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## The Hidden Effects of Company Strikes: Workers Made Idle in UK Engineering and Metalworking from 1920 to 1970

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# The Hidden Effects of Company Strikes: Workers Made Idle in UK Engineering and Metalworking from 1920 to 1970\*

## Abstract

This study examines a neglected aspect of research on industrial relations: workplace disputes in which workers are incidentally made idle because of the strike actions of others. The work uses a comprehensive dataset from 1920 to 1970 compiled by the UK Engineering Employers' Federation (EEF), where membership embraces engineering and metalworking industries, including automotive and aircraft manufacture. During the interwar and wartime period (1920–45), relatively few workers were made idle compared with those directly on strike. In contrast, the post-war period (1946–70) saw a substantial rise in both the likelihood and scale of workers made idle. This was driven largely by sharp increases from the late 1950s with the onset of prolonged and previously unprecedented industrial conflict in manufacturing. Focusing on 1960–70, the study finds that in the later years, when the new Labour Government encouraged mergers in the car industry, the number of EEF workers made idle nearly matched the hundreds of thousands who were striking. Non-pay disputes were most likely to generate incidental idleness within the EEF companies, particularly those involving demarcation disputes, production constraints, working conditions, and redundancy.

## JEL classification

J52, L61, L62

## Keywords

company strikes, workers made idle, pay disputes, non-pay disputes, British industry

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## 1. Introduction

Using a unique data set compiled by the UK's Engineering Employers' Federation (EEF) over the period 1920 to 1970,<sup>1</sup> this paper focuses on an important aspect of strikes that has been generally under-researched. This is the phenomenon of non-striking workers who are incidentally made idle as the result of the strike actions of others. The total numbers of employee days lost in company strikes has generally resulted in large part from three broad causes: first, through the strike actions of employees over pay or non-pay grievances; second, because of workers made idle as a direct result of strike actions by their colleagues; and third, due to company workers made idle through strikes or layoffs in outside supply industries that caused supply shortages of intermediate production inputs.

The complete and comprehensive EEF strikes dataset is archived at the UK Data Service (Hart, 2008). It has been used previously to analyse the responses of strike durations, strike incidence, and strike outcomes to the business cycle, distinguishing between pay and non-pay strikes (Devereux & Hart, 2008, 2011). For each strike in 1920-70, the EEF dataset reports the name of the company involved,<sup>2</sup> the union(s) involved, the geographical engineering district (e.g., Aberdeen, Manchester, Coventry), the cause of the strike (differentiating between pay and non-pay disputes), its duration in days (with precise start and end dates),<sup>3</sup> the numbers and classes of workers involved (e.g., toolroom fitters, machine men), and each strike's outcome or resolution. Of relevance to the central focus of this paper, the data record

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<sup>1</sup> Established in 1896, the employers' federation was named the Engineering Employers' Federation in 1899. It merged in 1918 with the National Employers' Federation and became known as the Engineering and Allied Employers' National Federation. In 1961, it changed its name back to the Engineering Employers' Federation. The Federation's membership averaged about 4,500 companies over the period studied here (see Wigham, 1973, Appendix J). It accounted for between 30% and 35% of total UK engineering industry employment. A remarkable feature of this organisation is that it compiled, on a thoroughly systematic basis, a complete record of strikes for its member companies from 1920 to 1970.

<sup>2</sup> Sometimes in the dataset, the company listed may be a junior enterprise within a larger parent company, or conglomerate. Other times, the company listed for the strike can be the parent company. In all of what follows, companies are treated as distinct according to the EEF records, and no adjustments are made for substantial name changes, mergers, acquisitions, or conglomerates. This is returned to later in Section 3 when discussing the automotive industry in the period 1960-70.

<sup>3</sup> For strikes lasting less than a day, durations are reported in hours.

the number of workers on strike during each dispute, as well as the number of non-striking workers incidentally made idle within the same company.

Member companies in the EEF were primarily engaged in engineering and metal working, including automotive and aircraft manufacture. From 1920 to 1970, the EEF recorded 7,130 strikes among member companies. Over most of this 51-year period, the total numbers of workers made idle across the strikes, in any given year, were small relative to the numbers of workers actually on strike. However, there was a post-war jump in the likelihood and numbers of workers recorded as made idle by strikes within EEF companies, starting in the late 1950s. The work here includes an in-depth investigation of the period 1960 to 1970, in which the numbers of workers made idle across the strikes was comparable in magnitude to the numbers actually on strike. Without doubt this outcome was primarily due to problems in the British automotive manufacturing industry (see relevant narrative accounts in, e.g., Duncan et al., 1983; Galambos & Evans, 1977; Turner et al., 1967; Whisler, 1999). This occurred not least in the years that followed the merger in 1965 of the British Motor Company and its major supplier, Pressed Steel, which was encouraged by the new Labour Government (House of Commons, 1966; Ministry of Technology, 1966).

The remainder of the paper proceeds as follows. Section 2 describes the frequencies of workers made idle over the complete period, 1920 to 1970. Sections 3 and 4, focus further on the period 1960-70, and Section 5 concludes. The 1960-70 period merits this focus for two reasons. First, halfway through this decade there was a surge in the numbers of strikes and workers made idle across the major EEF companies, especially in the automotive industries. Second, given the EEF provides rich data with which to investigate this sudden phenomenon, it clearly demands special investigation. Section 3 largely concentrates on the duration of company strikes and on workers made idle. It also discusses union involvements in all strikes and in car strikes. Section 4 then concentrates on car strikes, including strikes with workers made idle. It differentiates between pay and non-pay disputes, finding exceptional

differences between these two types of strikes. The different types of pay and non-pay strikes are described, and a linear probability model is also estimated to assess which types of disputes were more or less likely to lead to other workers in the companies being incidentally made idle.

## **2. Strikes and workers made idle in the EEF from 1920 to 1970**

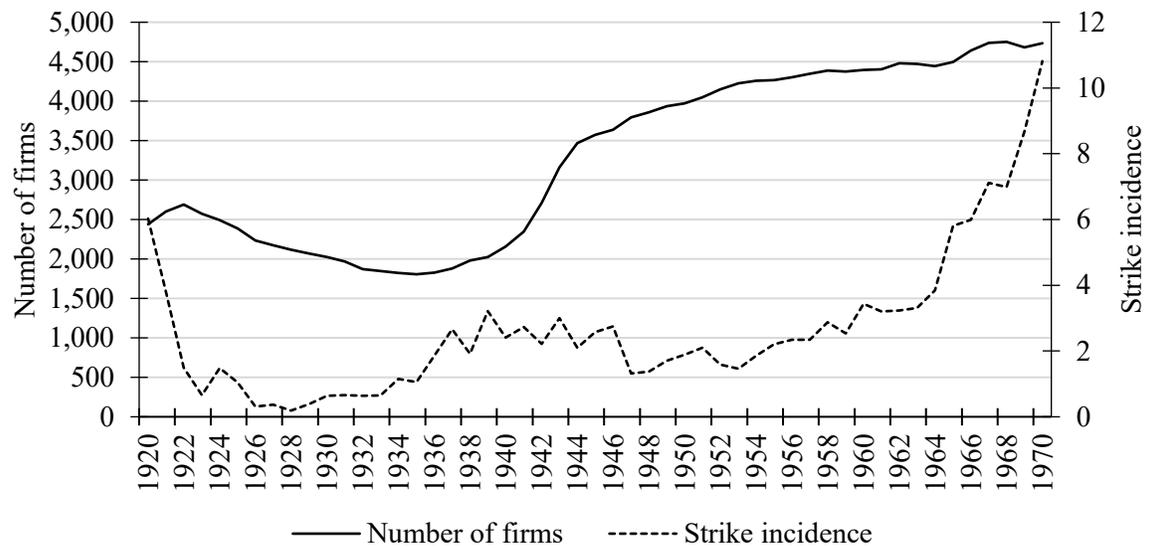
From 1920 to 1970, Figure 1 shows the annual number of EEF member companies together with their associated strike incidence. In the pre-war period, a peak of 2,690 member companies in 1922 declined monotonically to 1,806 companies by 1935. Thereafter, company numbers in the EEF rose to 3,571 in 1945. Excepting three very minor falls in 1959, 1963 and 1964, the post-war number of companies rose steadily from 3,636 in 1946 to 4,734 in 1970. Annual strike incidence fell from 6% in 1920 and, with a few slight deviations, remained below 1% till 1933. From 1934, the year marking the upturn from the trough of the Great Depression, strike incidence rose to between 2% and 3% from 1937 to 1945. This plateau was maintained until 1954, when it started to climb gradually to 1959, before rising exponentially to 11% in 1970.

What were the total impacts of these strikes in respect of both the numbers of workers on strike and incidentally made idle? Figure 2 demonstrates these numbers summed across all the EEF company strikes within each year in the 1920-70 period. It is important to note at this point that although the EEF data provide precise measures of the strike durations and numbers of workers involved, it is unknown whether in any given strike those workers were on strike or made idle for the whole duration. Even so, Online Appendix Figure B1 gives a complement to Figure 2 by weighting each company strike and its employee numbers by the duration, thus giving an upper bound on the total number of EEF working days lost in each year.<sup>4</sup>

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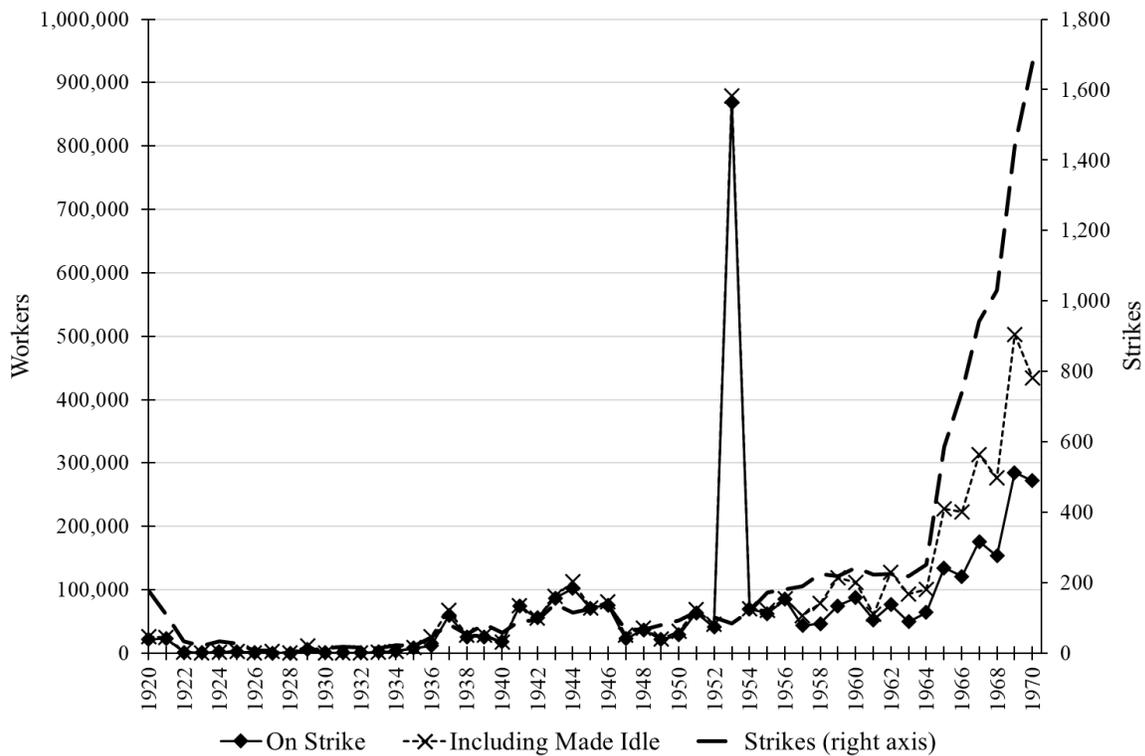
<sup>4</sup> The relatively short duration of strikes in later years is returned to later. This is also evident from comparing the patterns between Figure 2 and Online Appendix B1.

