

1958]

## The Relation Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861–1957<sup>1</sup>

By A. W. PHILLIPS

### I. HYPOTHESIS

When the demand for a commodity or service is high relatively to the supply of it we expect the price to rise, the rate of rise being greater the greater the excess demand. Conversely when the demand is low relatively to the supply we expect the price to fall, the rate of fall being greater the greater the deficiency of demand. It seems plausible that this principle should operate as one of the factors determining the rate of change of money wage rates, which are the price of labour services. When the demand for labour is high and there are very few unemployed we should expect employers to bid wage rates up quite rapidly, each firm and each industry being continually tempted to offer a little above the prevailing rates to attract the most suitable labour from other firms and industries. On the other hand it appears that workers are reluctant to offer their services at less than the prevailing rates when the demand for labour is low and unemployment is high so that wage rates fall only very slowly. The relation between unemployment and the rate of change of wage rates is therefore likely to be highly non-linear.

It seems possible that a second factor influencing the rate of change of money wage rates might be the rate of change of the demand for labour, and so of unemployment. Thus in a year of rising business activity, with the demand for labour increasing and the percentage unemployment decreasing, employers will be bidding more vigorously for the services of labour than they would be in a year during which the average percentage unemployment was the same but the demand for labour was not increasing. Conversely in a year of falling business activity, with the demand for labour decreasing and the percentage unemployment increasing, employers will be less inclined to grant wage increases, and workers will be in a weaker position to press for them, than they would be in a year during which the average percentage unemployment was the same but the demand for labour was not decreasing.

A third factor which may affect the rate of change of money wage rates is the rate of change of retail prices, operating through cost of living adjustments in wage rates. It will be argued here, however, that cost of living adjustments will have little or no effect on the rate of change of money wage rates except at times when retail prices are

<sup>1</sup> This study is part of a wider research project financed by a grant from the Ford Foundation. The writer was assisted by Mrs. Marjory Klonarides. Thanks are due to Professor E. H. Phelps Brown, Professor J. E. Meade and Dr. R. G. Lipsey for comments on an earlier draft.

forced up by a very rapid rise in import prices (or, on rare occasions in the United Kingdom, in the prices of home-produced agricultural products). For suppose that productivity is increasing steadily at the rate of, say, 2 per cent. per annum and that aggregate demand is increasing similarly so that unemployment is remaining constant at, say, 2 per cent. Assume that with this level of unemployment and without any cost of living adjustments wage rates rise by, say, 3 per cent. per annum as the result of employers' competitive bidding for labour and that import prices and the prices of other factor services are also rising by 3 per cent. per annum. Then retail prices will be rising on average at the rate of about 1 per cent. per annum (the rate of change of factor costs minus the rate of change of productivity). Under these conditions the introduction of cost of living adjustments in wage rates will have no effect, for employers will merely be giving under the name of cost of living adjustments part of the wage increases which they would in any case have given as a result of their competitive bidding for labour.

Assuming that the value of imports is one fifth of national income, it is only at times when the annual rate of change of import prices exceeds the rate at which wage rates would rise as a result of competitive bidding by employers by more than five times the rate of increase of productivity that cost of living adjustments become an operative factor in increasing the rate of change of money wage rates. Thus in the example given above a rate of increase of import prices of more than 13 per cent. per annum would more than offset the effects of rising productivity so that retail prices would rise by more than 3 per cent. per annum. Cost of living adjustments would then lead to a greater increase in wage rates than would have occurred as a result of employers' demand for labour and this would cause a further increase in retail prices, the rapid rise in import prices thus initiating a wage-price spiral which would continue until the rate of increase of import prices dropped significantly below the critical value of about 13 per cent. per annum.

The purpose of the present study is to see whether statistical evidence supports the hypothesis that the rate of change of money wage rates in the United Kingdom can be explained by the level of unemployment and the rate of change of unemployment, except in or immediately after those years in which there was a very rapid rise in import prices, and if so to form some quantitative estimate of the relation between unemployment and the rate of change of money wage rates. The periods 1861-1913, 1913-1948 and 1948-1957 will be considered separately.

## II. 1861-1913

Schlote's index of the average price of imports<sup>1</sup> shows an increase of 12.5 per cent. in import prices in 1862 as compared with the previous

<sup>1</sup> W. Schlote, *British Overseas Trade from 1700 to the 1930's*, Table 26.

year, an increase of 7.6 per cent. in 1900 and in 1910, and an increase of 7.0 per cent. in 1872. In no other year between 1861 and 1913 was there an increase in import prices of as much as 5 per cent. If the hypothesis stated above is correct the rise in import prices in 1862 may just have been sufficient to start up a mild wage-price spiral, but in the remainder of the period changes in import prices will have had little or no effect on the rate of change of wage rates.

