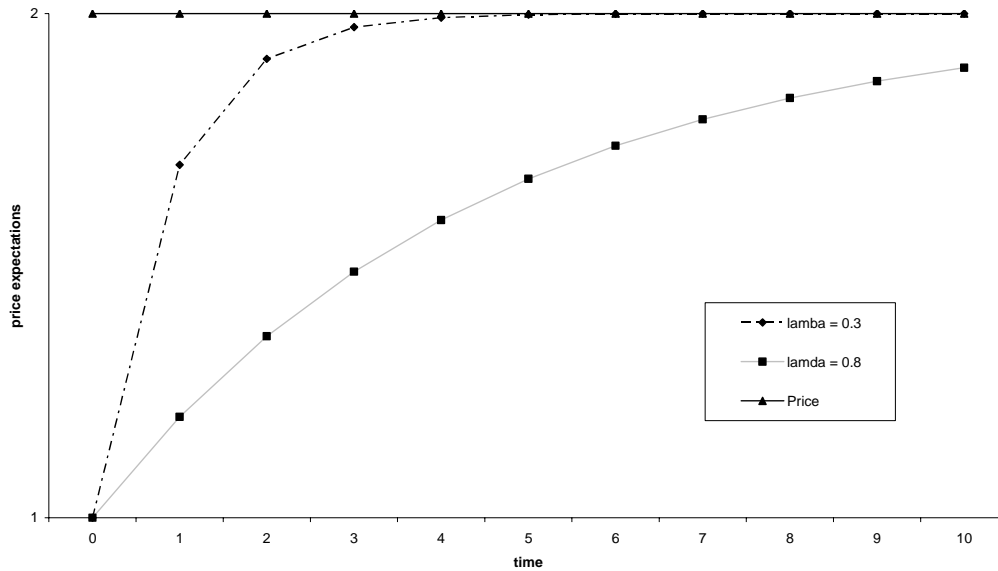
The evolution of price expectations can be calculated by recursively substituting into the adaptive expectations rule.

Time	$\lambda = 0.8$	$\lambda = 0.3$
0	1	1
1	1.7	1.2
2	1.91	1.36
3	1.973	1.488
4	1.9919	1.5904
5	1.99757	1.67232
6	1.999271	1.737856
7	1.999781	1.790285
8	1.999934	1.832228
9	1.99998	1.865782
10	1.999994	1.892626

b. What is the relationship between λ and the speed at which expectations are updated? What factors are likely to determine the size of λ ?

A plot of the table constructed in part a. shows that actual and expected prices converge much faster when λ is greater. This implies that each time a new price expectation is formed, a larger weight is placed on the observed price relative to that previously expected. Price expectations are therefore updated much faster.

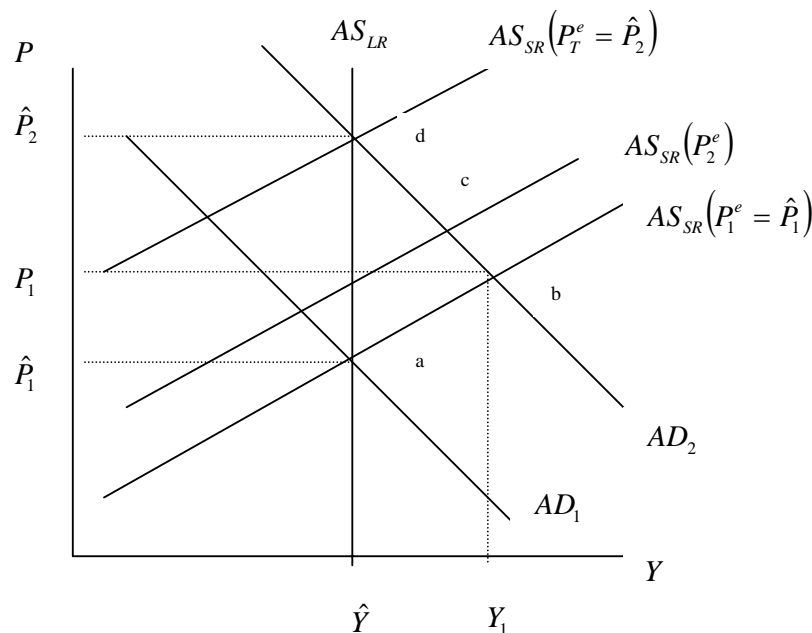
The parameter λ will largely reflect the information held by the general public regarding prices changes, and therefore how fast they should react to a change in prices that deviates from expectation. If prices tend to be volatile, then the public may adapt expectations slowly due to the uncertainty over where equilibrium prices actually lie. When prices are volatile it becomes harder to identify whether a change in prices represents a new equilibrium, or simply the underlying and temporary volatility. When prices are more stable it is arguably easier to discern what constitutes an equilibrium movement in prices- therefore price expectations will adjust more rapidly.



