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JEL Classification: E30, N14

Keywords: Great Depression, Interwar Britain, Nominal Rigidity

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How sticky were wages during the Great Depression? Although classic accounts emphasize the importance of nominal rigidity in amplifying deflationary shocks, the evidence is limited. In this paper, I calculate the degree of nominal wage rigidity in the United Kingdom between the wars using new granular data covering millions of wages. I find that nominal wages were more flexible downwards than in most modern economies, but that the frequency and magnitude of wage cuts were too low to fully offset deflation.

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1 Introduction

The standard explanation for the international Great Depression is that deflationary impulses were propagated by nominal rigidities (Eichengreen and Sachs, 1985; Eichengreen, 1992; Bernanke, 1995; Bernanke and Carey, 1996; Madsen, 2004). In the "deflationary vortex" of the 1930s (Bernanke and Carey, 1996), sticky nominal wages translated to rising real wages, which resulted in mass unemployment (Bernanke, 1995). According to Keynes (1936, p. 9), who formulated the *General Theory* in the aftermath of the Depression, the nominal rigidity of wages – especially downward – was "the normal case."

The United Kingdom is in the thick of this research (Dimsdale, 1981; Beenstock and Warburton, 1986; Broadberry, 1986a,b; Crafts and Fearon, 2013). Based on average wages, economic historians suggest that nominal wages were sticky in interwar Britain. As Figure 1 shows, between 1929 and 1932, nominal wages declined by 5.1% (Feinstein, 1972) but real consumption and product wages increased by up to 11.3% as retail prices and the GDP deflator fell by 14.7% and 6.4% respectively (Capie and Collins, 1983, p. 38).[1] At the same time, unemployment spiked from 8% to 17% (Boyer and Hatton, 2002). These patterns were not specific to the United Kingdom but were the statistical signature of the international Great Depression.

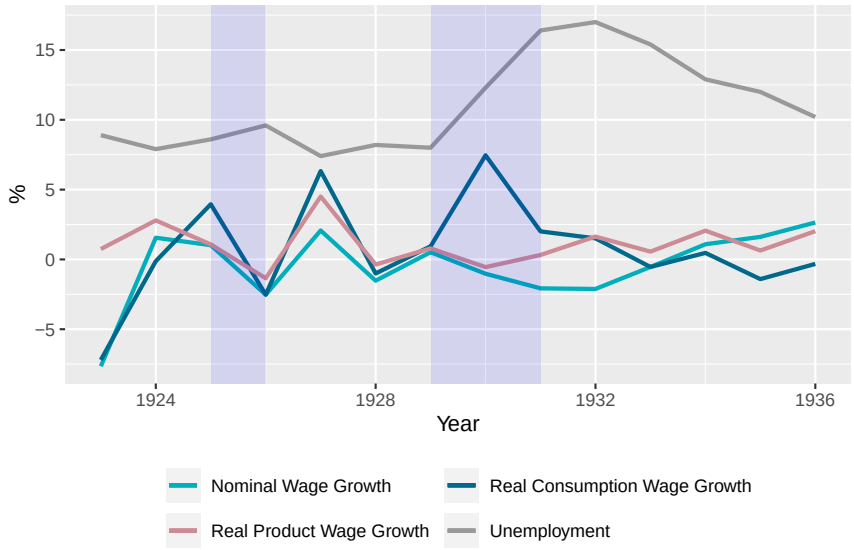
Analyses of modern economies use micro data on nominal wages to estimate the parameters that are relevant in theoretical models, such as the frequency of wage changes. As micro data is vanishingly rare in historical contexts, economic historians of the United Kingdom (Dimsdale, 1981; Beenstock and Warburton, 1986; Broadberry, 1986a,b) and beyond (Bernanke, 1995; Bernanke and Carey, 1996; Bordo et al., 2000; Madsen, 2004) have been forced to use macro data on average wages.[2]

However, just as aggregate price indices are inadequate for the analysis of sticky prices, average wages are poor measures of sticky wages (McLaughlin, 1994; Hazell and Taska, 2021), as multiple sources of variation are tangled into a single statistic, such as the fre-

[1] The series for nominal wages covers the main industries and services and reflects changes in weekly wage rates, actual hours worked, and the composition of the labour force (Feinstein, 1972, T. 141).

[2] Important exceptions are Hanes (2000) and Rose (2010) for the United States.

Figure 1: The Labour Market



Notes and sources: This figure shows nominal wage growth, real consumption wage growth, real product wage growth, and the unemployment rate in the United Kingdom between 1923 and 1936. The series have been calculated using information from Feinstein (1972, T. 140), Capie and Collins (1983, p. 38), Sefton and Weale (1995, pp. 181-8), and Boyer and Hatton (2002). The shaded areas represent recessions from Chadha et al. (2022b).

quency of wage rises and cuts, the magnitude of rises and cuts, and the composition of jobs. A shift from high to low wage jobs, for example, will reduce average wages but is unrelated to nominal rigidity (Hazell and Taska, 2021).

In this paper, I study nominal wage rigidity in interwar Britain using new quasi-micro data from the Ministry of Labour, which collected information on millions of wages. However, while the individual returns have seemingly been lost, the key moments that underpin modern analyses of sticky wages can be calculated from the information that survives. Despite the promise of this data, economic historians have not exploited it before.[3]

I find that wages were sticky in interwar Britain compared to estimates for modern economies. On average, wages were adjusted every 3.6 years. However, there was substantial heterogeneity on several levels.

[3]To my knowledge, the only other user of this data is Routh (1980, p. 142), who reported the number of workpeople affected by changes in wage rates between 1920 and 1924. With a focus on 1923 to 1936, my contribution is to utilise the more granular structure of the data, express it units comparable to modern studies on sticky wages, and to run a rich set of analyses.

First, it was a paucity of pay rises, as opposed to cuts, that is unusual by modern standards, as wages were raised every 8.5 years. Pay cuts were slightly more common than raises, occurring every 7.2 years. Second, downward and upward rigidity was not constant but fluctuated over time. In the depths of the Depression, wages became less downwardly rigid. In 1931, for example, 36.3% or more than 3 million workers received wage cuts, which is comparable to the United States during the Great Recession – a model of labour market flexibility. Third, the oscillations in stickiness over time coincide with phases of inflation and deflation, which suggests that nominal rigidity was state dependent. Fourth, stickiness varied across industries. The industry at the top of the table (transport) was ten times more flexible than the industry at the bottom (other industries).

Counterfactual simulations show that to the extent that nominal wages fell was due to an increase in the frequency of wage cuts, as opposed to an increase in the magnitude of cuts or a decline in the frequency or magnitude of rises. However, many more and much bigger wage cuts would have been needed to offset deflation and check the rise in real wages.

What jammed the adjustment of nominal wages? An analysis of the full spectrum of minimum wages shows that these lower bounds were rarely changed. Therefore, if actual wages were close to the minimum, then minimum wage legislation may have contributed to stickiness by preventing nominal wages from falling. I also present evidence that directly links wage cuts to increases in strikes from 1929. As a result, the threat of strikes may have added to stickiness as firms were reluctant to cut wages.

When wages did change, the most common cause was sliding scales, which mechanically linked nominal wages to a benchmark, such as the cost of living or the firm's prices. Although this institutional quirk was not widespread, it baked in some nominal flexibility to the interwar labour market.

This paper relates to several strands of existing research. First, it develops the standard account of the international Great Depression (Eichengreen and Sachs, 1985; Eichengreen, 1992; Bernanke, 1995; Bernanke and Carey, 1996; Madsen, 2004). It's not that the interwar period was a unique ice age of frozen wages but that the macroeconomic conditions re-

quired unusually flexible labour markets. Second, it builds on recent research studying the amplification (Chadha et al., 2022a) of shocks (Crafts and Mills, 2013, 2015; Cloyne et al., 2018; Lennard, 2020; Lennard et al., 2021) in interwar Britain. Third, it contributes to the literature measuring wage stickiness (Barattieri et al., 2014; Grigsby et al., 2021; Hazell and Taska, 2021). As episodes of deflation and depression are rare, the 1930s are a valuable setting for investigating downward nominal wage rigidity.

The paper is organised as follows. Section 2 outlines the related literature. Section 3 describes the data. Section 4 calculates the frequency and magnitude of nominal wage adjustment. Section 5 develops some decompositions of nominal wages. Section 6 accounts for why some wages were sticky. Section 7 explains how other wages changed. Section 8 concludes.

2 Related Literature

A. Theoretical

Wage stickiness has a long history in economic thought, extending back to Hume in the mid-eighteenth century and through to the great economists of the nineteenth and twentieth centuries, such as Marshall, Pigou, and Keynes (Laidler, 1996). Today, sticky wages are an important friction in the New Keynesian model (the standard macro model) and the plucking model (an emerging alternative).