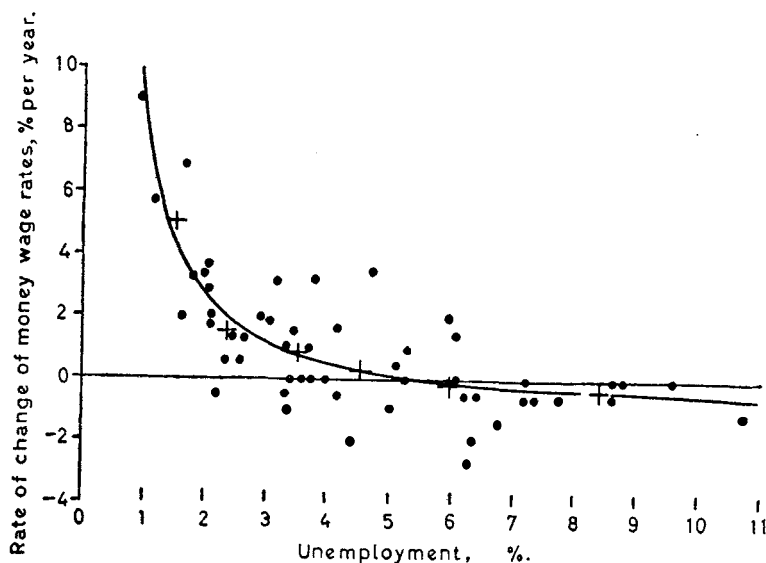


Fig.1. 1861-1913

A scatter diagram of the rate of change of wage rates and the percentage unemployment for the years 1861-1913 is shown in Figure 1. During this time there were  $6\frac{1}{2}$  fairly regular trade cycles with an average period of about 8 years. Scatter diagrams for the years of each trade cycle are shown in Figures 2 to 8. Each dot in the diagrams represents a year, the average rate of change of money wage rates during the year being given by the scale on the vertical axis and the average unemployment during the year by the scale on the horizontal axis. The rate of change of money wage rates was calculated from the index of hourly wage rates constructed by Phelps Brown and Sheila Hopkins,<sup>1</sup> by expressing the first central difference of the index for each year as a percentage of the index for the same year. Thus the rate of change for 1861 is taken to be half the difference between the index for 1862 and the index for 1860 expressed as a percentage of the index

<sup>1</sup> E. H. Phelps Brown and Sheila Hopkins, "The Course of Wage Rates in Five Countries, 1860-1939," *Oxford Economic Papers*, June, 1950.