More advanced problems

5. The government is concerned about the current level of unemployment. It decides that an immediate reduction in interest rates is required to boost aggregate demand. What factors determine the success of this policy?

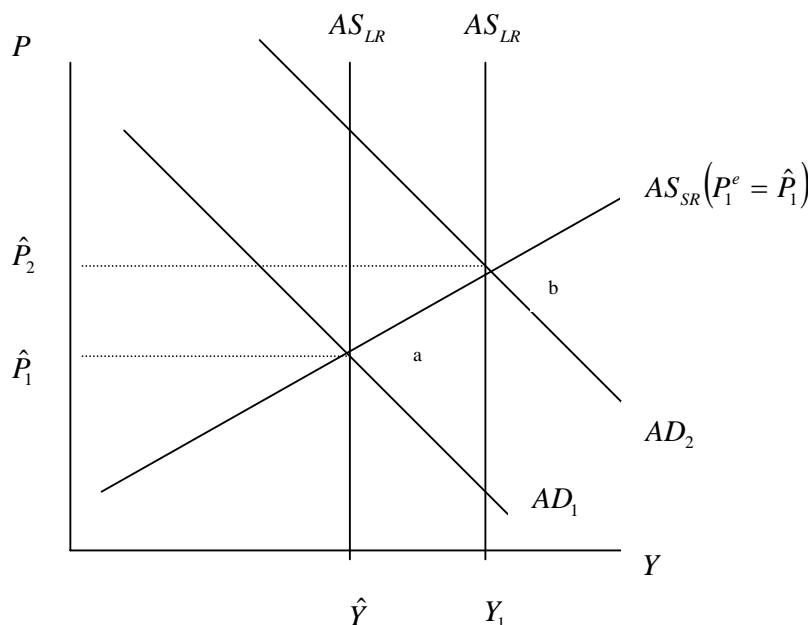
A reduction in interest rates is an example of an expansive monetary policy. As a result of higher investment and consumption the aggregate demand curve will shift to the right and output will increase. The economy has moved from point *a* to point *b*. A position to the right of the long run aggregate supply curve though is synonymous with unemployment being below the NAIRU, hence wages and prices will adjust to move the economy back onto the long run aggregate supply schedule. The speed at which we move from point *b* to *d* is determined by two main factors.



If prices are formed rationally, then workers will fully anticipate the effects of the monetary expansion on prices and their price expectations immediately. This then feeds directly into nominal wage demands and then price setting. Consistent with this the short run aggregate supply curve jumps quickly to reflect the higher price expectations. Because the price level is now higher aggregate demand contracts and the economy reaches equilibrium at point d. If though prices expectations are formed adaptively, the movement from b to d will be more cumbersome. This is because price expectations are updated gradually, so the consequences of the monetary expansion on the price level work slower through rounds of wage and price setting. Because of this the contraction in aggregate demand is slower and the government enjoys higher output (lower unemployment) in the short run.