The New Keynesian model is a micro-founded DSGE model that is "the dominant framework in the classroom, in academic research, and in policy modelling" (Galí, 2018). As opposed to the real business cycle model, the New Keynesian model includes sticky prices and/or wages. The nominal rigidity of wages is measured as the unconditional probability – simply the fraction – of wage changes each period, which is analogous to the Calvo (1983) model of staggered pricing (Woodford, 2003, p. 222). This stickiness causes nominal disturbances, such as monetary shocks, to have real effects (Galí, 2008, p. 131).

In the plucking model, coined by Milton Friedman, economic fluctuations are drops from potential as opposed to symmetric deviations around a natural rate. Dupraz et al.

(2021) show that unemployment in the United States since World War II has displayed this plucking asymmetry. The logic of the model is that "good shocks mostly lead to increases in wages, while bad shocks mostly lead to increases in unemployment" (Dupraz et al., 2021). To explain this pattern, Dupraz et al. (2021) develop a micro-founded model in which a Diamond-Mortensen-Pissarides search model of the labour market is augmented with nominal wage rigidity, measured as the share of job-stayers receiving a one-year wage freeze. The model is able to match the plucking property, which crucially depends on the downward nominal rigidity of wages.

Overall, these leading macroeconomic models suggest that nominal wage rigidity is an important source of economic fluctuations and that the relevant quantity to estimate is the fraction of wage changes.

B. Empirical

Contemporary

A growing body of empirical research studies wage rigidity in modern economies. In order to do so, this literature uses micro data and simple calculations that count the number of wage changes as a fraction of employees in the sample. The micro data is usually based on surveys (McLaughlin, 1994; Kahn, 1997; Gottschalk, 2005; Nickell and Quintini, 2003; Barattieri et al., 2014; Elsby et al., 2016), as well as novel sources such as administrative payroll data (Grigsby et al., 2021) and online job postings (Hazell and Taska, 2021).

Table 1 reports a selection of estimates of the frequency of wage freezes and cuts for the United Kingdom and the United States since the 1970s.[4] As it is difficult to define the cut-off between flexible and sticky wages, this table will help us to contextualize the results for interwar Britain. The summary suggests that: (1) Wage freezes are relatively rare, implying that wages are quite flexible. The minimum fraction of workers experiencing a pay freeze is 0.2%; the maximum is 59.8%. (2) Wage cuts are also quite scarce. The minimum proportion receiving pay cuts is 2.5%; the maximum is 37.1%. (3) There is substantial heterogeneity

[4]See Dickens et al. (2007), Elsby and Solon (2019), and Grigsby et al. (2021) for a summary of estimates of wage freezes and cuts beyond the United Kingdom and United States.

across studies, which is clear from the large gaps between the minimums and maximums receiving wage freezes and cuts. This could be due to varying data quality across studies or to the samples studied. If wage changes are state dependent, contingent on the state of the economy, such as expansion versus contraction or inflation versus deflation, then the estimated rigidity will vary according to the macroeconomic context. Kahn (1997), for example, who found relatively few wage freezes, studied the Great Inflation in the United States, when prices increased by up to 12% a year (Nakamura et al., 2018).

An important empirical challenge in this literature is measurement error. Studies based on household surveys, such as the Panel Study of Income Dynamics, use self-reported wages to determine if there has been a wage change (Gottschalk, 2005; Barattieri et al., 2014). If, however, the reported wage is rounded or approximate (Kahn, 1997), then there is a risk of both false positives and false negatives in the identification of wage changes (Elsby et al., 2016). Thus, estimates of wage rigidity based on self-reported surveys are likely to be biased (Elsby and Solon, 2019). To deal with this issue, new methods (Gottschalk, 2005; Barattieri et al., 2014) and data sources (Grigsby et al., 2021; Hazell and Taska, 2021) have been used.

Historical

Empirical work on the international Great Depression has used macro data to investigate nominal wage rigidity. An important starting point is Eichengreen and Sachs (1985), who found a positive association between exchange rate depreciation and industrial production growth in a sample of 10 economies between 1929 and 1935. They suggest that one mechanism through which the exchange rate affected output was through real wages, assuming the slow adjustment of nominal wages.

Bernanke (1995) and Bernanke and Carey (1996) built on Eichengreen and Sachs (1985) by focusing on the role of nominal wage rigidity as a propagation mechanism during the Depression. Based on a sample of 22 economies between 1931 and 1936, Bernanke and Carey (1996) estimated by non-linear IV that there was incomplete adjustment of average nominal wages to changes in prices, concluding that there was a "substantial degree of

Table 1: Existing Estimates of the Frequency of Wage Adjustment

Source	Sample	Data	Freezes (%)	Cuts (%)
McLaughlin (1994)	United States, 1976-86	Panel Study of Income Dynamics	7.2	17.3
Kahn (1997)	United States, 1976-88	Panel Study of Income Dynamics	7.5	17.8
Nickell and Quintini (2003)	United Kingdom, 1975-99	New Earnings Survey	0.2-7.1	5.1-22.4
Gottschalk (2005)	United States, 1986-93	Survey of Income and Program Participation	49.2-53.7	4.3-5.1
Barattieri et al. (2014)	United States, 1996-2000	Survey of Income and Program Participation	29.0-38.8*	10.0-12.5*
Elsby et al. (2016)	United States, 1980-2012	Current Population Survey	6.2-19.5	11.2-37.1
Elsby et al. (2016)	United Kingdom, 1975-2012	New Earnings Survey	0.4-9.1	4.9-23.5
Grigsby et al. (2021)	United States, 2008-16	ADP administrative payroll data	33.2	2.5
Hazell and Taska (2021)	United States, 2010-16	BGT online vacancies	58.2-59.8	8.7-9.5
Minimum			0.2	2.5
Maximum			59.8	37.1

Notes and sources: This table summarises a selection of existing studies on wage stickiness. * indicates that quarterly wage change probabilities have been converted to annual probabilities using $\pi_a = 1 - (1 - \pi_q)^4$, where π_a and π_q are the annual and quarterly probabilities (Barattieri et al., 2014).

stickiness" in wages and that it was the stickiness of wages, as opposed to prices, that was "the dominant source of non-neutrality."

Madsen (2004), who studied a panel of up to 12 economies between 1927 and 1938, estimated using OLS, GLS, and IV/GLS that there was incomplete pass-through from prices to average nominal wages. However, in contrast to Bernanke and Carey (1996), Madsen (2004) concluded that price stickiness was more important than wage stickiness in the 1930s.

For the United Kingdom, a key reference is Dimsdale et al. (1989), who developed a macroeconometric model for the interwar economy which showed that demand shocks raised unemployment because wages and prices were sticky. In addition, there have been

some important passing references to sticky wages in interwar Britain. Beenstock and Warburton (1986) estimated using OLS that the own-product real wage was negatively associated with employment between 1923 and 1938, which they conjectured may have been due to sticky wages. Based on the behaviour of average nominal wages and the retail price index, Dimsdale (1981) and Broadberry (1986a,b) noted that there was unprecedented downward flexibility during the Great Slump of 1919-21, but that nominal wages were stickier thereafter. In a survey, Crafts and Fearon (2013, p. 49) wrote of the British Great Depression that "the deflationary shock interacted with the inflexibility of wage and price-setting behaviour to create a difficult adjustment problem during which unemployment rose considerably as real-product wages increased markedly."

For the United States, there is a larger literature on nominal wage rigidity during the Great Depression using macro data and theoretical (Bordo et al., 2000; Cole and Ohanian, 2001; Ohanian, 2009) or econometric models (Bernanke, 1986) and micro data based on surveys of manufacturing firms from the Bureau of Labour Statistics (Hanes, 2000; Rose, 2010).[5] This research has found mixed results on the incidence and consequences of sticky wages.

In summary, the stickiness of wages during the Great Depression, in the United Kingdom and in other economies, remains an open question.

3 Data

Modern analyses of nominal wage adjustment use micro data such as surveys (McLaughlin, 1994; Kahn, 1997; Nickell and Quintini, 2003; Gottschalk, 2005; Barattieri et al., 2014; Elsby et al., 2016), administrative payroll data (Grigsby et al., 2021), and online job postings (Hazell and Taska, 2021). The richness of this data, often consisting of millions of observations, is summarised into a few key parameters, such as the frequency of adjustment, the sign and size of adjustment, and so on. It is these parameters that are of interest theoretically and empirically.

[5] For studies on nominal wage rigidity in other periods of American history, see Hanes (1993) and Hanes and James (2003).

Historically, micro data on wages in the United Kingdom would have been collected but the underlying data is seemingly missing. However, while the micro data is not available, the key quantities of modern analyses of sticky wages have survived. These statistics – the very objects we would calculate today – were calculated at the time using the lost micro data.

The source is *The Ministry of Labour Gazette*, which "compiled returns collected by the Ministry of Labour from employers and their associations, trade unions, and other sources" (Ministry of Labour, 1937, pp. 88-9). The *Gazette* reported the following statistics for the United Kingdom: (1) the number of employees receiving wage rises and wage cuts, (2) the change in the weekly wage bill due to wage rises and wage cuts, and (3) the methods by which wage changes were arranged. This data was reproduced in the *Twenty-Second Abstract of Labour Statistics of the United Kingdom* (Ministry of Labour, 1937), which, unless otherwise stated, is the source I use as it includes revisions.