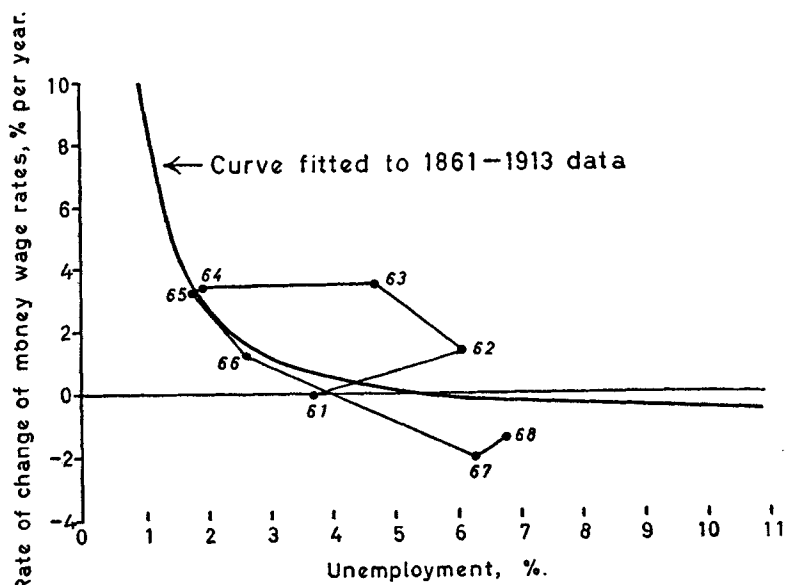


Fig. 2. 1861 - 1868

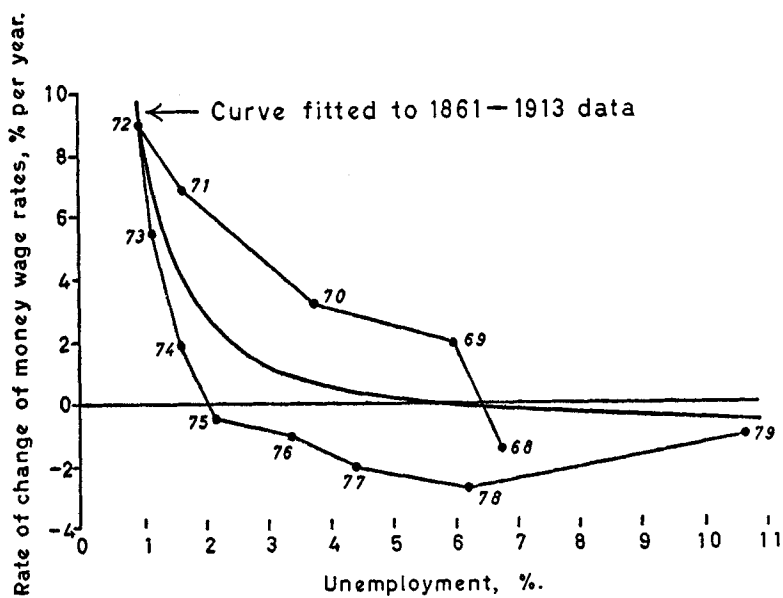


Fig. 3. 1868 - 1879

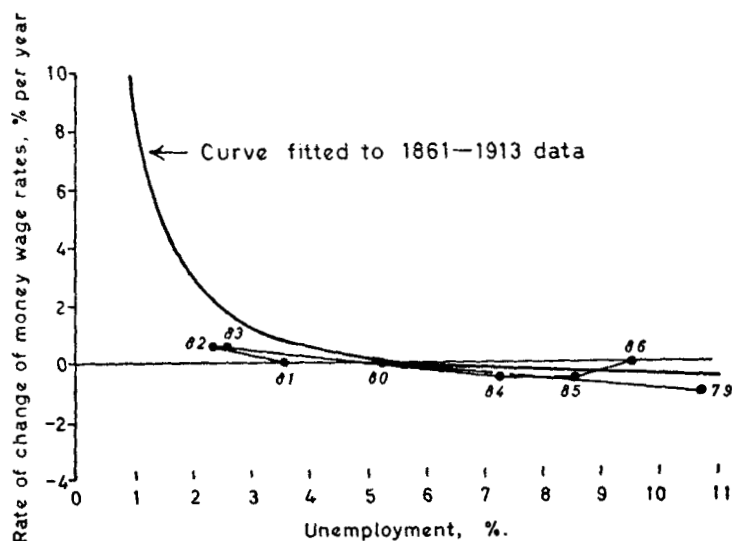


Fig.4. 1879 -1886

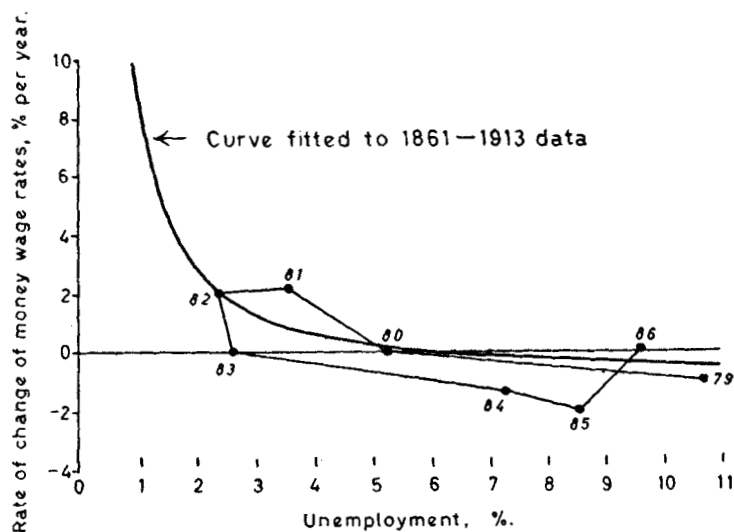


Fig.4a. 1879-1886, using Bowley's wage index for the years 1881 to 1886

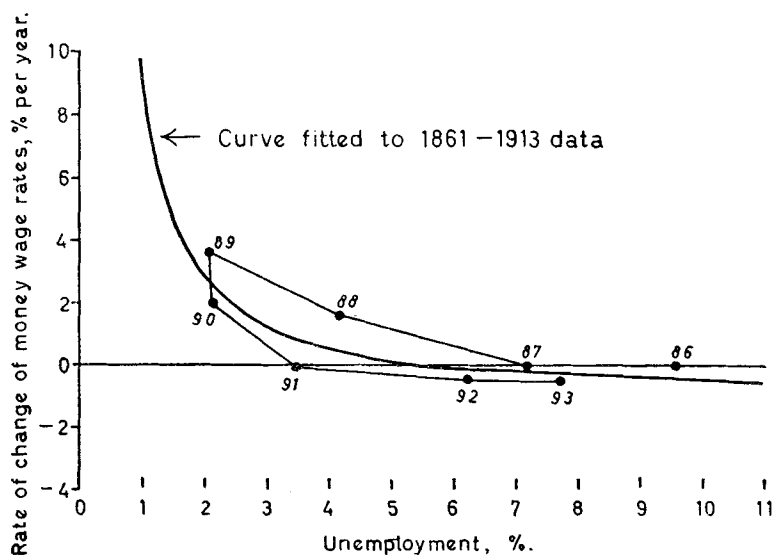


Fig.5. 1886 - 1893

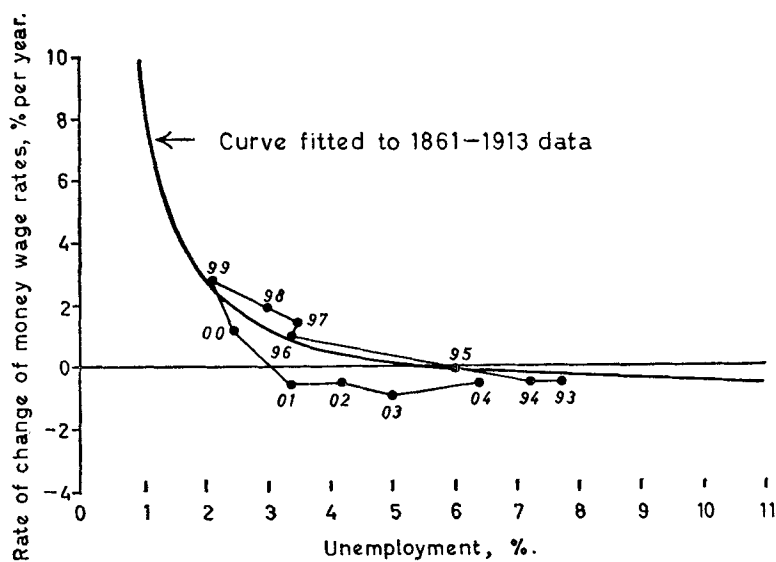


Fig.6. 1893 - 1904

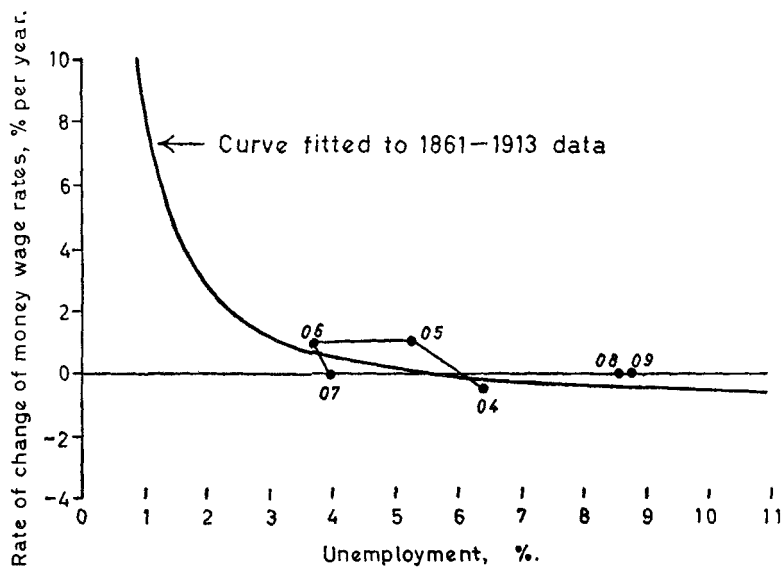


Fig. 7. 1904 - 1909

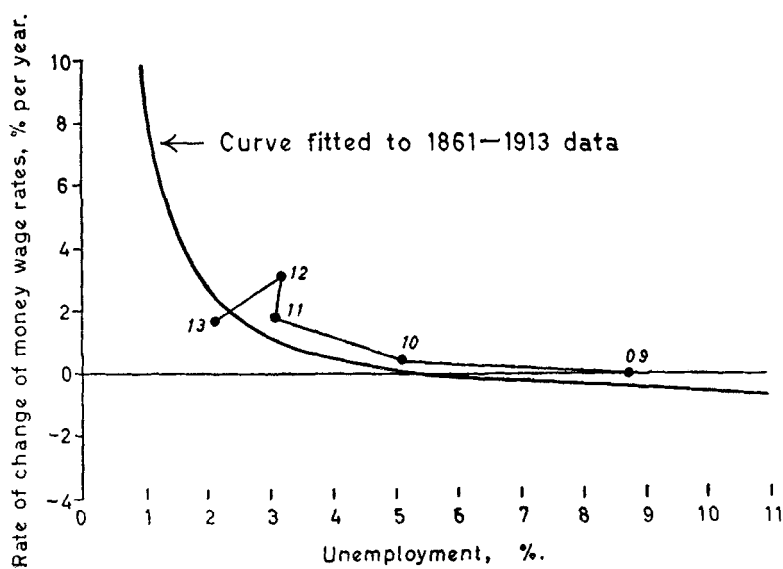


Fig. 8. 1909 - 1913

for 1861, and similarly for other years.<sup>1</sup> The percentage unemployment figures are those calculated by the Board of Trade and the Ministry of Labour<sup>2</sup> from trade union returns. The corresponding percentage employment figures are quoted in Beveridge, *Full Employment in a Free Society*, Table 22.

It will be seen from Figures 2 to 8 that there is a clear tendency for the rate of change of money wage rates to be high when unemployment is low and to be low or negative when unemployment is high. There is also a clear tendency for the rate of change of money wage rates at any given level of unemployment to be above the average for that level of unemployment when unemployment is decreasing during the upswing of a trade cycle and to be below the average for that level of unemployment when unemployment is increasing during the downswing of a trade cycle.

The crosses shown in Figure 1 give the average values of the rate of change of money wage rates and of the percentage unemployment in those years in which unemployment lay between 0 and 2, 2 and 3, 3 and 4, 4 and 5, 5 and 7, and 7 and 11 per cent. respectively (the upper bound being included in each interval). Since each interval includes years in which unemployment was increasing and years in which it was decreasing the effect of changing unemployment on the rate of change of wage rates tends to be cancelled out by this averaging, so that each cross gives an approximation to the rate of change of wages which would be associated with the indicated level of unemployment if unemployment were held constant at that level.

The curve shown in Figure 1 (and repeated for comparison in later diagrams) was fitted to the crosses. The form of equation chosen was

$$y + a = bx^c$$

$$\text{or} \quad \log(y + a) = \log b + c \log x$$

