Nominal Wage Rigidity and the Rate of Inflation

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August 2000

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Acknowledgements

We are most grateful to the ESRC Centre for Economic Performance and the Monetary Policy Committee Unit for their assistance. We should also like to thank Bill Dickens, Mike Wickens and two referees for helpful comments on an earlier draft.

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Abstract

Using the accurate and extensive data available in the UK New Earnings Survey, this paper investigates the extent to which nominal wages are downwardly rigid and whether such rigidity interferes with necessary real wage adjustments when inflation is low. Despite the substantial numbers of individuals whose nominal wages fall from one year to the next, we find that if long-run inflation is one percent higher, the number of individuals with negative real pay growth increases by around 1.4 percent. This is controlling for the median and dispersion of the real wage change distribution.

JEL categories: E24, E31; Key words. Inflation, Wage Rigidity.

1. Introduction

It is commonplace for economists to assert that nominal wages are downwardly rigid. However, a casual glance at the work of Smith (2000) for the UK or McLaughlin (1994) for the US immediately appears to indicate that substantial numbers of individuals experience falls in nominal wages from one year to the next. So is the downward rigidity of nominal wages simply a myth? Not necessarily. It is possible that these observed falls in nominal wages are due to measurement error in the data. Furthermore even if many individuals have negative nominal wage rises, some people may still face a barrier at zero and this type of nominal rigidity could still generate significant real effects.

Our purpose is to analyse the extent to which downward nominal wage rigidity influences actual real wage changes given equilibrium real wage changes, thereby interfering with the workings of the labour market. We investigate this issue by making use of the fact that changes in equilibrium real wages are much less likely to involve negative nominal wage changes when inflation is high. Consequently, the size of the distortion generated by rigidities at zero nominal wage changes will vary systematically with the overall inflation rate.

Following a number of papers which use US data, mainly the PSID or the CPS, Smith (2000) studies the extent of downward nominal rigidity in Britain. Using data from the British Household Panel Study for the 1990s, she finds that around nine per cent of employees who remain in the same job from one year to the next have zero pay growth. Smith puts around half of this down to measurement error (including rounding error). Further, she also has to deal with the fact that her successive annual observations on pay are not necessarily 12 months apart and she finds that a significant proportion of the group with zero pay growth are there because of 12-month contracts. The problem here is that periodic contracting is part of the structure of nominal rigidity. Indeed, the very existence of 12-month contracts is, itself, evidence of nominal rigidity and may interfere significantly with the efficient operation of the labour market, especially if inflation is high.

In this paper, we are able to go considerably further than Smith (2000) and, indeed, the US studies, because we have very accurate pay data for a large panel of individuals over a long period (1975-99). The accuracy of the data is particularly helpful because it enables us to focus on substantive issues rather than devoting our energies to confronting and attempting to resolve measurement error problems. The data we use are taken from the UK New Earnings Survey (NES). This is a sample of employees based on all individuals whose National Insurance number ends in a given pair of digits. Since these numbers are issued prior to starting work and are retained for life, there is a large panel element in the data. Complete data on earnings are provided for every individual and cover a specific week in April for each year. These data are provided by employers who are legally bound to comply and come directly from payroll records, which ensures a high degree of accuracy. The data cover hourly and weekly earnings plus detailed information on hours, overtime hours, age, occupation, industry, region and whether or not the individual was in the same job as in the previous year. Note that she can be in a different job with the same employer. We only consider full-time employees and the wage changes refer to the April to April movements in the hourly rate for each individual.

In Figure 1, we present the distribution of nominal wage changes (in the form of proportional increases) for non-job changers in a period of high inflation, 1975-76 (inflation: 18.8%), medium inflation, 1986-87 (inflation: 4.4%), low inflation, 1992-93 (inflation: 1.3%). In all three periods there is a distinct spike at zero but the spike is far more marked when inflation is low. This immediately suggests that nominal wage rigidity may have real consequences because of the obvious distortion to the nominal (and hence real) wage change distribution. We pursue this issue first by providing a detailed description of the data, providing a preliminary justification for our assertion that the observations on wage changes are particularly accurate. Then, in Section 3, we provide a detailed analysis of the negative and zero annual nominal wage changes, comparing our numbers with those presented in Smith (2000) as well as with the US data. Finally we investigate the basic question of whether nominal wage rigidity interferes with necessary real wage adjustments. The answer turns out to be yes but no much.

2. The Data

Here we provide a detailed description of the pay data in order to justify our assertions about its accuracy.

The sample

The New Earnings Survey (NES) is based on a 1 percent sample of employees who are members of pay-as-you-earn (PAYE) income tax schemes. This sample comprises all those whose National Insurance numbers end with a specific pair of digits, the same pair having been in use since 1975. The coverage of full-time adults is virtually complete but many part-timers and a small number of young people are not covered because their weekly earnings are below the income tax threshold. We only use full-time workers in our analysis.

The survey method

The survey information refers to a reference week in April each year and is provided by the employer. They specify the length of the pay period to which the reported earnings relate, usually a week, a four week period or a calendar month and these are converted to a weekly equivalent using conversion factors which ensure that there are no spurious pay changes from having different numbers of working days in the month.

Employers respond via questionnaires except large organisations which typically provide the data electronically directly from their payroll records. Since 1994, the NES has scanned the questionnaires directly into the computer, thereby minimising transcription errors.

The measurement of earnings and hours

Employers provide information on hours worked in the reference week, separating standard hours and overtime hours. They also separate overtime pay, so we define our measure of hourly pay as weekly pay excluding overtime pay divided by weekly hours excluding overtime hours. We exclude part-time employees and those whose pay was affected by holidays, sickness, other absence and short-time working. Finally, we cannot identify those individuals who are paid on an hourly basis, although those who work overtime hours are typically paid by the hour. We can, however, identify people whose pay contains some form of incentive pay (eg. piece rates, bonuses etc.). To summarise, in the rest of the paper we consider the wage changes of full-time employees where the wage change refers to the April to April movements in the hourly rates as described above. Given the method of data collection, we would argue that these data are considerably more accurate than is typical in studies of this type. As a first step, therefore, we look at the distribution of wage changes and see how it compares with those derived from other data in both the UK and the US.