The statistics are reported as aggregates and by industry group. The groups are: (1) mining and quarrying; (2) brick, pottery, glass, chemical, etc.; (3) metal, engineering and shipbuilding; (4) textile; (5) clothing; (6) paper, printing, etc; (7) building, public works contracting, etc; (8) transport; (9) gas, water, electricity and public administration services; and (10) other industries. However, the returns do not cover all industries, excluding "agricultural labourers, Government employees, domestic servants, shop assistants and clerks" (Ministry of Labour, 1937, p. 88).[6]

In order to calculate the frequency of adjustment, the relative size of the sample, and so on, an important variable is the number of employees in the included industries. The most useful source is the Department of Employment and Productivity's *British Labour Statistics* (1971, pp. 216-7), which reports the number of (female and male) insured employees aged 16 and over (1923-7) and aged 16-64 (1927-36) at each mid-year in the United Kingdom by industry. Using the information above on the industries that are included and excluded in the *Gazette* returns, I match industries to calculate the number of employees in the sample industries. On this basis, I include all employees reported in *British Labour Statistics* (1971,

[6]The excluded industries made up approximately 22% of total employment (Feinstein, 1972, Tt. 126-7, 129).

pp. 216-7) other than those working in agriculture, the distributive trades, and national government service.

Annual data is available for most variables between 1923 and 1936, although many extend back to the late nineteenth century (Board of Trade, 1915, p. 72). As a result, I focus on the period 1923 to 1936, unless otherwise stated. This yields a sample of up to 9.7 million employees, which represents 49.2% of civil employment and 48.3% of total employment. Table 2 reports the minimum, maximum, and mean sample sizes. Even by the standards of modern studies, the sample is extraordinarily large. Cutting edge research in macroeconomics does not have access to the population but uses samples (Kahn, 1997; Grigsby et al., 2021; Hazell and Taska, 2021).

Table 2: Sample Size

	Employees in Sample (Million)	Share of Civil Employment (%)	Share of Total Employment (%)
Minimum	8.1	44.1	43.4
Maximum	9.7	49.2	48.3
Mean	8.8	47.0	46.1

Notes and sources: This table reports summary statistics for the sample used in the analysis. Employees in the sample is from Department of Employment and Productivity (1971). Civil employment and total employment is from Feinstein (1972, Tt. 126-7).

Before moving on to the analysis, there are some elements of the data to discuss further. First, as with much of the micro data used in modern analyses (McLaughlin, 1994; Gottschalk, 2005; Barattieri et al., 2014; Grigsby et al., 2021), there is an issue of measurement error. The Ministry of Labour suggested that the wage changes of "unorganised workers" of "individual employers" may not be reported (Ministry of Labour, 1937, p. 88).[7] The omission of categories of employees and employers is not uncommon in the literature. Grigsby et al. (2021), for example, only observe the wages in firms of more than 50 employees. If wage changes were under-reported, this will lead to an overestimation of the degree of wage stickiness.

[7]The number of missing returns depends on three factors: the rate of unionisation, θ, which was 26 per cent on average between 1923 and 1936 (Thomas and Dimsdale, 2017); the extent of employment in small firms, ϕ, which was 12.7 per cent on average in manufacturing firms according to the Censuses of Production of 1930 and 1935 (Business Statistics Office, 1978, pp. 244-5); and the extent of under-reporting, ρ, which is unknown. For low (0%), medium (50%), and high (100%) under-reporting values, the fraction of missing returns, which can be approximated as $\zeta = (1 - \theta)\,\phi\rho$, is 0%, 4.7%, and 9.4% respectively.

Second, the authorities counted a wage change if the wage at the end of the year was different to the wage at the start (Ministry of Labour, 1937, p. 88). Therefore, if a wage was changed by $£x$ and changed again by $-£x$ within the year, so that the wage was the same at the end of the year as it was at the start, a wage change would be missed and the degree of stickiness would be overestimated. The "restoration of wage cuts", for example, was not uncommon (Trade Union Congress Archives, MSS.292/110.4/1). However, while the Ministry of Labour did not report these individuals under wage rises or wage cuts, they are included in the total affected by wage changes. Therefore, they can be calculated as the difference between total wage changes and the sum of wage rises and wage cuts.

Third, the ideal measure of the change in the weekly wage bill due to wage rises and cuts would only capture changes arising from wage rates, as opposed to changes in earnings stemming from fluctuations in hours or employment. This is precisely what is measured in the *Gazette* (1932, p. 4).

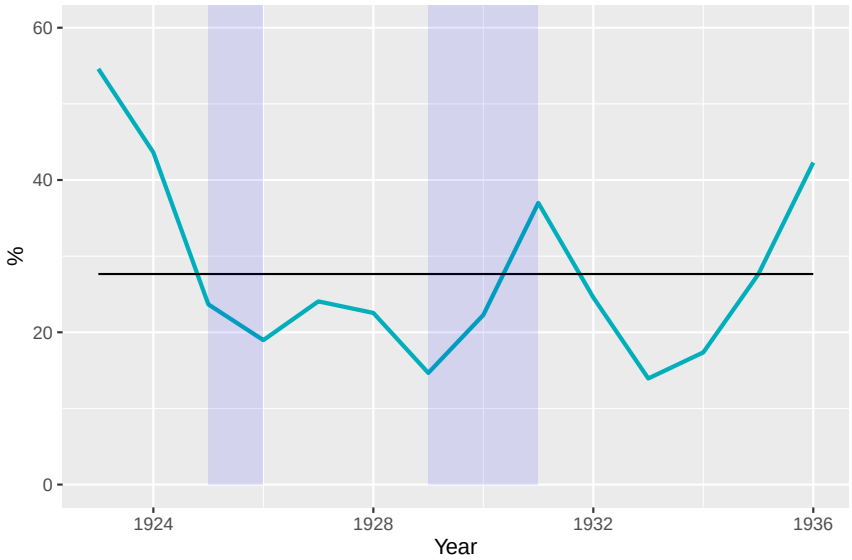
4 Results

A. The Frequency of Nominal Wage Adjustment

Using the data from the Ministry of Labour, it is possible to calculate the first estimates of wage stickiness for interwar Britain. To do so, I divide the number of employees receiving wage changes by the number of employees in the sample industries for each year. As shown in Figure 2, the unconditional probability of a wage change was 27.7% a year. Put differently, 72.3% of workers had their wages frozen on average each year. This implies that nominal wages remained fixed for 3.6 years on average.

Yet the average suppresses significant temporal heterogeneity. In 1923 and 1924, there was considerably more flexibility, when 54.6% and 43.6% of employees received pay changes respectively. Following the return to the gold standard in 1925, wage changes were more scarce, when less than a quarter received changes. Having fallen to just 14.7% in 1929, the

Figure 2: The Frequency of Wage Adjustment



Notes and sources: This figure shows the frequency of wage adjustment in the United Kingdom between 1923 and 1936. The series has been calculated using information from the Ministry of Labour (1937, p. 88) and Department of Employment and Productivity (1971, pp. 216-7). The black line is the sample mean. The shaded areas represent recessions from Chadha et al. (2022b).

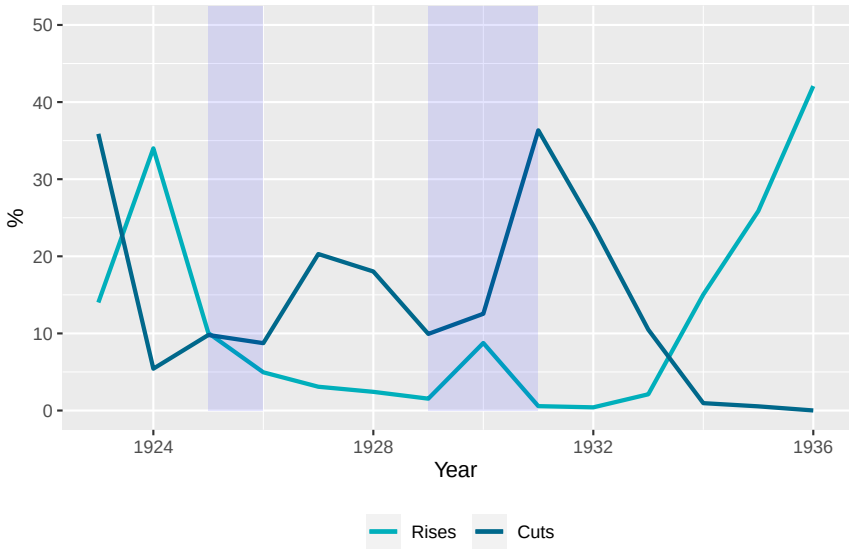
frequency of adjustment increased during the Great Depression. It rose to 22.3% in 1930, 37% in 1931 and 24.6% in 1932. 1933 was the most rigid year in the sample, when just 13.9% of wages changed. From 1934, wages became increasingly flexible. In 1936, 42.3% of employees received changes in pay.