FIGURE 1: Annual numbers of EEF companies and associated strike incidence (%), 1920-70



Notes: Strike incidence is measured as the percentage of all EEF companies in a year that experienced a strike.

FIGURE 2: EEF total strikes and the total numbers of workers on strike or made idle across these strikes, 1920-70



Notes: The total numbers of workers on strike and made idle in each year are computed simply from summing these numbers across all the EEF strikes that started within the year. See Figure 3 for the relative amounts of workers made idle in each year. See also Online Appendix Figure B1, which provides a comparable figure showing weighted sums of the workers, where the relative weights applied across all strikes in the period use the durations of the individual strikes. The comparison of the unweighted and weighted series thus demonstrates that the strikes in the 1960-70 may have involved many workers but they were also on average shorter than in the earlier years of the dataset.

## **2.1 Workers made idle during the pre-war and war years, 1920-1945**

During the period 1920 to 1946, the average ratio of workers on strike to those made idle was approximately 10:1 in EEF member companies. There were three significant periods in this respect. These involved a national coal strike in 1920, the apprenticeship strike of 1937, and a large outbreak of strike activity toward the end of WW2.

### ***1920-21***

A classic cause of workers made idle is the loss of production inputs due to strikes in outside supply industries. Companies may fail to meet planned output targets due to strikes in outside companies that supply intermediate products. Effectively, workers are made idle due to unavoidable reductions in plant capacity utilisation. An important example of such an occurrence in engineering and metal manufacture occurred at the start of the EEF data in the early 1920s. It concerned in large part the national coal strike in 1920 which involved one million workers. Due to emergency government orders, there were sudden cuts in coal, gas, and electricity by 50%. Over the affected industries, 243,000 workers were laid-off by works closures while 248,000 worked short-time hours. Textile industries were most affected, followed by iron and steel, engineering and shipbuilding (Knowles, 1952, p.272). In the EEF specifically at this time (see Figure 2), workers were made-idle at rates of around 1 for every 5 and every 11 striking workers in 1920 and 1921, respectively (Figure 2).<sup>5</sup>

### ***1937***

The engineering apprenticeship strike of 1937 involved 32,500 apprentices, lasted for 94 days, and resulted in 406,000 working days lost (see Ryan, 2004). Since EEF companies featured prominently in

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<sup>5</sup> Knowles (1952) also reports that a national coal strike in 1912 lasted for 6.5 weeks and involved 93% of workers in the coal industry. This would have had an even more serious effect on working days lost compared to 1920, since 60% of workers were made unemployed in iron and steel trades.

this action, the apprenticeship strike would have accounted for a significant proportion of the Federation's total (i.e., covering all 83 strikes that year) of 59,200 striking workers and 8,403 made idle (Figure 2).

As discussed in Hart (2005), apprentices in the EEF trained for 5 to 7 years, depending on their employment start date and a strictly enforced end date at age 21. The great majority left school at the age of 14. Most trained in one occupation, for example a fitter or erector or turner or boilermaker. They typically worked under the supervision of a so-called journeyman. Because their terms of apprenticeship were so long and their trades relatively narrow, they were typically employed in direct production roles well before the end of their apprenticeship service. Usually, they were unsupervised by the time of their final year. So, the apprentices strike of 1937 not only involved young trainee apprentices but also high proportions of skilled productive apprentice labour. A critical loss of high-end skilled apprentices due to the strike may well have created idle non-apprenticed, less skilled, workers due to acute shortages of skilled supervision.

### *1944*

As shown in Figure 2, there were high levels of strike activity in the EEF in the war years from 1941 to 1945, peaking at 139 strikes in 1943, spilling over as well into 1946 with 138 strikes. The relative rate of workers made idle peaked significantly in 1944, to approximately 1 for every 10 workers on strike. Across all the main industries (Mining, Textiles, Engineering, Transport, Building, Clothing, 'Other' Industries), the great majority of the strikes occurred in coal mining and engineering.<sup>6</sup>

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<sup>6</sup> Knowles (1952 – Statistical Appendix, pp. 307-309) provides detailed statistical data for these industries in respect of numbers of strikes, workers and days lost. The numbers of workers involved include both those taking strike action and other workers (not separately reported).

Within the EEF, 1944 marked by far the highest magnitude of strike activity in the war years, with 102,387 workers on strike across the sum of the 116 strikes.<sup>7</sup> One notable feature of the industrial conflict in the later war years was that there were many unofficial strikes of short durations.

## **2.2 Workers made idle during the post-war years, 1946-70**

Apart from an exceptional one-day strike across all unions in 1953, involving relatively few workers made idle (see Wigham, 1973 p.174 and Appendix H), significant EEF strikes did not commence until after the mid-1950s. Figure 3 shows the relative amounts of workers made idle across EEF company strikes within each year from 1946 to 1970, expressed as a percentage of the sum of workers on strike and made idle. From 1956, there was a marked increase in these percentages, reaching 40% by 1958, before dropping back down to 14% by 1961, and then fluctuating between 36% and 47% in 1962-1970. In 1969, which was the peak in terms of the 285,000 workers involved across EEF strikes that year, there were 218,000 instances of an employee made idle by a strike within their company. It is notable that the numbers of EEF strikes at first rose steadily during this period, from 181 in 1956, to 251 by 1964, before sharply rising in the last few years, reaching 1,676 in 1970.

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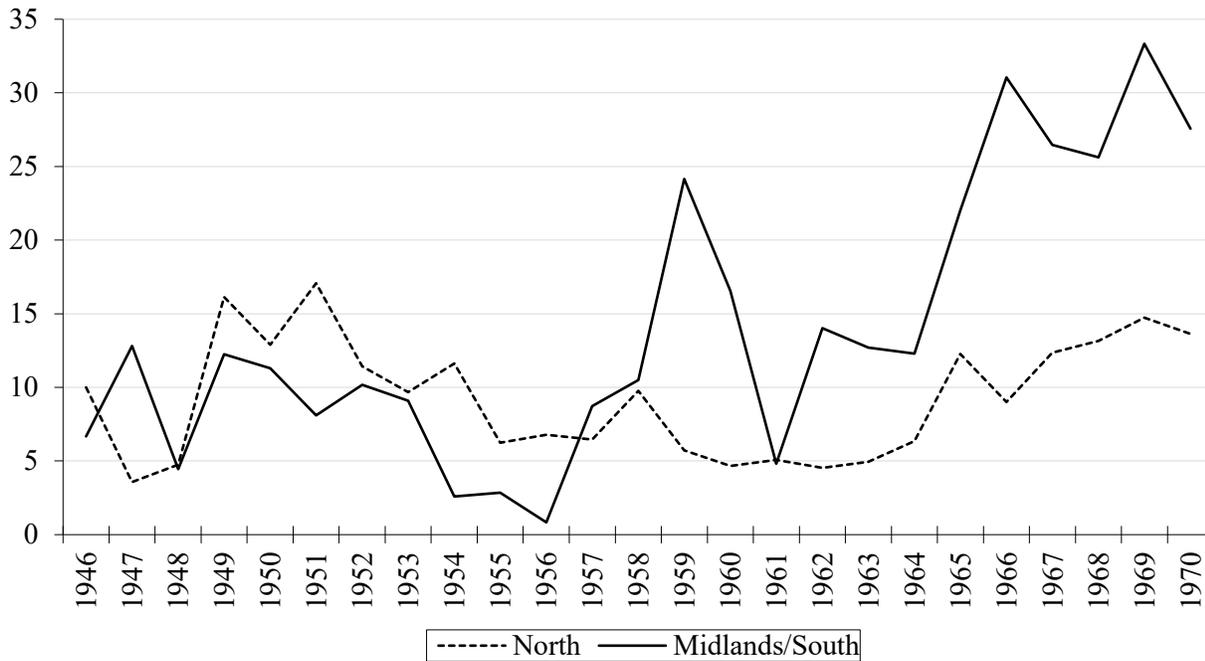
<sup>7</sup> Inman (1957, pp. 395-406) provides a useful overview of the strike activity in the run-up to and during the war.

FIGURE 3: Percentages of total workers directly affected by company strikes who were made idle (as opposed to on strike), 1946-70



A further key insight is demonstrated in Figure 4, which compares the percentages of EEF strikes involving workers made idle by year, differentiating between companies in the northern and midland/southern UK districts. In the early part of the post-war period, the northern districts displayed a modestly higher percentage of strikes with any workers made idle. Starting in 1956, there was a pronounced shift in such strikes in the midland and southern EEF districts. After a dip in 1961, the percentage of strikes with any workers made idle in these locations reached around 30% by the end of the period. This was twice the size of the percentages in northern districts. Production in the midland/southern EEF districts was dominated by modern engineering industries, including car, aircraft, and machine tool manufacture. Automotive industries are especially important to what follows. In contrast, the northern districts were dominated by more traditional engineering and metal working activities, such as marine engineering, textile engineering, and the manufacture of agricultural machinery.