3. A Picture of Nominal Wage Changes in the UK, 1975-99

In Table 1, we present some aspects of the frequency distribution of changes in basic hourly pay for individuals who stay in the same job. The changes refer to a given week in April in every year. Looking first at column 1 (no change in wages) we see that practically no-one has a constant nominal wage from one year to the next in the years of very high inflation (eg 1975-77 or 1979-81). By contrast, in the low inflation years of the 1990s, the numbers reach a peak of over seven per cent.

In column 2, we see the percentage receiving nominal pay cuts, the numbers ranging from nine or ten per cent in periods of high inflation to around 20 per cent in periods of low inflation. To see how the distribution of nominal wage changes is bunched around zero, we present the proportion of individuals whose wage changes lie in the one per cent interval centred on zero and those adjacent to it. Throughout the twenty four years of the sample, the interval centred on zero always contains around two to three times as many people as each of the surrounding intervals. This indicates again

that the zero change has a particular status, even in periods of high inflation. If we consider longer period changes, we would expect a marked decline in the numbers facing zero nominal wage changes and in Table 2 we see this is exactly what happens. In most periods, fewer than one per cent of individuals in the same job have no change in nominal wages over two years.

We also investigated whether there were any significant differences by gender and skill and found little of interest. There is some evidence that higher skilled men are slightly less likely to have a decline in nominal pay but this probably reflects their somewhat higher median real wage increases.

Comparison with Smith (2000)

Smith (2000) reports an analysis of nominal wage changes in the 1990s based on the British Household Panel Study. As we noted in the Introduction, the data are, for a variety of reasons, likely to contain significantly more measurement or rounding error than those used here, so a comparison might be informative.

In Table 3, we see that the Smith data contain a markedly greater proportion of individuals with both nominal pay cuts and unchanged wages. These data are based on wages reported by individuals and the survey indicates whether or not the individual payslips were checked during the interview. Measurement error is likely to be minimal when payslips are checked and, as we can see in Table 2, for the 30 percent of the sample who fall in this category, the average percentage with nominal cuts and rigid wages is almost identical to that recorded in our data. This undoubtedly reinforces our belief that the data we are using has minimal measurement or rounding error.

Comparison with UK settlements data

How do our pay changes relate to union pay settlements? In Table 4, we report the employment weighted distribution of union pay settlements which cover around a third of the total work force, heavily weighted towards the public sector. We can see that even though inflation is relatively low, the proportion of settlements generating

cuts or pay freezes is very small and, overall, the distribution of pay increases is very compressed. This is superficially at variance with our results based on actual pay. However, the relationship between pay settlements and average earnings is a tenuous one because the latter include many individual elements of pay which are additional to the basic pay settlement. Thus, in Figure 1, we see how the UK Average Earnings Index (AEI) relates to a settlements index. It is clear that while the overall pattern is the same, the gap between the two series fluctuates a great deal and this remains true even if we exclude bonus payments from the AEI. Thus, we feel that the absence of nominal pay cuts in the settlements data does not undermine our findings on the individual data.

Factors underlying rigidity and nominal pay cuts

There is some suggestion in the previous section that there may be significant differences in wage flexibility between different groups of workers. For example, it seems likely that those who work in the public sector whose pay is covered by a union agreement are far more likely to exhibit some form of wage rigidity than the subset of workers in the private sector who are not covered by any union agreement. In Table 5 we see that once inflation becomes low after the mid 1980s, what actually happens is that in the unionised public sector both pay cuts and pay freezes become less common than in the non-union private sector. Overall, however, the differences between the two sectors are not as stark as might have been expected.

Another possibility is that flexibility of pay may be associated with the receipt of at least some element of incentive pay in the pay packet. In Table 6 this possibility is definitely confirmed. Those workers in receipt of incentive pay, whether they work overtime or not, are far less likely to have a zero pay change and far more likely to have a pay cut than those who do not receive incentive pay. This suggests that incentive pay is one of the key elements in generating pay flexibility, although by no means the only one, since even with no incentive pay, at least 10 percent of job stayers have nominal pay cuts when inflation is low.

Comparison with the United States

There have been a number of studies of wage change distribution in the United States (see foot 1). In Table 7, we report some comparisons of rigidity and nominal cuts at similar levels of the inflation rate. These results indicate that the percentage of nominal cuts in our UK data is slightly lower but the percentages exhibiting actual wage rigidity are vastly lower in the UK data. It is true that at given inflation rates, median real wage increases in the UK are markedly higher than in the US, but this surely does not explain why there is so much more apparent rigidity in the US.

In fact, the overall consensus seems to be that the measurement error inherent in typical US data (either CPS or PSID) means that in reality, the percentages under "rigid wage", reflecting unchanged "nominal pay", are much higher and those under "nominal cut" are much lower than those reported in Table 7 (see particularly Altonji and Devereux, 1999 and Akerlof et al., 1996). This contrasts strongly with the UK results of Smith (2000) who finds that those individuals who use their payslips when reporting wages have a much lower rate of rigid wages than those who do not consult their payslips. The former, of course, will have much small measurement error, so we have a complete reversal of the US findings. There is, however, some evidence from the US that incentive pay does lead to an increase in nominal pay cuts. Altonji and Devereux (1999) report that in the personnel records of a large US financial corporation, of those salaried workers who regularly receive annual bonuses, some 8.7 percent experienced an annual decline in nominal pay.

Overall, however, there appears to be a significant contrast between the UK and the US. In the UK, despite having typically larger average median real wage increases, there is a markedly larger proportion of workers with nominal wage cuts and a markedly smaller proportion of workers with unchanged nominal pay than in the US. The reasons for this are not clear. It is true that in the UK, more or less all workers have an annual pay review and a significant proportion of employees have an element of incentive pay. In the US, it is certainly the case that a significant group of workers, certainly in the union sector, have longer term contracts. It is also the case that Lebrow et al (1999) find that the proportion of nominal cuts rises significantly, and the proportion with rigid wages falls significantly, once total compensation is

accounted for rather than simply wages and salaries. However, we do not have a complete explanation of these sharp differences between the UK and the US and we leave this issue unresolved. Our next step is to see whether or not the rigidities we do observe in the UK are symptomatic of a significant distortion of the structure of wages, particularly in periods of low inflation.