Weighed against existing estimates, nominal wages in interwar Britain were remarkably sticky. Wage freezes were more common than in any other context covered by the studies reported in Table 1. Relative to the United Kingdom at the end of the twentieth and start of the twenty-first centuries, wage freezes were more than 7 times more likely in the interwar period (Nickell and Quintini, 2003; Elsby et al., 2016). One explanation is that menu costs were substantial in the 1920s and 1930s. Another is the under-reporting of wage changes, which I will return to.

B. Downward and Upward Rigidity

The critical issue – in macroeconomic models (Dupraz et al., 2021) and in the historiography – is not the overall level of nominal wage rigidity but the level of downward rigidity. As a result, I plot the fraction of wage cuts and rises in Figure 3. On average, the frequency of pay rises was 11.8% a year; the frequency of pay cuts was 13.8% a year. Therefore, in contrast to modern economies, downward rigidity was no greater than upward rigidity in interwar Britain.

Figure 3: The Frequency of Rises and Cuts in Wages



Notes and sources: This figure shows the frequency of wage rises and wage cuts in the United Kingdom between 1923 and 1936. The series have been calculated using information from the Ministry of Labour (1937, p. 88) and Department of Employment and Productivity (1971, pp. 216-7). The shaded areas represent recessions from Chadha et al. (2022b).

During the key period of the Great Depression, there were masses of wage cuts. Between 1930 and 1932, the average frequency of cuts was 24.3%, of which 12.5% of employees received reduced pay in 1930, 36.3% in 1931, and 24% in 1932. To put these numbers into context, the wage cuts in 1931 alone affected more than 3 million workers.

The waning rigidity in the slump observed in the data is confirmed in qualitative evidence. In May 1931, the *Economist* (30 May 1931, p. 1143) noted that "wage negotiations

are pending in a number of important British industries, among them engineering, shipbuilding and docks, and it is clear that this summer will bring to the forefront the main question, which a long-continued depression in trade was bound to raise, whether a widespread reduction in wage-levels has or has not become essential." According to the Trade Union Congress, there was a subsequent "Attack on Wages": a coordinated attempt "to bring down wages all round [...] by the large organisations of employers" (Trade Union Congress Archives, MSS.292/110.11/4). Therefore, during the Depression itself, when deflation and slump were sharpest, nominal rigidities were lessened, possibly because menu costs were minor frictions in the context of the macroeconomic volatility.

Added to this misery was the disappearance of pay rises. In 1930, just 0.6% of employees had the good fortune of a raise, falling to 0.4% in 1931. During the economic recovery, wage rises reversed cuts, such as at the Decca Record Company, Imperial Chemical Industries, and many local councils (Trade Union Congress Archives, MSS.292/109.1/3). From 1934, pay rises vastly outnumbered cuts. At the close of 1935, the *Financial Times* (9 November 1935, p. 4) wrote that "there is little doubt [...] that the position of the worker in this country has been improved relatively to his 1929 standard."

While wages seem sticky based on the frequency of wage changes, the conclusion is different when focusing on wage cuts in the final column of Table 1. On this basis, interwar Britain had quite low downward nominal wage rigidity. Across the full sample of 1923 to 1936, the average frequency of wage cuts of 13.8% is on the higher side of existing estimates. During the Great Depression, when wage cuts advanced to 36.3% in 1931, the British labour market looks strikingly flexible. Only in the United States during 2007-8 was there a greater fraction of wage cuts (Elsby et al., 2016). Therefore, in terms of downward nominal wage rigidity, the United Kingdom during the Great Depression was about as flexible as the United States during the Great Recession.

How can we reconcile the twin facts of few wage changes and many wage cuts? The answer lies in the scarcity of wage rises. In modern economies, an annual raise is the norm, but in interwar Britain the likelihood was just 11.8% or a raise every 8.5 years on average. Thus, if one studies wage *changes*, the British economy between the wars appears

sticky. However, in the context of the deflation and depression of the 1930s, in which the important metric is wage *cuts*, interwar Britain was rather flexible.

The average frequency of rises (11.8%) and cuts (13.8%) does not sum to the average frequency of changes (27.7%). This is because changes also include reversals, which were offsetting within-year fluctuations. For example, a cut of $£x$, later restored with a raise of $£x$. These zero sum wage changes were relatively infrequent, accounting for the remaining 2.1%. Reversals were slightly more common before the Depression, averaging 3.4% between 1923 and 1929, than after, when the average was less than 1%.

C. State Dependence

We have discovered that wages were fixed for a duration that was not constant over time. As Figure 2 shows, while the average probability of a wage change was 27.7% between 1923 and 1936, the lowest was 13.9% in 1933 and the highest was 54.6% in 1923. Could this time heterogeneity be associated with the state of the economy so that nominal rigidity was state dependent? For example, nominal rigidity could be different during expansions and contractions or inflations and deflations.

Table 3 reports the results of a simple exercise in which the average frequency of wage changes is calculated according to the state of the economy. The chronology of the business cycle is from Chadha et al. (2022b) and of prices from Capie and Collins (1983, p. 38).[8] There are differences between expansions and contractions with the boom associated with slightly more rises than cuts and the bust with rather more cuts than rises. This pattern of few rises and many cuts during downturns is consistent with the evidence for the United States during the Great Recession (Grigsby et al., 2021). The overall probability of a wage change is marginally higher in expansions than contractions. However, the differences are not statistically significant, possibly due to the short sample.

Table 3: The Frequency of Wage Adjustment by State (%)

State	Sample	Cuts	Rises	Changes
	Business Cycle			
Expansion	1923-5, 1927-9, 1932-6	12.3	13.7	28.1
Contraction	1926, 1930-1	19.2	4.8	26.1
Difference		-6.9	8.9	2.0
	Prices			
Inflation	1924, 1934-6	1.7	29.2	32.7
Deflation	1923, 1925-33	18.6	4.8	25.6
Difference		-16.9***	24.5***	7.1
All states	1923-36	13.8	11.8	27.7

Notes and sources: This table reports the mean frequency of wage changes conditional on the state of the business cycle and the course of prices. The chronology of the business cycle is from Chadha et al. (2022b) and of prices from Capie and Collins (1983, p. 38). *, **, *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

There is a large, statistically significant difference between inflations and deflations, with pay cuts far more likely when prices are decreasing and rises more frequent when prices are increasing.[9] Therefore, this exercise suggests that nominal rigidity is state dependent, with stronger evidence for the relevant state being inflation or deflation than expansion or contraction.

D. Sectoral Heterogeneity

The granularity of the information collected by the Ministry of Labour has allowed me to explore heterogeneity over time, up and down, and by the state of the economy, but what about by industry? This will shed light on whether sticky wages were an aggregate or sectoral characteristic. As Table 4 shows, there was a good deal of variation in nominal wage rigidity across industries. The most flexible were transport; mining and quarrying; and building, public works contracting, etc. In these industries, wages changed with a probability of between 40.6% and 63.4%, which suggests an average duration of wages of 1.6 to 2.5 years. Other industries were far stickier. The least flexible were brick, pottery,

[8] An inflationary state is defined as periods of price increases, measured by the Retail Price Index at the end of each year.

[9] The results are similar for retail prices (Capie and Collins, 1983, p. 38) and the GDP deflator (Sefton and Weale, 1995, pp. 181-8).

glass, chemical, etc.; paper, printing, etc.; and other industries. The probability of a wage change in these industries was between 6.1% and 18.8%, which implies that wages were changed once every 5.3 to 16.4 years.

Table 4: The Frequency of Wage Adjustment by Industry (%)

Industry	Cuts	Rises	Changes
Transport	31.4	29.1	63.4
Mining and quarrying	20.0	23.3	44.3
Building, public works contracting, etc.	25.1	13.7	40.6
Gas, water, electricity, and public administration services	14.0	16.4	34.3
Textile	20.3	8.4	32.0
Metal, engineering, and shipbuilding	11.1	15.1	27.6
Clothing	11.2	4.7	22.9
Brick, pottery, glass, chemical, etc.	6.6	12.0	18.8
Paper, printing, etc.	4.0	1.0	9.0
Other industries	3.1	2.0	6.1

Notes and sources: This table reports the mean frequency of wage adjustment by industry in the United Kingdom between 1923 and 1936. The series have been calculated using information from the Ministry of Labour (1937, pp. 88-91) and Department of Employment and Productivity (1971, pp. 216-7).