FIGURE 4: Percentages of EEF strikes with workers made idle: northern vs midland/southern UK districts, 1946-70



### 3. Car company mergers and the EEF strikes from 1960 to 1970

From 1960 to 1970, the EEF averaged 4,567 member companies. Table 1 shows the strike frequencies for the 858 distinct companies in the EEF records that experienced pay strikes, and the 765 companies that experienced non-pay strikes during this period. Most companies affected by strikes over this period experienced less than 6 disputes. In sharp contrast, on the right tails of the strike distribution, 17 companies were involved in more than 50 disputes. Table 2 shows that these 14 EEF companies that had at least 50 recorded strikes in the dataset account for 32% of the pay disputes and 48% of the non-pay disputes.<sup>8</sup> In fact, two EEF member companies stand alone in Table 2, in terms of the magnitude of their strike activity in 1960-70: the British Motor Corporation (BMC) (1,331 strikes, 23% of all EEF strikes in the period); and British Leyland (BL) (480 strikes, 8% of all EEF strikes in the period, but concentrated

<sup>8</sup> The numbers across Tables 1 and 2 do not tally perfectly. This is because for Table 2, to emphasise the relevance of the mergers in the automotive industries, we grouped the individual EEF member companies that formed the British Motor Corporation and subsequent British Leyland conglomerates.

in the final two years, 1969-70). Notably, these two companies also experienced disproportionately large shares of all EEF member non-pay-related disputes, compared relatively with disputes over matters of pay.

TABLE 1: Frequency of EEF company pay and non-pay disputes, 1960-70

Strikes per Company	Pay Disputes	Non-Pay Disputes	All
1	416	417	539
2 – 5	312	262	446
6 – 10	70	44	100
11 – 20	33	25	56
21 – 50	18	11	33
51 – 100	6	1	10
> 100	3	5	7
Number of Companies	858	765	1,191
Total Strikes	3,651	3,477	7,158

The BMC was formed in 1952 by the merger of the Morris and Austin motor companies, both based in the West Midlands, in and around Birmingham. At that point, BMC became comfortably the largest car manufacturer in Great Britain (Times, 1952a, 1952b). When the Labour Government of Harold Wilson came to power in 1964, there was a publicly declared strategy to arrest the decline in British manufacturing output and competitiveness by promoting and supporting mergers, especially in the automotive industry (Ministry of Technology, 1966; House of Commons, 1966). As a result, in 1965 BMC merged with its major supplier, Pressed Steel (27,000 employees), which already provided its car bodies (The Times, 1965; British Motor Corporation, 1966). The following year, BMC also merged with Jaguar (7,000 employees) (The Times, 1966). Another large operator in the British car industry at this time was the Leyland Motor Corporation. Notably, Leyland had merged with Triumph in 1960 and Rover in 1967. Under pressure from the Wilson Government, in 1968 a merger was proposed between BMC and Leyland, which became British Leyland (BL) (Department of Trade and Industry, 1968; House of Commons, 1968a, 1968b).

TABLE 2: EEF Companies with over 50 pay-related and/or non-pay-related disputes, 1960-70

	Pay	Non-Pay	Total
British Motor Corporation Ltd., 1960-69 <i>Cars: Austin, Morris, MG, Pressed Steel (1965-69)</i>	400	931	1,331
British Leyland Ltd., 1969-70 <i>Cars: Leyland + British Motor Corp.*</i>	159	321	480
Joseph Lucas Ltd. <i>Automotive components</i>	81	36	117
Rolls Royce Ltd. <i>Jet engines &amp; cars</i>	55	53	108
Hawker Siddeley Ltd. <i>Aircraft</i>	58	39	97
Smiths Industries Ltd. <i>Clocks, watches, and automotive instruments</i>	50	41	91
Rover Co. Ltd. <i>Cars</i>	52	39	91
Plessey Co. Ltd. <i>Electronics, avionics</i>	51	21	72
English Electric Co. Ltd.***	91	49	42
Babcock & Wilcox Ltd. <i>Nuclear power</i>	40	30	70
General Electric Company Ltd.***	34	28	62
Associated Electrical Industries Ltd.***	41	18	59
Bristol Siddeley Engines Ltd. (1960-67)** <i>Aircraft engines</i>	27	28	55
International Harvester Co. (GB) Ltd. <i>Agricultural, Automotive</i>	28	24	52
Total	1,167	1,658	2,727
Percentage of all EEF strikes (%)	32	48	38

Notes: The main manufacturing output and notable brands (pre-merger companies) are shown in italics. The numbers for British Motor Corporation and British Leyland are lower bounds, as there were several small subsidiary companies of these conglomerates that are also represented in the EEF dataset. \* Excludes Rover Co. Ltd., which was acquired by Leyland in 1967 and became part of British Leyland. \*\* Acquired by Rolls Royce. \*\*\* Had all merged by 1968 – the defence arm later became BAE Systems Ltd.

In the EEF data, we observe records of dispute activity at individual member companies such as BMC Ltd., Austin-Morris, and Rover operating under the BL conglomerate through to 1970, and we also observe strikes being recorded specifically under the BL company name in 1969 and 1970. The Leyland Motor Company, which operated through to 1968, is notably absent from Table 2. In fact, the exceptional industrial dispute activity within the EEF appears to have started around the time of the first Labour-government-backed merger of BMC with Pressed Steel, happening within the BMC and its subsidiary companies, before transferring into BL in 1969-70.<sup>9</sup> Therefore, it would not be an exaggeration to state that the exceptional onset of strike activity in the EEF, which began in the mid-1960s, was centred around a single organisation, the BMC, its subsidiaries, and its successor BL, all predominantly within the West Midlands, in and around Birmingham (see Figure 4).<sup>10</sup>

In general, ‘Car strikes’ (at companies directly involved in any car manufacturing) displayed a spectacular increase in their share of total EEF strikes during the 1960-70 period. As shown in Online Appendix Figure B2, from 1960 to 1964 the car strikes averaged less than 5% of total EEF strikes. Thereafter, they rose steeply to 31% of total strikes in 1969. Online Appendix Figure B3 further shows that non-pay disputes were the cause of around a half of all strikes throughout the period. However, for car companies alone, the comparative distributions of pay and non-pay strikes over this period were more erratic. Non-pay strikes averaged 35% of total car strikes from 1960 to 1964, before almost doubling to an average of 68% from 1965 to 1970. This coincides with the incidence and numbers of workers made idle during strikes displaying exponential growth (see Figure 2).

Online Appendix Table A1 compares the average and median strike durations for both all EEF companies and only car companies, distinguishing between all strikes and those involving workers made idle. There

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<sup>9</sup> Hyman (1989, p. 225) describes British Leyland as the most notable example where ‘government willingness to fund investment programmes (or to offset operating losses) has been directly proportionate to management rigour in attacking established collective agreements.’

<sup>10</sup> For an alternative and more developed narrative account of this period of significant change and upheaval in the British car industry, see Whisler (1999).

are three main observations. First, the average durations among all companies are longer than those among only the car companies. Second, both for all companies and car companies, pay-related strike durations are on average longer than non-pay durations. Third, EEF strikes in this period displayed generally low (in days) average durations. Online Appendix Figure B4 shows kernel density plots for the natural logarithm of EEF strike durations during 1960-70, depending on whether the strike was non-pay or pay-related, and whether in each case any workers were made idle at the company. Across all these categories of strike, there is a substantial mass of very short strikes, of around one day, with also a substantial mass of strikes that lasted less than a day. Online Appendix Figure B4 further shows that such short strikes were especially common for pay-related disputes where workers were made idle.

Online Appendix Table A2 demonstrates an additional distinguishing feature of the car strikes, showing the frequency distributions of the numbers of unions operating in all EEF member company strikes and separately in only the car strikes in 1960-70. Compared to a percentage frequency across all companies of 67% for disputes involving single unions, the equivalent percentage for car disputes is only 37%. Where two or three unions were involved per dispute, the respective percentage for all companies is 28% compared with 62% in car companies.

#### **4. Relative probabilities of workers made idle by strikes, 1960-70**

Figure 2 shows that strikes involving workers made idle reached exceptional levels during the period 1960 to 1970. Starting in 1964, the growth in the numbers of workers made idle greatly exceeded that of the workers on strike. The EEF reports on the underlying causes of its strikes – the main issue under dispute. Based on this information, Table 3 shows the constructed categories of pay and non-pay disputes together, with brief descriptions and their relative frequencies over the 1960-70 period. This section examines whether there were significant differences between the probabilities of EEF strikes involving

workers made idle, as opposed to involving strikers only, according to the underlying nature of the dispute, be that pay or non-pay related. From this analysis of what was happening in the British engineering and metal working industries during this period, conclusions can be made not only about the features of the strikes, but also why they additionally led to hundreds of thousands of employees and millions of working days lost among those made idle because of the strikes.

#### **4.1 Dispute categories and the frequency of workers made idle by strikes**

Table 3 also shows what proportion of the EEF strikes in 1960-70, by category of dispute, involved workers made idle. Among all the pay disputes, just over half, 52%, concerned issues around base wages. However, only around one in eight of these disputes (13%) resulted in any workers at the company being made incidentally idle by the strike. The other frequent types of pay-related dispute, regarding either bonuses or piece rates, also infrequently led to workers made idle: occurring approximately during one in four and one in five of such strikes, respectively.<sup>11</sup>

Without doubt and as Table 3 demonstrates, non-pay-related disputes were substantially more likely to result in workers made idle in the EEF companies. It is especially noticeable that some dispute types were associated with a high likelihood of workers being made idle. Job demarcation disputes, which constitute the major cause of 5.4% of the non-pay strikes in the 1960-70 period, resulted in workers made idle in one of three such cases (33%). Over half of the strikes caused by production constraint disputes resulted in workers made idle. Other similar causes of EEF company strikes, which were generally much more likely than others in this period to involve workers made idle, included work environment (42%) and work flexibility (39%).

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<sup>11</sup> Hyman (1989, p 47.) described figures from October 1967 of basic wage rates for fitters and labourers of £9.37 and £11.08, respectively, and contrasts these with actual average wages in vehicle manufacturing of £24.42. The difference was the result of piecework and overtime, both of which required workers to organise and bargain effectively.