4. Does Nominal Wage Rigidity Distort the Wage Structure in the UK?

It is often argued that one of the benefits of having a positive rate of inflation is that it can ease necessary adjustments in relative wages in a world where nominal wages are downwardly rigid (see Tobin, 1972 or Yates, 1998, for example). As we have seen, nominal wages are not apparently rigid downwards but there is enough bunching of nominal wage changes at zero to make it worth pursuing the question of whether nominal rigidity is interfering significantly with the operation of the labour market.

One way of doing this is to see whether unemployment has a smaller negative impact on wages when inflation is low than when inflation is high. The argument here is as follows. When unemployment is higher, wage increases are lower across the board. If inflation is low, more of these would have to be negative than if inflation high. If some significant proportion of negative pay rises are ruled out by rigidity, the overall negative impact of unemployment on wages will be smaller when inflation is low. In Table 8, we report a wage equation[2] based on a regional panel where we see that the unemployment coefficient is slightly lower when inflation is low (D_1, implies inflation less than 3.5 percent) than it is when inflation is high (D_3 implies inflation greater than 7 percent). The difference is, however, minimal, being well below one standard error. So on this basis, there is no evidence that low inflation has a significant impact on overall wage determination because of wage rigidities.

An alternative mode of investigation is to make use of the fact that if nominal rigidities at zero are important, then the distribution of real wage changes across individuals should be influenced by inflation, ceteris paribus. Our approach here is somewhat different from that in the literature because the formal tests used there only apply under restricted circumstances. The LSW statistic, proposed by Lebow et al (1995), is not robust to asymmetry in the underlying wage change distribution. The

Kahn test, proposed in Kahn (1997), is not robust to systematic variations in the dispersion of the underlying wage change distribution. A quick glance at Figure 1 reveals immediately that the underlying wage change distribution is both asymmetric and has systematic variations in dispersion over the years. So what we propose here is to focus on the proportion of real wage changes which are negative.

In order to build up an analytical framework, we start by considering the factors which would impact on the proportion of real wage changes which are negative in the absence of nominal rigidity at zero. First, it is obvious that the proportion of real wage changes which are negative would depend on the position of the real wage change distribution, which we capture by the median. Furthermore, it is clear that the relationship between the proportion below zero and the median real wage change is not linear, although it will generally be negative. Here we model the non-linear relationship by a quadratic function of the median. This will be exact if the density function of real wage changes is linear over the appropriate range[3], otherwise it simply serves as an approximation. Second, since the median real wage change is nearly always positive (see Table 9), it is likely that the proportion of changes below zero will be positively related to the dispersion of the distribution (see Figure 3). Third, even if the distribution of real wage changes is independent of inflation in the long run, if changes in inflation reflect surprises then they will impact on changes in real pay. Typically a positive (negative) inflation surprise will lead to real wages being lower (higher) than planned. This will, of course, operate via the median but if surprises influence wage changes differently at different parts of the distribution, because of more or less indexation, for example, then inflation changes could have an impact on the proportion negative.

So if we control for all the above factors which we take to capture the effect of equilibrium real wage changes, what will be the ceteris paribus impact of inflation on the proportion of real wage changes which are negative? In Figure 4, we illustrate the potential distortion caused by the existence of some degree of nominal rigidity around zero nominal wage changes, that is real wage changes at $-\dot{p}$ where $\dot{p}$ is the inflation rate. The idea is that the introduction of a barrier around zero nominal wage changes will lead to some individuals being shifted from the area of real wage changes just

below $-\dot{p}$ to the area just above. The distortion involves the area A below $-\dot{p}$ being moved to the area B above $-\dot{p}$. Of course, the areas A and B are equal and it is clear that if inflation is low, so that $-\dot{p}$ is close to the zero line, then the distortion moves some individuals to the right of this line (see Figure 4A). This will not happen when inflation is high because $-\dot{p}$ is far away from the zero line (see Figure 4B). This leads to a positive relationship between the inflation rate and the percentage of real wage changes which are negative.

In order to investigate this relationship, we consider a time series regression whose dependent variable is the percentage of real wage changes which are negative. The regressors include the median real wage change and its square, a measure of dispersion which we take to be the 75-35 percentile range and the level and change of the rate of inflation. The use of the rather eccentric measure of dispersion is an attempt to use something which is not much affected by the nominal rigidity distortion which, in the main, all happens to the left of the 35th percentile. In order to utilise more information we also consider pooled regional data since we have all the necessary information available at the level of the standard UK regions. Of course, the regional time series relationships are not independent, so we allow for cross-correlation in the residuals by using the SURE method[4].

In Table 10, we report the regression results for men and women separately. As we can see the overall impression is that the proportion of job stayers whose real wage change is negative is well explained by the position and dispersion of the real wage change distribution. However, in addition, there is a strong positive inflation effect which is consistent with the distortion generated by having some degree of rigidity in the area of zero nominal wage changes. Taking the average inflation coefficient from the four equations in Table 10, we find that a one per cent rise in the long-run rate of inflation will induce, in the long run, a ½ percentage point rise in the number of job stayers with a negative real wage increase. On average, this reflects a 1.4 per cent increase. So while this effect is statistically significant, it is not a very large one.

In Table 11, we see the same kind of inflation effect on the percentage of job stayers whose two-year real wage change is negative. Furthermore, if we look at the percentage of job stayers whose annual real wage change is less than –5 per cent (as opposed to less than zero), we find exactly the same results with much the same inflation effect. The question now arises as to whether the inflation effects are actually generated by a rigidity located at zero as opposed to some more generalised form of money illusion. Looking again at Figure 4, we see that if we consider the percentage of real wage changes below -x% where x is above the range of inflation rates, then we should observe a negative relationship between this percentage and inflation. Thus in Figure 4B, we see that when inflation is high, the distortion removes individuals from the left of -x. When inflation is low in Figure 4A, the distortion is too far away from -x to have any impact. This suggests that the type of distortion generated by the particular form of nominal rigidity based on zero nominal wage changes illustrated in Figure 3 will lead to the following particular structure of relationships.