where  $y$  is the rate of change of wage rates and  $x$  is the percentage unemployment. The constants  $b$  and  $c$  were estimated by least squares using the values of  $y$  and  $x$  corresponding to the crosses in the four intervals between 0 and 5 per cent. unemployment, the constant  $a$  being chosen by trial and error to make the curve pass as close as possible to the remaining two crosses in the intervals between 5 and 11 per cent. unemployment.<sup>3</sup> The equation of the fitted curve is

$$y + 0.900 = 9.638x^{-1.394}$$

$$\text{or} \quad \log(y + 0.900) = 0.984 - 1.394 \log x.$$

<sup>1</sup> The index is apparently intended to measure the average of wage rates during each year. The first central difference is therefore the best simple approximation to the average absolute rate of change of wage rates during a year and the central difference expressed as a percentage of the index number is an appropriate measure of the average percentage rate of change of wage rates during the year.

<sup>2</sup> *Memoranda upon British and Foreign Trade and Industrial Conditions* (Second Series) (Cd. 2337), B.P.P. 1905, Vol. 84; *21st Abstract of Labour Statistics, 1919-1933* (Cd. 4625), B.P.P. 1933-34, Vol. 26.

<sup>3</sup> At first sight it might appear preferable to carry out a multiple regression of  $y$  on the variables  $x$  and  $\frac{dx}{dt}$ . However, owing to the particular form of the relation



Considering the wage changes in individual years in relation to the fitted curve, the wage increase in 1862 (see Figure 2) is definitely larger than can be accounted for by the level of unemployment and the rate of change of unemployment, and the wage increase in 1863 is also larger than would be expected. It seems that the 12.5 per cent. increase in import prices between 1861 and 1862 referred to above (and no doubt connected with the outbreak of the American civil war) was in fact sufficient to have a real effect on wage rates by causing cost of living increases in wages which were greater than the increases which would have resulted from employers' demand for labour and that the consequent wage-price spiral continued into 1863. On the other hand the increases in import prices of 7.6 per cent. between 1899 and 1900 and again between 1909 and 1910 and the increase of 7.0 per cent. between 1871 and 1872 do not seem to have had any noticeable effect on wage rates. This is consistent with the hypothesis stated above about the effect of rising import prices on wage rates.