If wages and prices are quick to adjust- either predicated through a change in price expectations or through disequilibrium in the labour market- then the period of time the economy spends at point b can be relatively short. In fact, if prices are fully flexible, and expectations are fully rational, then the economy will spend no time at point b. As soon as the expansionary monetary policy is unleashed the economy will jump from point a to point d.

However, even if expectations are rational, impediments to the quick adjustment of wages and prices would slow down the movement to equilibrium. For example, even if the private sector quickly and correctly anticipate a higher future price level, the subsequent rise in prices can only come through the wage and price setting processes. If wages and prices are sticky, and can only be adjusted gradually then it is more likely that the monetary expansion will have short term effects on output and unemployment.



If the policy is successful in raising output in the short run, it may generate hysteresis type effects which lead to the increase in output being propagated into the medium and long run. In this case, the economy having moved from point *a* to point *b* then settles at this point with higher equilibrium output (lower NAIRU). For example, an improvement in productivity through the employment of previously idle factors of production, a reduction in the numbers of long term unemployed increasing the search intensity in the labour market (increased competition for jobs), and means that this higher level of output could be consistent with stable prices.

6. Is fiscal policy neutral in the short run? Is fiscal policy neutral in the long run?

There are two ways in which fiscal policy might be neutral (in terms of the level of output) in the short run.

Ricardian Equivalence holds: Forward-looking lifetime utility maximising households realise that in the long run the government will attempt to balance its budget. Therefore, current deficits will have to be offset by surpluses of an equal present discounted value in the future. Therefore, a cut in current taxes, or a rise in government spending (on transfer payments or on goods and services) will have no impact on the overall level of income. This is because consumption smoothing behaviour will see these be offset by movements in consumption and saving.

No short run aggregate supply curve: Providing Ricardian Equivalence fails to hold (borrowing constraints, finite lives, myopia, distortionary tax changes) a change in fiscal policy would shift the AD curve. Output will only expand if the conditions supporting a short run upward sloping aggregate supply curve holds. This requires there to be some rigidity in the wage and price-setting framework which prevents instantaneous adjustment of prices.

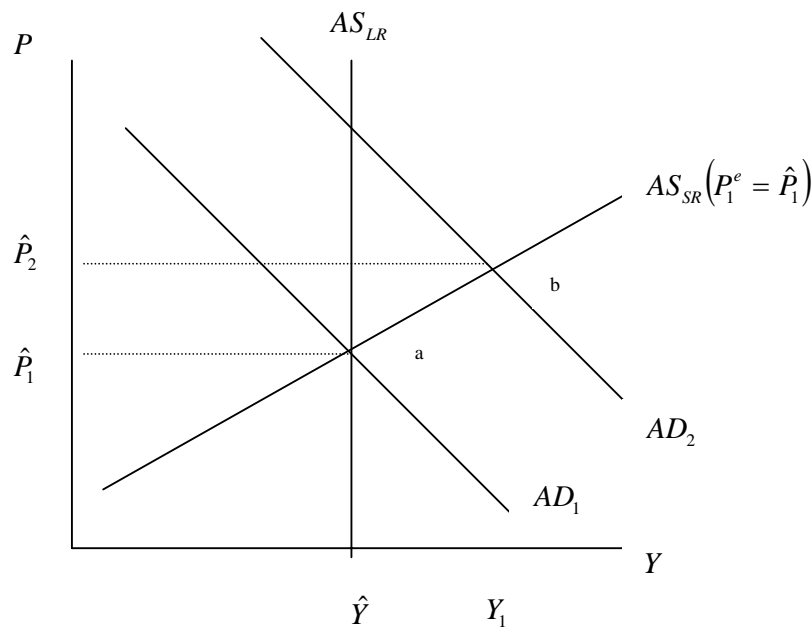
Some conventional wisdom would argue that in the short run fiscal policy is less likely to be neutral than monetary policy. Monetary policy essentially affects nominal variables, and there are a number of rules (such as the quantity theory of money) that can be used in the formation of price expectations. Discerning the impact of fiscal policy on the price level is much harder- because it can alter the composition of output and directly affects real macroeconomic variables.