If we take the percentage of job stayers whose annual real wage changes are below –Y% where Y is towards the lower end of the sample range of inflation rates, this percentage will be positively related to inflation, ceteris paribus. If Y is towards the upper end of the sample range, the percentage of job stayers whose annual real wage changes are below –Y% will be negatively related to inflation. So what happens in practice? The answer is presented in Table 12. We see that we have precisely the pattern suggested above. As Y moves from the lower end of the sample range of inflation to the upper end, the coefficient on inflation moves systematically from positive to negative. This suggests that the nominal rigidity is indeed focused on zero nominal wage changes and induces a distortion in real wage changes of the type illustrated in Figure 4.

5. **Conclusions**

Using the accurate and extensive data available in the UK New Earnings Survey, we have undertaken an investigation of the extent to which nominal wages are downwardly rigid. The proportion of individuals whose nominal wages fall from one year to the next is both large and, in the 1990s, very similar in magnitude to that

found by Smith (2000) in a sample of individuals who consulted their payslip before providing information on pay. However, there is evidence of some rigidity at a nominal wage change of zero, so that if long-run inflation is one per cent higher, the percentage of individuals with negative real pay growth increases by ½ percentage point (ie. around 1.4 per cent). This is a statistically significant increase in flexibility which is ceteris paribus on the median and overall dispersion of the real wage change distribution. However, despite its statistical significance, this overall effect is clearly very modest.

Endnotes

1. McLaughlin (1994), Lebow *et al* (1995)(1999, Akerlof *et al* (1996), Card and Hyslop (1996), Kahn (1997) and Altonji and Devereux (1999).

2. The wage equation we report here is in levels (i.e. a wage curve), not in differences (i.e. a Phillips Curve). The wage curve specification is preferable with UK data (see Bell et al. 2000). It remains true, however, that if the coefficient on unemployment is smaller negative when inflation is low, this will imply that the NAIRU is higher.

3. So, for example, if the density function of wage changes is triangular, the probability of a wage change being negative is a quadratic function of the median wage change as the density translates.

4. This method of estimation is essentially one where the data are pooled across regions and then generalised least squares is used on the pooled data set.

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Table 1

Nominal Wage Rigidity, 1976-99

Percentage of job stayers whose annual change in hourly pay falls in the given categories

	Rigid Wage	Nominal Wage	(-1.5%;-0.5%]	(–0.5% ;0.5%]	(0.5%;1.5%]	Inflation	Median real wage change
1976-75	0.29	5.11	0.43	1.03	0.49	18.84	4.20
1977-76	0.57	10.04	0.87	2.33	1.41	20.49	-5.59
1978-77	1.14	9.50	0.97	3.08	1.32	5.47	2.92
1979-78	0.88	9.35	0.79	2.95	1.09	9.98	-0.15
1980-79	0.20	5.06	0.35	0.80	0.46	21.82	4.47
1981-80	0.99	10.14	0.76	3.41	1.07	12.03	3.48
1982-81	1.20	9.90	0.90	3.92	1.29	9.34	1.34
1983-82	2.05	10.63	0.91	3.27	1.38	5.73	4.16
1984-83	4.59	12.75	1.15	6.21	1.75	3.43	1.78
1985-84	1.64	11.60	1.06	2.96	1.48	6.95	1.11
1986-85	1.36	12.30	1.08	3.36	1.39	3.10	4.39
1987-86	2.50	12.05	1.16	3.91	1.62	4.36	3.09
1988-87	1.55	11.43	1.01	2.64	1.39	4.00	3.57
1989-88	1.98	10.86	0.96	3.13	1.28	7.95	1.42
1990-89	2.28	10.59	0.94	3.47	1.35	9.52	0.51
1991-90	2.77	11.09	0.93	3.87	1.24	6.50	4.07
1992-91	5.03	13.13	1.21	6.63	1.84	4.19	3.41
1993-92	7.13	16.25	1.73	9.42	3.30	1.29	2.90
1994-93	6.48	19.38	2.19	9.44	6.40	2.56	0.50
1995-94	5.48	19.47	1.78	8.03	2.98	3.28	0.08
1996-95	1.32	18.20	1.61	6.44	2.41	3.11	0.09
1997-96	1.49	22.38	1.92	7.71	2.85	1.79	2.37
1998-97	3.92	18.66	1.49	6.10	2.22	3.90	-0.57
1999-98	4.51	16.85	1.44	6.56	2.10	1.62	2.83

Notes: i) The first five columns refer to the percentage of individuals whose nominal wage changes fall in the categories described at the head of the column. ii) The workers are full-time individuals who remain in the same job.

Table 2

Nominal Wage Rigidity over a Two Year Period, 1976-99

Percentage of job stayers whose bi-annual change in hourly pay falls in the given categories

ALL workers							
	0	< 0	(-1.5%;-0.5%]	(-0.5%;0.5%]	(0.5%;1.5%]	Inflation	Median real wage change
1975-80	0.09	3.79	0.31	0.48	0.37	30.06	1.11
1980-85	0.17	4.91	0.36	0.62	0.48	18.91	5.27
1985-91	0.26	6.07	0.46	0.80	0.57	12.26	5.59
1991-95	1.38	11.33	0.95	2.53	1.34	6.59	5.10
1995-99	0.84	13.65	1.02	2.58	1.36	6.06	2.25

Notes: i) This table differs from Table 1 simply because all changes refer to two year periods and we have aggregated over 5 year periods. Inflation refers to the average 2 year percentage price increase.

Table 3

Comparison of Wage Rigidity with the Other UK Study (Smith, 2000)

Percentage of job stayers whose annual change in hourly pay falls in the given categories

	New Earnings Survey		British Household Panel Study	
	Nominal Cut	**Rigid Wage**	**Nominal Cut**	**Rigid Wage**
1991-2	13.1	5.0	20.9	8.1
1992-3	16.3	7.1	25.1	9.7
1993-4	19.4	6.5	22.9	10.1
1994-5	19.5	5.5	22.5	9.4
1995-6	18.2	1.3	23.4	7.8
Average	17.3	5.1	23.0	9.0
		Payslips seen (30%)	17.8	5.6
		Payslips not seen (70%)	25.2	10.4

Notes: i) New Earnings Survey refers to the data used in this paper. British Household Panel Study refers to the data used in Smith (2000) reported in Tables 1 and 2.