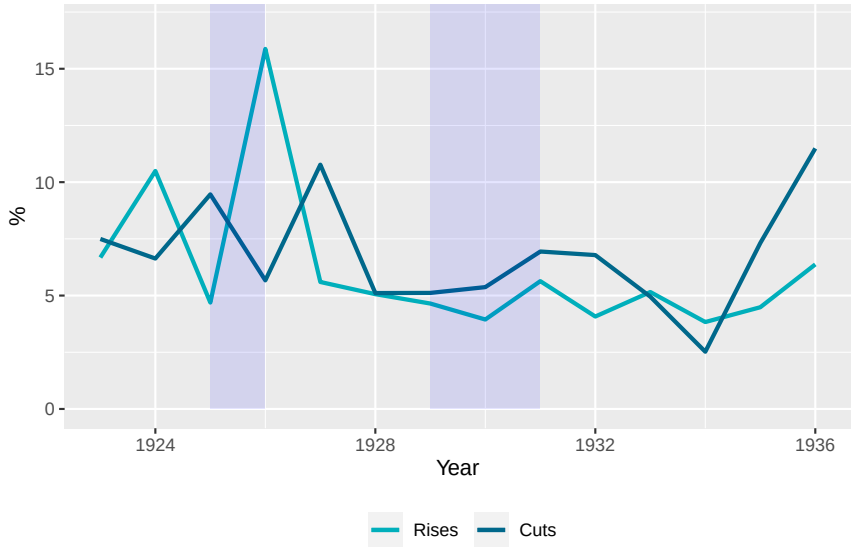
Focusing on wage cuts, there is a similar ranking of industries. The most flexible were transport; building, public works contracting, etc.; and textile, in which the average frequency of wage cuts was 20.3% to 31.4%. The least flexible were brick, pottery, glass, chemical, etc.; paper, printing, etc.; and other industries, in which the average frequency of wage cuts was 3.1% to 6.6%.

However, this disaggregation is only approximate. Matching the industries reported in the Ministry of Labour's *Gazette* (1937) with those in the Department of Employment and Productivity's *British Labour Statistics* (1971) resulted in a few industry-year observations of wage changes exceeding 100%. This suggests that although the industries reported in the two publications are close in name, there are some differences in the allocation of employees across industries. This is mainly an issue of the industry-level, as opposed to the aggregate, analysis.

E. The Magnitude of Nominal Wage Adjustment

We have explored the sign of wage changes but what about the size? This can be calculated by dividing the change in the weekly wage bill due to wage rises or cuts by the number of employees receiving wage rises or cuts, which were reported by the Ministry of Labour (1937, p. 88).[10] As Figure 4 shows, when contracts were altered, the changes in pay were non-trivial. The average wage rise was 6.2%, the average cut was 6.8%, which is further evidence that wages were no more sticky down than up. During the Great Depression, rises shrank in size, while cuts grew. In 1931, for example, the average rise was 5.6%, the average cut was 6.9%. However, the early 1930s were not the years with the biggest pay cuts. The average cut was 10.8% in 1927 and 11.5% in 1936.

Figure 4: The Magnitude of Rises and Cuts in Wages



Notes and sources: This figure shows the mean wage rise and wage cut in the United Kingdom between 1923 and 1936. The series have been calculated using information from the Ministry of Labour (1937, p. 88), Feinstein (1972, T. 140), and Chadha et al. (2018). The shaded areas represent recessions from Chadha et al. (2022b).

[10] To convert the average pay changes from £ to %, I divide by lagged average weekly earnings from Feinstein (1972, T. 140) and Chadha et al. (2018).

F. Under-reporting of Wage Changes

A general challenge in the sticky wage literature is imperfect data.[11] With the data from the Ministry of Labour, the main limitation is the potential under-reporting of wage changes, with "unorganised workers" of "individual employers" most susceptible (Ministry of Labour, 1937, p. 88). If this were the case, it would bias down the frequency of adjustment, but should not bias the conclusions about the share of wage rises and cuts or the magnitude of adjustment. A useful cross-check is to construct an average wage index using the information on the frequency and magnitude of wage rises and cuts from the Ministry of Labour and compare it to established average wage indices from the Department of Employment and Productivity (1971, p. 53), Capie and Collins (1983, p. 62) – which was calculated by Arthur Bowley for the London and Cambridge Economic Service – and Feinstein (1972, T. 140).[12]

Figure 5 plots the four series of nominal wage growth. The comovement is particularly strong between the simulated series and those from the Department of Employment and Productivity ($r = 0.98, p < 0.01$) and Capie and Collins ($r = 0.90, p < 0.01$). The association is positive and statistically significant but weaker between the simulated series and that from Feinstein ($r = 0.54, p < 0.05$). However, between 1929 and 1936, the main period of interest, the correlation rises to 0.95 ($p < 0.01$). That the correlations are high is reassuring. That they are not perfect is to be expected as the Ministry of Labour excluded some industries, such as agriculture and government, and average wages reflect additional factors, such as changes in hours and the composition of jobs (Feinstein, 1972, T. 141).

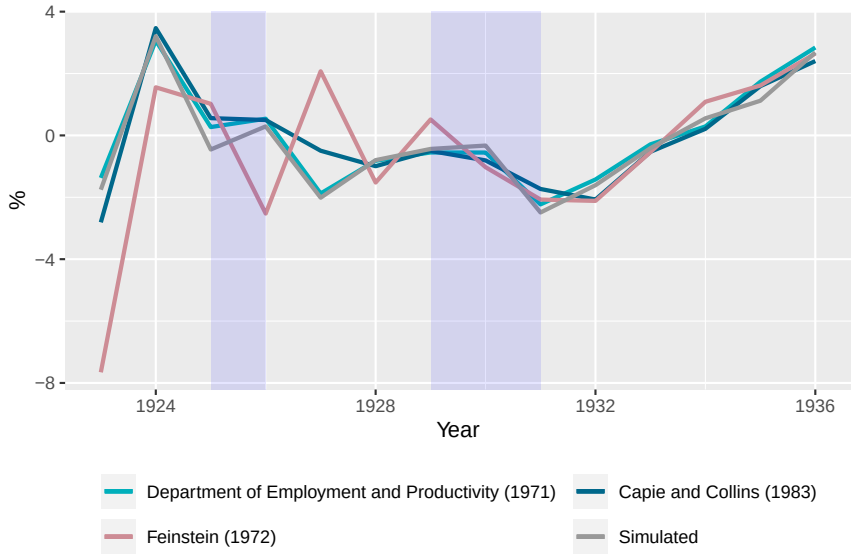
5 Decomposing Nominal Wages

Firms can control the wage bill through multiple channels – the frequency of wage rises,

[11] Dickens et al. (2007), for example, find that these data set "characteristics" are a significant source of estimated nominal wage rigidity across countries and time.

[12] To construct an index of average wages from the Ministry of Labour data, I use equation 7.

Figure 5: A Comparison of Nominal Wage Growth



Notes and sources: This figure shows nominal wage growth in the United Kingdom between 1923 and 1936 based on estimates by the Department of Employment and Productivity (1971, p. 53), Capie and Collins (1983, p. 62), Feinstein (1972, T. 140), and a simulation based on equation 7. The shaded areas represent recessions from Chadha et al. (2022b).

the magnitude of wage rises, the frequency of wage cuts, and the magnitude of wage cuts – given the level of hours and employees. In this section, I develop a decomposition that links these four channels to average wage growth during the Great Depression.

Define the change in the total wage bill at time t as:

$$\Delta B_t = B_t^+ - B_t^- \tag{1}$$

where B_t^+ is the increase in the total wage bill for employees who received wage rises and B_t^- is the decrease in the total wage bill for employees who received wage cuts.

The increase in the total wage bill due to wage rises is given by the number of employees receiving wage rises, N_t^+, multiplied by the average wage rise, ΔW_t^+, and vice versa for the decrease in the total wage bill due to wage cuts:

$$B_t^+ = N_t^+ \Delta W_t^+ \tag{2}$$

$$B_t^- = N_t^- \Delta W_t^- \tag{3}$$

Insert equations 2 and 3 into 1:

$$\Delta B_t = N_t^+ \Delta W_t^+ - N_t^- \Delta W_t^- \tag{4}$$

Divide by the total number of employees, N_t:

$$\frac{\Delta B_t}{N_t} = \frac{N_t^+}{N_t} \Delta W_t^+ - \frac{N_t^-}{N_t} \Delta W_t^- \tag{5}$$

Note that $\frac{\Delta B_t}{N_t}$ is the average change in wages, which can be denoted as ΔW_t. Inserting $\Delta W_t = \frac{\Delta B_t}{N_t}$ into equation 5 yields:

$$\Delta W_t = \frac{N_t^+}{N_t} \Delta W_t^+ - \frac{N_t^-}{N_t} \Delta W_t^- \tag{6}$$

In order to fix the decomposition in percentages, divide by lagged average wages, W_{t-1}:

$$\frac{\Delta W_t}{W_{t-1}} = \frac{N_t^+}{N_t} \frac{\Delta W_t^+}{W_{t-1}} - \frac{N_t^-}{N_t} \frac{\Delta W_t^-}{W_{t-1}} \tag{7}$$