Figure 3 and Figures 5 to 8 show a very clear relation between the rate of change of wage rates and the level and rate of change of unemployment,<sup>1</sup> but the relation hardly appears at all in the cycle shown in Figure 4. The wage index of Phelps Brown and Sheila Hopkins from which the changes in wage rates were calculated was based on Wood's earlier index,<sup>2</sup> which shows the same stability during these years. From 1880 we have also Bowley's index of wage rates.<sup>3</sup> If the rate of change of money wage rates for 1881 to 1886 is calculated from Bowley's index by the same method as was used before, the results shown in Figure 4a are obtained, giving the typical relation between the rate of change of wage rates and the level and rate of change of unemployment. It seems possible that some peculiarity may have occurred in the construction of Wood's index for these years. Bowley's index for the remainder of the period up to 1913 gives results which are broadly similar to those shown in Figures 5 to 8, but the pattern is

---

between  $y$  and  $x$  in the present case it is not easy to find a suitable linear multiple regression equation. An equation of the form  $y + a = bxc + k \left( \frac{1}{x^m} \cdot \frac{dx}{dt} \right)$  would probably be suitable. If so the procedure which has been adopted for estimating the relation that would hold between  $y$  and  $x$  if  $\frac{dx}{dt}$  were zero is satisfactory, since it can easily be shown that  $\frac{1}{x^m} \cdot \frac{dx}{dt}$  is uncorrelated with  $x$  or with any power of  $x$  provided that  $x$  is, as in this case, a trend-free variable.

<sup>1</sup> Since the unemployment figures used are the averages of monthly percentages, the first central difference is again the best simple approximation to the average rate of change of unemployment during a year. It is obvious from an inspection of Fig. 3 and Figs. 5 to 8 that in each cycle there is a close relation between the deviations of the points from the fitted curve and the first central differences of the employment figures, though the magnitude of the relation does not seem to have remained constant over the whole period.

<sup>2</sup> See Phelps Brown and Sheila Hopkins, *loc. cit.*, pp. 264-5.

<sup>3</sup> A. L. Bowley, *Wages and Income in the United Kingdom since 1860*, Table VII, p. 30.

rather less regular than that obtained with the index of Phelps Brown and Sheila Hopkins.

From Figure 6 it can be seen that wage rates rose more slowly than usual in the upswing of business activity from 1893 to 1896 and then returned to their normal pattern of change; but with a temporary increase in unemployment during 1897. This suggests that there may have been exceptional resistance by employers to wage increases from 1894 to 1896, culminating in industrial strife in 1897. A glance at industrial history<sup>1</sup> confirms this suspicion. During the 1890's there was a rapid growth of employers' federations and from 1895 to 1897 there was resistance by the employers' federations to trade union demands for the introduction of an eight-hour working day, which would have involved a rise in hourly wage rates. This resulted in a strike by the Amalgamated Society of Engineers, countered by the Employers' Federation with a lock-out which lasted until January 1898.

From Figure 8 it can be seen that the relation between wage changes and unemployment was again disturbed in 1912. From the monthly figures of percentage unemployment in trade unions<sup>2</sup> we find that unemployment rose from 2.8 per cent. in February 1912 to 11.3 per cent. in March, falling back to 3.6 per cent. in April and 2.7 per cent. in May, as the result of a general stoppage of work in coal mining. If an adjustment is made to eliminate the effect of the strike on unemployment the figure for the average percentage unemployment during 1912 would be reduced by about 0.8 per cent., restoring the typical pattern of the relation between the rate of change of wage rates and the level and rate of change of unemployment.

From a comparison of Figures 2 to 8 it appears that the width of loops obtained in each trade cycle has tended to narrow, suggesting a reduction in the dependence of the rate of change of wage rates on the rate of change of unemployment. There seem to be two possible explanations of this. First, in the coal and steel industries before the first world war sliding scale adjustments were common, by which wage rates were linked to the prices of the products.<sup>3</sup> Given the tendency of product prices to rise with an increase in business activity and fall with a decrease in business activity, these agreements may have strengthened the relation between changes in wage rates and changes in unemployment in these industries. During the earlier years of the period these industries would have fairly large weights in the wage index, but with the greater coverage of the statistical material available in later years the weights of these industries in the index would be reduced. Second, it is possible that the decrease in the width of the loops resulted not so much from a reduction in the dependence of wage

<sup>1</sup> See B. C. Roberts, *The Trades Union Congress, 1868-1921*, Chapter IV, especially pp. 158-162.

<sup>2</sup> *21st Abstract of Labour Statistics, 1919-1933*, loc. cit.

<sup>3</sup> I am indebted to Professor Phelps Brown for pointing this out to me.

changes on changes in unemployment as from the introduction of a time lag in the response of wage changes to changes in the level of unemployment, caused by the extension of collective bargaining and particularly by the growth of arbitration and conciliation procedures. If such a time lag existed in the later years of the period the wage change in any year should be related, not to average unemployment during that year, but to the average unemployment lagged by, perhaps, several months. This would have the effect of moving each point in the diagrams horizontally part of the way towards the point of the preceding year and it can easily be seen that this would widen the loops in the diagrams. This fact makes it difficult to discriminate at all closely between the effect of time lags and the effect of dependence of wage changes on the rate of change of unemployment.

### III. 1913-1948

A scatter diagram of the rate of change of wage rates and percentage unemployment for the years 1913-1948 is shown in Figure 9. From 1913 to 1920 the series used are a continuation of those used for the period 1861-1913. From 1921 to 1948 the Ministry of Labour's index of hourly wage rates at the end of December of each year<sup>1</sup> has been used, the percentage change in the index each year being taken as a measure of the average rate of change of wage rates during that year. The Ministry of Labour's figures for the percentage unemployment in the United Kingdom<sup>2</sup> have been used for the years 1921-1945. For the years 1946-1948 the unemployment figures were taken from the *Statistical Yearbooks* of the International Labour Organisation.