TABLE 3: Pay and non-pay main causes of EEF strikes, and the incidence of workers made idle by strikes for each cause, 1960-70

Pay Disputes (N=3,651)	Relative frequency (%)	Workers made idle by strikes (%)	Non-Pay Disputes (N=3,476)	Relative Frequency (%)	Workers made idle by strikes (%)
1. Wages	52.3	12.9	1. Wrongful dismissal	12.2	8.2
2. Bonuses	16.9	19.6	2. Treatment of workers	10.0	24.6
3. Piece rates	12.9	24.6	3. Union-related <i>(e.g., employment of non-union workers, inter-union disputes)</i>	7.4	15.6
4. Relative pay <i>(mainly disputes about pay differentials among skill groups)</i>	3.1	17.9	4. Redundancy	4.1	13.5
5. Systems of pay <i>(e.g., rate fixing, abolition of piecework system)</i>	5.0	20.6	5. Use of outside labour	0.9	16.7
Holiday pay	2.1	1.3	6. Supervision/Management <i>(e.g., objection to attitude of foreman)</i>	4.3	18.7
6. Payment for time lost <i>(mainly waiting time payments due to downtime)</i>	6.4	37.1	7. Timing of job tasks <i>(e.g., time of piecework, objections to work time investigations)</i>	6.1	21.1
7. Miscellaneous <i>(incl., overtime, shift/night rates, holiday time)</i>	1.2	28.3	8. Job demarcation <i>(see Section 5)</i>	5.4	33.0
			9. Production constraints <i>(see Section 5)</i>	4.5	54.8
			10. Sympathy with others <i>(largely sympathy with workers directly involved in strikes/disputes)</i>	3.4	8.6
			11. Work environment <i>(e.g., work conditions too cold)</i>	10.2	41.9
			12. Working hours	7.5	24.1
			13. Work flexibility <i>(e.g., switching labour to alternative tasks, cover for absenteeism, work reorganisation)</i>	10.3	39.4
			14. Delay in/Refusal to open negotiations	4.4	22.7
			15. Attendance at union meetings <i>(e.g., attendance at an unofficial meeting during work hours)</i>	3.0	33.6
			16. Miscellaneous <i>(incl., Apprentices – 0.1%)</i>	6.2	30.1

So, why were there fewer instances of workers made idle by strikes in respect of pay awards compared to non-pay disputes? The pay structures across most of the EEF companies were linked traditionally to the wages of fitters and labourers. For example, the average hourly earnings of time workers and pieceworkers in June 1953 were set in order of company status in nine descending job roles: toolroom fitters, sheet metal workers ... and so on to fitters in fifth place ... and then to labourers in the final category (Knowles & Hill, 1954, Appendix C, p32). While companies were allowed to deviate from EEF suggested pay levels 'in most occupations [they] are related to fitters and labourers in one way or another' (Knowles & Hill, 1954). This suggests that wide levels of agreements by unions, employers and workers, in respect of relative pay across companies with different skill requirements, probably helped to limit serious or frequent company disputes over pay.<sup>12</sup>

In contrast, to illustrate problematic management issues in relation to non-pay strikes and workers made idle, we return to two of the specific dispute types highlighted by the patterns in Table 3: production constraints and demarcation.

**Production constraints.** These disputes concern interrupted workflow. Examples from the specific dispute descriptions within the EEF data include 'under-manning', 'absenteeism causing extra work', 'alteration in the work sequence', 'problems with the work schedule', 'disruption due to line breakdowns' and 'poor workflow from other work groups'. In work environments with highly interrelated production and job task sequences, a dispute in one localised work section may disrupt workflow in other sections that are not directly involved. Line production is obviously vulnerable to such knock-on effects. The most prominent EEF example of line production is car assembly: work disputes in a segment of the line may well entail both downstream and upstream repercussions (see Hyman, 1989, p. 37). Downstream sections will suffer from a disrupted production flow. Upstream activity will be slowed down as bottlenecks accumulate. It is not unreasonable to suppose that the company mergers in the car industry – especially vertical mergers with major suppliers, such as

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<sup>12</sup> Specifically in the car industry, very many strikes that were classified officially as due to wage increases were in fact from differences and comparisons of pay within the same plant or company (Turner et al., 1967, p. 63).

between Pressed Steel and the BMC in 1965 – may not only have exacerbated disputes caused by interrupted workflows but also increased the incidence of worker idleness elsewhere in the firm when strike action disrupted one or more stages of the production process.

**Demarcation.** These disputes refer to disagreements between different unions representing workers in the company over the allocation of work tasks across different job and skill categories of workers. They may also involve worker disputes within a single union. A union may take strike action in the belief that work tasks most appropriate to its members have been allocated inappropriately to workers in another union.<sup>13</sup> Specific examples of such disputes recorded in the EEF data include objections to ‘labourers being employed on plate moulding’, ‘the class of workers being employed on coreblowing machines’, ‘the employment of youths in certain job tasks’, ‘the employment of semiskilled labour on sandslinging machines’, and ‘the class of labour employed on metal pattern machining’. Alternatively, and with the same possibility of outcome, an aggrieved category of workers may take strike action because they consider that they are being required to perform job tasks that should be undertaken by work colleagues working under different job descriptions. As with production constraints, such demarcation disputes seem likely to emerge following mergers, when newly merged companies attempt to redeploy workers and realise the economies of scale and efficiency gains that motivated the mergers in the first place, as in the case of the government-backed mergers in the British car industry in the late 1960s.

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<sup>13</sup> In fact, such objections may arise while a group of workers are on strike. For example, there is a case in the EEF records of a dispute involving the claim that non-testers handled work while testers were on strike.

## 4.2 Regression analysis of workers made idle and the causes of disputes

The descriptive patterns in Table 3 have given a first sense of what dispute types were causing the exceptional surge of workers made idle by EEF company strikes in the 1960s. In this section, regression analysis is employed to control for other covariates, such as the duration of the strike and the identity of the companies involved, to arrive at more robust conclusions.

First, let  $Y_i = 1$  if strike  $i$  involves workers made idle and  $Y_i = 0$  for a strike in which only direct strikers are involved. Then, consider a simple linear probability model specification<sup>14</sup> of the following form:

$$Y_i = \alpha + \beta_1 Dur_i + \beta_2 Urate_i + \sum_{k=1}^K \gamma_k C_{ki} + \phi_{F(i)} + \theta_{U(i)} + \delta_{D(i)} + \mu_{M(i)} + \sigma_{T(i)} + \varepsilon_i \quad (1)$$

where  $Dur_i$  is strike duration in days (see Online Appendix Figure B4), and  $Urate_i$  is the unemployment rate in EEF district and month corresponding to the location of the strike and when it began.<sup>15</sup> These district unemployment rates are based on the 54 EEF districts (see Online Appendix Table A3 for a list of the districts and the sources of the district unemployment rates).

Equation (1) also includes four sets of fixed effects:  $\phi_{F(i)}$  control for the EEF company,  $f = F(i)$ , where the strike  $i$  took place;  $\theta_{U(i)}$  give union,  $u = U(i)$ , fixed effects – when multiple unions were involved in the strike, each observed combination is addressed as though it is a distinct union type;  $\delta_{D(i)}$  control for the 54 EEF strike location districts,  $d = D(i)$  – some companies have plants and thus strike locations in multiple districts;  $\mu_{M(i)}$  and  $\sigma_{Y(i)}$  give month,  $m = M(i)$ , and year,  $t = T(i)$ , fixed effects for the start date of a strike.<sup>16</sup> As such, through these fixed effects, Equation (1) addresses

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<sup>14</sup> This model choice is conditioned by the fact that the regressions control for company, engineering district, union, and time fixed effects, and so fixed effects probit or logit regression models may be biased due to the incidental parameters problem (Greene, 2004).

<sup>15</sup> There are no censored durations because all reported strikes had ended by the end of the dataset period. For notable studies on the cyclicity of strike activity in the UK and US, around the periods we study, see, for example: Card (1988), Devereux and Hart, (2011); Harrison and Stewart (1994); Ingram et al. (1993), McConnell, (1990); Vroman (1989).

<sup>16</sup> Fixed effects for the more prescriptive interaction of month×year were also considered, with results that are qualitatively and approximately quantitatively robust to the choice of a more parsimonious specification. These results are available from the authors upon request.

the general tendency of workers to be made idle during a strike according to the company and unions involved, the location of the strike, the month of the year (seasonality), and any underlying trend or pattern across the years in the 1960-70 sample period.

Finally, the main variables of interest in Equation (1) are the set of mutually exclusive indicators  $C_{ki}$  for the cause of the strike, as per the categories listed and described by Table 3. The estimates of the associated parameters,  $\gamma_k$ , then trace out and allow tests of whether the different issues of dispute causing the strikes were more or less likely than others to result in workers being made idle, conditional on the strike duration, the local economic conditions – proxied by the district unemployment rate – and all the other factors addressed by the fixed effects, including the identity of the company involved.

In estimating Equation (1), the sample of strikes are separated into the distinct sets of pay and non-pay disputes. As such, for the pay disputes model, there are  $K = 7$  dispute cause categories, and the chosen excluded category for estimation is ‘Systems of pay’. For the non-pay disputes model,  $K = 16$  and the excluded category is chosen to be ‘Treatment of workers’. Equation (1) is estimated first with ordinary least squares (OLS) but then also with an instrumental variables (IV) estimator, wherein the model is exactly identified, with strike duration being instrumented by an indicator of whether the EEF recorded that the strike followed their laid down procedures for a dispute. The potential endogeneity of strike duration in the regression model is obvious, via reverse causality, and is thus addressed with what turns out to be a strong instrument (see the Cragg-Donald F-statistics reported in results Tables 4 & 5). Online Appendix C provides further description of this specific aspect of the EEF dataset and the justification for the choice of instrument. Finally, standard errors are estimated robust to clustering at the level of the district, month and year, all interacted, addressing any interdependence of EEF strikes occurring at roughly the same time in the same part of the country.

### 4.3 Estimation results & discussion

Tables 4 and 5 show the estimation results of Equation (1), for the two sets of pay and non-pay strikes, respectively.<sup>17</sup> In each table, the first column reports the OLS estimates, while the second column reports the IV estimates. The comparison indicates that the positive and statistically significant effects of strike duration on the probability that workers are made idle is substantially downward biased in the OLS specification.<sup>18</sup> It is also noteworthy that there is no evidence that the local district unemployment rate influenced the likelihood of workers being made idle during a strike.

The main estimated parameters of interest,  $\hat{\gamma}_k$ , which demonstrate the conditional relative likelihood of different dispute types being associated with any workers made idle, are more easily interpreted, along with their 90% confidence intervals, in the coefficient plots given by Figures 5 & 6 for pay and non-pay disputes, respectively. In these figures, the estimated coefficients from the IV specifications for each dispute category are ordered from top to bottom by magnitude. All coefficients are interpreted relative to the excluded categories. They should be read together with the sample averages for the incidence of workers made idle by each dispute cause (Table 3).

In general, the linear probability estimates in Table 4 and Figure 5 do not demonstrate evidence of differences between the likelihoods that workers are made idle by strikes from different types of pay-related dispute. There is only weak evidence that bonus payment disputes significantly increase the probability of workers being made idle relative to the excluded category, systems of pay.

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<sup>17</sup> Note that 632 pay-related strikes are dropped from the estimation sample, as well as 629 non-pay related strikes, because they are singleton observations – singular observations in the cells defined by the sets of model fixed effects.