In the long run, the predictions of fiscal policy changes are considered to be the same as monetary policy changes. Whenever the economy moves off the long run aggregate supply curve it is in a position away from the NAIRU. As a result, wages, prices and price expectations will eventually change to return the economy to the level of output consistent with the NAIRU. The amount of time that defines the short run and the long run though is another issue.

However- the long run effects of fiscal policy may not be neutral if the policy change alters the supply of factors of production or the NAIRU. For example, changes in marginal tax rates may have an influence on the incentives to work or invest. Government spending on education, health or infrastructure may alter the level of productivity in the economy. Fiscal policy also has compositional effects which could be important. For example, a tax cut funded by borrowing will raise household consumption, but might also be expected to crowd out investment which increases the long term NAIRU. There is also the possibility that short term movements in output can permanently alter the NAIRU through hysteresis type mechanisms.

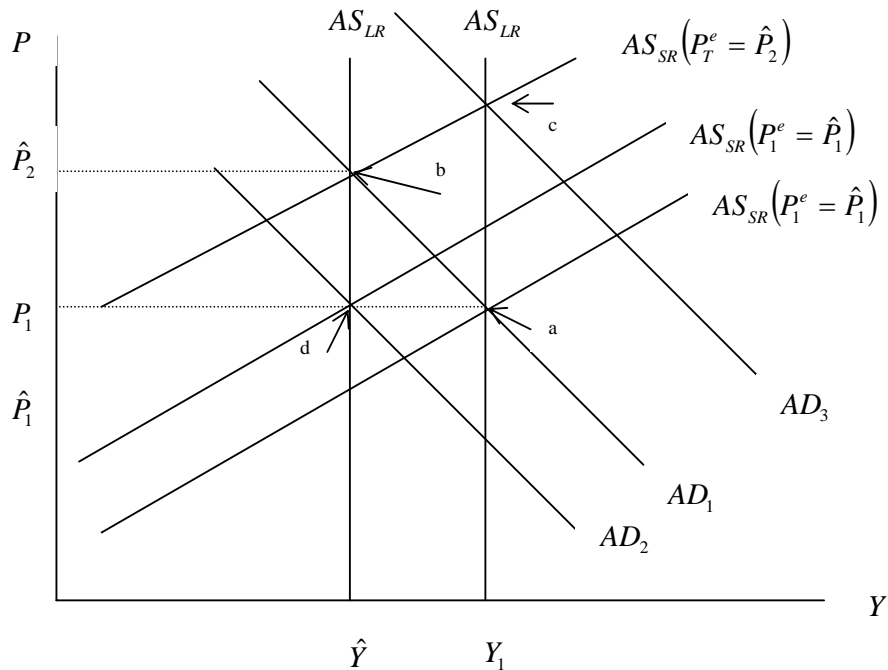
7. There are two governments: one cares about keeping output stable and the other cares about keeping prices stable. What would be their reactions to:

a. an increase in consumer confidence



An increase in consumer confidence would shift the AD schedule to the right and move output away from its long run aggregate supply level. In both cases the government would require the closing of this output gap. The first, to stabilise output at its long run sustainable level, and the second because if left to persist the output gap would push up prices. This would require an offsetting contractionary policy- usually an increase in interest rates. Therefore both governments will respond in a similar fashion to a demand shock.

b. An oil price increase



An oil price shock is taken to be an example of a negative productivity shock which shifts the long run aggregate supply curve inwards. If left unabated the economy would then move from point a to b , with a contraction in output and an increase in the price level.

For the government attempting to control the price level it is necessary to move the economy to position d . This requires a contraction in aggregate demand to offset the inflationary impact of the supply shock- so the economy can settle straight away on the new long run aggregate supply curve and unemployment at the new higher NAIRU.