Table 4

Employment-Weighted Distribution of Union Pay Settlements

Percentage Increase in Pay

	< 0	**0**	**0.1 – 1.9**	**2.0 – 3.9**	**≥ 4.0**
1993	0.24	3.00	55.28	40.44	1.04
1994	0.05	0.65	2.38	92.00	4.92
1995	0	0.73	0.60	91.76	6.91
1996	0	0.71	0.23	87.05	12.01
1997	0	0.26	0.71	82.99	16.04
1998	0	0.28	0.54	71.14	28.04
1999	0	0.52	2.16	65.87	31.45
2000	0	0.34	2.47	79.29	17.90

Note: These refer to the percentage of employment-weighted union pay settlements which fall into the percentage categories heading each column.

Source: Bank of England pay settlements data base.

Table 5

Comparing the Unionised Public Sector with the "Non-Union" Private Sector

Percentage of job stayers whose annual change in hourly pay falls into the given categories

	Unionised Public Sector		Non-Unionised Private Sector		Inflation
	Nominal Cut	**Rigid Wage**	**Nominal Cut**	**Rigid Wage**	
1975-80	7.97	1.98	6.94	1.47	15.3
1980-85	10.39	3.12	10.36	3.10	7.5
1985-90	11.26	0.35	11.23	2.96	5.9
1990-95	13.72	1.83	16.45	7.38	2.9

Notes: Refers to full time workers who stay in the same job. Unionised refers to those whose wages are covered by a national pay agreement. Those in the public sector who are not covered by a national pay agreement and those in the private sector who are covered are not included in this table.

Table 6

Wage Rigidity and Incentive Pay

Percentage of job stayers whose annual change in hourly pay falls in the given category

	Incentive Pay				No Incentive Pay				Inflation
	Overtime		No Overtime		Overtime		No Overtime		
	0	< 0	0	< 0	0	< 0	0	< 0	
1975-80	0.27	12.79	0.58	11.75	0.92	8.03	1.89	4.73	15.3
1980-85	1.51	16.02	1.92	15.43	2.30	10.78	3.86	6.97	7.5
1985-90	0.43	16.06	0.45	17.37	2.24	10.35	2.77	8.04	5.9
1990-95	1.27	23.49	1.37	24.83	5.86	13.99	7.25	11.53	2.9
Percentage	10.46		11.41		22.19		55.94		

Notes: i) Refers to full time workers who stay in the same job. Overtime refers to those who work overtime in both years, incentive pay refers to those who receive an element of incentive pay in their weekly pay in both years.

Table 7

Comparisons of Wage Rigidity Between UK and US

Percentage of job stayers whose annual change in hourly pay falls in the given categories

Inflation Rate (%)	UK			US		
	Nominal Cut	Rigid Wage	Median Real Wage Change	Nominal Cut	Rigid Wage	Median Real Wage Change
9-12	10.00	1.34	1.3	11.85	7.25	-0.4
5-7	10.71	1.90	3.1	16.80	13.65	0.6
4-5	12.20	3.03	3.4	17.78	16.12	0.5
3-4	16.26	3.33	1.2	18.80	17.03	0.8
1-3	18.72	4.90	2.2	19.70	17.10	1.6

Notes: (i) Years included in 9-12: US; 1979-80, 1980-81
UK; 1978-79, 1980-81, 1981-82, 1989-90
5-7: US; 1981-82, 1989-90
UK; 1977-78, 1982-83, 1984-85, 1990-91
4-5: US; 1982-83, 1983-84, 1987-88, 1988-89, 1990-91
UK; 1986-87, 1987-88, 1991-92
3-4: US; 1984-85, 1986-87, 1991-92
UK; 1983-84, 1985-86, 1994-95, 1995-96, 1997-98
1-3: US; 1985-86, 1992-93
UK; 1992-93, 1993-94, 1996-97, 1998-99

(ii) US members are taken from Card and Hyslop (1997), Table 1, and are based on matched CPS samples.

Table 8

Regional Wage Equation, 1976-97

Dependent Variable : In $wage_{jt}$

ln $wage_{jt-1}$	0.63 (9.1)
ln u_{jt} x D_{2jt}	- 0.035 (4.0)
ln u_{jt} x D_{2jt}	- 0.037 (5.1)
ln u_{jt} x D_{3jt}	- 0.040 (6.2)
D_{2jt}	0.007 (0.4)
D_{3jt}	0.016 (0.9)
Adjusted wage	✓
Time dummies	✓
Region dummies	✓
Region trends	✓
N	10
NT	210
se	0.0076

Notes: i) j = region, t = time
ii) wage is the composition corrected wage in region j, based on an annual cross-section individual based regression controlling for age, age^2, tenure, four skill groups, nine industry dummies. u is the regional unemployment rate. D_{1jt} = 1 if regional retail price inflation is less than 3.5%, zero otherwise. D_{2jt}, D_{3jt} = 1 if regional retail price inflation is between 3.5% and 7% or greater than 7% respectively.
iii) t ratios in parentheses. These are robust against heteroskedasticity.