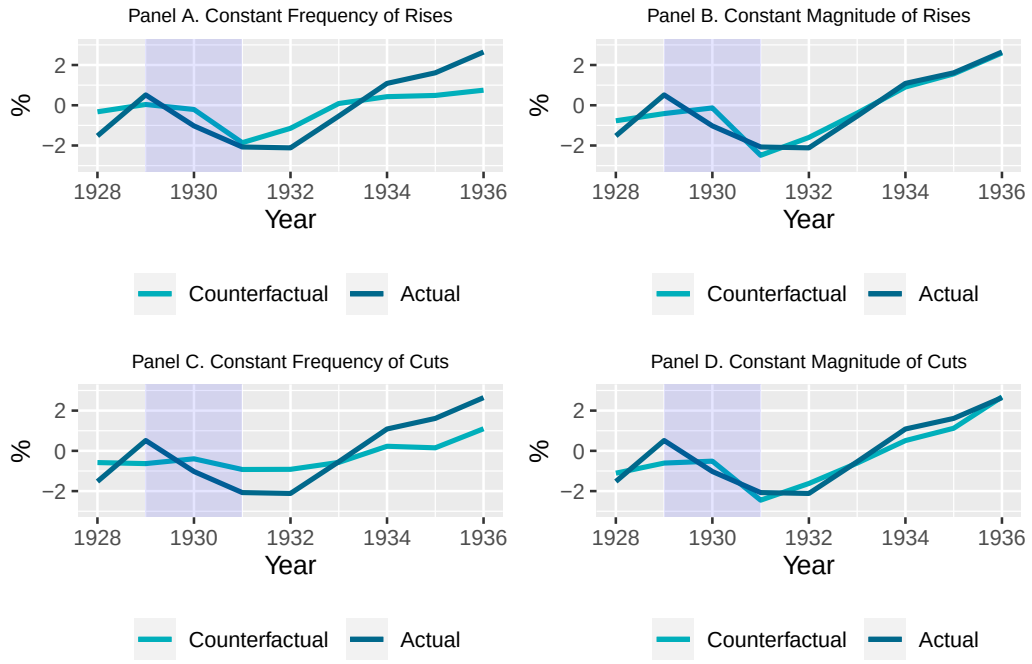
This decomposition suggests that the growth in average wages is equal to: (1) the share of employees who receive wage rises, $\frac{N_t^+}{N_t}$; (2) the average wage rise, $\frac{\Delta W_t^+}{W_{t-1}}$; (3) the share of employees who receive wage cuts, $\frac{N_t^-}{N_t}$; and (4) the average wage cut, $\frac{\Delta W_t^-}{W_{t-1}}$. Therefore, this identity shows that wage growth depends on the frequency, size, and sign of wage changes.

In order to quantify the importance of each channel, I construct four counterfactuals. In each counterfactual, I shut down one channel at a time by setting it to the sample mean. In Figure 6 I hold fixed the frequency of wage rises in Panel A, the magnitude of wage rises in Panel B, the frequency of wage cuts in Panel C, and the magnitude of wage cuts in Panel D. The difference between the counterfactual and actual outcomes is the contribution of each channel to average nominal wage growth.

In all cases except one, there is little difference between the counterfactual and actual outcomes during the Depression. The frequency of wage rises, the magnitude of wage rises, or the magnitude of wage cuts contributed little to nominal wage growth in the early 1930s. However, in the case of the frequency of wage cuts, there is a bigger contribution. The spike in wage cuts in the early 1930s substantially lowered nominal wage growth.

In summary, the decomposition shows that nominal wages fell during the Great Depression for one reason: the frequency of wage cuts. Therefore, to the extent that nominal wages fell was due to downward nominal wage *flexibility*. This flexibility was greater in interwar Britain than in other settings for which we have estimates. However, given the scale of the job losses during the downturn, it is clear that wages were not flexible enough.

Figure 6: A Decomposition of Nominal Wages



Notes and sources: This figure shows actual and counterfactual average nominal wage growth in the United Kingdom between 1928 and 1936. The series have been calculated using information from the Ministry of Labour (1937, p. 88), Department of Employment and Productivity (1971, pp. 216-7), Feinstein (1972, T. 140), and Chadha et al. (2018). The shaded area represents recession from Chadha et al. (2022b).

How much more flexible did wages need to be to offset inflation, so that real wages were

approximately constant? To answer this question, I subtract retail price inflation from both sides of equation 7, set the left-hand side to zero, and solve for $\frac{N_t^-}{N_t}$ and $\frac{\Delta W_t^-}{W_{t-1}}$ respectively. This yields the following expressions:

$$\frac{N_t^-}{N_t}^* = \frac{N_t^+}{N_t}\frac{\Delta W_t^+}{\Delta W_t^-} - \pi_t \frac{W_{t-1}}{\Delta W_t^-} \tag{8}$$

$$\frac{\Delta W_t^-}{W_{t-1}}^* = \frac{N_t^+}{N_t^-}\frac{\Delta W_t^+}{W_{t-1}} - \pi_t \frac{N_t}{N_t^-} \tag{9}$$

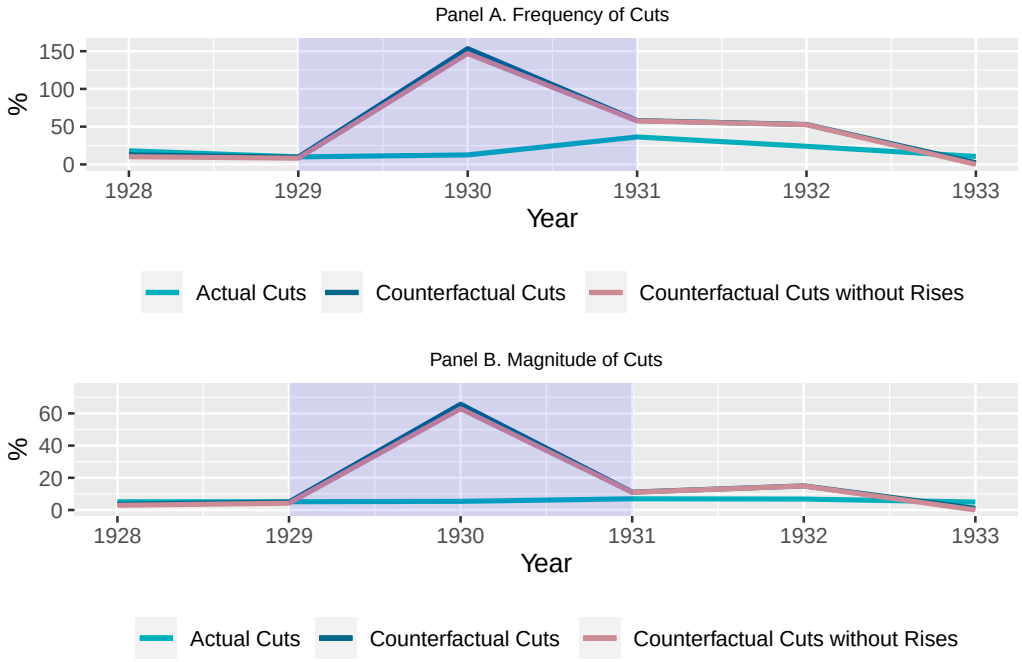
where π_t is retail price inflation. Equations 8 and 9 are the counterfactual frequency and magnitude of wage cuts that equate nominal wages with inflation respectively.

The results are shown in Figure 7. Panel A shows the simulation for the frequency of wage cuts, Panel B shows the simulation for the magnitude. The green lines plot the actual frequency and magnitude of wage cuts. The blue lines plot the counterfactual frequency and magnitude of wage cuts needed to equate nominal wage growth and inflation. The red lines plot the same as the blue except that wage increases are set to zero. In Panel A, the divergence between the green and the blue and red lines is striking. Despite a good deal of downward flexibility by modern standards, a much greater fraction of wages needed to fall given the scale of deflation, the magnitude of wage cuts, and the extent of wage rises. In 1930, for example, 153% of wages needed to be adjusted to offset deflation, compared to 12.5% in reality. While this might seem to be an error, remember that the average wage cut was 5% in 1930, while inflation was -7.9%. Thus, even if 100% of workers reduced their wages by 5%, it would not be enough to match deflation.[13] Beyond the specifics of the 1930s, the decomposition raises a general point: if the average nominal wage cut is less than deflation, then real wages will rise for any level of downward nominal rigidity.

In Panel B, the gap re-emerges between the green line and the blue and red lines. In 1930, for instance, for the 12.5% that received wage cuts, wages needed to be reduced by 65.7% to offset inflation. As the red lines show in Panels A and B, removing the wage rises

[13] If the GDP deflator (Sefton and Weale, 1995, pp. 181-8) is used in place of retail price inflation (Capie and Collins, 1983, p. 38), the results are qualitatively similar but more muted as the GDP deflator declined by less than retail prices, so a lower frequency and magnitude of wage cuts are necessary to offset deflation.

Figure 7: A Counterfactual Simulation of Nominal Wages



Notes and sources: This figure shows the actual and counterfactual frequency and magnitude of nominal wage cuts required to offset deflation in the United Kingdom between 1928 and 1933. The series have been calculated using information from the Ministry of Labour (1937, p. 88), Department of Employment and Productivity (1971, pp. 216-7), and Capie and Collins (1983, p. 38). The shaded area represents recession from Chadha et al. (2022b).

makes little difference to these conclusions, as rises were rare in the early 1930s.