The government trying to maintain stable output though will counteract the movement a - b with an expansion in aggregate demand b - c . However, at this point unemployment lies below its NAIRU, suggesting that prices will rise pushing output back towards its long run aggregate supply level. Therefore, this government can only keep output stable by either:

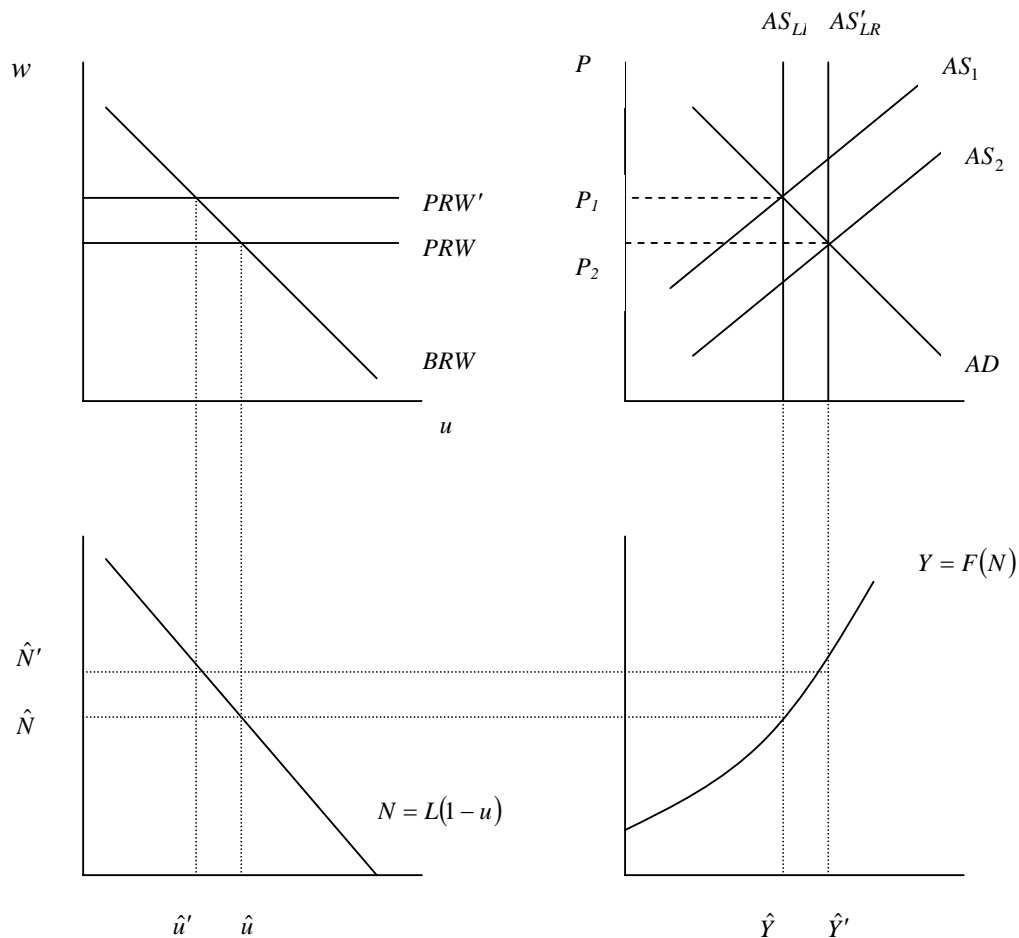
- Continually expanding aggregate demand, but with the cost of a continually rising price level
- A supply-side intervention that successfully offsets the oil shock and returns the long run aggregate supply curve to its initial position. However, supply-side policies usually require time to work.

Therefore, following a supply-side shock the government targeting price stability will veer towards concretionary policies, whereas that targeting output stability would prompt an expansive policy.