Table 9
Annual Real Wage Changes for Job Stayers, 1976-99

	Percentage with negative real wage change	Median real wage change	35th percentile	75th percentile	(75th-35th)	Real change at zero nominal change
1976-75	33.17	4.20	0.53	12.69	12.17	-18.84
1977-76	72.95	-5.59	-7.95	0.73	8.67	-20.49
1978-77	72.95	2.92	0.26	10.31	10.06	-5.47
1979-78	50.72	-0.15	-3.01	7.30	10.30	-9.98
1980-79	32.52	4.47	0.69	13.95	13.13	-21.82
1981-80	37.40	3.48	-0.80	12.33	13.13	-12.03
1982-81	41.34	1.34	-0.94	7.61	8.55	-9.34
1983-82	21.17	4.16	1.94	10.05	8.10	-5.73
1984-83	36.16	1.78	-0.03	7.55	7.57	-3.43
1985-84	42.92	1.11	-0.90	6.69	7.59	-6.95
1986-85	19.14	4.39	2.39	10.51	8.11	-3.10
1987-86	24.11	3.09	1.34	9.14	7.80	-4.36
1988-87	25.33	3.57	1.03	10.90	9.87	-4.00
1989-88	40.90	1.42	-1.04	9.31	10.35	-7.95
1990-89	47.17	0.51	-1.39	7.36	8.75	-9.52
1991-90	24.04	4.07	2.45	10.45	8.00	-6.50
1992-91	26.68	3.41	1.25	8.72	7.48	-4.19
1993-92	28.19	2.90	1.41	7.85	6.44	-1.29
1994-93	44.25	0.50	-0.96	5.13	6.09	-2.56
1995-94	49.22	0.08	-1.08	5.40	6.48	-3.28
1996-95	49.49	0.08	-1.28	6.08	7.36	-3.11
1997-96	28.06	2.37	1.30	8.42	7.13	-1.79
1998-97	52.11	-0.57	-1.73	5.54	7.27	-3.90
1999-98	24.91	2.83	1.36	8.84	7.47	-1.62

Table 10

Explaining the Percentage of Job Stayers whose Annual Real Wage Change is Negative, 1976-99

Dep Var: Percentage with Negative Annual Real Wage Change

	Men		Women	
	Annual Data	Annual/ Regional Data	Annual Data	Annual/ Regional Data
	OLS	**SURE**	**OLS**	**SURE**
Median Real Wage Change (%)	-5.12 (13.8)	-5.24 (32.6)	-4.37 (5.9)	-5.44 (21.0)
$(\text{Median})^2$	-0.43 (4.2)	-0.20 (5.7)	-0.33 (2.1)	0.004 (0.1)
75^{th}-35^{th} Percentile Difference (%)	0.071 (0.1)	0.485 (3.6)	1.19 (1.5)	0.921 (6.2)
Inflation Rate (%)	0.857 (2.8)	0.449 (5.6)	0.618 (1.7)	0.252 (3.0)
Δinflation Rate	-0.248 (1.7)	-0.089 (1.6)	0.016 (0.1)	-0.019 (0.3)
Region Dummies		√		√
Observations	23	230	23	230
R^2	0.97	0.93 (average)	0.94	0.91 (average)

Notes

(i) t ratios in parentheses.

(ii) The real wage is the nominal basic hourly rate normalised on the retail price index. The median real wage change is measured as a percentage. The 75^{th}-35^{th} percentile difference refers to the difference between the percentage real wage change at the 75^{th} percentile less the percentage real wage change at the 35^{th} percentile. It is a measure of dispersion. The inflation rate is the percentage rate and refers to the retail price index. All changes are annual, April to April. In the regional equations, the data are all region specific.

(iii) The use of SURE for the regional panel takes account of the high cross-region correlations in the equation errors when computing the standard errors. These correlations are generally in the range 0.5 to 0.8. The R^2 refers to the average over the ten regional regressions.

Table 11

Explaining the Percentage of Job Stayers Bi-Annual Real Wage Change is Negative, 1976-99

Dep Var: Percentage with Negative Bi-Annual Real Wage Change

Annual/Regional Data: SURE

	Men	**Women**
Median Real Wage Change (%) (2 year)	-4.98 (29.3)	-5.21 (24.4)
(Median)²	0.169 (10.3)	0.164 (10.0)
75^{th}-35^{th} Percentile Difference (%)	0.915 (10.0)	0.870 (8.2)
Inflation Rate (%) (2 year)	0.104 (2.7)	0.185 (4.3)
ΔInflation Rate	0.023 (0.6)	-0.029 (0.6)
Region Dummies	√	√
Observations	220	220
R^2 (average)	0.91	0.93

Notes

As in Table 10, except the changes are over 2 years.

Table 12

The Impact of Inflation on the Percentage of Job Stayers whose Annual Real Wage Changes are less than –Y%

Inflation Coefficients in the Standard Regression (as in Table 10)

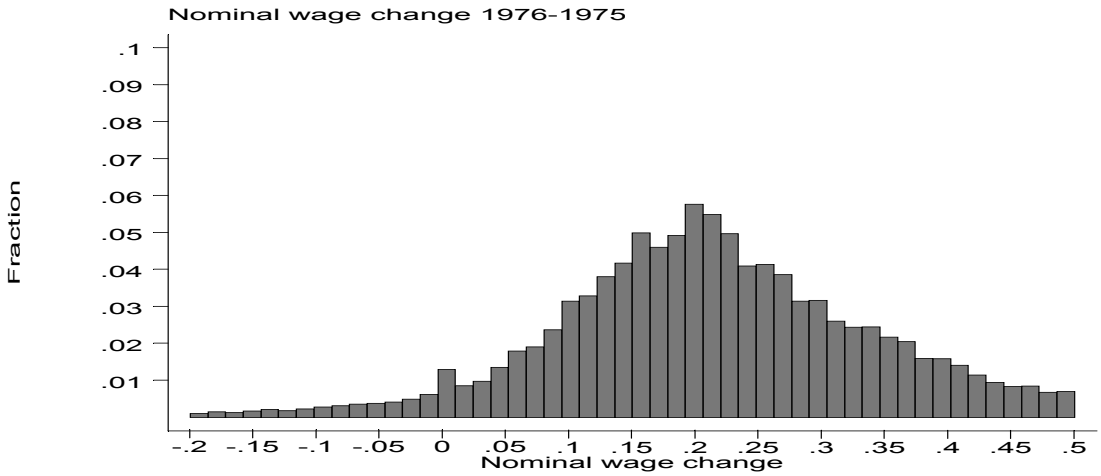
-Y	0%	-5%	-10%	-15%	-20%
Men	0.449 (5.6)	0.453 (8.4)	0.074 (1.6)	-0.026 (0.9)	-0.036 (2.0)
Women	0.252 (3.0)	0.400 (7.4)	-0.038 (0.7)	-0.050 (1.8)	-0.073 (4.3)