Of course, cutting the wages of 153% of workers is impossible and reducing some wages by 65.7% is inequitable. There are, however, many intermediate solutions. The fairest scenario is equal pay cuts for all, which could have been achieved, for example, by universal sliding scales indexed to the cost of living.

6 Accounting for Stickiness

Why were some wages sticky? In this section, I explore three explanations that have

been proposed in the historiography: minimum wages, unionisation, and strikes. A natural way forward would be to use the industry-level information in a panel regression of the frequency of wages changes on various independent variables. However, the challenge of matching industries discussed in Section 4 is deepened when trying to link the frequency of wage changes from the Ministry of Labour and Department of Employment and Productivity with potential explanatory variables. Minimum wages, for example, were set by job not industry and also varied by gender and region.[14] On top of the issue of matching, there is another of endogeneity, stemming from reverse causality (strikes, for example, may be both a cause and consequence of wage changes) and from omitted variables (wages are an equilibrium outcome between employees and firms that depend on a long list of factors). In the absence of a credible research design that overcomes these empirical challenges, I advance by working through one potential explanation at a time, using the best available evidence in each case.

A. Minimum Wages

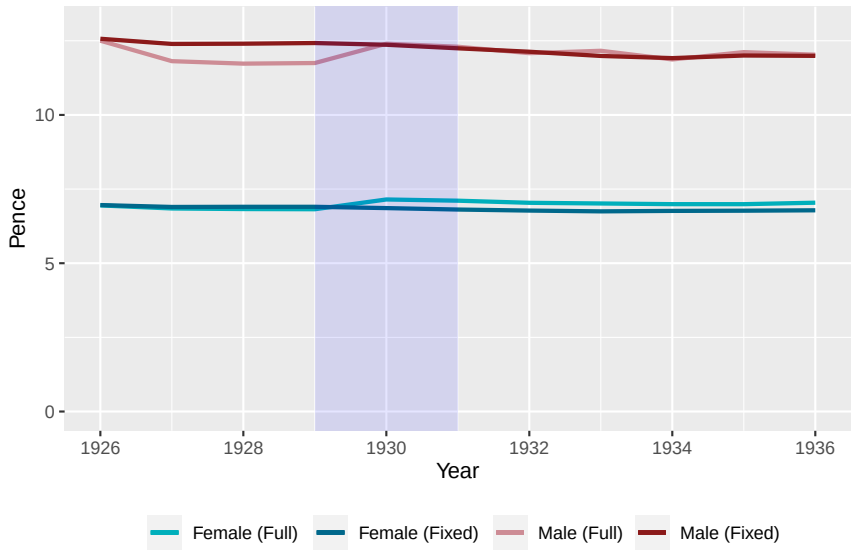
Pay in interwar Britain was governed by minimum wages set by Trade Boards. Solomou (1996, p. 95) conjectures that these legislated lower bounds may have been a binding constraint on firms that would have otherwise cut wages. In order to explore this possibility, I construct a data set on the full schedule of minimum wages from primary sources (Ministry of Labour, 1926-36), which was specific to job, gender, and region. The complexity of the legislation results in 1,414 job-gender-region-year observations between 1926 and 1936.

Figure 8 plots the average minimum wage in pence per hour for females (blue lines) and males (red lines). The darker lines are the average of a fixed sample of minimum wages that were in force during the full period. The lighter lines are the average of all minimum wages. Based on the fixed sample, which controls for the changing composition of jobs covered by the legislation, minimum wages fell for males and females each year between

[14]For instance, in the clothing industry, there were specific minimum wages for the jobs of boot and shoe repairing; button manufacturing; dressmaking and women's light clothing; hat, cap and millinery; and so on (Ministry of Labour, 1933, pp. 112-4).

1930 and 1933. However, the cuts were small – lower than 1.2% each year – which was less than the rate of deflation in 1930, 1931, and 1932. As a result, real minimum wages increased.

Figure 8: Average Minimum Wages

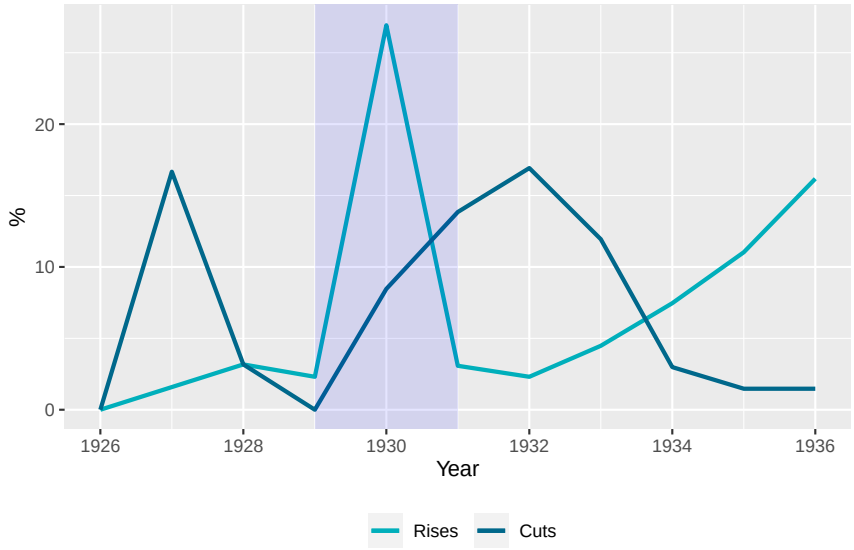


Notes and sources: This figure shows the mean minimum wage by gender in the United Kingdom between 1926 and 1936. The series have been calculated using information from the Ministry of Labour (1926-36). The shaded area represents recession from Chadha et al. (2022b).

Looking behind the averages, Figure 9 shows that 26.9% of job-gender-region rates were *raised* in 1930, but only 8.5% were cut. The frequency of cuts rose to 13.8% in 1931 and 16.9% in 1932. Therefore, nominal minimum wages were more sticky than actual nominal wages during the Great Depression. This suggests that the nominal floor may have propped up wages that would otherwise have fallen.

If minimum wages were a binding constraint, we would expect that wages would be bunched around the minimum. While the full distribution of wages is not available, we can look at a related piece of evidence. Under the Trade Boards Acts, the wage records of firms were inspected. If it was found that minimum wages were not paid, firms were required to compensate employees with arrears that were due to them. Therefore, if the distribution of wages was centred on the minimum, we would expect that more breaches would be

Figure 9: The Frequency of Rises and Cuts in Minimum Wages

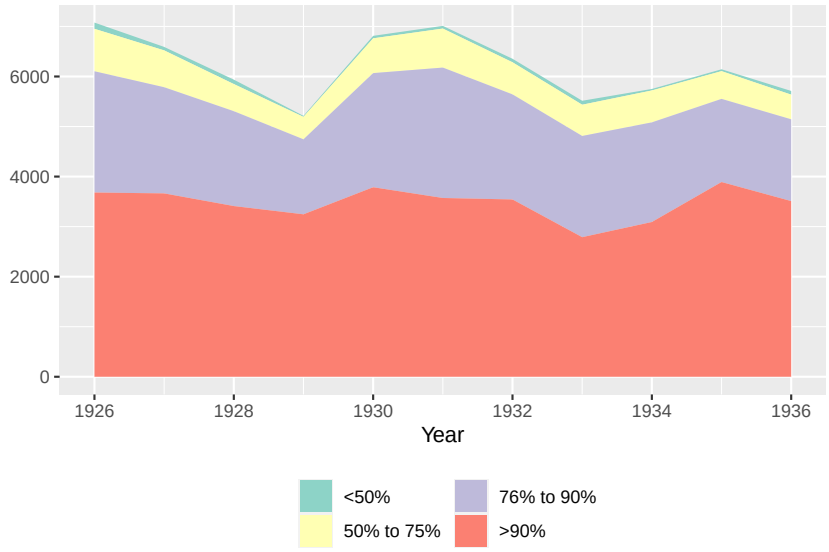


Notes and sources: This figure shows the frequency of rises and cuts in minimum wages in the United Kingdom between 1926 and 1936. The series have been calculated using information from the Ministry of Labour (1926-36). The shaded area represents recession from Chadha et al. (2022b).

uncovered by the inspectors. In Figure 10, each stack plots the number of employees that were underpaid by the fraction of the minimum wage that was paid. The sum of the stacks is the total number of underpaid employees. The figure suggests that the incidence and severity of breaches increased during the downturn. While breaches were uncommon in 1929, affecting 5,214 employees, there were 6,812 in 1930, and 7,011 in 1931. In addition, the breaches became more egregious. While 62.2% of underpaid workers were being paid at least 90% of the minimum wage in 1929, the proportion fell to 55.6% in 1930 and 50.9% in 1931. The implication is that there was an increase in the share being paid below 90% of the minimum wage.