It will be seen from Figure 9 that there was an increase in unemployment in 1914 (mainly due to a sharp rise in the three months following the commencement of the war). From 1915 to 1918 unemployment was low and wage rates rose rapidly. The cost of living was also rising rapidly and formal agreements for automatic cost of living adjustments in wage rates became widespread, but it is not clear whether the cost of living adjustments were a real factor in increasing wage rates or whether they merely replaced increases which would in any case have occurred as a result of the high demand for labour. Demobilisation brought increased unemployment in 1919 but wage rates continued to rise rapidly until 1920, probably as a result of the rapidly rising import prices, which reached their peak in 1920, and consequent cost of living adjustments in wage rates. There was then a sharp increase in unemployment from 2.6 per cent. in 1920 to 17.0 per cent. in 1921, accompanied by a fall of 22.2 per cent. in wage rates in 1921. Part of the fall can be explained by the extremely rapid increase in unemployment, but a fall of 12.8 per cent. in the cost of living, largely a result of falling import prices, was no doubt also a major factor. In 1922 unemployment was 14.3 per cent. and wage rates fell by 19.1 per cent. Although

<sup>1</sup> *Ministry of Labour Gazette*, April, 1958, p. 133.

<sup>2</sup> *Ibid.*, January, 1940 and subsequent issues.

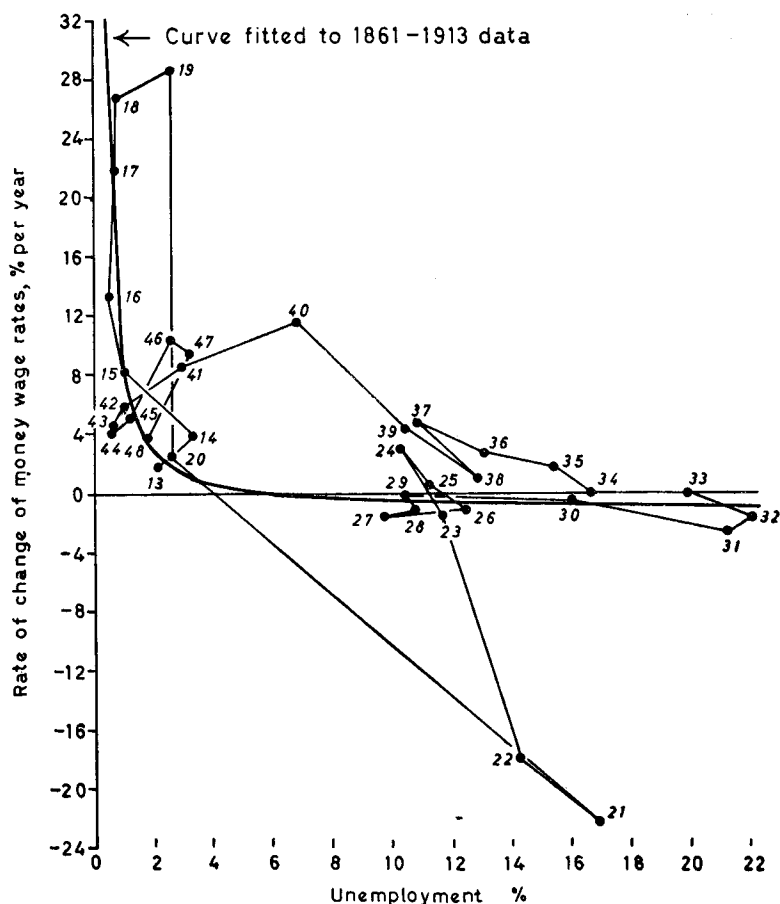


Fig. 9 1913-1948

unemployment was high in this year it was decreasing, and the major part of the large fall in wage rates must be explained by the fall of 17.5 per cent. in the cost of living index between 1921 and 1922. After this experience trade unions became less enthusiastic about agreements for automatic cost of living adjustments and the number of these agreements declined.

From 1923 to 1929 there were only small changes in import prices and in the cost of living. In 1923 and 1924 unemployment was high but decreasing. Wage rates fell slightly in 1923 and rose by 3.1 per cent. in 1924. It seems likely that if business activity had continued to improve after 1924 the changes in wage rates would have shown the usual pattern of the recovery phase of earlier trade cycles. However, the decision to check demand in an attempt to force the price level down in order to restore the gold standard at the pre-war parity of

sterling prevented the recovery of business activity and unemployment remained fairly steady between 9·7 per cent. and 12·5 per cent. from 1925 to 1929. The average level of unemployment during these five years was 10·94 per cent. and the average rate of change of wage rates was -0·60 per cent. per year. The rate of change of wage rates calculated from the curve fitted to the 1861-1913 data for a level of unemployment of 10·94 per cent. is -0·56 per cent. per year, in close agreement with the average observed value. Thus the evidence does not support the view, which is sometimes expressed, that the policy of forcing the price level down failed because of increased resistance to downward movements of wage rates. The actual results obtained, given the levels of unemployment which were held, could have been predicted fairly accurately from a study of the pre-war data, if anyone had felt inclined to carry out the necessary analysis.