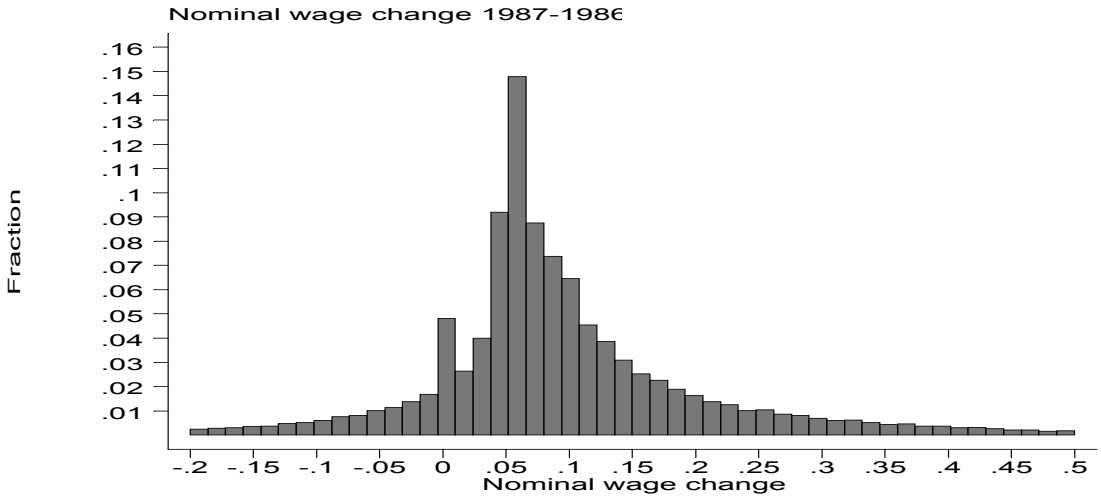
Notes

(i) These inflation coefficients are taken from SURE regressions whose independent variables are those in Table 10 and whose dependent variables are the percentage of job stayers whose annual real wage changes are less than –Y%. Thus the first column presents the inflation coefficients reported in Table 10.

(ii) t ratios in parentheses.

Figure 1
The Distribution of Nominal Wage Changes





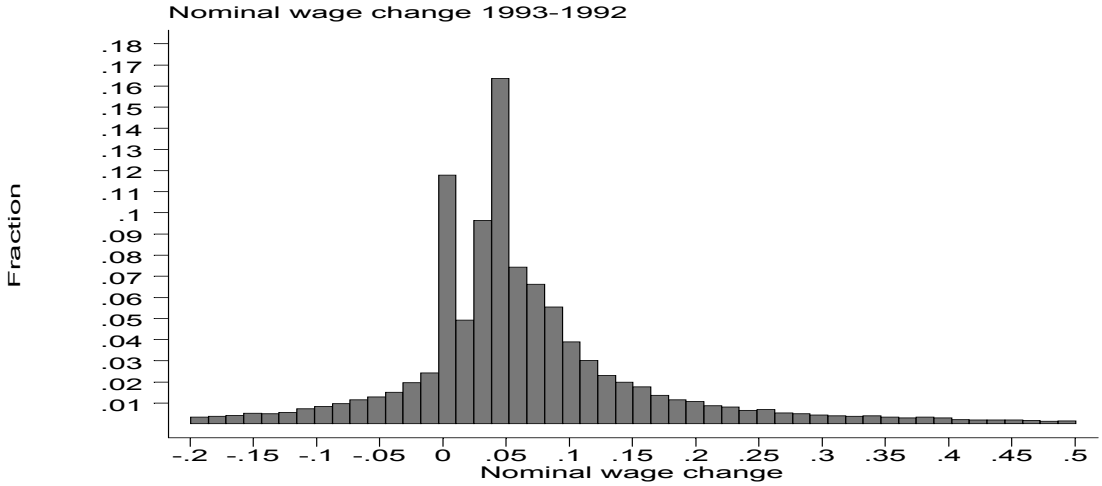
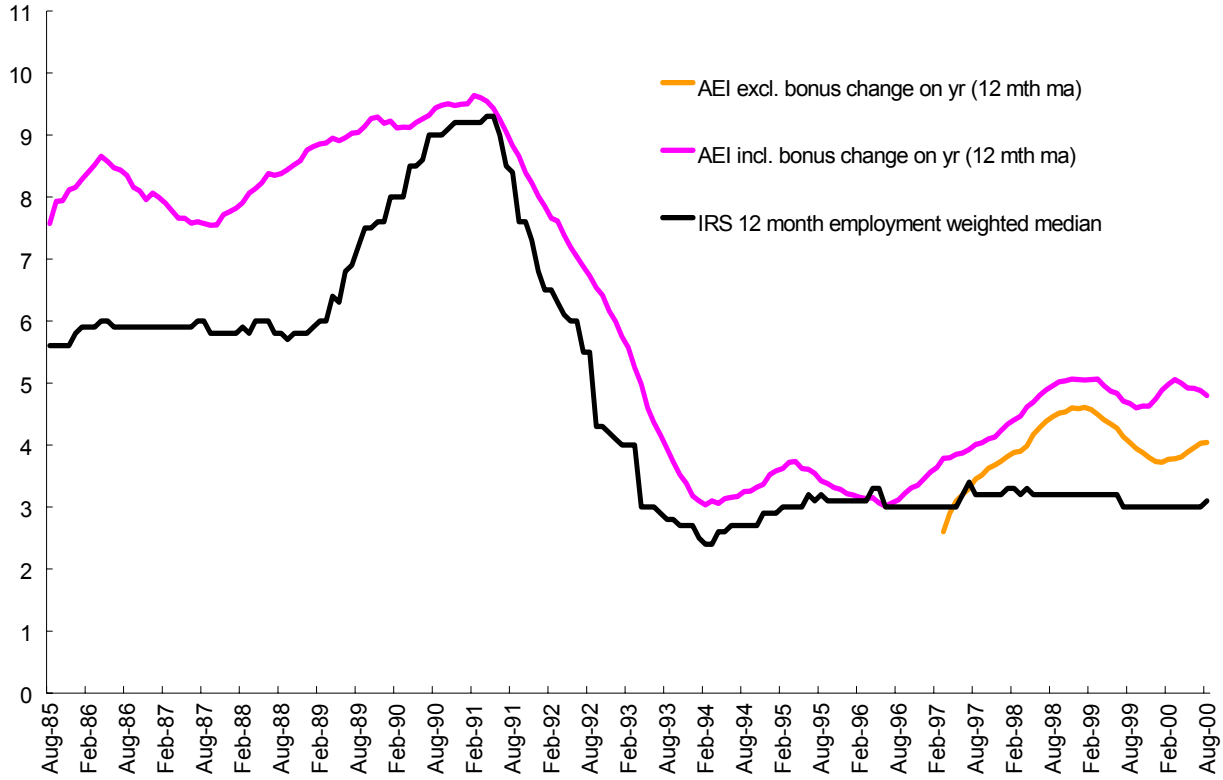