Overall, this evidence is suggestive if not conclusive. On one hand, the breaches show that the minimum wage was not an important impediment, at least for the several thousand firms that were caught underpaying each year. On the other, the breaches suggest that for some jobs the shadow wage had sunk below the minimum wage, which policymakers did not fully adjust to the deflationary shock. Therefore, there may have been some insti-

Figure 10: The Underpayment of Minimum Wages



Notes and sources: This figure shows the number of employees that were underpaid by the fraction of the minimum wage that was paid in the United Kingdom between 1926 and 1936. The series have been calculated using information from the Ministry of Labour (1926-36).

tutional treacle that contributed to the stickiness of wages.

B. Unionisation

An interesting hypothesis is that unionisation had an impact on the rigidity of nominal wages. According to Broadberry (1986b, p. 91): "A combination of a decline in the proportion of the labour force unionised, and the playing of a cooperative game between unions, industry and government would explain the unusual degree of downward nominal wage flexibility until 1923. However, after that date, trade union density levelled out, and trade unions returned to their prewar non-cooperative perceptions on nominal wage bargaining."

That wages became more sticky after 1923 due to the stability of unionisation is not well suited to the data, which shows that unionisation had been as high as 41% during the

Great Slump, had fallen to 30% by 1923 and further still to 25% during the Great Depression (Ministry of Labour, 1937; Feinstein, 1972). In addition, while a minority of workers were members of unions, the majority received wage freezes during the Depression, as 78% and 63% of wages were unchanged in 1930 and 1931 respectively.

C. Strikes

Although unions are unlikely to explain nominal wage rigidity, a related factor, strikes is more promising. Hanes (1993) finds that strikes in the 1880s were associated with downward nominal rigidity in the recession of 1893 in the United States.[15] With the spectre of the General Strike of 1926 not long passed, in which 162 million workdays were lost (Ministry of Labour, 1937, p. 127), firms may have been reluctant to cut wages during the British Great Depression. Figure 11 charts the number of workpeople involved in strikes and lock-outs by cause, distinguishing those due to "wage increases," "wage decreases," and "other wage questions." As the economic outlook turned south, the numbers striking over wage questions increased from less than 38,000 in 1927 and 1928 to 440,000 in 1929 and persisted above 156,000 until 1932. The vast majority of these grievances were due to wage decreases. Thus, perceived and realised strikes over wage cuts may have been an important cause of downward nominal wage rigidity.

7 Means of Adjustment

The reverse of why some wages were sticky is why others changed. In order to answer this question, I use the returns filed to the Ministry of Labour (1937, pp. 92-3), which enumerated "the methods by which changes in rates of wages were arranged." The categories are: (1) By arbitration or mediation, (2) Under sliding scales: Cost of living, (3) Under sliding scales: Selling prices or proceeds of industry, (4) By standing joint bodies, and (5) By direct negotiation. The numbers reported are the "aggregate weekly amount of increases in rates of wages arranged" and "aggregate weekly amount of decreases in rates of wages

[15] In Sweden in the late nineteenth- and early twentieth-century, a significant share of strikes were caused by wage cuts (Enflo and Karlsson, 2019; Enflo et al., 2021).

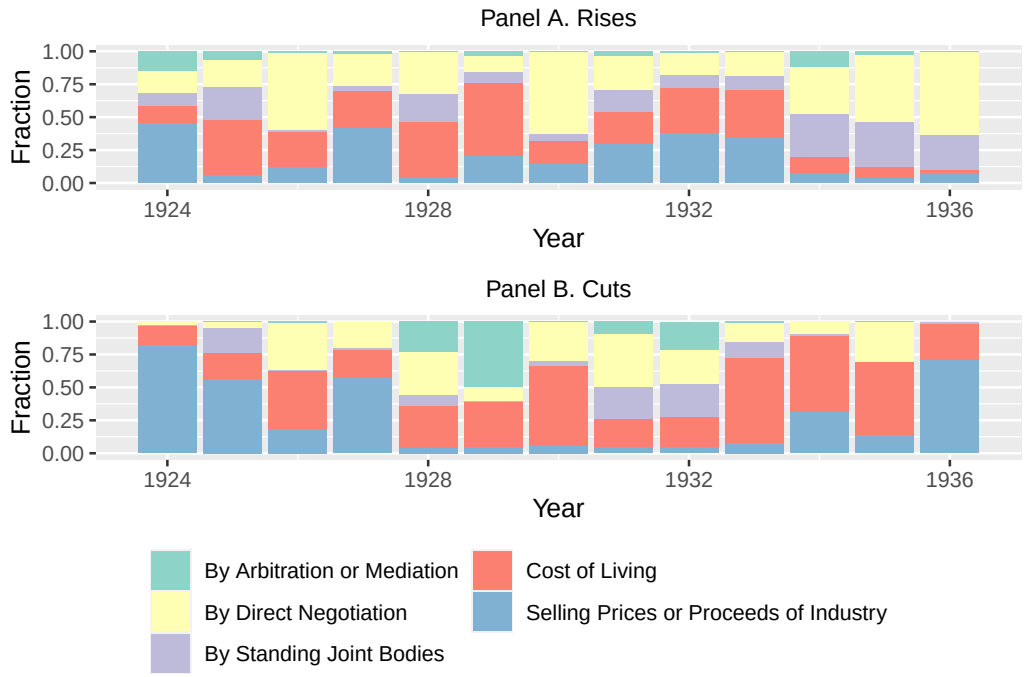
Figure 11: The Causes of Strikes

Notes and sources: This figure shows the number of employees directly involved in strikes and lock-outs by cause in the United Kingdom between 1927 and 1936. The series have been calculated using information from the Ministry of Labour (1937, pp. 132-3).

arranged."

While most of the categories are well understood, it is worth discussing sliding scales.[16] Sliding scales linked the nominal wages of employees to either the firm's product prices, the firm's profits, or to an economy-wide cost of living index (Trade Union Congress Archives, MSS.292/109.1/3). Wages were then adjusted periodically in response to fluctuations in these indicators. Therefore, sliding scales raised nominal flexibility. The more employees tied into sliding scales, the greater the flexibility. Indexing wages to output prices was common in the iron and steel industry, while linking wages to profits occurred in the coal industry (Trade Union Congress Archives, MSS.292/109.1/3). These sliding scales governed the wages of 220,000 employees in 1925 (Ministry of Labour, 1925, p. 269). Tying wages to the cost of living was routine in a number of industries, from food and drink to textiles, affecting the wages of "rather more than 2.5 million" employees in 1925 (Ministry

Figure 12: The Means of Adjusting Nominal Wages



Notes and sources: This figure shows the means of adjusting nominal wages in the United Kingdom between 1924 and 1936. The series have been calculated using information from the Ministry of Labour (1937, pp. 92-3).

of Labour, 1925, p. 228) and between 0.75 to 1.25 million in 1933 (Pool, 1938, p. 257).

Figure 12 plots the means by which nominal wages were adjusted upwards and downwards according to the returns collected by the Ministry of Labour. On average, the most common method for securing a pay rise and a pay cut was the sliding scale, of which linking wages to "selling prices or the proceeds of industry" was slightly more prevalent than to the "cost of living." The least common was by arbitration or mediation.

During the Depression, however, the mix changed. Sliding scales were still the biggest factor lowering wages, but it was the cost of living that weighed more heavily. Between 1930 and 1932, 33.7% of wage reductions were due to the automatic adjustments of sliding scales, of which 29.2% were accounted for by the cost of living and 4.5% by selling prices or the proceeds of industry. The next most common method of reducing wages was direct

[16]For an excellent description of the rise and fall of sliding scales in the United Kingdom and the United States, see Hanes (2010).

negotiation. Whereas 19.6% of wages had been cut in this way in the five years before the depression, 33.2% were directly negotiated during the slump. Other means also became more common, such as by standing joint bodies and by arbitration and mediation. The latter suggests that as the downturn became acute, the disputes became more serious and required external reconciliation.

8 Conclusion

An accepted fact in economic history is that nominal rigidity was a major amplification mechanism in the international Great Depression. However, outside of the United States, the best available evidence is on average wages, which is problematic for several reasons. In this paper, I document the first estimates of nominal rigidity in interwar Britain that are comparable to those for modern economies. In order to do so, I use information on millions of wages from primary sources. My findings suggest that it was not that the British labour market in the 1930s was especially downwardly rigid – it was actually quite flexible by modern standards – but that the scale of the nominal shock was such that unprecedented levels of flexibility were needed to flatten the spike in real wages and unemployment.

In the hierarchy of aggregation, I used data somewhere between micro data on individual wages and macro data on average wages. These intermediate aggregates allowed me to calculate the same key statistics that would have been possible with the micro data but impossible with the macro data. A limitation of the aggregates, however, is that the richness of the underlying micro data is obscured, preventing the investigation of other insights and extensions.

There are a number of interesting avenues for future research. One is to zoom in on nominal rigidity in interwar Britain by focusing on the industries excluded by the Ministry of Labour, such as agriculture and government, or on individual firms for which the necessary archival evidence survives. Another is to study nominal rigidity in the interwar period outside of the Atlantic economies of the United Kingdom and United States to further understand the transmission of the international Great Depression.

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