The relation between wage changes and unemployment during the 1929-1937 trade cycle follows the usual pattern of the cycles in the 1861-1913 period except for the higher level of unemployment throughout the cycle. The increases in wage rates in 1935, 1936 and 1937 are perhaps rather larger than would be expected to result from the rate of change of employment alone and part of the increases must probably be attributed to cost of living adjustments. The cost of living index rose 3·1 per cent. in 1935, 3·0 per cent. in 1936 and 5·2 per cent. in 1937, the major part of the increase in each of these years being due to the rise in the food component of the index. Only in 1937 can the rise in food prices be fully accounted for by rising import prices; in 1935 and 1936 it seems likely that the policies introduced to raise prices of home-produced agricultural produce played a significant part in increasing food prices and so the cost of living index and wage rates. The extremely uneven geographical distribution of unemployment may also have been a factor tending to increase the rapidity of wage changes during the upswing of business activity between 1934 and 1937.

Increases in import prices probably contributed to the wage increases in 1940 and 1941. The points in Figure 9 for the remaining war years show the effectiveness of the economic controls introduced. After an increase in unemployment in 1946 due to demobilisation and in 1947 due to the coal crisis, we return in 1948 almost exactly to the fitted relation between unemployment and wage changes.

#### IV. 1948-1957

A scatter diagram for the years 1948-1957 is shown in Figure 10. The unemployment percentages shown are averages of the monthly unemployment percentages in Great Britain during the calendar years indicated, taken from the *Ministry of Labour Gazette*. The Ministry of Labour does not regularly publish figures of the percentage unemployment in the United Kingdom; but from data published in the *Statistical Yearbooks* of the International Labour Organisation it

appears that unemployment in the United Kingdom was fairly consistently about 0·1 per cent. higher than that in Great Britain throughout this period. The wage index used was the index of weekly wage rates, published monthly in the *Ministry of Labour Gazette*, the percentage change during each calendar year being taken as a measure of the average rate of change of money wage rates during the year. The Ministry does not regularly publish an index of hourly wage rates;<sup>1</sup> but an index of normal weekly hours published in the *Ministry of Labour*

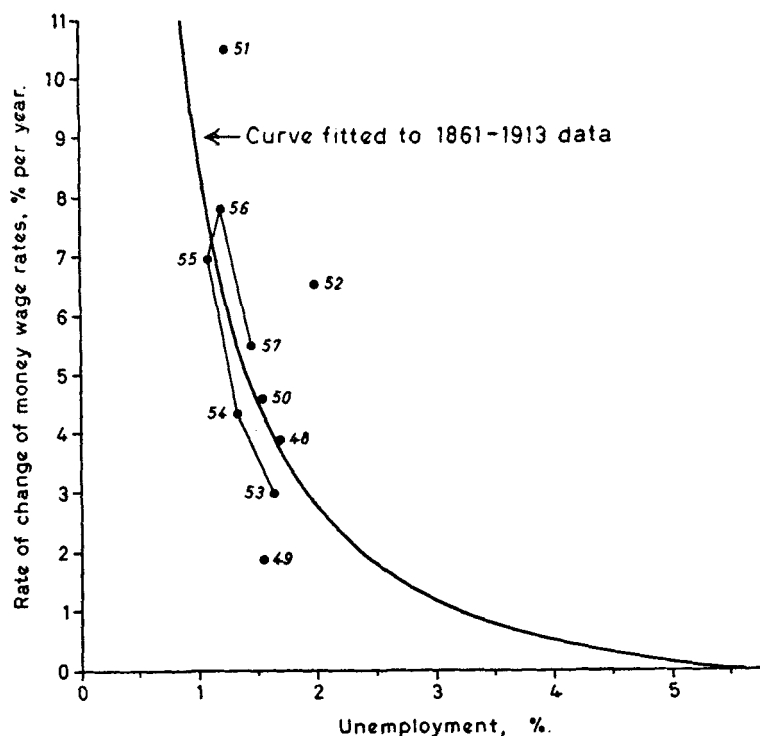


Fig. 10. 1948-1957

*Gazette* of September 1957 shows a reduction of 0·2 per cent. in 1948 and in 1949 and an average annual reduction of approximately 0·04 per cent. from 1950 to 1957. The percentage changes in hourly rates would therefore be greater than the percentage changes in weekly rates by these amounts.

It will be argued later that a rapid rise in import prices during 1947 led to a sharp increase in retail prices in 1948 which tended to stimulate wage increases during 1948, but that this tendency was offset by the

<sup>1</sup> An index of hourly wage rates covering the years considered in this section is, however, given in the *Ministry of Labour Gazette* of April, 1958.

policy of wage restraint introduced by Sir Stafford Cripps in the spring of 1948 ; that wage increases during 1949 were exceptionally low as a result of the policy of wage restraint ; that a rapid rise in import prices during 1950 and 1951 led to a rapid rise in retail prices during 1951 and 1952 which caused cost of living increases in wage rates in excess of the increases that would have occurred as a result of the demand for labour, but that there were no special factors of wage restraint or rapidly rising import prices to affect the wage increases in 1950 or in