Figure 2

Average Earnings Compared with Union Pay Settlements



Note

AEI is the UK Average Earnings Index which, from 1997 is available both including and excluding bonus payments. IRS refers to a private sector survey of union pay settlements.

Fig 3. Real Wage Changes: Increase in Dispersion

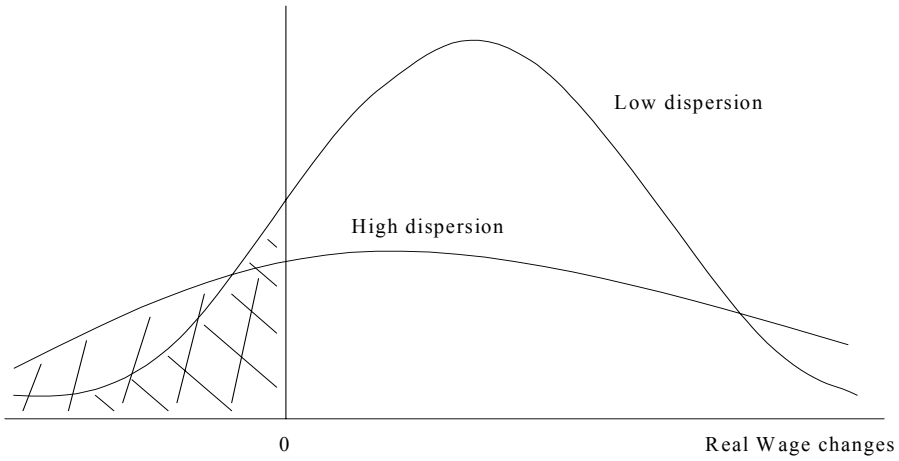


Fig 4A. Real Wage Changes. Distortions due to nominal rigidities: Low Inflation

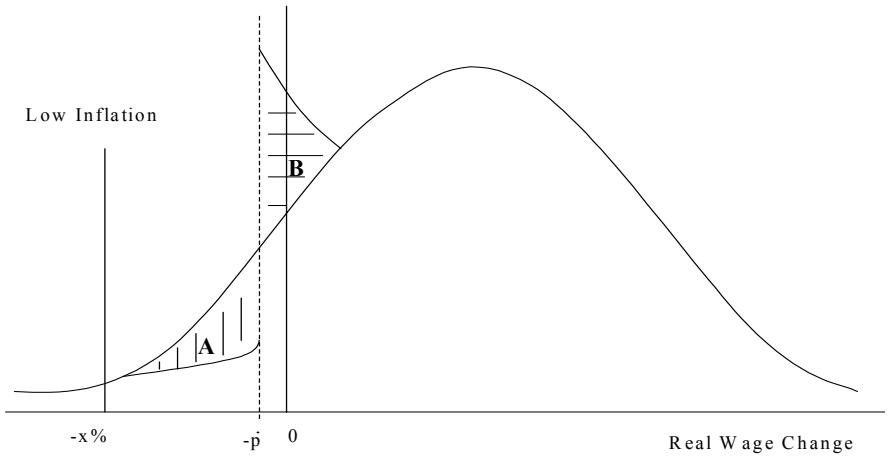
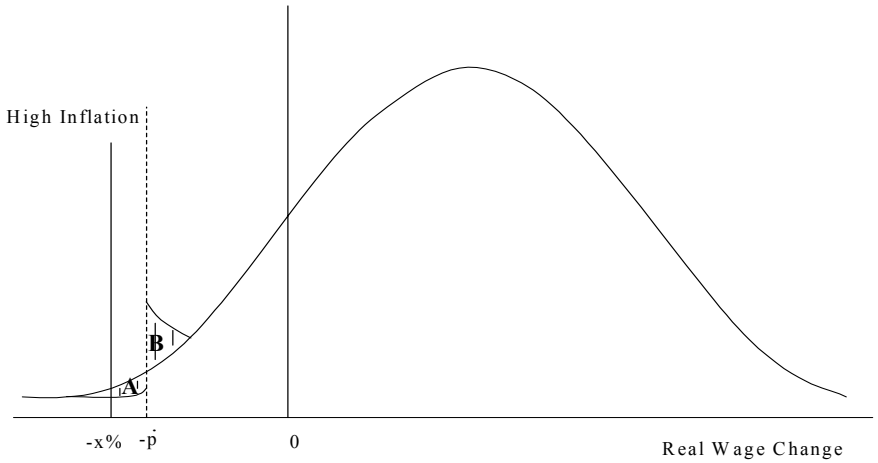


Fig 4B. Real Wage Changes. Distortions due to nominal rigidities: High Inflation



Data Appendix

Nominal Wages: Weekly pay of those whose pay is unaffected by absence excluding overtime pay divided by weekly hours excluding overtime hours. For a given week in April, annually. UK New Earnings Survey.

Prices: Retail price index. Available monthly in UK. Labour Market Trends.

Prices (regional): A Regional Price index for the UK is collected annually by the Regional Rewards Survey Ltd. The company samples prices in approximately 100 British Towns and then produces a percentage comparison of prices in each region against the national average. We use the national CPI to create regional CPI indices from these data.