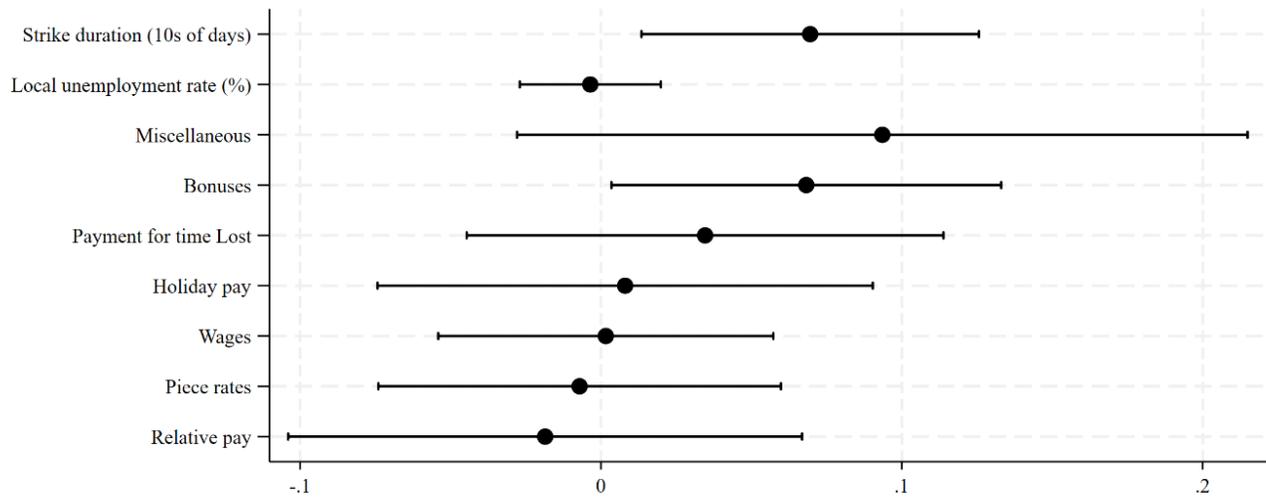
<sup>18</sup> The strength of the instrument is demonstrated by the large and statistically significant Cragg-Donald F-statistics, reported in the tables – the null of a weak instrument can be rejected at standard levels in both cases.

TABLE 4: Linear probability estimates for whether workers were made idle by a pay-related strike, 1960-70

	OLS (1)	IV (2)
Strike duration (10s of days): $\beta_1$	0.0364*** (0.00763)	0.0695** (0.0341)
Local unemployment rate (%): $\beta_2$	-0.00364 (0.0159)	-0.00354 (0.0142)
Wages	0.000157 (0.0382)	0.00161 (0.0339)
Bonuses	0.0640 (0.0440)	0.0682* (0.0394)
Piece rates	-0.0126 (0.0453)	-0.00710 (0.0407)
Relative pay	-0.0226 (0.0576)	-0.0185 (0.0519)
Holiday pay	-0.00161 (0.0520)	0.00804 (0.0500)
Payment for time Lost	0.0271 (0.0530)	0.0346 (0.0482)
Miscellaneous	0.0897 (0.0837)	0.0935 (0.0738)
Constant	0.165*** (0.0508)	3.50e-11 (0.00549)
Cragg–Donald $F$ stat.		143.9
$R^2$	0.437	
$N.$ of strikes	3,019	3,019

Notes: See Equation (1). See Table 3 and the main text for descriptions of dispute category variables. See Figure 5 for a plot of the IV coefficient estimates. All models include fixed effects for firm, union, district, year, and month. The excluded dispute type is ‘Systems of pay’. Standard errors (in parentheses) are clustered at the level of the district-month-year. \*, \*\*, \*\*\* indicate significance from zero at the 10%, 5% and 1% levels, respectively, two-sided tests.

FIGURE 5: Linear probability model coefficients (IV): Whether workers were made idle, *pay* disputes, 1960-70



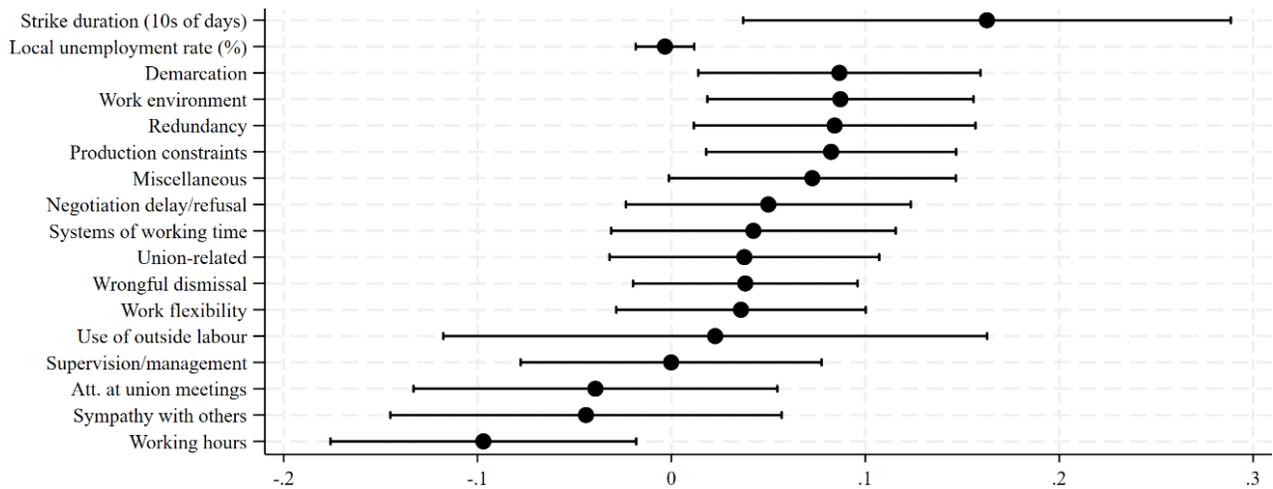
Notes: See column (2) of Table 4 for full estimates and details. The excluded dispute type is ‘Systems of pay’. The bars show 90% confidence intervals.

As expected from the discussion and description in the previous sections and Table 3, Table 5 and Figure 6, which show the model estimates for non-pay-related strikes, provide more stark results. Compared with some of the other non-pay dispute types, and conditioning on the strike duration and other factors in the regression model, disputes concerning redundancy,<sup>19</sup> demarcation, production constraints, and work environment are significantly associated with an increased incidence of workers made idle in the company. The results also show that strikes caused by disputes over working hours are the least likely among non-pay reasons to result in workers made idle. This finding strongly supports the view that companies may place *more* emphasis on managing fluctuations in working hours rather than employment. During weakening demand conditions, such employers may offer a continuation of

<sup>19</sup> Many disputes in the EEF involve redundancy decisions. It was not uncommon for workers to take strike action as a protest against the redundancy of others. Such workers constituted *bona fide* strikers. In the absence of absolute solidarity within the company’s workforce, other workers will not join the strike because, for example, they themselves are not directly affected by the issues at hand. However, if a strike has wide appeal, then it may be the case that those not opting to take part could be unavoidably made idle due to severe input and output disruptions. See Lima Aranzaes et al. (2024) for an account of solidarity (or lack thereof) during strike activity in modern US car manufacturing.

employment at the cost of fewer per-period hours.<sup>20</sup> Finally, it is noteworthy that the incidence of workers made idle by non-pay disputes is also substantially more sensitive to the strike duration than for pay-related disputes, with a strike lasting ten days longer increasing the probability of this occurring by 16 percentage points.

FIGURE 6: Linear probability model coefficients (IV): Whether workers were made idle, *non-pay* disputes, 1960-70



Notes: See column (2) of Table 5 for full estimates and details. The excluded dispute type is ‘Treatment of workers’. The bars show 90% confidence intervals.

<sup>20</sup> In a somewhat different context, there is strong evidence for the UK and USA that, on the threat of short-term employment losses, employers practise short-run hours reductions rather than facing costs of redundancy and losses of specific investments (Borowczyk-Martins & Lalé, 2019; Schaefer & Singleton, 2019).

TABLE 5: Linear probability model estimates for whether workers were made idle by a non-pay strike, 1960-70

	OLS (1)	IV (2)
Strike duration (10s of days): $\beta_1$	0.0555*** (0.0132)	0.163** (0.0765)
Local unemployment rate (%): $\beta_2$	-0.00352 (0.00972)	-0.00332 (0.00918)
Wrongful dismissal	0.0342 (0.0382)	0.0381 (0.0352)
Union-related	0.0478 (0.0446)	0.0376 (0.0423)
Redundancy	0.0973** (0.0471)	0.0842* (0.0442)
Use of outside labour	0.00995 (0.0925)	0.0226 (0.0853)
Supervision/management	-0.00879 (0.0504)	-0.000154 (0.0472)
Systems of working time	0.0400 (0.0485)	0.0423 (0.0446)
Demarcation	0.0905* (0.0478)	0.0866* (0.0442)
Production constraints	0.0803* (0.0426)	0.0824** (0.0392)
Sympathy with others	-0.0604 (0.0656)	-0.0440 (0.0613)
Work environment	0.0811* (0.0452)	0.0871** (0.0417)
Working hours	-0.0889* (0.0509)	-0.0970** (0.0479)
Work flexibility	0.0375 (0.0434)	0.0359 (0.0391)
Negotiation delay/refusal	0.0310 (0.0459)	0.0500 (0.0447)
Att. at union meetings	-0.0509 (0.0624)	-0.0392 (0.0570)
Miscellaneous	0.0627 (0.0487)	0.0727 (0.0450)
Constant	0.263*** (0.0398)	-0.000154 (0.00652)
Cragg–Donald $F$ stat.		80.1
$R^2$	0.500	
$N.$ of strikes	2,847	2,847

Notes: See Equation (1). See Table 3 and the main text for descriptions of dispute category variables. See Figure 6 for a plot of the IV coefficient estimates. All models include fixed effects for firm, union, district, year, and month. The excluded dispute type is ‘Treatment of workers’. Standard errors (in parentheses) are clustered at the level of the district-month-year. \*, \*\*, \*\*\* indicate significance from zero at the 10%, 5% and 1% levels, respectively, two-sided tests.

### 4.3 Robustness check: the absolute and relative numbers of workers made idle within strikes

The results discussed so far in this section have focused on whether any workers at all were made idle during strikes with varying causes. Although the duration of the strikes was controlled for, it is also possible that some dispute types involved larger numbers of striking workers and this was instead the main factor determining whether other workers in the companies were made idle. The EEF data do exhibit substantial variation in the size of the strikes in 1960-70, both in terms of numbers of striking workers and workers made idle. Online Appendix Figure B5 illustrates this latter variation in the form of a kernel density plot, showing that pay related strikes during 1960-70 generally led to more workers made idle than during non-pay related strikes,<sup>21</sup> and accounted for most of the strikes with large numbers of made idle workers. Online Appendix Figure B6, however, shows that relative to the numbers of striking workers, non-pay strikes tended to generate more workers made idle than pay-related strikes, the latter typically involving more striking workers and lasting longer (see Online Appendix Figure B4).