8. How would the following affect the level of output in the short run and the long run?

a. an increase in the proportion of skilled labour in the workforce

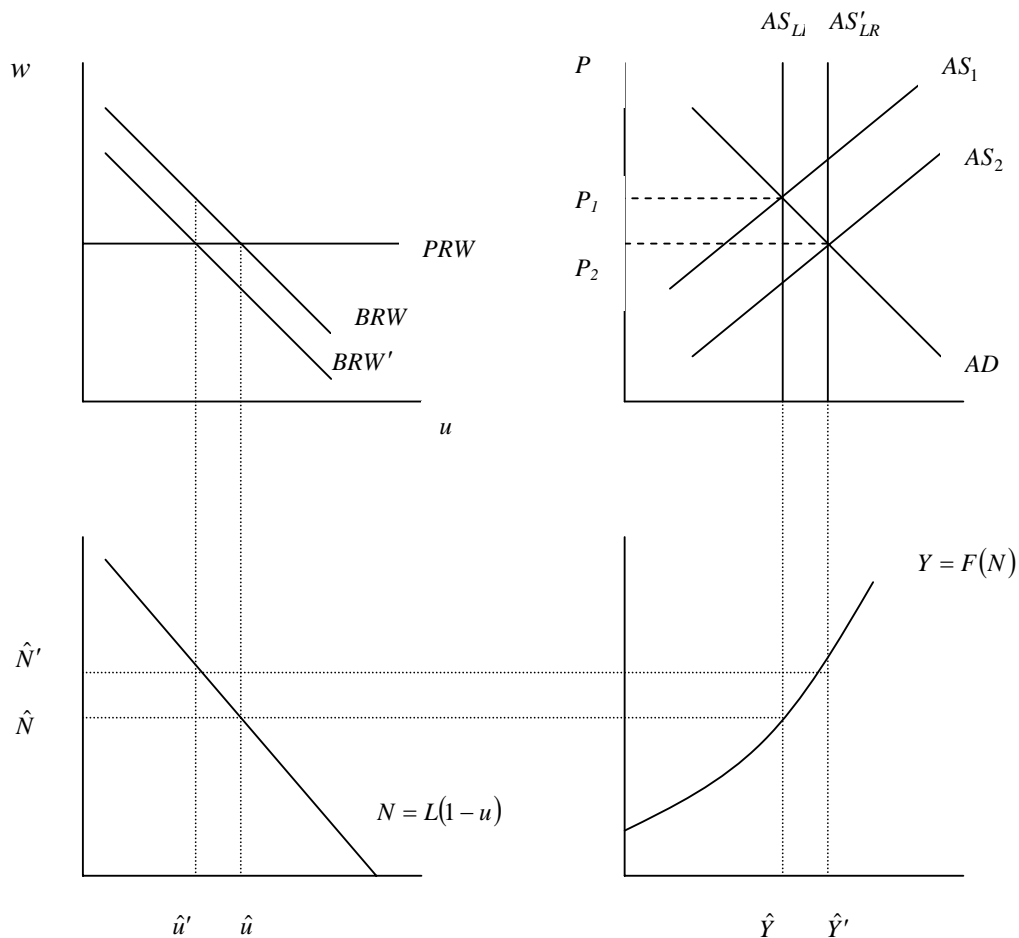
By raising labour productivity the NAIRU will fall and the long run aggregate supply curve will shift to the right. Equilibrium prices will fall, reflecting the lower cost of labour (= nominal wage/labour productivity) and output will expand along the aggregate demand curve. This is because falling prices increase the real value of the money stock, lower interest rates and expand investment.



b. Globalisation

Several aspects of globalisation might have the same effects as in part a. First, increased product market competition could lower the mark up. Second, access to foreign technology may encourage productivity. Both these effects would shift the PRW schedule upwards, lowering the NAIRU and increasing the long-run aggregate supply level of output.

An additional impact may be on the bargaining power of labour. Globalisation reduces the labour power of workers (because domestic workers are increasingly subject to foreign competition) shifting the BRW schedule inwards. As a result the NAIRU falls and long run aggregate supply shifts to the right.