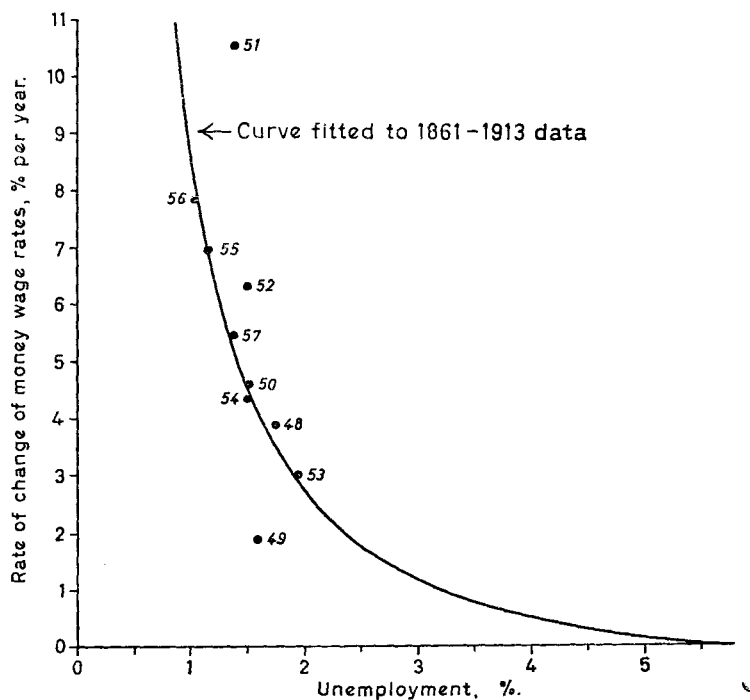


Fig. 11. 1948-1957, with unemployment lagged 7 months

the five years from 1953 to 1957. It can be seen from Figure 10 that the point for 1950 lies very close to the curve fitted to the 1861-1913 data and that the points for 1953 to 1957 lie on a narrow loop around this curve, the direction of the loop being the reverse of the direction of the loops shown in Figures 2 to 8. A loop in this direction could result from a time lag in the adjustment of wage rates. If the rate of change of wage rates during each calendar year is related to unemployment lagged seven months, i.e. to the average of the monthly percentages of unemployment from June of the preceding year to May of that year, the scatter diagram shown in Figure 11 is obtained. The loop has now disappeared and the points for the years 1950 and 1953

to 1957 lie closely along a smooth curve which coincides almost exactly with the curve fitted to the 1861-1913 data.

In Table 1 below the percentage changes in money wage rates during the years 1948-1957 are shown in column (1). The figures in column (2) are the percentage changes in wage rates calculated from the curve fitted to the 1861-1913 data corresponding to the unemployment percentages shown in Figure 11, i.e. the average percentages of unemployment lagged seven months. On the hypothesis that has been used in this paper, these figures represent the percentages by which wage rates would be expected to rise, given the level of employment for each year, as a result of employers' competitive bidding for labour, i.e. they represent the "demand pull" element in wage adjustments.

TABLE 1				
	(1) Change in wage rates	(2) Demand pull	(3) Cost push	(4) Change in import prices
1947	..	..	..	20.1
1948	..	3.9	7.1	10.6
1949	..	1.9	2.9	4.1
1950	..	4.6	3.0	26.5
1951	..	10.5	9.0	23.3
1952	..	6.4	9.3	-11.7
1953	..	3.0	3.0	-4.8
1954	..	4.4	1.9	5.0
1955	..	6.9	4.6	1.9
1956	..	7.9	4.9	3.8
1957	..	5.4	3.8	-7.3

The relevant figure on the cost side in wage negotiations is the percentage increase shown by the retail price index in the month in which the negotiations are proceeding over the index of the corresponding month of the previous year. The average of these monthly percentages for each calendar year is an appropriate measure of the "cost push" element in wage adjustments, and these averages<sup>1</sup> are given in column (3). The percentage change in the index of import prices<sup>2</sup> during each year is given in column (4).

From Table 1 we see that in 1948 the cost push element was considerably greater than the demand pull element, as a result of the lagged effect on retail prices of the rapid rise in import prices during the previous year, and the change in wage rates was a little greater than could be accounted for by the demand pull element. It would probably have been considerably greater but for the co-operation of the trade unions in Sir Stafford Cripps' policy of wage restraint. In 1949 the cost element was less than the demand element and the actual change in

<sup>1</sup> Calculated from the retail price index published in the *Monthly Digest of Statistics*. The figure for 1948 is the average of the last seven months of the year.

<sup>2</sup> *Board of Trade Journal*.



wage rates was also much less, no doubt as a result of the policy of wage restraint which is generally acknowledged to have been effective in 1949. In 1950 the cost element was lower than the demand element and the actual wage change was approximately equal to the demand element.

Import prices rose very rapidly during 1950 and 1951 as a result of the devaluation of sterling in September 1949 and the outbreak of the Korean War in 1950. In consequence the retail price index rose rapidly during 1951 and 1952 so that the cost element in wage negotiations considerably exceeded the demand element. The actual wage increase in each year also considerably exceeded the demand element so that these two years provide a clear case of cost inflation.

In 1953 the cost element was equal to the demand element and in the years 1954 to 1957 it was well below the demand element. In each of these years the actual wage increase was almost exactly equal to the demand element. Thus in these five years, and also in 1950, there seems to have been pure demand inflation.

## V. CONCLUSIONS

The statistical evidence in Sections II to IV above seems in general to support the hypothesis stated in Section I, that the rate of change of money wage rates can be explained by the level of unemployment and the rate of change of unemployment, except in or immediately after those years in which there is a sufficiently rapid rise in import prices to offset the tendency for increasing productivity to reduce the cost of living.

Ignoring years in which import prices rise rapidly enough to initiate a wage-price spiral, which seem to occur very rarely except as a result of war, and assuming an increase in productivity of 2 per cent. per year, it seems from the relation fitted to the data that if aggregate demand were kept at a value which would maintain a stable level of product prices the associated level of unemployment would be a little under  $2\frac{1}{2}$  per cent. If, as is sometimes recommended, demand were kept at a value which would maintain stable wage rates the associated level of unemployment would be about  $5\frac{1}{2}$  per cent.

Because of the strong curvature of the fitted relation in the region of low percentage unemployment, there will be a lower average rate of increase of wage rates if unemployment is held constant at a given level than there will be if unemployment is allowed to fluctuate about that level.

These conclusions are of course tentative. There is need for much more detailed research into the relations between unemployment, wage rates, prices and productivity.

*The London School of Economics.*