To explore this variation further, the EEF pay and non-pay related strikes in 1960-70 are selected that have at least one worker made idle. Then versions of Equation (1) are estimated in which the dependent variable is the natural logarithm of, either (i) the number of workers made idle, or (ii) the ratio of made idle to striking workers. The estimation results, using the same IV approach described before, are presented in Online Appendix Tables A4 & A5. Although the statistical inference is under-powered, given the large amount of variation in the size of the EEF strikes and the smaller samples of strikes with any workers made idle, there is some evidence that strikes relating to the whole ‘Systems of pay’ at a company, compared with those over more specific aspects of wages and pay, led to larger numbers of workers made idle. For non-pay strikes, there is general similarity in the causes of disputes that associate

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<sup>21</sup> The same pattern is seen for UK-wide strikes in this period: pay-related disputes were more frequent than non-pay, and the former involved substantially more days lost per strike on average (see Hyman, 1989, Table 7.4).

most and least strongly with any workers being made idle and, conditional on this, with greater numbers being made idle.

## **5. Summary & Discussion**

This paper has described a unique aspect of a comprehensive dataset of strike-related activity in the UK engineering and metalworking sectors. Our main contribution has involved the area of workers made incidentally idle by the strike actions of others.

The incidence of workers being made idle within the Engineering Employers' Federation member companies between 1920 and 1970 can usefully be divided into two distinct phases. The first, from 1920 to 1956, is characterised by large but intermittent spikes in the numbers of workers made idle, interspersed with many years of relatively modest disruption. The most significant episodes were associated with the national coal strikes of 1920–21 and the surge in unofficial strike activity during the later war years, especially in 1944.

The second phase, from 1958 to the end of the EEF dataset in 1970, proved to be the most severe in terms of workers made idle. Following a sharp post-war decline from 1946 to 1956 – with the exception of a substantial one-day strike in 1953 – the numbers of strikes and workers incidentally made idle were relatively modest, suggesting a workforce in the EEF companies operating at or near peak productive capacity. Thereafter, strike-related idleness rose sharply, affecting almost as many workers as were actually on strike by the end of the 1960s. This clearly represented a substantial retreat from full work activity. 'In 1955 the UK produced 1.2 million cars and was the world's second largest auto manufacturer after the US. Decline set in, however, and the industry became a byword for inefficiency, industrial strife and poor quality' (Keiller et al., 2024). These problems intensified throughout the 1970s, culminating in the sale of the last British-owned car plant to BMW in 1994. In retrospect, the final five years of the EEF

data on strikes, especially from car companies and on workers made idle, revealed a potential industrial tragedy of extraordinary scale.<sup>22</sup>

Several broader questions arise from the findings in this study that point to promising avenues for future research. One concerns the role of the Federation as a large employer representative organisation itself. By the 1960s, the EEF represented an increasingly large and diverse membership facing intensifying international competition, particularly in the motor industry. This raises the question of whether its established procedures and collective bargaining structures, designed for a more fragmented and less complex industrial landscape, had become too rigid or ill-suited to the scale and heterogeneity of its members, especially the car companies. Closely related is the issue of whether the quasi-nationalisation of the car industry, through mergers and the creation of publicly encouraged or supported conglomerates, exacerbated these problems. The emergence of very large artificially constructed firms, in particular the British Motor Corporation and British Leyland, may have encouraged ‘one-size-fits-all’ bargaining frameworks and employment practices that fitted neither the plants nor workforces nor their union representatives particularly well. The result was to generate frequent small-scale disputes that caused substantial disruption to production – not only through the strikes themselves, but also the costs associated with workers made idle.

The workers made idle recorded in the EEF data almost certainly understate the full scale of disruption to workforces and production, particularly in the 1960s, since strikes in one member firm may have led to idleness in others that was not directly observed. The evidence presented here is, therefore, likely to have captured only the visible portion of a wider pattern of inter-firm and inter-plant spillovers in

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<sup>22</sup> The latter years of the EEF dataset, 1965-70, represent the start of the substantial upturn in UK-wide industrial dispute activity throughout the 1970s and 1980s (e.g., Godard, 2011; Hyman, 1989). In terms of the frequency of strikes, however, the period 1966-70 was the peak for the UK motor vehicles manufacturing industry, with an annual average of 51 strikes per 100,000 employees, compared to 44 and 41 per 100,000 employees in 1971-75 and 1976-79, respectively. However, 1976-79, was exceptional in the intensity of the strikes, with an annual average of 18 days on strike per employee in the industry. (Hyman, 1989, p. 31).

industrial relations conflict.<sup>23</sup> More generally, this paper has shown that workers being made idle was a frequent and economically significant feature of EEF-related strikes and industrial disputes, suggesting that similar effects may have been present in other industries and institutional settings that so far has been hidden to researchers, pointing, therefore, to a fruitful direction for empirical work.

A final and obvious follow-up concerns the overall productivity implications of the findings here. As Katz et al. (1987) demonstrate for US automotive manufacturing in the 1970s and 1980s, industrial relations institutions could have profound implications for performance in this industry, given its production lines and workflows. For Britain, the question remains how damaging the patterns of strike-induced idleness were for productivity, and whether the underlying institutions contributed to the eventual collapse of the domestically owned car industry, or whether its displacement by international competition was ultimately inevitable.

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<sup>23</sup> Hyman (1989, p. 171) though goes even further by suggesting that car industry employers may have also used the ‘sympathy lock out ... as a deliberate tactic for putting pressure on strikers (in other plants or parts of the production line) to return to work’, thus making non-striking workers idle, because the workers in the car companies may have been particularly ‘lacking in ‘solidaristic’ class consciousness’. In other words, when losing most of their wages, which largely depended on piecework in vehicle manufacturing (see Hyman, 1989, p. 48), fitters and labourers may have seen strikers in other plants as the culprits and exerted pressure on them to drop their grievances, so that the production line could resume.

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# The Hidden Effects of Company Strikes: Workers Made Idle in UK Engineering and Metalworking from 1920 to 1970

Robert A. Hart

Carl Singleton\*

## Online Appendix

### A. Additional Tables

TABLE A1: Means and medians of EEF strike durations (days), 1960-70

COMPANIES	<u>Pay-related strikes</u>				<u>Non-pay strikes</u>			
	<u>All Strikes</u>		<u>Strikes with Made Idle</u>		<u>All Strikes</u>		<u>Strikes with Made Idle</u>	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
ALL	9.2	2.3	11	3	4.8	1.5	4.4	1
CAR	3.1	1	2	0.8	1.4	0.5	1.2	0.5

TABLE A2: Numbers of Unions Involved in EEF company strikes, 1960-70

Number of Unions	All Companies (% Frequency)	Car Companies (% Frequency)
1	67.4	36.6
2	16.9	29.3
3	10.9	32.4
4	2.7	1.0
5-10	2.1	0.7

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TABLE A3: Local EEF districts used in the 1960-70 regressions

1	Aberdeen	19	East Scotland	37	North West Scotland
2	Barrow	20	Grimsby	38	Northern Counties
3	Bedfordshire	21	Halifax	39	Nottingham
4	Belfast Marine	22	Huddersfield	40	Oldham
5	Birkenhead	23	Hull	41	Outer London
6	Birmingham	24	Keighley	42	Peterborough
7	Blackburn	25	Kilmarnock	43	Preston
8	Bolton	26	Lancashire	44	Rochdale
9	Border Counties	27	Leeds	45	South Wales
10	Bradford	28	Leicester	46	Scottish
11	Burnley	29	Lincoln	47	Sheffield
12	Burton	30	Liverpool	48	Shropshire
13	Chester	31	London	49	South Eastern
14	Coventry	32	Manchester	50	St Helens
15	Derby	33	Mid Anglian	51	West of England
16	Dundee	34	North East Coast	52	Wakefield
17	East Anglia	35	Northern Ireland	53	West Midlands
18	East Midlands	36	North Staffordshire	54	Wigan

Source: EEF data (Hart and Roberts, 2008). Matching unemployment rates obtained from Ministry of Labour Gazette (various issues): "Numbers Unemployed in Principal Towns and Development Areas", London (HMSO).

TABLE A4: Linear regression estimates for the log absolute or relative numbers of workers made idle by a pay-related strike, 1960-70

	Log(Number-made-Idle)	Log(Number-made-Idle/Number-on-Strike)
	(1)	(2)
Strike duration (10s of days): $\beta_1$	0.0930 (0.682)	0.513 (0.588)
Local unemployment rate (%): $\beta_2$	-0.0702 (0.164)	-0.0159 (0.198)
Wages	-0.317 (0.258)	-0.540* (0.307)
Bonuses	-0.524** (0.234)	-0.269 (0.358)
Piece rates	-0.476** (0.222)	-0.151 (0.346)
Relative pay	-0.175 (0.544)	-0.343 (0.507)
Holiday pay	-1.541** (0.604)	0.236 (0.652)
Payment for time Lost	-1.395*** (0.198)	-1.234*** (0.360)
Miscellaneous	-1.839*** (0.506)	-1.567** (0.693)
Constant	7.05e-10 (0.0477)	8.77e-10 (0.0499)
Cragg–Donald $F$ stat.	13.2	13.2
$N.$ of strikes	472	472

Notes: See Equation (1). See Table 3 and the main text for descriptions of dispute category variables. All models include fixed effects for firm, union, district, year, and month. The excluded dispute type is ‘Systems of pay’. Standard errors (in parentheses) are clustered at the level of the district-month-year. \*, \*\*, \*\*\* indicate significance from zero at the 10%, 5% and 1% levels, respectively, two-sided tests