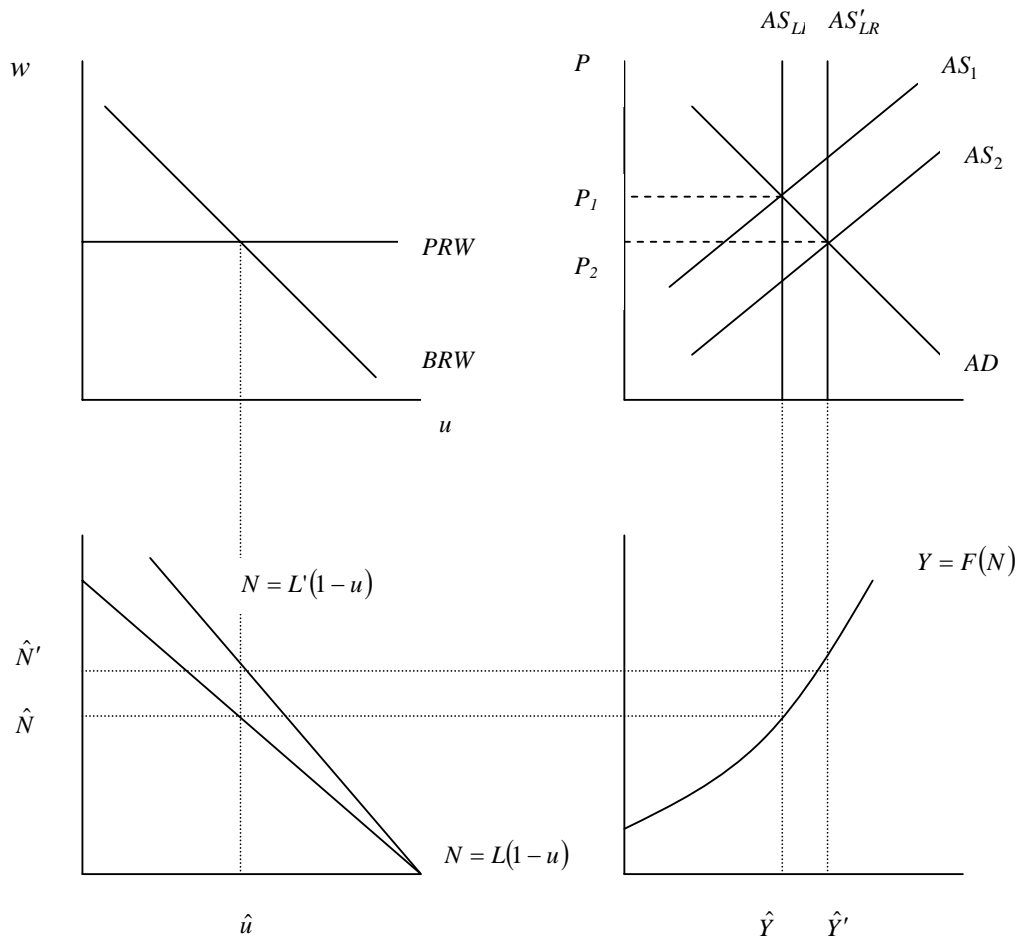


Because the bargaining power of labour is reduced lower nominal wages are demanded at each level of unemployment. This wage moderation feeds into prices which leaves real wages unchanged, but enables an extension in aggregate demand

and output. Therefore the dynamic effects of globalisation may be beneficial for workers even though their bargaining power has been reduced. That is not to say however that some may benefit more than others.

c. Increased immigration

Although this does not necessarily change any fundamental part of the bargaining framework and therefore the NAIRU, it increases the availability of factors of production in the economy. As a result prices fall, responding to the increase in the supply of domestic goods and services in the market place and employment and output both rise.



There could be other effects of immigration, or even just potential immigration. First, a pool of reserve labour created by immigrants may reduce the bargaining power of current labour, reducing the bargained real wage as demonstrated in part b.

Alternatively, if immigrant labour possesses skills that are in relative scarcity in the economy, labour productivity may improve. This will shift the PRW schedule upwards as shown in part a.