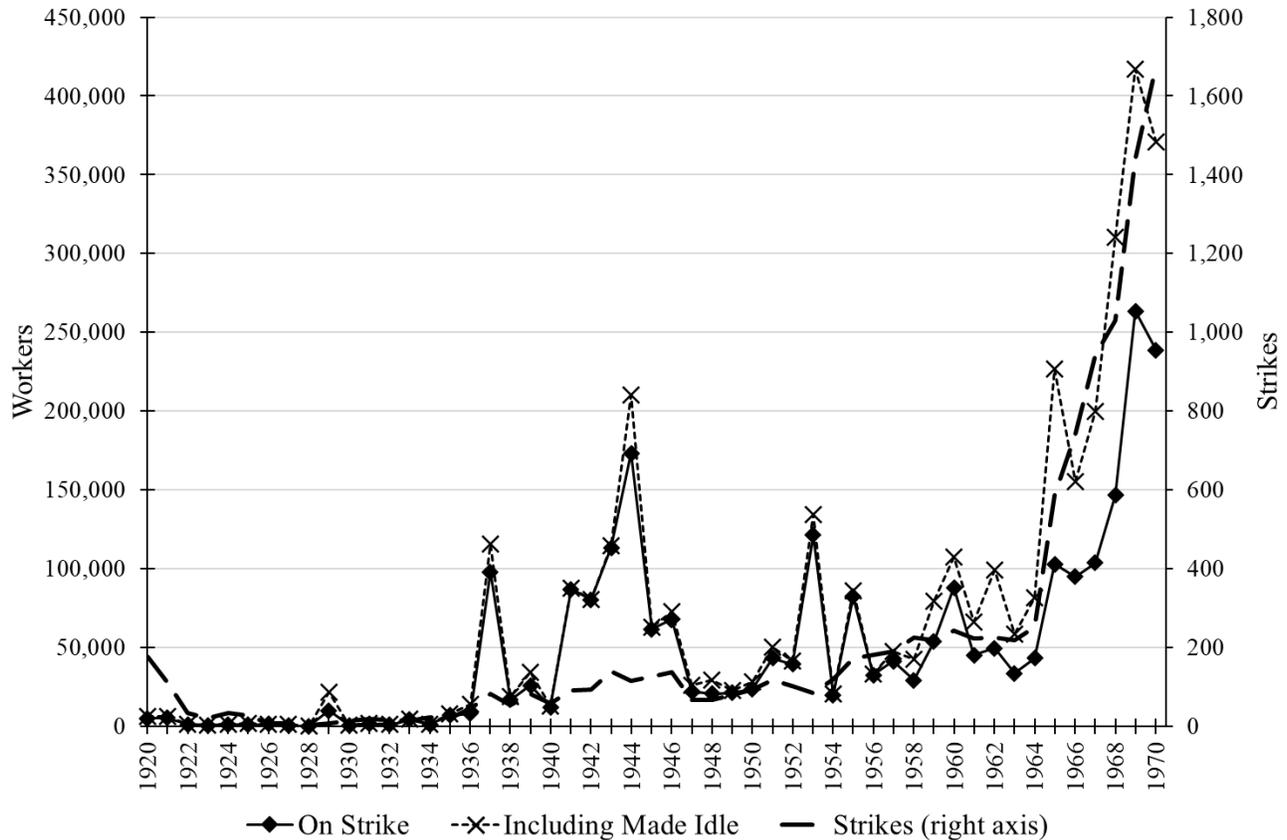
TABLE A5: Linear regression estimates for the log absolute or relative numbers of workers made idle by a non-pay related strike, 1960-70

	Log(Number made Idle)	Log(Number made Idle/Number on Strike)
	(1)	(2)
Strike duration (10s of days): $\beta_1$	-1.034 (2.721)	-2.086 (3.041)
Local unemployment rate (%): $\beta_2$	-0.0990 (0.0606)	-0.125* (0.0756)
Wrongful dismissal	0.0358 (0.816)	0.557 (0.854)
Union-related	-0.383 (1.021)	-0.858 (1.265)
Redundancy	1.223 (1.750)	1.243 (2.014)
Use of outside labour	-0.385* (0.203)	-0.971* (0.504)
Supervision/management	-0.133 (0.322)	0.174 (0.411)
Systems of working time	-0.481 (0.295)	0.124 (0.363)
Demarcation	-0.282 (0.433)	0.177 (0.582)
Production constraints	-0.490* (0.260)	0.0280 (0.359)
Sympathy with others	-0.744 (0.905)	-1.225 (1.056)
Work environment	-0.517*** (0.187)	0.409 (0.302)
Working hours	-0.534** (0.271)	-0.545* (0.299)
Work flexibility	-0.171 (0.248)	0.383 (0.342)
Negotiation delay/refusal	-0.778*** (0.239)	-0.710** (0.331)
Att. at union meetings	-0.772* (0.413)	-1.260*** (0.462)
Miscellaneous	-0.0922 (0.221)	0.351 (0.349)
Constant	0.000851 (0.0430)	-0.000764 (0.0549)
Cragg–Donald $F$ stat.	1.2	1.2
$N.$ of strikes	804	804

Notes: See Equation (1). See Table 3 and the main text for descriptions of dispute category variables. All models include fixed effects for firm, union, district, year, and month. The excluded dispute type is ‘Treatment of workers’. Standard errors (in parentheses) are clustered at the level of the district-month-year. \*, \*\*, \*\*\* indicate significance from zero at the 10%, 5% and 1% levels, respectively, two-sided tests. Note, the Cragg–Donald  $F$  stat. is not statistically significant for these models.

## B. Additional Figures

FIGURE B1: EEF total strikes and the total numbers of workers on strike or made idle across these strikes, 1920-70: Strikes weighted by duration



Notes: See Figure 2 in the main text which provides a comparable figure showing unweighted sums of the workers. Here, the relative weights applied across all strikes in the period use the durations of the individual strikes.

FIGURE B2: Percentages of car strikes to total strikes in the EEF, 1960-70

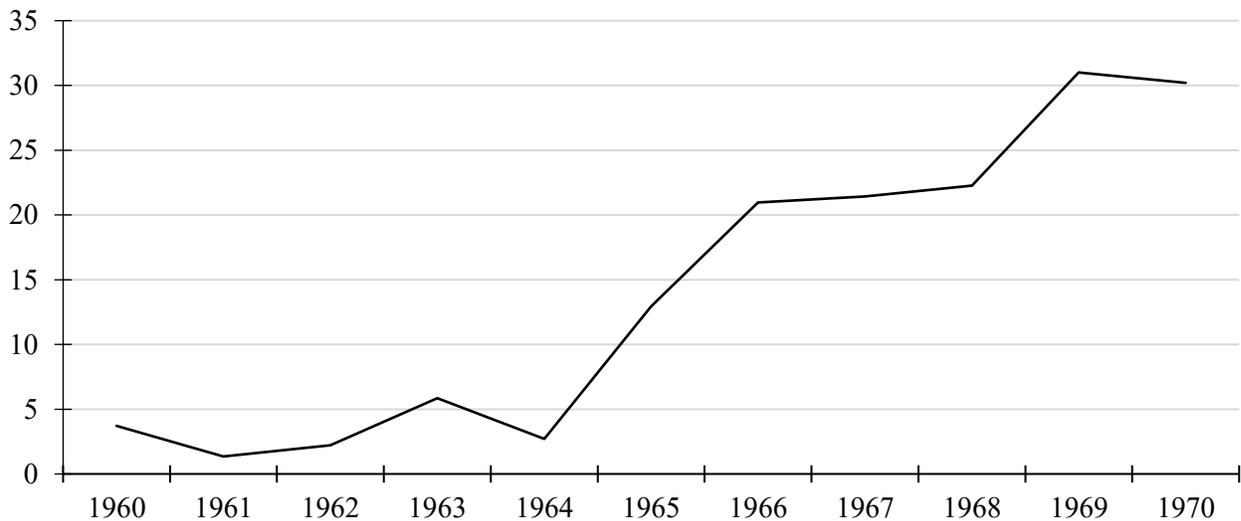


FIGURE B3: Percentages of EEF strikes that involve non-pay disputes

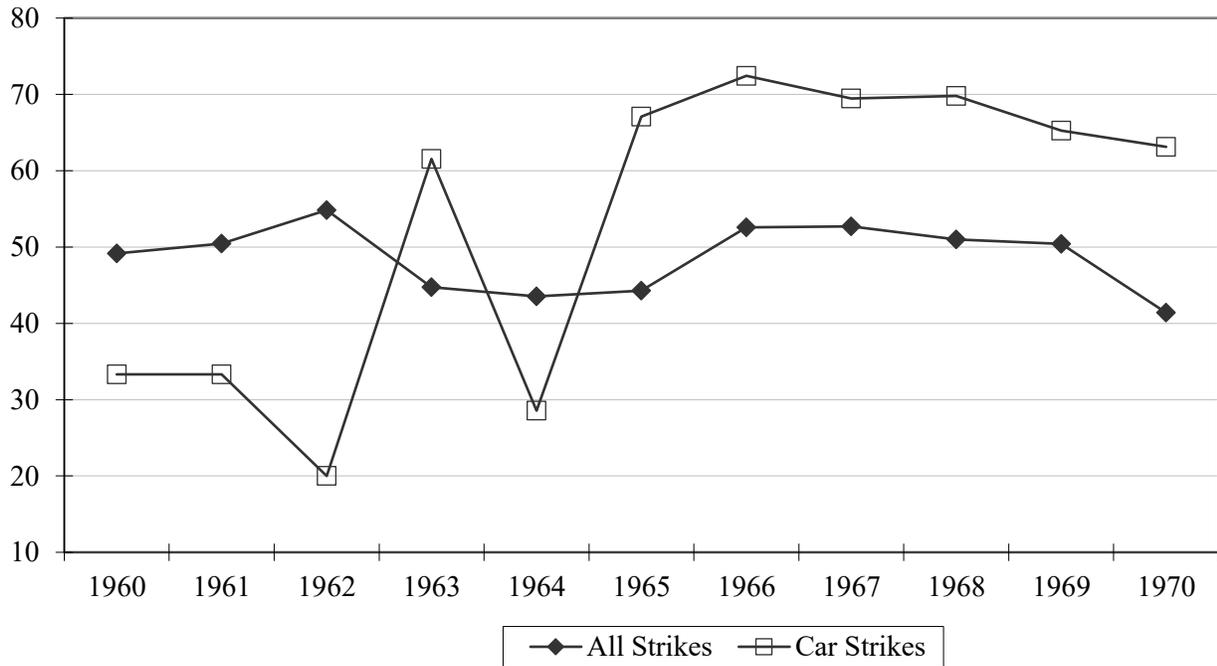
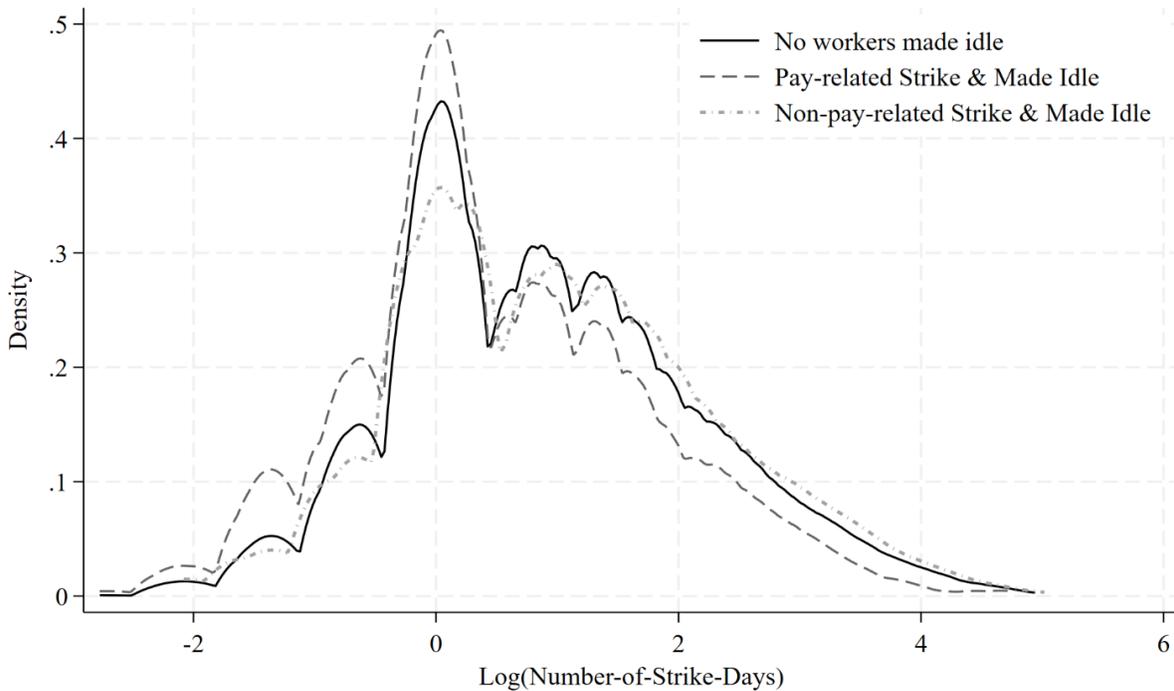
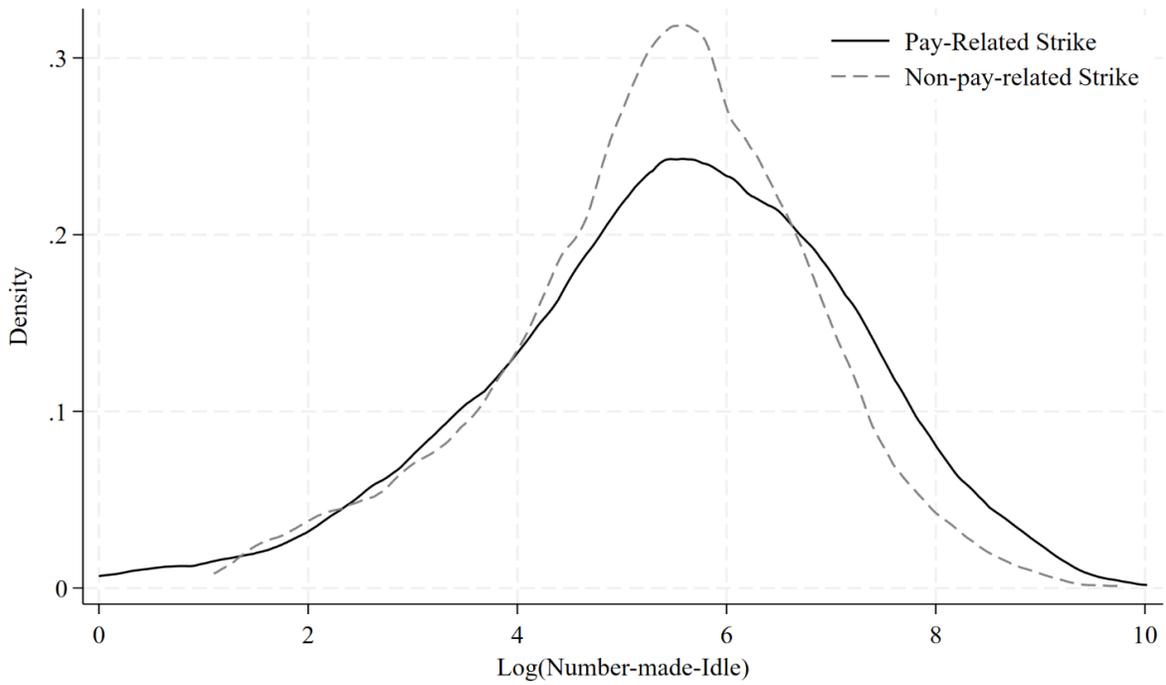


FIGURE B4: Distributions of the strike duration by whether any workers also made idle and whether strike was pay-related



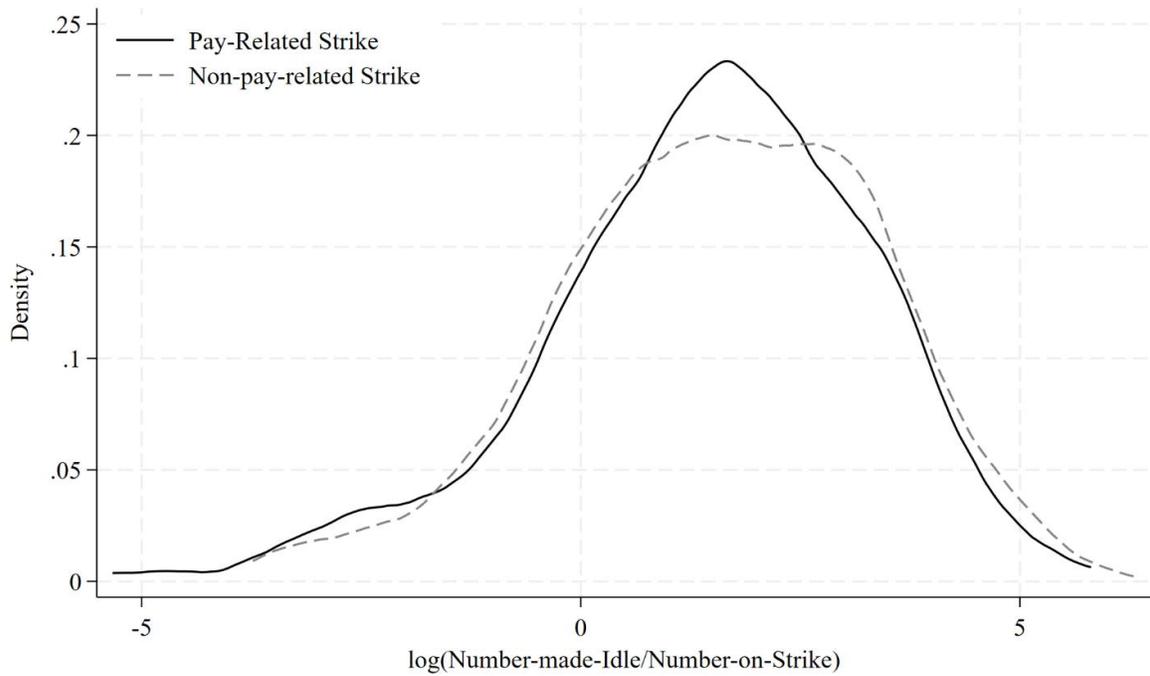
Notes: kernel densities estimated using Epanechnikov kernel with Silverman plugin bandwidth selection.

FIGURE B5: Distributions of the number of workers made idle by whether strike was pay-related



Notes: kernel densities estimated using Epanechnikov kernel with Silverman plugin bandwidth selection.

FIGURE B6: Distributions of the relative size of workforce made idle compared with the number of workers on strike



Notes: kernel densities estimated using Epanechnikov kernel with Silverman plugin bandwidth selection.

### **C. EEF laid-down procedure for dealing with member-company strikes**

The EEF had a laid-down procedure for dealing with work disputes potentially resulting in strike actions within member companies. Its workplace grievance formula was entitled ‘Provisions for Avoiding Disputes’. Depending on its degree of tractability, a union dispute could initially involve work floor foremen and then higher-level managers within the company, before proceeding outside the company to relevant local unions and employers’ associations, and then, if necessary, to national union and representative employer levels. The length of time between submitting a dispute to the formal procedure and an outcome could be considerable. Unsurprisingly, unions often favoured direct ‘unofficial’ negotiation with plant managers rather than risk a lengthy process that may eventually involve outside adjudicators. *Ex post*, the EEF systematically recorded whether a given strike followed or breached the laid-down provisions for avoiding disputes (see Online Appendix Figure C1 for percentages of EEF pay and non-pay strikes in breach of laid-down procedure, for each year in 1960-70).

Unions and workers were more likely to incur the time costs associated with following procedure if and only if they felt *a priori* that a given dispute involved complex issues that were unlikely to be resolved easily at plant level. By contrast, if the details surrounding a dispute appeared to be relatively simple and straightforward, then it was probably deemed to be worthwhile to breach procedure and attempt to sort out matters with local management. Selecting to be ‘in breach’ was the more popular route to take. As shown in Online Appendix Figure C1, from 1960 to 1970 about 85% of pay-disputes were ‘in breach’, while for non-pay disputes over 95% were in breach. Crucially for the purposes here, strategies of following or ignoring laid-down procedure could and did break down, resulting in strike activity. Online Appendix Table C1 also shows that both pay and non-pay strikes experienced breakdowns in agreements that had followed procedure, which resulted in considerably longer strike duration, on average, than those in which formal EEF rules had had been ignored.

From an econometric viewpoint, there may be an endogeneity issue in predicting associations between the length of strike durations and types of strike, especially in relation to whether workers are made idle. On the one hand, workers made idle are likely to exert pressure on union strikers to reach a quick settlement to an ongoing dispute. On the other hand, unions may choose strategically to lengthen strikes to put pressure on employers to reach favourable settlements. Distinguishing between strikes not in breach or in breach of laid-down procedure provide potentially strong instruments, given their different lengths of duration. Moreover, because there are procedural issues of negotiations that may or may not *subsequently* lead to strike actions, it is reasonable to assume that these instruments should prove to be independent of the error terms in the estimating equations.

TABLE C1: Average durations of EEF strikes by year, by pay vs non-pay dispute, and by whether in breach of EEF laid-down procedure, 1960-70

	Pay disputes		Non-Pay disputes	
	Not in breach	In breach	Not in breach	In breach
	<i>Mean strike durations (days) / N of strikes</i>			
1960	30.1 / 4	7.3 / 83	49.0 / 2	9.4 / 83
1961	40.9 / 9	9.6 / 95	-	7.0 / 104
1962	25.1 / 15	69.8 / 80	35.0 / 4	9.7 / 110
1963	23.2 / 10	5.4 / 106	-	10.0 / 93
1964	23.8 / 26	6.6 / 102	32.0 / 2	5.8 / 102
1965	18.6 / 29	3.6 / 279	14.8 / 3	3.8 / 241
1966	18/0 / 47	2.8 / 297	4.8 / 11	2.9 / 368
1967	10.2 / 44	5.5 / 389	36.4 / 10	3.0 / 478
1968	22.9 / 31	5.6 / 452	14.3 / 3	3.6 / 514
1969	29.4 / 34	3.9 / 623	14 / 1	2.3 / 695
1970	20.5 / 58	6.2 / 838	8.9 / 9	2.7 / 644
Total	21.0 / 307	5.2 / 3,344	20.0 / 45	3.7 / 3,432

FIGURE C1: Percentages of EEF pay and non-pay strikes in breach of laid-down procedure, 1960-70

